Map making and map use in a multi-actor context

Spatial visualizations and frame conflicts in regional policymaking in the Netherlands

Linda Carton

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Maps: parts of the "Waterkansenkaart" — Hoogheemraadschap Delfland
Photos of map use in a multi-actor context — L.J. Carton and The Netherlands Institute for Spatial Research

Map making and map use in a multi-actor context:

Spatial visualizations and frame conflicts in regional policymaking in the Netherlands

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PREFACE

During my years as policy analysis researcher, I liked reading prefaces of the books I read, as they gave a closer and more personal idea of the author behind the book. In many prefaces, important motivations that drove the author to write his/her book are alternated with seemingly unimportant details that set the atmosphere, like the first close-up shots in classic detective movies. The preface gives freedom to write whatever message the author wants to convey. A few months ago I was sitting behind my desk in Delft, looked out of the window, and thought about how I would fill the preface once the thesis would be ready. Keeping the page empty was an original option in my view, as I prefer talking. Writing a very humorously short episode was another exiting challenge, but my talents in that direction are limited. Another option that felt good was to quote an author from a third world country, to symbolically give a voice to old African or South-American wisdom. I selected such an expression, but ironically lost the literal words since. Now, a few days before the thesis goes to press, I decide to write three parts: 1) about two particular details/episodes of the research, 2) a few words about policy analysis, and 3) acknowledgements.

Two particular moments of the study I find memorable to include them in this preface. Firstly, while observing in the Water Opportunity Map project at water board Delfland, it rained more and more often, and once a meeting had to be postponed because many project-members were having duty as part of an alert stage 'orange', where they had to monitor the area or coordinate information. The water board showed to be well prepared for such a rainy situation, simultaneously the event confirmed that the project aim to make space for water was, and is important.

Secondly, in the Game on Space project, I worked a few days in the 'GIS'-room of the RPB with Johan van der Schuit, whose cheerful character, together with the splendid view out of the window and the wealth of geo-information under our hands in the computer, made the making of maps an exciting task. The stories of Schuit's colleague about far-away GIS-projects reminded me of the adventurous life of a geodesist/GIS expert, which I let go to do this adventurous research in 'far-away' parts of the Netherlands.

What is policy analysis? This question lay at the basis of my start at the policy analysis section. The research agenda of the section seemed very interesting, but what exactly did policy analysis mean? In my personal opinion, if communication could be 'perfect' and integration did not come with costs, policy analysis would not need a separate space in between the worlds of science and policymaking. But acquiring, disseminating and assessing (scientific) knowledge is not automatic in a fragmented world, where many languages are spoken.

For me a vivid example where policy analysis comes into play was shown last year, in 2006. In the journal Science, more and more groundbreaking articles appeared with evidence of climate change, and its causes and effects. The overall picture of the problem was fragmented, as the atmosphere is complex, global, and connected to activities in seas, volcanoes, sun spots, forests, deserts, etc. And yet, the trend of the studies' observations directed at human-made causes and increasing effects in the future: but while in science advances were made, public opinion, media and policy institutions seemed to ignore or trivialize the issue. Until film editor Guggenheim made a movie of Al Gore's understandable explanation of the big picture of climate change (a story that emphasizes the urgency and magnitude of the phenomenon, using

the word crisis). The movie, being released and marketed worldwide to the major public, woke up politicians like premier Blair of Britain and Balkenende of the Netherlands. Climate policy is now on top of the agenda of countries and governmental institutions like the European Union.

The example shows that lobbyists, environmental advocacy groups, media, political elections, all play their own role in the process of policymaking. Good science in specialized fields of research does not automatically lead to informed policymaking. How this relation between policymakers and scientists works is, in my view, the central subject of policy analysis. Since the act of policymaking and the act of acquiring knowledge are organized as separate domains in many societies there is room for a field of research that focuses on the connection between the two.

Many thanks and acknowledgements for their support of this study go to:

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- The people who were willing to give interviews, shared their experience or debated with me on map use issues, including practitioners at the Ministry of Housing, Spatial Planning and the Environment (VROM), Royal Haskoning, Arcadis, Bureau Nieuwe Gracht, RDH landscape architects, WL Delft Hydraulix, water board Hunze en Aa’s, the provinces of South-Holland and Brabant.
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SUMMARY

Map making and map use in a multi-actor context: Spatial visualizations and frame conflicts in regional policymaking in the Netherlands

In current policy processes about spatial policy issues, usually (multiple) maps are circulated among the experts, civil servants, decision-makers and stakeholders. Previously, map making and map use was a highly specialized area of expertise carried out in the map rooms of governments. Nowadays, stimulated both by the availability of advanced data-sets and ease of use of geographic information systems (GIS) and other visualization technologies, the acquiring and use of maps is quick and easy. As a consequence, the function of map making and map use appears to be changing. Maps are no longer produced as blue prints once a policy is decided upon. Rather, many maps circulate during the early phases of problem formulation. These changing practices of map making and map use, together referred to as 'map use' in this thesis, have consequences for the way maps are perceived and how they function in the policymaking process.

Logically, and by their nature, maps are considered helpful instruments in present-day policymaking, in areas such as spatial planning, environmental management, infrastructure planning and other spatially related policy sectors. Maps, and their digital version embedded in applications like GIS, are generally described as instruments that serve for supporting decision-making: but in many examples of map use among multiple actors the policy maps that are used are surrounded by a lot of discussion and often seem to be magnets for conflict. It was our aim to understand how and why conflicts around maps appear in policymaking and how this relates to the map's reputation as a helpful instrument. This use of maps where they take on a 'life' of their own, characterized by the multi-actor environment in which they are made and circulated, was the object of study presented in this thesis.

The objective of this research was to unravel and understand the socio-technical mechanisms embedded in map use during policy debates. The general problem statement of this dissertation reads as follows.

"How can we explain the functionality of maps in multi-actor policymaking settings, and elucidate occurrences of emerging conflict?"

We have divided this main question in three research questions.

1 **For what functions are maps used in the practice of multi-actor policymaking?**
2 **How do maps function in this multi-actor setting, and what factors and mechanisms contribute to the emergence of conflicts around maps in policymaking?**
3 **How can the activity of map use be guided/improved, can we draw lessons?**

Another starting point of the research was the practice of participative or interactive policymaking. Here, in two case studies, we looked at the lives of maps as a specific type of model, with the aim of contributing to the body of knowledge on information use in multi-actor policymaking in general.

Two main fields of theory were explored in a literature study. From the field of policy analysis (chapter 2), the development of the 'discourse paradigm' and attention for 'participative policymaking' are emphasized, as these streams in policy analysis emphasize the multi-actor nature of policymaking. From the field of map making/map use (chapter 3), developments in the history of cartography and geographic information science are highlighted. The recent developments labelled participative geographic information systems (PGIS) are referred to as the ideas in this stream of theory fit with the object of study in this thesis; namely, the use of map-related models (map images, physical scale models or GIS) in a multi-actor environment.

The reason why people attribute considerable power to maps were structured into six points: their *artefact* character, with the fixation and explication of mental worldviews; the essence of a *scale*-model in which a larger landscape is represented; the *visual* nature of maps, which can inhibit the use of a high density of information; the map as a product of *artistic* creation with an inherent beauty; the assumed *authority* of maps; and the *political* character of policy maps, which often signal that interventions can be expected.

On the basis of these two branches of theory, a framework was formulated that served to help us interpret and evaluate map use from empirical observations. In this framework, the perceived functionality of maps and the concept of 'framing' are central elements. From the body of literature, the concept of framing was selected as an explanatory theory for clarifying the emergence of conflicts around maps in policymaking, as the concept fits with the paradigm of discourse analysis and with the process of meaning construction in map-making. The concept is elaborated theoretically, distinguishing a number of key-elements of 'frames' and 'framing', among which different types of rationality. Two of these frames were identified on the basis of theory. In particular Stone (1988) gives two frames on policy analysis and the use of knowledge/information in policymaking: one with a scientific-analytic point of view, and another which she called 'political reason'.

In the evaluation of map use in practice, the *experienced functionality* of map images was a central element. We have classified the possible actor perspectives on the functionality of maps into four broad categories: 'functional as planned', 'emergent functional', 'non-effective', or 'dys-functional'. Using these classifications, we aimed to distinguish between anticipated and un-foreseen functions of maps and between satisfactory and unsatisfactory effects, *as perceived from the point of view of various actors around the same map*. It was expected that the various actors would use the maps for different purposes, that the purpose of a map may change over time, and that this results in different opinions about the functionality of the same map. Rather than evaluating the use of maps from one 'objective' point of view, the functionality of maps is thus analyzed through a reconstruction of the actor perspectives. The

differences and contrasts between the various perspectives on the functionality of a map were elicited and analyzed using this multi-actor approach.

Case studies

Case one was the Water Opportunity Map case of the water board Delfland. Firstly, the contextual setting in which various (contemporary) map documents were made and used was observed and described, including the project structure, the envisaged methods that would be used to produce the various map products and the historical policymaking process (chapter 5). Secondly, three maps that circulated during the policymaking process were analyzed in depth.

1. The clockwise/anti-clockwise circulation sketches
2. The Water Wish Map
3. The Suitability Map

In the making of the Water Wish Map especially stubborn conflicts emerged (chapter 6), but there was also conflict around the Suitability Map. The experts of the water board had several conflicting perspectives on policy issues that became visible when the creation of a policy map forced them to make explicit choices. The mapping of potential water reservoirs, a measure for coping with situations of persistent drought in the future, was highly debated.

From this case, an overview was created of three 'frames' on map use that came into conflict during the policymaking process aimed at making one coherent set of policy maps. The three frames were named 'analysis frame', 'design frame' and 'negotiation frame'.

In the second case study, a simulation game was used as a platform for analyzing map-use in a semi-controlled and accelerated environment. The game was organized about the implementation of development planning in the region of Brabant, a Southern province of the Netherlands (chapter 7). In this case, the findings and lessons from the first case study were used as input for analysis. The design of the map support was intertwined in the design of the game. As part of this simulation game, the concept of the Dutch Internet-based tool 'The New Map' was adopted, in an analogous version, as one of the maps used in the game. Three types of map support were provided.

1. A central block map as part of the planning procedure
2. Maps on the tables and thematic wall maps on the wall
3. Material for drawing maps were provided for the participants, and professional designers were supported to help them visualize visions for (parts of) the region and sketches for project proposals

The wall maps were prepared by us, reflecting a piece of action research, to test if the map images functioned as planned, and whether the maps were evaluated as satisfying their purpose by the game participants.

The central block map, the wall map images and the making of a vision sketch with help of a designer were evaluated and analyzed in depth (chapter 8). The same frames

as present in Delfland could be identified and similar mechanisms in map use could be observed in the simulation game.

It was found remarkable that the supporting designers, who helped the stakeholders with map-making, were dissatisfied with the setup of the game and their role in it, while the stakeholders found the game and the role of the designers very realistic. In our analysis, we interpret this difference of opinion as a clash between the 'design frame' and the 'negotiation frame'.

Results

The maps served different functions in the eyes of various actors and in different moments in time, and as expected, conflicts occurred around the maps in both cases. In both case studies a resulting policy map 'emerged' incrementally, while the maps were changed in various 'rounds' in the policymaking process. In these rounds, actors built further on information provided by others, while they perpetuated a particular (partial) (re-) framing of the pre-eminence and meaning of a map. The processes of map-making and map use in both cases could be described as incremental, participative and partly unconscious. The legitimacy of legend items or maps-as-a-whole grew while the legends and maps settled themselves in the language that was practiced.

The factors that were observed to contribute to the emergence of conflict around maps were:

- the presence of multiple actors with fundamentally different frames of reference about both the policymaking process as a whole and the function of a map in particular
- the capricious and strategic character of the multi-actor deliberations, through which the function and functionality of a map could change
- the 'power' of the map itself (inherent properties like its visual nature, attributed authority, etc.), as artefact that forces to clarify and explicate spatial (policy) choices
- the function of the map as political instrument while simultaneously the early stages of policymaking leave much room for choices and interpretations of uncertainties concerning the deliberated policy issues at hand (climate change, population growth, etc.)

The findings of the cases support the proposed theory on 'framing' as formulated in the conceptual framework. The theory of framing could explain the emerging conflicts that have been observed in the cases. The maps functioned as a 'playing field' where different actor frames met, were shared, and sometimes competed. The identification of 'shifts' or new 'rounds' in policymaking was useful to explain why maps got altered, neglected or remembered, and we needed three frames to explain the ongoing policymaking process.

The two frames that were identified on the basis of theory (Stone, 1988) with either a scientific-analytical point of view or a political way of reasoning, were recognized

in our study and labelled the 'analysis' respectively 'negotiation' frame. The third frame, which we called the design frame, was identified on the basis of the Delfland case, and was helpful to explain the emerging conflicts that were observed.

An overview of the three frames is presented in Table 1. The question: What to map and how to map it? is at the heart of what we consider to be the concept of framing, from the perspective of the map-maker. Each of the three frames has unique dominant values and inherent logic, which we called the underlying rationality of the frames. Using the three frames we tried to clarify the different viewpoints of actors, i.e. policymakers, stakeholders and experts that, in our view, stem from three different types of rationality.

These rationalities have either:

- a scientific background where the map is considered a research model (analysis frame)
- an attitude as creator or innovator where the map is considered as a language to express one's ideas (design frame)
- a political or negotiation attitude with corresponding assumptions and values where the map is considered a strategic agenda for making decisions (negotiation frame)

In our view, the essence or the source of conflicts between the three frames is the rationality according to which a solution for a policy problem is believed to be found or should be found. Generalizing from the empirical observations, the following sources for emerging conflict between the three frames were formulated.

Inherent conflicts between analysis and design frame

In our interpretation, the analytic and design rationalities conflict in the way they define and deal with policy options. While analysis focuses mainly on the exclusion and selection of possibilities by gaining *evidence*, design rationality focuses on the scope of *possibilities* and the 'room for engineering or manipulation'. For the analysis frame, possibilities are subordinate to finding the truth through evidence, while for the design frame, finding evidence is instrumental to creating options and enabling new possibilities.

Inherent conflicts between analysis and negotiation frame

While the analysis rationality is, generally speaking, based on idea of one dominant truth that is out there, and that can, and should be, discovered (through testing hypotheses), the negotiation rationality is based on the concept of subjective experiences and preferences and the existence of multiple worldviews (multiple truths) as starting point for deliberation. For negotiation rationality, finding truth is only instrumental to finding satisfycing agreements, where values and interests of affected stakeholders are involved in the considerations. Conflicts can thus appear when, from a negotiation rationality point of view, finding truth is subordinate to other considerations in the policy process (such as trust, power play, reputation

etc), while in the analytic frame, policymaking should have as objective finding/ discovering the truth.

Inherent conflicts between the negotiation and design frame:

While design rationality strives for beauty, coherence and perfection in the conceptual structure of a plan, for negotiation rationality this is subordinate to practical use and procedural feasibility. Imperfect but pragmatic compromises may be preferable in the perspective of negotiation rationality, but this is not satisfactory in pure design rationality. The design artefact (a policy, a spatial plan, a map design) is the object of creation in the design frame and the process of making this artefact is subordinate to the product, while in the negotiation frame the process gets prioritized over the particular outcome; it is important in the negotiation frame to consider actor-relations over time and over the horizon of an individual policy project.

Table 1. Overview of different frames on map use in policymaking

frames:	**Analysis (A)**	**Design (D)**	**Negotiation (N)**
	Map use as science	*Map use as art*	*Map use as politics*
Context (C)			
Archetypical group or actor	Expert, skilled in research fields like geography, GIS, cartography, economy etc.	Expert, skilled in artistic fields like urban architecture, landscape design, etc.	Stakeholder, experienced in decision-making, acting on behalf of dependency/stakes.
Focus of frame	Emphasis on research and assessment	Emphasis on creation and presentation of options	Emphasis on deliberation, trade-offs, problem framing.
Map use and appearance of map (M)			
Values in coding of information	Objective and valid information	Broad, holistic information	Comprehensible information
Values in mapping	Map valid according to model and cartographic heuristics	Visual impression of artistic quality, coherent design	Map sufficient and opportune for the occasion
Habits in act of thinking	Use of technology, unambiguous definitions and specified information	Use of examples, associations and imagination	Simplifying arguments in map-making and message of map
Overall image	Specific, superfluous information	Abstract, metaphoric information	Dedicated, selective information
Legend items	Clearly defined categories and sub-classes	Conspicuous names with ambiguous interpretations	Few legend items –only those (to be) decided upon
Boundaries	Sharp boundaries	Sketchy boundaries	Boundaries on or off the map[1]
Effects (E)			
Dominant functionalities of maps	…*Clarify* spatial mechanisms (socio/ physical)	…*Visualize* and articulate imaginative spatial planning concepts	… *Agendize* problems, create a sense of urgency, and persuade actors about spatial decisions.
	…*Synthesize* analytic results, providing accurate model information (detailed, precise and reliable)	…*Identify* patterns in the landscape; imposing (new) structure, altering (spatial) distributions and adding constructs	…*Move* (inactive) tacit and implicit opinions towards an *explicated*, articulated agenda and policy agreement
The map is seen as a...	… Research model	… Design language	… Decision agenda

[1] Whether the boundaries are deliberatively drawn on or left off the map depends on the negotiation strategy (f.e. an advocative, mediative or strategic strategy).

Besides the descriptive approach that was taken up in the research, we also aimed to formulate lessons for future map use. In the conclusions, five 'mechanisms' are formulated that were found in the cases. They represent the ways how actors in the cases actually dealt with the map conflicts that appeared. These mechanisms are based on the formulation of our theoretical framework, where framing theory is considered to consist of, amongst others, the following elements.

- Own *visibility*/manifestation of a frame in symbols, names, language, metaphors, images
- *Focus*, with inherent main objective and 'horizon' of what is being considered relevant
- Underlying *rationality*, with inherent set of values and logic
- A *process* among multiple actors where frames are communicated through language

The following five basic mechanisms were identified that people employed to influence the framing of policy, and to overcome emerging conflicts.

1. *Change the cartographic layout of maps.*

   A mechanism oriented at the **visibility** (manifestation) of a frame. This mechanism does not change the problem framing, but serves to hide or smooth over the conflictive issue, thus literally placing problems out of sight. We consider this a symbolic strategy to cope with map conflicts.

2. *Change the scope of the map, by changing its scale or the region presented, thereby also altering the 'horizon' or system boundary of the policy issue under study.*

   A mechanism oriented at the **focus** of a frame that is embedded in a map. The frame is shifted with this mechanism. (For instance, by including a wider territory, new options can come into sight; or by making a small-scale map with little detail, attention is focused on the main choices rather than the details of a policy issue, which can be deliberated in a later stage).

3. *Change the classification system around a policy issue, by a redefinition of legend items and alternative clustering of themes on a map.*

   A mechanism oriented at the **rationality** underlying a frame of reference. This mechanism basically requires new maps to be made, and for the map-makers and policymakers (the multiple actors involved) to look with different eyes at the issues to be mapped. With help of a new map, a new agenda for deliberation can be formulated, involving a fresh look at the policy issues and involved dilemmas, trade-offs, solutions and problems.

4. *Change the function and status of the map in the policy process.*

   A mechanism oriented at the **process** of framing. With this mechanism, the map image is not changed: but by altering the maps' role in the policymaking process, the acceptance of the map can be increased.

5. *Handle over the arguments involved in a conflict to decision-makers in charge and let politics decide (possibly by means of maps).*

A mechanism oriented at the **institutional context**. With this mechanism, maps may serve the function of clarifying the different frames that are competing for dominance; the actor-coalitions that advocate a particular view may use the maps to strengthen their arguments towards decision-makers.

Whether these options were chosen deliberatively –consciously or unconsciously– or not, was not part of structural research. The five mechanisms show that there are several ways to deal with a conflict surrounding maps. The way out can be sought in changing the map, either its visual appearance/manifestation (changing graphic variables, for instance replacing spots by indicative point symbols) or the structure and content of the legend (changing clusters of legend items, for instance grouping items according to policy priority).

The settlement of disputes can also be sought in the contextual policymaking setting, and not in the map. The map can be used to formulate a new framing of the problem, or to present all information to decision-makers who may then, on a basis of political representative- ness, decide. The maps can be used deliberatively to make a conflicting situation clearly visible, which may polarize the political debate, but which also makes the involved trade-offs transparent for all participants. Furthermore, conflict can be sought deliberatively and the polarization of opinions –or the evolvement of a policymaking process into an impasse– can at times be conceived as desirable by participants, and for such a purpose (often not explicated by participants as it is part of their strategic agenda) a map may be a helpful instrument.

As an answer on the third research question: What lessons we can draw? we argue that an awareness of frame conflicts assists in diagnosing situations and manoeuvring around (or sometimes deliberately towards) conflicts. When conflicts around maps emerge there are several types of mechanisms that map makers or map users may employ. Furthermore, thinking and speaking about intended or expected functions of map use can help map makers understand the actor frames involved and can assist in making conscious choices about the appearance of a map (see Table 1).

Generalizing

It is argued that the archetypical frames, with the elaborated differences between their inherent rationalities, and the mechanisms can be generalized beyond the scope of the two case studies. Arguments for this statement are:

- the generic nature of the involved frame differences and mechanisms
- the representative character of the planning practice in the game according to the participants
- the corroboration of the empirical observations through interviews with map-makers and planners in the Netherlands from outside the two reported case studies

This leads to the following propositions about map making and map use in the context of Dutch policymaking.

- *The distinction of the three generalized frames analysis, design and negotiation explains many controversies over maps in the Netherlands that cannot be explained by 'simpler' explanations such as conflicting interests or information imbalance.*

- *Actors cope with map conflicts using several mechanisms, either through actions with the map or actions in the process/context of the policymaking setting. In map conflicts that are identified as frame conflicts, when the choice is made to cope with the conflict by altering the map, actions can focus on altering the visibility, focus or rationality of a frame.*

In the reflections on the research, it is argued that this division of frames, including the corresponding tensions between types of rationality, is part of the cultural practice of spatial policymaking and map use in the Netherlands, and difficult to change.

1 INTRODUCTION: POLICYMAKING AND THE USE OF MAPS

Spatial visualizations in participative policymaking practice

"The map is not the territory.[1] *"*

– A. Korzybski in 'Science and Sanity - an introduction to non-aristotelean systems and general semantics' (1933)

1.1 Introduction

> "It seems to be distinctly more difficult to reach compromise about cartographic concepts than about verbal ones" Faludi and Waterhout (2002), p. 154.
>
> "Oh, no worry, that issue is not a problem. We will make a map of that." GIS-expert colleague, and to serve as an example of how these GIS-experts think about maps as panacea for solving disagreements (interview with J. Slinger, Faculty TPM, 2004).
>
> "Shut up. You are just the map maker. You must draw what we tell you to draw." Spatial planner taking part in the Game on Space, spoken to a landscape designer, December 2002 (this thesis, chapter 8).

The above statements show some of the variety of how people in practice think of and work with maps. The quotes are illustrative for the confusion that arises in many policymaking processes where multiple actors take part, and where maps are used as part of the process.

[1] Korzybski said "the map is not the territory" to indicate that we should not confuse the "map" of reality that we carry around in our heads with reality itself. Korzybski's work on semantics was controversial, but this expression has got a life of its own.

Policymaking on complex spatial problems

Participative approaches have become increasingly important in spatial policymaking processes. Using names like 'coproduction', 'stakeholder planning', 'interactive visioning' or 'participative policy analysis', many experiments have been tried in Western countries. The main reasons for involving stakeholders in participative processes are: to improve the democratic character of policymaking, to ensure the enhancement of support for proposals, and to enrich the quality of the policy outcome (Edelenbos, 2000; Enserink and Monnikhof 2000). While these motivations are clear, the facilitation and management of interactive processes is often problematic, due to the different perceptions of stakeholders and the complexity of interrelated policy issues.

There is a clear need for methods and guidelines that can be used to structure the processing of knowledge, and the policy process, in these type of 'multi-actor settings' (see, amongst others, Jasanoff, 1990; Eeten and Heuvelhof, 1998; Salet and Faludi, 1999; Vigar and Healey, 2002; Edelenbos, Monnikhof and Van de Riet, 2003; Metze and Saris, 2004). This is especially the case for complex spatial problems. Extensive, complex problems are faced in the fields of spatial planning, natural resource management, infrastructure planning, urban development and environmental management. To mention a few examples, think of the planning of –extensions of– cities, highways, railways, airports; or the exploitation of gas, oil, or timber in rural areas; or the complex negotiations centred around access to water and land between counties or countries. These issues have in common a spatially related character, and the interconnectedness, and conflicting interests, of the involved stakeholders and communities.

With the shifting emphasis in policymaking towards participative approaches, the use –and making– of map information is being adapted, to support the inclusion of actors in all phases of data collection, problem diagnosis, design of alternatives, impact assessment, etc.

Maps as support tools

There are many approaches and instruments available for supporting the policymaking process. Maps are one of the types of models that are often used in spatial, and spatially related, policy processes. Maps, and their digital version embedded in applications such as Geographic Information Systems (GIS) are generally described as instruments that serve to support decision-making (Bertin, 1981; MacEachren, 1995; Stillwell et. al., 1999; Longley et. al., 2001; amongst others). In current policy debates on spatial issues, there are commonly (multiple) maps are circulating among the experts, civil servants, decision-makers and stakeholders. Increasingly, map images are being circulated in policy documents and web-sites, used to register all kinds of geographic phenomena and to help diagnose policy issues.

Such maps include:

- *air pollution maps, noise contour or building contour maps*
- *housing or infrastructural planning maps*
- *economic scenario maps*
- *ecologic main structure maps, vulnerable species maps*
- *coastal risk atlases, groundwater vulnerability maps, water opportunity maps*

The production and usage of this type of information has been stimulated by technological advancements in the collection, processing and distribution of data. Previously, map making and map use was a highly specialized area of expertise. The production of a map was an expensive and time-consuming process, executed in map rooms of governments. Nowadays, stimulated both by the availability of advanced data-sets and the ease of use of Geographic Information Systems (GIS) and other visualization technologies, the making and usage of maps has become a cheap and quick action, within anybody's reach. The choice therefore of whether of not to produce and incorporate a map within a policy document, is no longer dominated by restrictions such as a lack of qualified personnel or financial resources. As a consequence, the role of map making and map use has changed. Maps are no longer produced as blue-prints once a policy is decided upon. Instead, many maps circulate during the early phases of problem formulation. Nowadays there is commonly a situation of 'information overload' rather than information shortage in participative policymaking. Together with the shifting emphasis in policymaking towards participative approaches, this changing use of maps and ways of map making has consequences for the way maps are perceived and used, and it is this use of maps in multi-actor environments, that forms the object of study in this thesis.

In the next section, a number of examples from practice are presented that illustrate the use of the maps and their function in a policy discourse. These examples serve as empirical background for our research questions. The research questions will be outlined in section 1.3.

1.2 Discussions around maps in multi-actor policymaking

Logically, and by their nature, maps are helpful instruments for clarifying and communicating knowledge on spatial systems; but in policy debates on planning processes among multiple actors, it appears that the policy maps that are put forward are often surrounded by a lot of discussion. The map images appear to be very sensitive to controversy. Sometimes it seems that conflicting discussions break out as soon as maps are presented. Below, we illustrate this statement with four examples that vary in scale from an international i.e. Europe, World, to a regional scale i.e. French Polynesia, Netherlands.

1. No maps in the European Spatial Development Perspective

In the European Spatial Development Perspective (ESDP) process, the use and making of maps to visualize spatial problems and policies was such an extremely sensitive issue, that it was decided not to include any maps in the final report (Guevara and Ulied, 1999). The complete absence of policy maps in the ESDP illustrates how controversial maps can become (Faludi and Waterhout, 2002; Ulied and Guevara, 1999). The map that started the discussion on map use in the ESDP showed a centre-periphery perspective on Europe (See Figure 1-1, left image), with natural barriers highlighted, such as the Alps and the seas, and a highlighted centre area. The centre area was reminiscent of the map nicknamed the "Blue Banana", a metaphor for a map drawn by the French mapping agency DATAR (See Figure 1-1, right image). The regions 'within the blue banana' are considered to be the economic motor of Europe. All countries not in this blue banana fiercely objected to this picture. In her analysis of transnational cartography, Dühr (2005) called this 'the Migraine Map' of the ESDP process. A special commission was established to explore and work out new ways of mapping information, to overcome what Faludi and Waterhout (2002) called 'the problem of the maps'.

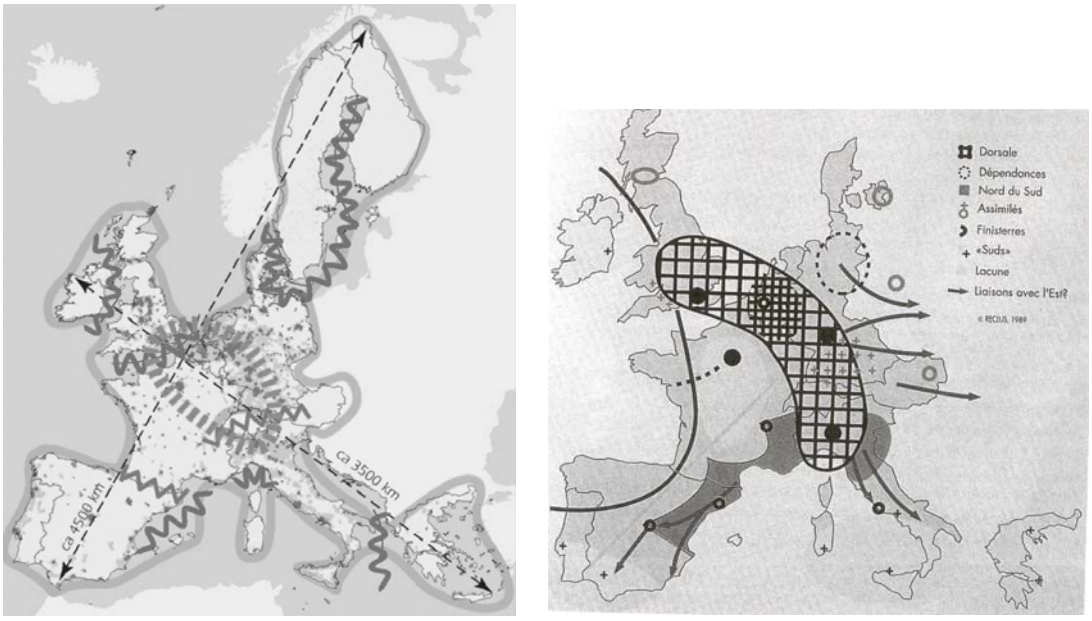


Figure 1-1. Left: Core-periphery perspective on Europe. (Source: VROM). Right: The 'Blue Banana'. Both maps present a perspective on "the core belt" of Europe where, according to interpretation, most economic activities take place. (Source: DATAR)

In this commission, some beautiful new cartographic techniques were invented under the header of 'infographics', as a counterpart to more traditional map making techniques classified under the header 'cartography' (SPESP Infographic's Group, 2000). However, the commission did not come forward with a straightforward answer to the problem of the maps.

2. *Worldwide remote sensing map images influencing environmental discourse*

The NO2 map of ESA in 2004

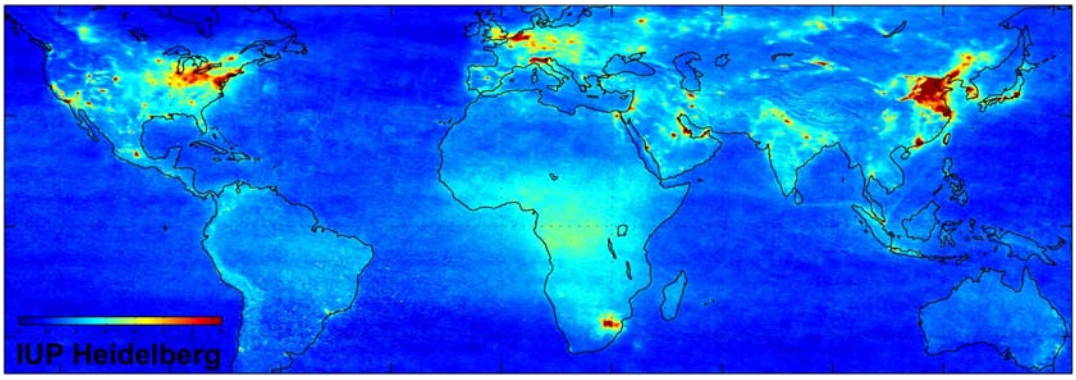


Figure 1-2. Global air pollution map produced in October 2004, based on measurements by ESA's satellite Envisat, using the onboard instrument 'Scanning Imaging Absorption Spectrometer for Atmospheric Chartography' (SCIAMACHY). Source: image produced by S. Beirle, U. Platt and T. Wagner of the University of Heidelberg's Institute for Environmental Physics -Press release by ESA on October 11th, 2004. See colour figure in Appendix 5.

In October 2004, the air pollution map produced by ESA's satellite Envisat hit the news worldwide. Scientists at the University of Heidelberg produced a global map showing concentrations of NO_2 in the air, based on Envisat data collected between January 2003 and June 2004. The high-resolution global atmospheric map of nitrogen dioxide pollution makes clear how human activities impact air quality. Large concentrations of NO_2 are shown in China, the USA, South Africa and Europe. Although NO_2 pollution was already a known problem in the Netherlands, Dutch politicians still were shocked to see their country mapped as the unhealthiest in Europe on the front cover of the daily newspapers. Immediately, air quality was placed high on the policy agenda. In a reaction, the Dutch politician Samson said that the image meant more than thousand words, and that it was now clear that something had to be done about the NO_2 pollution (Telegraaf, 2004).

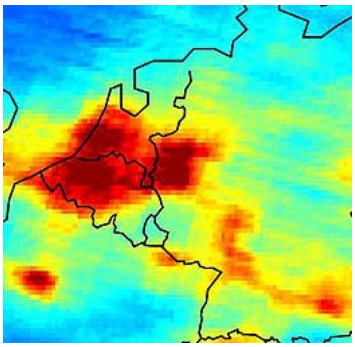


Figure 1-3. Detail of Figure 1-2 with NO2 levels over Belgium, Germany and the Netherlands (Source: ESA). See colour figure in Appendix 5.

3. Maps for pointing out marine protected areas in French Polynesia'

Controversy over maps is not just a Dutch or European phenomenon. In a research project concerning the creation of a community-based GIS (PGIS) in French Polynesia, Walker (2001, 2003) has studied the process and effects of establishing a system of marine protected areas in a plan making process called Plan de Gestion de l'Espace, Marine Space Management Plan (PGEM). In this process, a community-based GIS would be created, in which all lagoon users would have the opportunity to create, up-date, disseminate, and acquire knowledge about the lagoon in a spatial context. Figure 1-4 presents an early PGEM map where the project professionals created a map of the collected information.

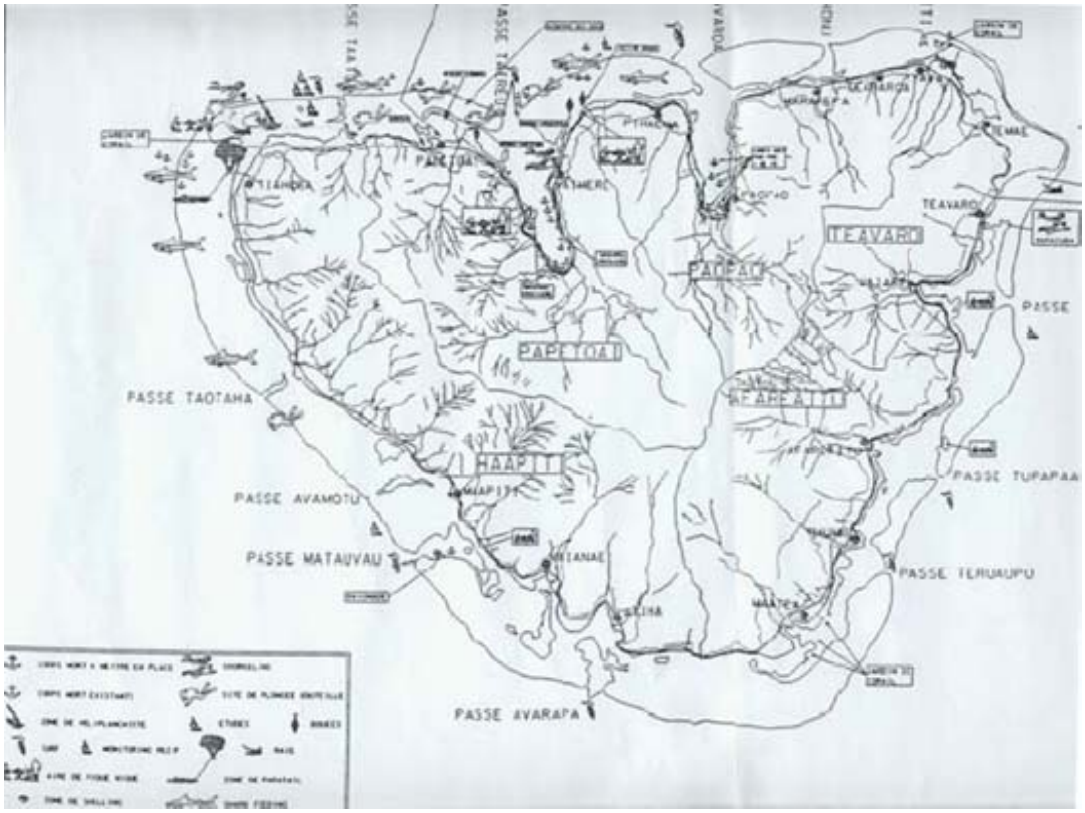


Figure 1-4. One of the first maps made and used during the PGEM process (early PGEM map). (Source: Stonich, 2002. Available at: http://moorea.berkeley.edu/maps/index.html)

However, even though the process was intended as participative action, the project did not turn out to be an example of "smooth" practice of PGIS. During the process, Walker ran into the controversial nature of maps and their usage. Local inhabitants did not have, or felt they had, direct influence over the maps that were produced by professional ecologists or government officials, and they did trust the involved map makers of the government to process their perceptions and (indigenous) knowledge well. The French Polynesian governmental bureaucrats would not incorporate diverse interpretations of the lagoon and its resources into the official PGEM decision-making maps. They preferred the scientific knowledge

of biologists, which conflicted with knowledge of the Maohi islanders, who relied on their life-long, daily interactions with the organisms in the lagoon and traditional lagoon management and fishing laws. As a reaction, the Maohi organized extended, lengthy public protest actions and formed own associations. Especially when concept marine reservation zones were designated on temporary planning maps, a printed map in the newspaper fuelled the conflict (see Figure 1-5).


DOUZE ZONES DE RÉSERVES POTENTIELLES À MOOREA

Figure 1-5. Map in the newspaper that fuelled the controversy. (Source: Stonich, 2002. Available at: http://moorea.berkeley.edu/maps/index.html)

A controversy evolved over the definitions and spatial parameters of lagoon habitats, ecology, and management between the French Polynesian Ministry of Urbanism, fishermen, hotel owners and lagoon tour operators. Walker (2003):

> "The maps produced by the government seemed "scientific" and "official," making them difficult to refute by stakeholders […] The use of these maps in the PGEM decision-making meetings limited the ability of many stakeholders to insert their cognition of the marine environment into the maps or the decision-making process. In addition, stakeholders felt that important uses and meanings of the lagoon - such as the non-economic value and the spiritual meanings associated with certain areas - could not be identified, quantified, or mapped within the confines of a digital database, or on an analog map for that matter. Stakeholders voiced anger and frustration at not having access to, or knowledge of the computer mapping technology used. At the same time, stakeholders were reluctant to provide their own data to the PGEM policy-makers because they did not trust the state to input or analyze their marine knowledge fairly in the GIS."

Fishermen made an own map with a proposal of reservation zones as a reaction on the official PGEM process (see Figure 1-6)

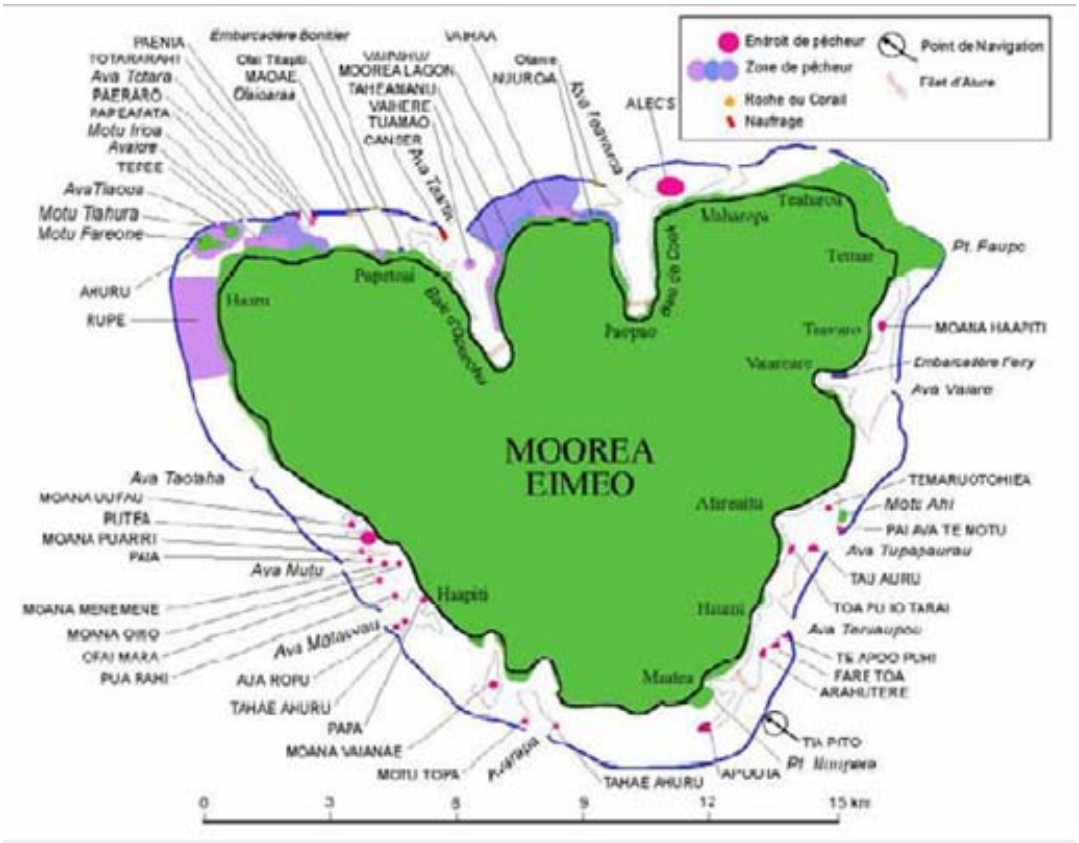


Figure 1-6. Fishermen's map made in the Public Participation GIS project as a reaction on the official PGEM process. (Source: Stonich, 2002; http://moorea.berkeley.edu/maps/index.html)

Eventually, the process of mapping the protected areas was put on hold; and, in the next municipal elections in 2001 the PNEM process was an important issue. Walker (2001):

> "In their inadequate attempts to invite public participation, the government ironically alienated stakeholders through the privileged use of GIS decision-making which was not accessible to the majority of Moorea's stakeholders. As a result, stakeholders eventually became willing to participate, although not in the ways that the government had hoped. Instead, they formed politicized and organized local associations which are not necessarily "for" the environment in the Western sense of environmentalism, but rather for their own livelihoods and sovereignty, and against government interference…"

In this example, the government started a mapping project with the intention to include citizen participation; but the participatory process did not proceed as expected for the government. Instead the maps seemed to reinforce the distinction between the governmental bureaucrats and the indigenous islander group. In

making the maps, the diverse interpretations of the lagoon became apparent, but the disputes about them were not settled in the official map results (a fragment of the official resulting PGEM map is presented in Figure 1-7).

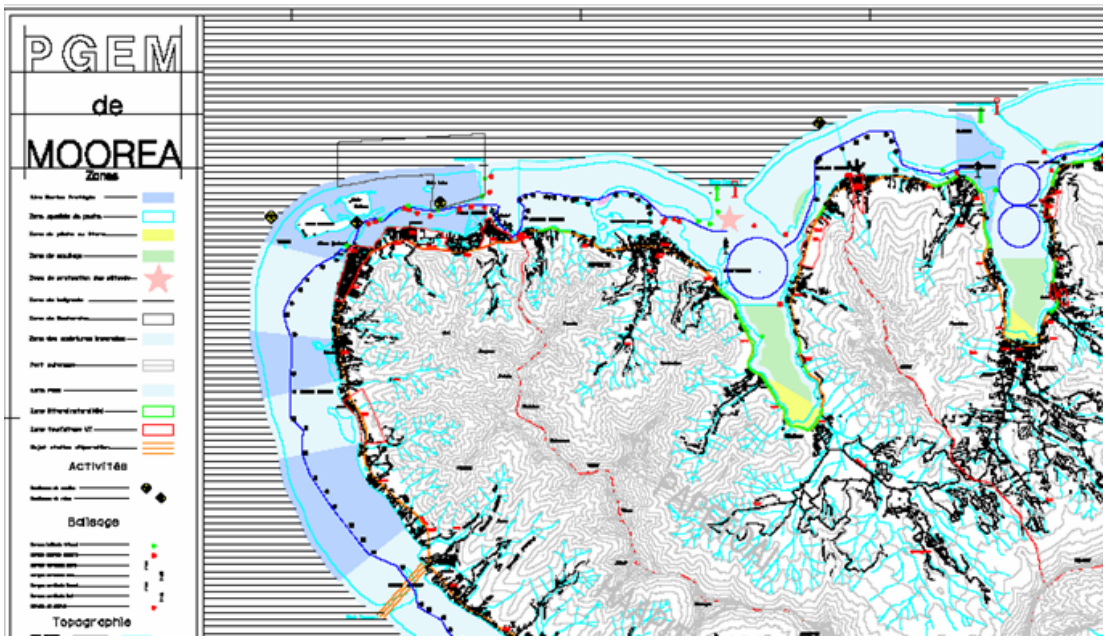


Figure 1-7. Fragment of the new PGEM map after deliberation between stakeholders and government. Note the difference between the marked protected areas (shaded) in the coastal zone the upper right, middle and lower map image (Source: Stonich, 2002; http://moorea.berkeley.edu/maps/index.html). See colour figure in Appendix 5.

4. The Green Heart controversy in the Netherlands

Van Eeten (1999, p. 91-111) has described the controversy over maps in the story of the "Green Heart" planning concept in Dutch spatial planning. This public dispute on the validity or fiction of the Green Heart concept has been going on for years. The controversy is focused on the question of whether a particular landscape that can be called "the" Dutch Green Heart exists, with a unique identity and landscape quality that needs conservation and protection, or whether the concept only exists as idea in the minds of government planners who look at maps in their office and see an 'empty space' in between the four largest cities of the Netherlands, Amsterdam, The Hague, Rotterdam and Utrecht (See Figure 1-8 [a]).

The Green Heart concept, according to stories, was first conceived in the 1930s by Albert Plesman, a legendary director of the Dutch Royal Airlines. He looked down from his cockpit, flying over the western part of the Netherlands, and saw a ring-like pattern of settlements, with an open space as its heart. From this time on a perception of the region as a city ring with an open, green, space in the middle has remained in the Dutch planning community until this day. Van Eeten (p. 109): "If a concept so clearly signals its main rationale is to capture the 'essence' of a map image, then one should not be surprised that all criticism is channeled into attempts to show that the concept does not accurately represent the map."

Van Eeten advises us to move beyond the fixation of "one area – one map – one concept – one identity". He argues that we should focus on the landscape quality as experienced in the field instead of the actual amount of hectares 'seen from above', and on the mixture of landscape types rather than keeping hold of a strict separation between 'old' fixed land use categories.

Illustrative in this respect is the Deltametopool initiative, in which the main cities surrounding the Green Heart united and presented themselves as the main economic "red" area while the green-blue qualities of the Green Heart region are still acknowledged. In maps of the Deltametropolis, the emphasis is placed on urban sprawl and the main infrastructure connecting the cities rather than on the empty heart of the region (See Figure 1-8 [b]).

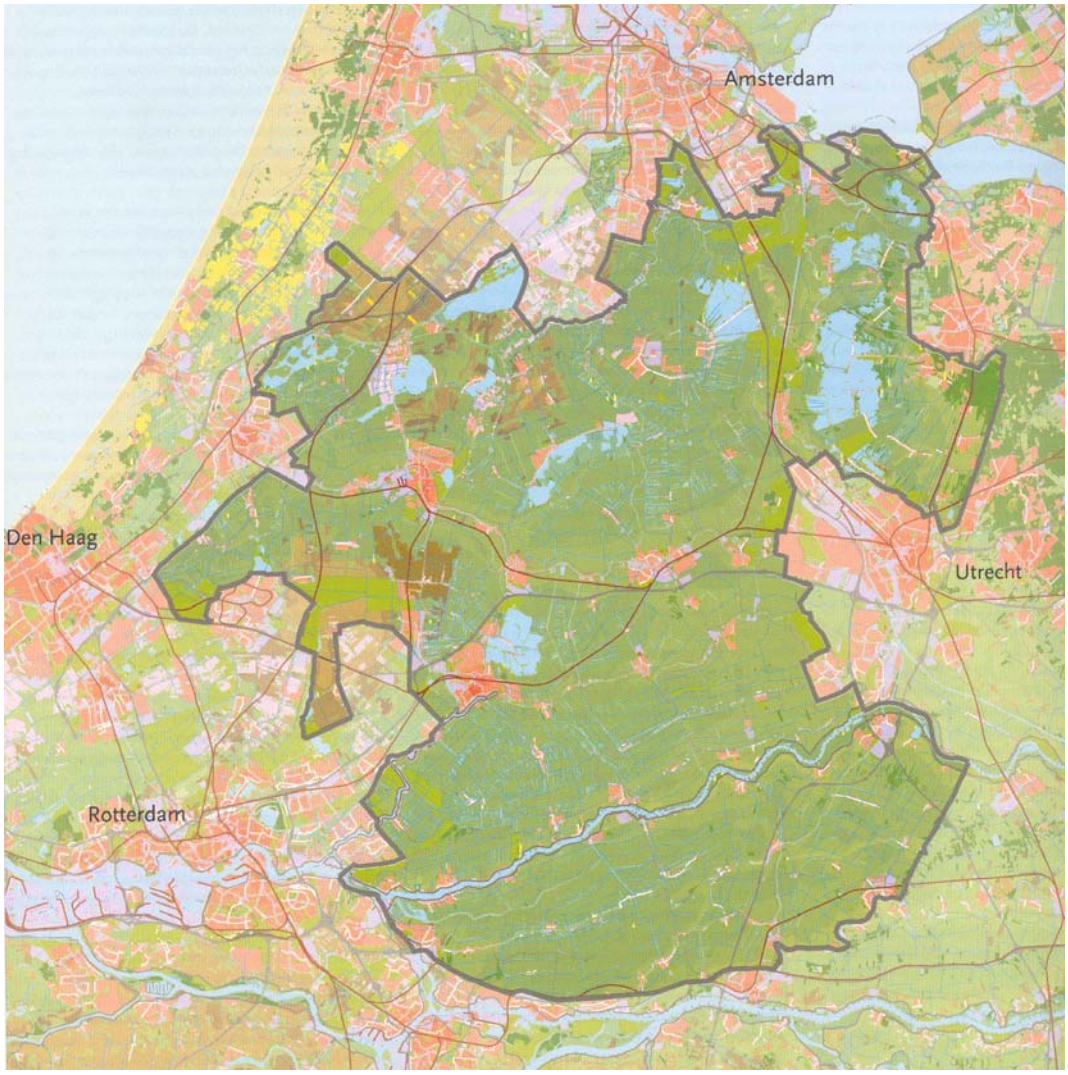


Figure 1-8 (a) Map of the Green Heart. (Source: National Policy Document on Spatial Planning, Part 3, 2002) See colour figure in Appendix 5.

Figure 1-8 (b) Map of the Deltametropolis. (Source: National Policy Document on Spatial Planning, Part 3, 2002) See colour figure in Appendix 5.

Interpretation of the four examples

All the above stories expose a repetitive pattern. All the maps in question have evoked discussion. In multiple cases, this has resorted in conflict and controversy: in the European ESDP project, in the case of French Polynesia and in the Dutch Green Heart case. The eminent place of maps in policymaking processes was the starting point for this study. Once maps are produced, they seem to take on a life of their own; but while they are acknowledged as powerful tools for communication, they also seem to work as magnets for conflict. It was our aim to understand how and why conflicts around maps appear in policymaking, and how this relates to their reputation as helpful instruments.

1.3 Research questions

The underlying factors and mechanisms of how maps become the main focus of conflict in some situations, while not in others, are not well understood, although the power of maps has been acknowledged in literature. In many occurrences of map conflicts, the 'simple' explanation of conflicting interest does not suffice. The objective of this research was to unravel the socio-technical mechanisms embedded in map use in policy debates. The main research question of this dissertation reads:

"How can we explain the functionality of maps in multi-actor policymaking settings, and elucidate occurrences of emerging conflict?"

As a primary answer to this question it can be argued that maps represent interest over land and its related natural resources. Land conflicts can be 'fought' while negotiating about maps; but in the four examples that have been referred to above, the conflicts were between governmental bureaucrats (ESDP process), between policymakers and researchers (Green Heart) or between experts/bureaucrats and citizen participants (French Polynesia). Between these actors, the 'simple' explanation of conflicting land interests does not suffice.

In this research we aimed to deepen our insight into conflicts over use of maps in multi-actor settings. While the technologic methods that can be used to make maps have been well-documented in theory, the use of maps for making policy in a multi-actor setting has not. We focused our research on the multi-actor aspect of map making and map use, and we divided our main question into three research questions.

1 **For what functions are maps used in the practice of multi-actor policymaking?**
–Note: This question covers the making and use of maps.
- What is a map, what makes maps so powerful?
- Can we distinguish between various ways in which maps are used in multi-actor policy settings?
- How can we evaluate map use from a multi-actor perspective?

2 **How do maps function in a multi-actor setting, and what factors and mechanisms contribute to the emergence of conflicts around maps in policymaking?**
- How do actors perceive the function(s) of maps? (–Note a map can have multiple functions)
- Can policy analysis theory explain the emergence of conflicts around maps?
- Can we design a framework for analysis that elicits factors and mechanisms to explain the emergence of conflicts involving map-use-in-action?

3 How can the activity of map use be guided/improved, can we draw lessons?

- What do we consider good policymaking?
- Can we learn from tactics employed by actors in practice how they make use of maps?
- Can we design guidelines or methods for map making in a multi-actor setting?

We wanted to gain insight into how maps 'work' in a multi-actor setting that is aimed at jointly making policy, how maps function in the participative setting and how they influence the policymaking process. We thus aimed to qualify and assess map use on its *functionality*. However, what is considered functional depends on intentions, contextual circumstances and from whose perspective the evaluation is executed. These factors were included in our framework of analysis.

The main focus of the research was question 2. Question 1 served as a background question, which is explored in the theoretical chapters in part I of this thesis. Question 3 refers to the lessons we aimed to draw using the conclusions drawn in this study.

Since there was no previous theory available that classified unambiguously the possible effects of map use, nor a list of critical contextual factors that influence the relation between map use and its effects, the study was explorative in nature. Our philosophy was that a deeper understanding of *real map-use-in-action* would serve as the best grounds for proposing recommendations for improvement. Our approach to this study was an engineering one. We see 'map use' as a service that consists of cognitive activities and social interactions. This service comprises aspects such as communication, design, modelling, analysis, interpretation etc. Being an activity where policy workers and experts meet, the service works at the interface of the knowledge domain and policy domain. We approached the internal working of this service as a complex system that contains multiple actors. The engineering approach, in our view, consists of analyzing the existing phenomenon as a (complex) system, of understanding its internal working, and, in a next step, using this gained knowledge to improve the system.

In contrast to 'classic' engineering we are not studying a purely technological artefact, but a set of interactions between multiple actors in their use of a particular (technical) artefact, namely, the map. We aimed to understand the socio-technical 'mechanisms' embedded in map use, which, aligned with a particular context, have a certain influence on the progress in decision-making. In this view, we consider the policymaking process and map use activities to be interrelated; the policymaking process has an influence on the (emerging) map and vice versa, the map use has an influence on the policymaking process and its outcomes. This is elaborated upon in our conceptual framework in chapter 4. Another difference with classic engineering is our inclusion of *multiple perspectives* on the whole of 'map use, context, and effects'. The acknowledgement of multiple perspectives is explained in the theoretic part of the thesis (chapter 2 and 4).

1.4 Theoretic embedding

This research was executed at the interface of several disciplines, most notably the fields of policy analysis and planning, group decision-making, geography and spatial design, cartography and GIS visualization. These fields can be generalized into two main pillars of research that formed the basis of our study: a) research related to policy analysis, and b) research related to maps, map making and map use.

Contribution to the field of policy analysis
We consider maps to be a (particular type of) model. One of the evident roles of a model is that it provides the medium and vocabulary for people to deliberate about real-world phenomena. The problem aspects, alternatives and consequences of real-world phenomena can be made concrete in the simplified form of a model. The visual and recognizable nature of maps makes *the map* a well-observable artefact that can be traced, documented, discussed and analyzed; by identifying and explaining how maps are used, we aimed to delineate the interaction between different actor perspectives on maps when used as a particular type of model in multi-actor policymaking. While our focus was thus primarily on maps as a special type of model, at a more general policy analytic level, we also aimed to contribute to the theoretical understanding of the use of models in multi-actor settings.

Contribution to the field of cartography and Geographic Information Systems (GIS)
In the fields of GIS and cartography, our research fits within the research program of the International Cartographic Association as proposed by the (GIS-)cartographers MacEachren and Kraak (1997, p. 340): "to explore the impact of map-based spatial decision support tools on decision-making strategies and on the outcome of decision making." These authors emphasized that when using the term 'spatial decision support tools', they mean computerized Decision Support Systems based on GIS, *and* the whole range of map images that are used during a decision-making process, including hand-drawn paper sketches and conceptual, virtual (mental) maps of space. Following this we did not limit our selves to the study of computerized models and Decision Support Systems, but included all forms of map images used during the policymaking process.

For us the technical aspects of how to collect data, to distribute and structure that data and visualize it on a map, e.g. the operational techniques used in map making and when maps are used, which are core issues in cartographic literature, were not our primary focus. We acknowledge that these techniques are going through a rapid evolution with the sustained increase in GIS- and ICT-enabled products and applications to be seen today (2007). Some examples include governmental projects to build National Geo-Information Infrastructures, and the rapid spread of easy-to-use-applications among non specialists like car navigation systems, and more recently the 3-D Internet-enabled software Google Earth and 2-D Google Maps. These technologies have been described as potentially, very powerful tools for planners (see amongst others Fischer and Nijkamp, 1993; France, 2002; Warner and Diab, 2002; Nature editorial, 2006). However, while this area has been substantially covered by a

large amount of (technology driven) research, the social side of map- and GIS use with an emphasis on the word *use*, has received much less attention in scientific research. As Jankowski and Nyerges (2001, p. 263) state, most of the research concerning the use of GIS to support decision-making has been about GIS development rather than about GIS use, 'without a strong theoretical link between the two'.

The term 'Participative GIS' (PGIS) (Harris et.all., 1995; Craig, Harris and Weiner, 2002) has only recently emerged in the field of GIS. The aim of our study was to contribute to the research area of cartography and (P)GIS, with the intention to find ways to integrate social and technological insights in this field.

1.5 Research approach

The research approach was qualitative of nature, based on Yin (1994), Stake (1995) and Denzin and Lincoln (2000). The main outline of the research approach consisted of a *literature survey* in the fields of policy analysis and mapping, followed by an empirical study consisting of two *comprehensive case-studies*. We choose to use in-depth case studies because we consider the contextual setting in which maps are used, to be of critical importance to how they function. Studying multiple maps in one case, allowed us to focus on the interactions between the overall policymaking process and the maps; to see how this process influences the making and use of maps and vice-versa, how map use in turn influences the ongoing policymaking process.

In our theoretic analysis and conceptual framework, we explain our position as policy analytic researchers, belonging to the school of Multi-Actor Systems and fitting with the discourse paradigm on policy analysis, as described by Fischer and Forester in 'The argumentative turn in policy analysis and planning' (Fischer and Forester, 1993). In general, we used a type of method typified as *discourse analysis* to interpret our empirical data of the case studies (Hajer, 2004; Howard, 2004; Denzin and Lincoln, 2000; Stake, 2000). We used discourse analysis because it fits our view of maps as instruments in policymaking. In this view, we see maps as *models* that are used as a form of argument to influence the decision-making process, because maps are tangible and visualized objects, they are an identifiable type of model and can be observed during a policymaking process. We studied the use of various maps over the course of the two case-studies. These projects were:

1. a real-life project centred around the development of water policy using a Water Opportunity Map (in Dutch: Waterkansenkaart) in the low-lying Western part of the Netherlands.
2. a simulation game where the interactive process of developing a future vision for 2030 was simulated for the region of Brabant, in the Southern part of the Netherlands.

Together with an elaboration of our framework of analysis, the case selection and methods for data inquiry are discussed in chapter 4.

1.6 Focus and limitations

In our research, emphasis is placed on the participative (multi-actor) policymaking context in which map documents are used and made. Such maps are made by experts like landscape designers, GIS engineers, environmental experts or geographic researchers, but also by, or on behalf of, other people like stakeholders and process facilitators. Our emphasis lay on the *interaction between actors about the maps*, as they deliberate on various (knowledge and policy related) issues. We limited our study to the phases in the policymaking process where the policy is not yet crystallized and decided upon. The visualization of already determined policy would be a cartographic question. Instead, our question was raised from the point of policy analysis, of wondering how a particular instrument works and functions in participatory settings. This stems from the observation that maps seem to be very sensitive to controversial interpretations, as described above, while commonly still being seen as important tools for supporting many types of (spatially related) policy processes.

Spatial and environmental policymaking in the Netherlands
Another limitation for our research was the type and scope of policymaking processes. We limited our study to Dutch spatial and environmental cases. We selected cases in areas where new policy is being formulated on complex issues. The two cases described in this thesis both reflect a new way of thinking about spatial planning and environmental management, which has triggered the need for new policies.

The first case reflects a transition that is currently takes place in the field of water management. In the past the Dutch water system was controlled and managed in a technological manner, which gave rise to an extensive system of sophisticated technological artefacts and control systems that were used to drain the water away. Nowadays the general 'motto' of the government is "room for water", with the underpinning idea that land use functions must be adapted to give water management priority. Taking into account an uncertain future at the mercy of climate change, alternative water management policies are being worked out for the Netherlands that focus on the storage and retention of water.

The second case, in the form of a simulation game, reflects the ongoing Dutch transition from a hierarchical, restrictive spatial planning tradition towards a development oriented and innovation stimulating perspective. A rural area in the South of the Netherlands, Brabant, which is facing a gradual urbanization process, forms the background against which the game is played.

Regional scale level
Our research builds further on the work of Edelenbos (2000) Monnikhof (2006) who analyzed analytical and process support for participative policymaking at a local scale level.
The conflicts between local interests and national interests were a recurring theme in their analyses. In this thesis, focus is on the regional scale, where the formulated abstract policy directions of national and international governments, i.e. Dutch

policies made in the arena of 'The Hague' and European policy made in 'Brussels', meet local knowledge and local interests. In the Netherlands, this intermediate layer is governed by the provinces and the water boards. On this regional scale, the concept of 'participative policy making' can be filled in different ways. Citizen participation and that of institutionalized interest groups, coupled with participation from multiple government agencies and possibly public-public cooperation are all a form of participative policymaking.

Important steps are made in regional policy projects to quantify and concretize abstract national ambitions such as the Dutch ambitions to create 'space for water', 'a city-network' or 'connecting city A with city B through a high speed train connection'. These regional governmental processes are in practice less 'visible' for outsiders than local policy making. For map makers and experts using maps, it can be useful to have a deeper insight into the context and character of regional policy making. For instance, the new national advisor for the landscape of the Netherlands, Dirk Sijmons, has pointed to the different nature of regional policymaking relative to local policy and project planning. He formulates it as follows:

> "On this scale [regional scale] there are societal and physical processes that a client or designer does not control and should not want to control. Designing at this scale means foremost: creating conditions, finding a balance between formal regulations allowing freedom, choosing position when dealing with uncertainties and with the factor time, and not thinking you can 'board up' (seal) a design. It has the character of three-cushion billiards: you can only try to reach your goal indirectly. Because the Dutch landscape is a democratic process –it is made collaborative or it is not made– regional design also lies close to political and societal deliberation." (Sijmons, 2002, p. 269).

Distinction with cartographic studies

We focused on the making and use of maps in deliberative settings among *multiple* actors and it is this multi-actor aspect that distinguishes our research from classic cartographic studies into maps and map making. In multi-actor settings, the differences in backgrounds and values of actors come into play. As the actors all have a different worldview and different interests, they will have different frames of reference. Maps that are composed during meetings or made afterwards, based on a meeting, will embody a certain visual framing of what has been discussed; as such, the content of the map will be shaped by the discussion that took place among the multiple actors. Consequently the maps that are made, internalize a certain fixation in time of the real world; certain legend items are present, a certain aggregation level will have been chosen, certain themes will have been conceptualized and shown as (proposed) boundaries on the map.

Once produced, a map forms an instance of a statement, a piece of language, an artefact that circulates in the policymaking process; and as the process continues, the role of the map can change. As such, the map may have a certain role in, and impact on, the decision-making process. Our analysis was thus designed to take into account these reciprocal streams of influence, from actors onto the map and vice versa, from the map onto the multi-actor process. Based on this dialectic view of the role of maps,

we aimed to arrive at new recommendations for the field of GIS and cartography for the development of map-based support tools that facilitate deliberative policymaking.

1.7 Structure of the thesis

The thesis is structured in four parts, divided over nine chapters.

Part I is dedicated to the theoretic underpinnings of the research. The theoretic exploration is divided to cover the major objects of study: policy analysis (chapter 2) and the craft of map making/map use (chapter 3). The literature study was used to find, partial, answers to the research question and to provide directions for empirical analysis. The policy analytic concept of 'framing' is chosen as the underlying theory for explaining emerging conflicts and controversies over maps. The framework for analysis, outlined in chapter 4, was constructed on the basis of the literature review and it was then used to evaluate the effects of maps from a multi-actor point of view.

The framework of analysis was then applied in a real-world case study, Part II of the thesis. The case study dealt with a project to develop a vision on water policy at water board Delfland. This project is described in chapter 5. During the project multiple maps were made and used. Observations and evaluations of the various maps are described in chapter 6. The observations made were used to analyze the effects of map use and to explain the conflicts that emerged in the case study.

The framework of analysis was then applied in a simulation game setting, Part III of the thesis. The results of the Delfland case were used as input. This case study consisted of action research. The simultaneous policymaking at various local and regional governments, and in private groups such as project developers and environmental groups that forms part of an ongoing policymaking process, was simulated in a role playing game. The game was supported by various types of map instruments, which we prepared. Instrument preparation and the game are described in chapter 7. The use and effects of the various maps, and the tactics used by several actors while using maps, are evaluated in chapter 8, and used to verify the results from the previous Delfland case study.

Part IV consists of the closing chapter of this thesis (chapter 9) where we discuss the results of the two cases. The two empirical case studies are used to elaborate on the theory of framing and its application in map use. The research questions are answered in the conclusion section. The main finding consist of three archetypical frames that were found dominant in the cases and which can be used as explanatory factors for emerging conflicts over the use of and habitual 'patterns' of map use. The chapter ends with a reflection on the study and recommendations for further research.

A schematic representation of the thesis structure is given in Figure 1-9.

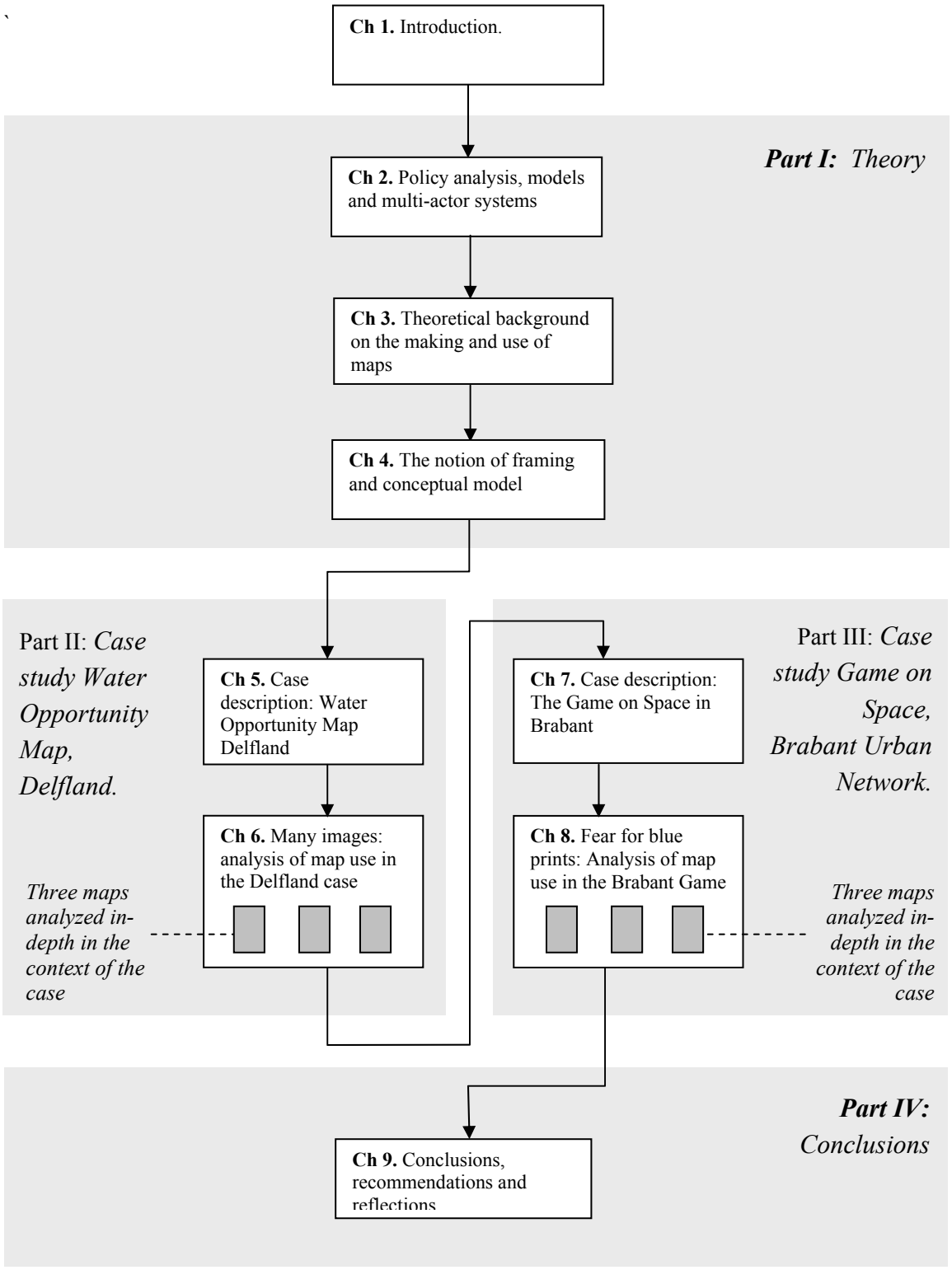


Figure 1-9. Schematic presentation of the thesis structure.

Part I:

Theory

2 POLICY ANALYSIS, MODELS AND MULTI-ACTOR SYSTEMS

Theoretical background on Policy Analysis

"Balancing between dogma and scepticism, we continually reweave our conceptual fabric to make sense of our experience, at times explaining away the surprises, at other times revising the expectations that made us vulnerable to surprise."

–A. Wildavsky in 'Speaking truth to power; the art and craft of policy analysis' (1979, p. 390).

2.1 Introduction

Maps as part of the policy analysis toolkit

The background of the main theories underlying this thesis is described in this chapter; the field of policy analysis. We see the map as one of the tools of the 'policy analysis toolkit'. The policy analysis toolkit is a collection of methods, models, insights and guidelines that used together make up the instrumental competences (know-how) of a policy analyst.

Firstly, before we discuss how maps fit in this toolkit as a specific type of instrument, we will define the toolkit of policy analysis and policy analysis.

Secondly, a brief overview is given of the history of the field of policy analysis, as it has developed over the last century and into this. In our perspective, this background is necessary to explain our position on what policy analysis is. The main developments in policy analysis are summarized; in particular the paradigm shift in policy analysis, known as "the argumentative turn", and the emergence of "participatory" approaches in policymaking.

Thirdly, the perspective of the research reported in this thesis is described. Two particular streams in policy analysis are addressed: the 'Delft school of thought on Multi-Actor Systems', which makes up the context in which this study was executed,

and the stream of theory dealing with participatory policymaking, with its advantages and disadvantages. Choosing from within the body of literature surrounding these two theoretical streams, we selected the theory that served as the basis for our analysis.

2.2 Defining policy analysis

The application domains and research areas classified under the heading 'policy analysis' are diffuse, and have many different faces. Some policy analyses are descriptive, others are prospective or prescriptive. Some claim objectivity, others state they are argumentative and subjective. We refer to a description of Wildavsky (1979) who defines the term policy analysis by specifying what policy analysts *do* (p. 385-390):

> "As a discipline, policy analysis ('problem creation – problem solution – problem supersession') does not fit neatly into the disciplinary map. […] It would be more fruitful to ask what these policy analysts do than where they reside. The short answer is that *policy analysts create and craft problems worth solving*. The long answer explains what "create and craft" means. (p.386-387)

The first sentence contains the technical image that has become 'the familiar picture' of policy analysis; the stepwise process of problem formulation, the creation of policy solutions, their assessment and their implementation (see Figure 2-1). In the quoted statement, Wildavsky emphasizes that policy analysis is more than a technical ability to use formal analytical tools.

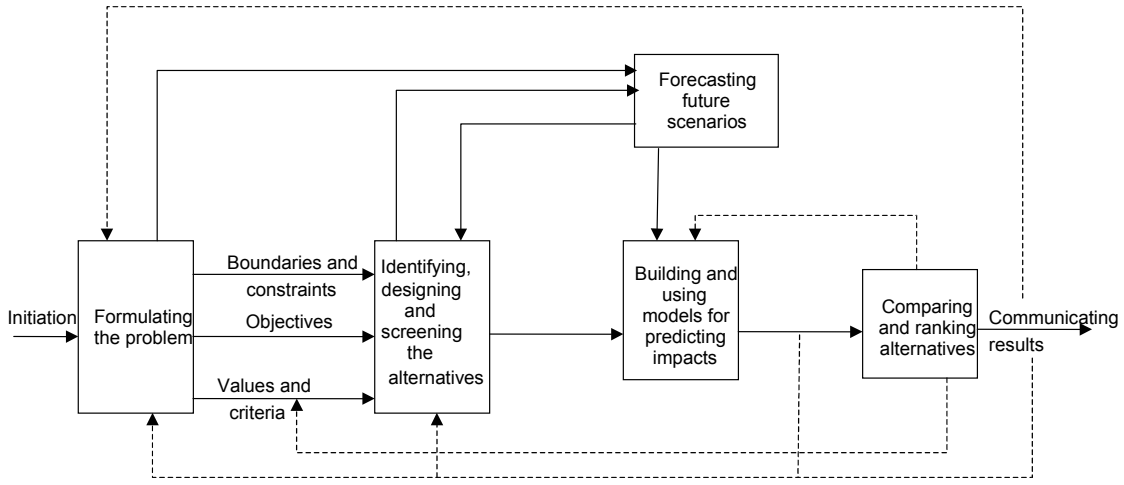


Figure 2-1. Overview of policy analysis activities based on fundamentals of systems analysis methodology. Source: Miser and Quade, 1985, pp. 124. The boxes represent different analysis activities. The dotted arrows represent iteration steps. This diagram, made up of blocks and arrows, gives a brief summary of problem solving activities for which policy analysis methods and tools are available.

However, not all problem solving is considered policy analysis. In the words of Wildavsky: "If policy analysis is everything, then it is nothing." (p. 387) One limitation of policy analysis is defined by its focus on policy. Wildavsky (1979) exlains the subject of "policy" as follows:

> "Policy is a process as well as a product. It is used to refer to a process of decision-making and also to the product of that process. Policy is spoken of as what is and what ought to be: policy is perverting our priorities, and policy should serve the public interest." (p. 387).

In the broad sense, we consider policy analysis to be an epistemological field of craftsmanship dedicated to analysis that aims to relate the formation and use of knowledge with the formation and evaluation of policy (Rein, 1976; Wildawsky, 1979; Jasanoff, 1990; Van de Riet, Edelenbos and Monnikhof, 2003). In a more narrow sense, we conceive policy analysis essentially as a conceptual framework and a collection of professional methods used to solve policy problems. The representation of policy analysis in prescriptive steps for assisting in problem-solving, such as provided by Miser and Quade (1985), summarizes this essence (see Figure 2-1).

A different schematized conceptualization of policy analysis is presented by Dunn (1981). Dunn emphasizes the circular characteristic of policy processes in his conceptual framework (see Figure 2-2). Here, the last phase, policy assessment, is linked to the first (agenda setting). According to Dunn (p.15), "Policy analysis seeks to create, critically assess, and communicate policy-relevant knowledge within one or more phases of the policy-making process. These phases represent ongoing activities that occur through time [...] in a non-linear cycle or round of activities."

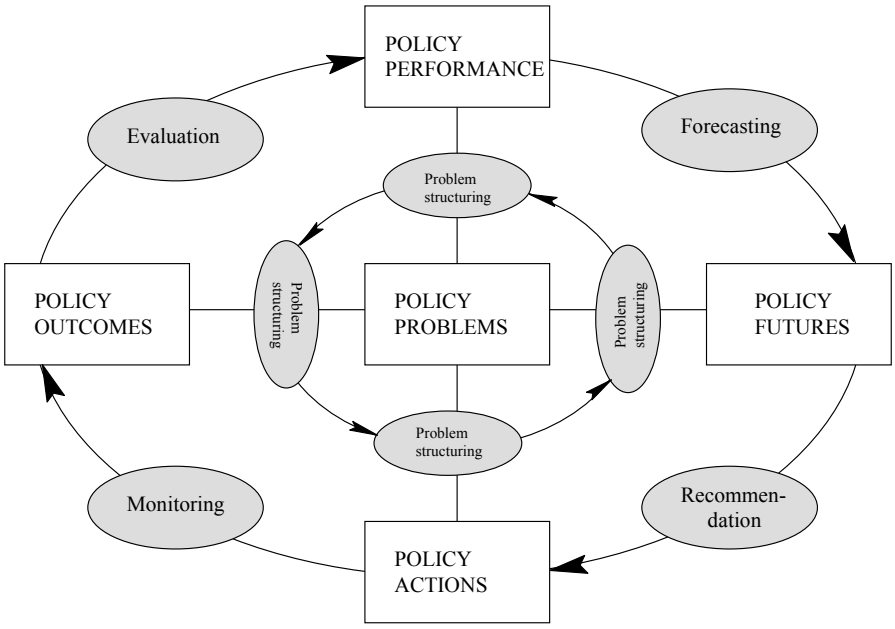


Figure 2-2. Circular framework representing policy analysis by Dunn (1981, p.15). The boxes represent (contemporary) products and results in the process of making and implementing policy. The ovals represent policy analysis activities.

While the linear concept of Miser and Quade emphasizes how a policy analyst can tackle a policy problem and arrive at advice for a solution to the problem, the circular concept of Dunn emphasizes how various types of policy analysis activities (problem structuring, evaluation, forecasting, etc) can assist in the process of policymaking. Between the linear and circular schematic representations of Figure 2-1 and Figure 2-2, we prefer the latter way of conceptualizing policy analysis, as it emphasizes the reciprocal relation between policy problems (or in terms of Dunn, shortcomings in current policy performance) and policy solutions (recommended 'policy actions' in Dunn's scheme). Dunn, in his scheme, makes the structuring of policy problems central.

We agree with Dunn's statement that the structuring of problems is central to every stage of policy analysis. We call this process of problem structuring "framing", following terminology of Schön and Rein (1994), amongst others. We will elaborate on this aspect of policy analysis in chapter 4.

A recurring key-motive in definitions of policy analysis is to 'learn'. Wildavsky (p.388): "In the perspective of epistemology, the essence of policy analysis is 'learning to recognize and correct errors'." The following question then is how policy analysis actually contributes to this learning. Based on different views of what policy analysis is (Thissen and Twaalfhoven, 2001), we differentiate four *functions* of policy analysis. In each function, 'learning' is explained differently.

1. To provide substantive knowledge, with information on and understanding of problems, solutions and argumentations.
2. To facilitate the discursive process and generate a (group) learning curve, investing in aspects such as participation, democratization and 'social learning', e.g. the improvement of learning processes among multiple actors.
3. To provide methods, tools, guidelines and insights for the practitioners who are involved in decision-making or in supporting policy analysis activities, to guide them in their efforts.
4. To use or mis-use policy analysis activities to serve a strategic side-objective or 'hidden agenda'.

The last function needs explanation. This functionality points to more politically oriented motivations for the time and efforts spent on policy analysis with unofficial and possibly non-constructive reasons, for instance to delay the political process or to park the problem temporarily. The policy analysis activity is secondary in this case. Professionals doing the policy analysis activities may be surprised that their efforts have no consequences or follow-up, and that their results just seem to have a symbolic meaning. According to de Bruijn, Ten Heuvelhof and in't Veld (1998) and Radin (2000) these strategic uses of policy analysis can always be latently apparent in multi-actor processes, because actors defend their interests. Knowledge about this implicit functionality of policy analysis serves to deepen our understanding of the political and negotiation aspects of policymaking processes.

The policy analysis functionality of maps

We consider spatial maps to be instruments that belong in the policy analysis toolkit, especially because they provide a method and tools (that of map making, supported by techniques such as GIS), and because of the information maps contain they offer insights for practitioners who are involved in decision-making. Maps can potentially contribute to all four functions of policy analysis.

1. Maps obviously serve their purpose to provide and clarify information on problems, solutions and argumentation (function 1).
2. With the advances in spatial information and visualization technologies, as well as changes in policymaking towards more participative, deliberative settings, maps and GIS are more and more exploited for *supporting deliberations in participatory processes*[1]. This resembles function 2.
3. There are several step-wise approaches in policymaking that include GIS, maps and map making as part of their method (function 3)[2]. Generally this map use comprises the collection of (physical and social) data, spatial analysis and presentation of the final policy advice.
4. The strategic use of maps is visible not only in geopolitical propaganda maps (Monmonier, 1991), but also in more general examples of Harley (1988, 1989) and Pickels (1995), who point at the strategic value of GIS and maps in the light of the sociologic view on information 'as power'.

We assume that maps are always made because at least one actor has a specific *intention* for the use of a map, for example to supply substantive information, to facilitate deliberation, to serve as a method or guide in step-wise processes, or to serve implicit strategic side intentions.

2.3 Background: Evolution of the field of policy analysis

Evidently, problem solving requires a consciousness of a problem. Put simply, thinking consciously means asking oneself questions. When someone questions what solutions might be best for a community rather than for one individual, he or she conducts a policy analysis, may it be in a rudimentary form. The oldest forms of policy analysis that can be traced back, are those of inscriptions left by people in long-lasting material –cave paintings. According to Dunn, the earliest recorded examples of conscious efforts to analyze public policy are legal codes produced in the twenty-first century B.C. in the city of Ur, Mesopotamia (Dunn, 1981, p. 34-35). We will not discuss the overall history of policy analysis. For an exhaustive history of the evolution of policy analysis, see Dunn (1981). In this section, we will continue the development of the field where Dunn ended his chronology of policy analysis.

[1] Examples are, amongst others, the deliberative use of the map tools "Ruimtescanner" of the Netherlands Institute for Spatial Reasearch (RPB), the "Leefomgevingsverkenner" of the National Institute of Health and the Environment (RIVM), and practices under the headings of "Public Participation GIS' (Craig, Harris and Weiner, 2002) or 'design for dialogue' (Metze and Saris, 2004).

[2] Examples of step-wise map making comprise the development of 'regional spatial visions' by governmental bodies in explicated procedural steps, such as the "streekplan procedure" in the Netherlands.

2.3.1 Growth of an 'analycentric' perspective (1940 – 1970)

Policy analysis originated from the field of operations research in America. The application of operations research by the Americans, during the Second World War, was seen to be a big success. After the world war, this type of systems analysis was expanded to non-military areas. With this widening of scope, systems analysis was reshaped to *policy analysis* and soon it was popular among governmental and external organisation. From the 1970's, policy analysis was adopted in Western Europe (Edelenbos, Van de Riet and Monnikhof, 2000).

The first policy analyses came from economical fields, and therefore economic theory on utilitarism and wealth was used in cost benefit analyses, which were executed as objectively as possible, to give an undisputable answer to the questions at hand. To resolve the difficulties with the monetarising of non-quantitative aspects like certain social and environmental effects, several additional methods were developed, like multi criteria analyses. Still, the central aim was to provide objective information to support the policymakers. Mayer (1997) characterized this perspective as 'analycentric'. The ideas were based on the perspectives of philosophers of science who aimed for an 'objective' projection of the 'real world' by the human ratio. In policy analysis, this is called the 'rational paradigm'; but in the second half of the twentieth century, when it became clear that the expectations of policy analysis as a mayor step in policy improvement could not be met, a wave of criticism developed.

Criticism of the rational paradigm on policy analysis

The purely rational approach of policy analysis is often referred to as 'classic policy analysis'.

Mayer (1997) summarized the critics on this classic form of policy analysis in five points.

1. 'Scientism'

Policy analysis was criticized for the mistaken belief in science as the only rational foundation for the solving of complex societal problems. The traditional policy analysts had limited problem solving to the rigid restrictions of technical means-ends rationality. This criticism directed attention to other types of rationality, like an inter-subjective, a communicative, or a strategic rationality.

2. Little account for the multi-actor character of policymaking.

It was noticed that policy analysis, as a social science discipline, took relatively little account of the pluricentric, inter-organisational, or network character of policymaking, while many new theories on public-society interaction and governmental steering were developed during the 1980's.

3. Limited utility for and limited impact on policymaking

When the outcomes of a policy analysis study have little relevance to the situation as perceived by the (key) stakeholders, these stakeholders will probably ignore or reject the outcomes. Inadequate communication between the policy analyst and client, can cause the 'learning effect' of policy analysis to remain small.

4. Lack of scientific consensus and interdisciplinarity

During the sixties and seventies, it was gradually recognised that the worldviews of analysts may also influence the interpretation of empirical data, for instance with regard to criteria of scientific reliability. For every scientific claim, many scientists can be found to dispute it. While the initial objective of policy analysis was to support interdisciplinarity, this was soon set aside because, according to (DeLeon, 1988), there was "a lack of theoretical foundations, empirical substance and methodological rigor."

5. More and more technocratic and undemocratic character

According to many critics, traditional policy analysis ignores or disguises the inherent value-basis of science, politics and social institutions. In their view, policy analysis is an activity 'of experts for other experts'. Thereby, analysts neglect societal interests and values that fall outside this technocratic setting. In this emphasis on analytic methods and reliance on scientific expertise, policy analysis is criticised for becoming more and more 'divorced from its original democratic objectives' (Mayer, 1997).

2.3.2 Turn towards the 'discourse paradigm' (1980 – 2000)

While in the decades after the second World War technical rationalism dominated policy analysis and the focus lay on instrumental aspects of policy analysis, in the next generation the focus shifted towards interaction between actors, towards 'discourses', where technical and analytic studies were seen as debatable arguments. There has been a stream of publications centred on this 'paradigm shift' in policy analysis between the 1980s and 2000. The 'new paradigm' does not consist of one clear-cut alternative view. Instead, many different streams and sub-streams characterize the 'postmodern era', with words like 'pluralistic', 'eclectic', and 'multi-' emphasizing the heterogeneous character of policy analysis (and not only policy analysis). We will only deal with a limited number of influencing works, ranging from as early as 1959 to 2003.

Lindblom (1959) and Wildavsky (1979) were among the first policy scientists who emphasized the importance of the political interaction process in policymaking. Simultaneously, several authors appreciated the central importance of language. Authors like Stone (1988), Majone (1989), Fischer and Forester (1993) Schön and Rein (1994) and Hajer (1995) draw attention to the role of language, arguments and 'narrative stories' in explaining policy situations. They point out the role of values in public policy and illuminate the implicit meanings in policy practices (e.g. Fischer and Forester, 1993; Schön and Rein, 1994). These authors consider policymaking to be a discursive process, and see policy analysis as a craft that can be used to analyze the particular 'discourses'. They build on recent philosophical works of, amongst others, Foucault (1966) and Derrida (1976). These philosophers emphasize the importance of the spoken and written words –and the need to read through and in between the lines– in understanding social processes and their implications.

Drawing from political and organizational sciences, attention for *social networks* was adopted by the policy sciences (Coleman, 1975; March and Olsen, 1989; Castells, 1996; De Bruijn et al. 1998), articulating the importance of institutions and focusing

on relations between actors. Society as a whole is conceptualized as a conglomeration of fragmented parts, with organisations considered to be actors or 'agents' in networks. Actors are assumed to have a certain level of 'free choice' in decision-making, but this is also steered by the actor's environment. Harmony between actors is not assumed to be trivial (De Bruijn et al. 1998). According to network theory, the multiple actors in a social network are *interdependent* and need each other to solve their problems, while at the same time each actor tries to maximize its own *individual interests*. The assumption of interdependency between actors presupposes the need for interaction as a requirement to find solutions for problems. The assumption that actors try to maximize their individual interests explains the strategic behaviour of actors.

Hajer and Wagenaar (2003) base the need to rethink policy analysis and its relationships with social theory and politics on developments such as the complexity of socio-technical systems, the impact of trans-national arrangements on national policy making, and increasing ethnic and cultural diversity. Hajer and Wagenaar argue that while traditional policy analysis has been based on the assumption that central government is self-evidently the locus of governing, modern democratic governance calls for a new deliberatively-oriented policy analysis.

The body of work of the 1980s and later is known as the 'post-positivist' position in policy analysis, where the focus lies on discourses, social networks, interaction processes and institutions.

This development has its roots in the shift in epistemology about the inquiry and evaluation of human knowledge, as discussed by philosophers of science, like Popper's *critical rationalism*[3] (1959), Kuhn's *paradigm theory*[4] (1962) (Koningsveld, 1987), and Lakatos' theory of the *protective belt*[5] (1970). The new conceptions state that humans are not able to discover or understand the outside world as it is 'out there', because knowledge is incontestably influenced by the culturally determined mental frames of humans. Knowledge is created within he context of a certain paradigm; a set of deep concepts about the nature of reality that shapes language, thought, perceptions and (system) structures. Consequently, like all bodies of knowledge, policy arguments are theory laden, which means that each set of facts is based on a distinctive worldview about what is important and what causes what. Since Kuhn (1962), many authors have contend that science is a *socially constructed reality*; knowledge is formed and reformed in communication processes between people.

For policy analysis, these ideas have been the basis for a shift of attention from a rational, economic and scientific view on policy problems towards attention for other

[3] Popper criticizes the ideas of inductive confirmation (knowledge is probably-made knowledge, providing a large amount of certainty) and the idea of a base of solid facts trough observation obtained, two fundamentals of the logic positivism. According to Popper, it is not the observation, but the creation of theories-as-works-of-art, as answers on theoretic problems, that is the starting point of science, which is then submittest to a (sharpest possible) test.

[4] According to Kuhn, the scientific character should be studied in sociological and psychological terms. Science is developed not through accumulation, but through evolution and revolutionary breaks, with a 'preparadigmatic period', a period of 'normal science', and a state of crises where the paradigm or parts of it are at stake, which may lead to a revolution.

[5] Lakatos elaborates on Kuhn's concept of knowledge creation, distinguishing a 'core' in a knowledge paradigm from a 'protective belt'. Only when the core is falsified, the whole paradigm collapses, otherwise the paradigm gets adapted flexibly according to innovations in the protective belt.

aspects in policymaking than the provision of scientific knowledge, and other roles of policy analysis.

Critical notions against the discourse paradigms

Following the positivist paradigm, these post-positivist paradigms have also met with criticism. Analogous to Mayer's (1997) summary of criticism against the rational actor paradigm in policy analysis, we have structured the critical comments about the (various forms of) discourse paradigm in general, into six main points.

1. A criticism of relativism

A wide-spread criticism is the tendency of the post-positivist paradigm towards endless relativism (Mayer, 1997; Hajer, 2002). Several authors warn that in a postmodern condition, policymaking will increasingly rely on a 'selling of the message' and place emphasis on media sound-bites, which will diminish the role of policy analysis as important basis for policymaking. Mayer formulates this critique as "true acceptance of relativism would consequently imply that 'anything goes'." (Mayer, 1997, p. 35).

2. 'Negotiated nonsense'

A second criticism stems from the popularity boost of concepts such as 'process management' and 'institutional redesign'. Critics have pointed to the neglect of substantial aspects of policy problems, because there is too much attention for the process. Policy analytic advisors quickly reach to covenants, process schemes and process guidelines as panacea instruments. In such situations, stakeholders collectively may reach agreement on such procedural solutions (and feel good among each other), while for external observers it is obvious that the decision is substantially bad. This phenomenon has been denoted 'negotiated nonsense' (Van de Riet, 2002) as opposed to 'negotiated knowledge' (Jasanoff, 1990; Van Eeten and Ten Heuvelhof, 1998).

3. Lack of prescriptive methods

Another point of criticism is the lack of prescriptive methods provided in post-positivist literature. While network theories are good at explaining why things went wrong, they offer little guidance in substantive design of new policies. As Mayer (1997, p.58) puts it, 'the new argumentative dog can't hunt'. Mayer wonders how the new argumentative insights help (or hinder) policy analysis as a professional field and as a client. Mayer (p.59): "Apart from the underlying judicial-rhetorical metaphor, argumentative policy analysis provides relatively little insight into methods and tools for policy analysis." If the theoretical notions of the post-positivist policy analyst shift to an emphasis on the discursive-rhetorical and legal aspects of decision-making, then the distinction between a policy analyst and a journalist or a lawyer becomes blurred, and the own unique identity of policy analysis may get lost.

4. Policy Analysis as "container-term", without meaning

Related to the first point of endless relativism, is the point of the container-term that policy analysis has become. The growing consensus on the importance of modern, participatory and discourse oriented policy analysis has not come with a growing clarity on what the concepts really mean (as it happens often when a concept gains

fast popularity). Quite the opposite, the terms and their meanings have gotten more and more sweeping and fuzzy. The eclectic field of multiple paradigms and the acceptance/embracement of this diversity also does not help in constructing a clear and concise, professional vocabulary and therefore there has been a failure to establish a separate discipline. Wildavsky (1973) critically stated in his often cited seminal article that "if planning is everything, maybe it is nothing."

5. Naivety

The participatory approaches especially in policy analysis, also called collaborative or interactive approaches, have been criticised as being naive. In their evaluation of five case studies of 'interactive policy making' in the Netherlands, Edelenbos and Monnikhof (2001) conclude that the expectations of such activities are often not met. The stakeholder input was not, or in a very limited scope, absorbed in the policy outcomes, the public support for the outcome policy was not necessarily higher than without an interactive policy analysis activity, and the expert opinions about the quality generated in such activities were not very positive. Non-cooperative behaviour is something that should be accounted for in the network settings of policymaking (Hardin, 1982. See also Olson, 1965; Ostrom, 2000; Pellikaan and Van der Veen 2002). According to Pellikaan and Van der Veen's study on collective action problems, environmental policy that relies on merely moralistic approaches, does not work when put on the burden of an individual actor. According to De Bruijn, Ten Heuvelhof and In't Veld (2002) and Radin (2000) strategic behaviour is a natural mechanism, which should be accounted for when designing policy. In participatory policymaking, all the people involved have 'stakes' in the matter somehow: be it a professional career of a hired expert, a local interest of a participating local citizen, or prospects in forthcoming elections of political representatives; the interests at stake do not only lie in the outcome of the policy product; and because of the appearance of all these different kinds of individual interests, it would be considered naive to think that policy analysis could be conducted in a 'power-free environment'.

6. The policy advice industry as fat cat consuming public budget

According to Dunn, policy analysis has gone through another historical transformation in the current knowledge society. In the post-industrial society of the twentieth century, the major part of the labour force has shifted from the production of goods to the delivering of services.

Today, a large amount of think tanks, consultancy firms, suppliers of 'interim process management professionals' etc. execute the type of work that we classify here as policy analysis, together with an expanding number of bureaucracies, managerial platforms, regular coordination-and-deliberation committees and institutionalized representing bodies (for example environmental groups). Once such institutions have been built up, they behave like organizations, with self-interests and own goals, strategies and activities.

While academics theorize about how policy analysis should be improved to be used in decision-making, these organizations and professionals produce lots of policy analysis documents in practice, while often the effectiveness of these products and practices is not evaluated and the merits of these products and practices is disputable. Wildavsky (1979) called this 'policy analysis as its own course' (pp. 62-85).

Currently, both the analycentric perspective and the discourse perspective are represented in policy analysis research. Literature is oriented at either the substantive policy issues under study, on the policy process, on the question how to research policy analysis practice, or normatively on how to support policymaking.

2.4 Perspective in this thesis

2.4.1 Participation of multiple actors in policymaking

As mentioned before in the introductory chapter (section 1.1), under headings like 'participative (/participatory) policy analysis', 'interactive planning', 'co-production', 'communities of practice', 'open planning process' or 'collaborative policy development', many experiments have been tried with collaborative multi-actor approaches to policymaking (Teisman, 1999; Monnikhof and Edelenbos, 2001). Even to the extent, that according to Leeuwis (2003) "in Africa, for example, almost no rural project can be found that does not begin with a standard battery of process techniques, like making a 'transect walk', a 'seasonal calendar' and doing all sorts of 'ranking' exercises."

The main motives for involving multiple participants directly in the policy process involve the following aspects (e.g. Teisman, 1992 p. 25-47; Beierle, 1999; Enserink and Monnikhof, 2000).

- *Improving democracy;* a view on democracy as intrinsic value, which considers democracy as a desirable goal in itself.
- *Enhance support* for proposals; among others because the societal process incorporates a 'learning' effect for all participants, and the participation of actors in a process implies commitment to the results. A derived argument in this line is the motive of *efficiency-improvement;* by involving the wider public earlier, policymakers have the opportunity to win support for their plans, adjust their plans or offer mitigating or compensating measures. In this way, a blockade may be prevented, and the runtime of policy could be decreased. (For this purpose, relevant stakeholders may be invited in the policy process or 'everyone' may be invited, often denoted as 'public participation')
- Quality improvement, *enrichment of the policy outcomes;* participants can deliver information which would otherwise not be available, extra knowledge (both professional and 'local' and 'tacit' information and expertise) and innovative ideas. Next to new information, participants deliver new perspectives on problems, and therefor they may broaden the scope of the problem, leading to a more *integral policy*.

In the meantime, criticism has also been raised against this form of policy making and the ode to participation. Based on experiences with processes that are characterized as being participative, comments have been made on the following issues.

- *Missing link* with the political decision-making process; despite of new insights and new options that might have been developed during interactive processes, the

formal political decision-making process seems to follow its own course (Edelenbos and Monnikhof, 2001). Political processes are often separated take place independently from participative exertions and their outcomes, leaving the choice whether to absorb elements of the outcomes or not to the willingness of bureaucrats and elected officials.

- The potential conflict between the '*primacy of politics*' and the legitimacy of outcomes of a particular participative policymaking project (Klijn and Koppenjan, 1999). What is the representative-ness of an occasional coalition formation around a particular policy issue? What happens to the interests of people who do not want to partake in the participative activities?
- The participative process as a machine for *generating public support*; one of the important reasons for politicians and bureaucrats to start participative processes, is to work towards a decision that has public support, and consequently less opposition during the implementation phase (Edelenbos and Monnikhof, 2001). However, many participants of these processes distrust the initiators for having made up their mind already, and mis-using the supposedly 'open' process for gaining support for that option or listening only to defend better their own favourite option.
- Interaction as *costly and time-consuming* hype. Many policy analysis guidelines on participatory approaches recommend to 'include all stakeholders relevant to the policy issues' and to consider 'all perspectives', 'all options' and 'all criteria'[6]. From this (overload of) people and information, an 'integral' assessment should be produced. However, policy problems such as environmental degradation (climate change, air quality, erosion etc) are interconnected at all scales (local, regional, national, global), and related to various sectors, which in their turn have to do with all sorts of businesses. It would not only be impossible to invite all actors who are (in-)directly related, it would also be unmanageable. Interaction and deliberation bring along extra transaction costs, which put limits to the efficiency and feasibility of a broadening of scope. This trade-off between inclusion of options and stakeholders against the costs of transaction and tractability of complexity, is a recurring theme in recent policy analysis literature (Hajer, 2003; Timmermans, 2004). One of the core questions in such a multi-actor set-up of policy analysis is exactly where to draw a boundary between inclusion and exclusion of issues and actors.
- Participation as a '*ritual dance'*. In his inaugural address as professor at Wageningen University, Leeuwis (2003) shared his experiences of the practice of participatory appraisals in developing countries: "Project members do it because they have to, and communities have become used to it and they have the outcomes more or less 'on the shelf'."

Despite all the critics, it seems that participatory approaches are to stay for some while (De Jong and Weggeman, 1999). For instance, in many European Union guidelines participation is included, which means that member-states have to incorporate participation in their policymaking process (Maurel, 2003).

[6] An example is Van de Riet, 2003.

Meanwhile, the same kinds of problems associated with these approaches occur repeatedly in practice. Lack of experience with such approaches results in typical problems of participation. While much attention has been given to the managerial side of participative policymaking (see for instance the studies summarized in Edelenbos, 2000 and Monnikhof, 2006) less attention has been dedicated to the substantive aspects. Miscommunication, information overload, and shortcomings of models result in frustration with experts, policymakers and (other) stakeholders (Edelenbos and Monnikhof, 2001; Metze and Saris, 2004). We have sensed this frustration in many interviews with policy analysis practitioners[7].

Our research therefore focuses on how the work is being done within such multi-actor settings. We are not comparing participative approaches to non-participative or other kinds of approaches. We restrict our study to cases where a collaborative approach to policymaking is taken, and thus where maps will be used in *multi-actor* settings and where the policy process will be of a *deliberative* nature. We assume that the multi-actor environment in so-called participative policymaking processes has a large influence of the use and functionality of maps. With our focus on multiple actors and the deliberations, with help of maps, we take the *discourse paradigm of policy analysis,* which emphasizes the multi-actor character of policymaking, as starting point.

Coping with conflicts

In the literature of discourse analysis and (spatial) planning on coping with conflicts, we found an explanatory argument in the work on *framing of issues* (Rein and Schön, 1993; Faludi, 1996; Salet and Faludi, 1999; Rein and Laws, 1999; Van Eeten, 1999, Hajer and Wagenaar, 2003). This theory on framing formulates a ground for explaining *why some sensitive issues do result in controversy;* even when a conflict between interests is not the main cause. Frames, which are considered to lie at a 'deeper' level than the perceived problem, rely on internal values and logic that make up the explanation of controversies. Working from this concept, the theory also offers a perspective on the process of 'sensemaking' or 'meaning construction' while exploring policy problems and seeking solutions.

Furthermore, this theory offers a plausible explanation of why some controversies are stubborn, and links up with the theory and functional workings *(ontology) of maps*. The process of interpreting and meaning-making is also involved in map making and map use: while gathering information, issues get conceptualized and interpreted, and the resulting maps thus represent a certain worldview or mental frame. We have thus selected the theory on frames and framing to construct our own framework of analysis. This theory will be discussed and elaborated in chapter 4.

[7] Amongst others in interviews at the Ministry of Transport and Public Works; the Ministry of Housing, Spatial Planning and the Environment; research institutes Delft Hydraulix, GeoDelft and TNO Delft; engineering firms Royal Haskoning and Arcadis; and spatial designers working for small design firms (whom it would not be appropriate to mention), being educated at the Faculty of Architecture of the TU Delft.

2.4.2 Context of study: The Delft School of thought on Multi-Actor Systems

This study is part of the larger research program 'Multi Actor Systems: Analysis, Design and Management' (MAS) of the Faculty Technology, Policy and Management at the Technical University Delft. This research program focuses on the fundamentals of so-called multi actor systems. These are *socio-technical systems* where people are part in the system as well as constructors of the system. Socio-technical systems incorporate social structures and physical artefacts.

For example, water circulation in the Netherlands can be seen as a socio-technical system. This system is managed and influenced by human-made dams and irrigation canals; otherwise almost half of the country would belong to the sea (The Dutch are said to have conquered their land from the sea). This water system is influenced by natural in- and outputs, such as the amount of rainfall and run-off to the sea, and by the way the canal system and sea defenses are constructed, the amount of water extracted by water users (farmers, drinking water companies etc) and by laws that regulate the allocation of water among regions, sectors, neighbouring countries etc. The systems under consideration are thus extensive and comprehensive.

The term socio-technical system is a *nested concept* (Bots and Ottens, 2005). It can be seen both as an artefact (something that is to be designed and realized) and as a design context (the context within which social and technical processes occur). Because of this nested character, reciprocal interactions with 'a context' will always be apparent. In the case of the Dutch water system; this system is bounded by institutional borders (the national border of the Netherlands) and by physical borders (dikes along the rivers and the sea). Simultaneously, the system is embedded in a larger whole; the rivers bring water from the Alps elsewhere in Europe, and the rivers than run trough the lowlands of the Netherlands are filled from groundwater run-off from the soil.

Design in/of multi-actor systems

In the research program MAS, the focus lies on the *design* of –parts of– socio-technical systems. A conceptual model of 'socio-technical system design' is presented by Bots and Ottens (2005). The term *multi actor* in MAS emphasizes the focus of the program on the nature of both such design processes and of the designed products. It is assumed that multiple actors are involved in the design process, as the people *in* the system are also involved in making decisions *about* the system –besides, the system is too extensive and complex to be (re-) designed by one single actor. The design process is a thus a *collective action*. The collective design actions take place from within the system, as the designers are also part of the socio-technical environment in which they perform their actions.

The term *design* indicates that we are dealing with conscious, deliberate, anticipating activities to make (or at least consider) changes to a certain system. With this intention, a modified system or new situation is imagined, and a new design is created -probably with help of a model, instead of using the 'real' system. Thus, the collective of designers is considered to be *intentional*. (Note that, in a collective of designers, the

intention of a single designer may overlap only partially with the collective intention of the group).
The design process involves making many *choices*, which are being communicated, coordinated, aligned and negotiated among the multiple actors. Consequently, the design activity has the form of a decision-making process in which negotiation takes place (Bucciarelli, 1994). We speak of a *multi-actor* activity instead of a *collaborative* or *participative* design activity, because the designing people have their own worldviews, interests and goals. These worldviews, interests and goals may differ, so the designers may cooperate or defect (they may object, oppose, negotiate, or simply do nothing –at least, they may not-cooperate) (Pelikaan and Van der Veen, 2002). The actors are assumed to utilize their strategy to defend and perhaps optimize their own position in the decision-making process. The sum of these different actor strategies is therefore hard to predict, and the decision-making process has a non-linear course, which often resorts in many unforeseen, unintended effects (De Bruijn, ten Heuvelhof and in't Veld, 2002).

Multi-actor systems and map use in the Netherlands
While learning about policy analysis and doing the research on map use, we have tried to find our own position in the theoretic landscape of policy analysis. In this study, we consider map making and map use elements of designing and analyzing. In our case studies, the regions and spatial patterns under study can be considered to be complex multi-actor systems. The act of using a map is considered to be an attempt of getting a grip and designing for these spatial systems. Because multiple actors are involved that represent interests and local stakeholders, they participate in the designing of the maps while they simultaneously make up part of the complex multi-actor system that is object of their work. We consider all people who are involved in, and who influence the discussions around, maps to be potential designers of maps, may it be that some might change maps indirectly, through guidelines to a professional map maker, and others might draw maps themselves.

We focus on the policy analytical functions of the maps. Our focus is on the policy analytic aspects in line with Fischer's and Foresters 'argumentative perspective', in the context of the Dutch policymaking culture. This culture has a deliberative nature, and is often called the *polder model* because of the institutionalized form used where industry employers, employees and the Dutch government negotiate about collective employment agreements (and historical, how the Dutch landscape of marshes was transformed into a cultivated landscape of dry, agricultural polders in a collaborative process that took place among farmers, engineers and the government). This cultural context forms the background against which we conducted our study.

3 THEORETICAL BACKGROUND ON THE MAKING AND USE OF MAPS

Visualizing with maps

"We can talk about the power of the map just as we already talk about the power of the word or about the book as a force for change. In this sense maps have politics. It is a power that intersects and is embedded in knowledge. It is universal."

–J. B. Harley 'The new nature of maps: essays in the history of cartography' (2001)

"A graphic is never an end in itself; it is a moment in the process of decision-making. To construct a useful graphic, we must know what has come before and what is going to follow."

–J. Bertin 'Graphics and Graphic Information Processing' (1981, p. 16).

3.1 Introduction

The background of the first theoretic pillar of this study, policy analysis, was described in the previous chapter. We will now introduce the second pillar; that of maps and map use, called cartography or, nowadays, 'geographic information science'.

In this chapter we summarize the theoretical concepts and scientific developments that are relevant for our framework of analysis in the empirical part of the study. This information is given to provide background information for readers (policy analysts) without a cartographic background (and can be skipped by those familiar with the field).

First, we need to define precisely what a map is, section 3.2. This ontology of the map is placed in historic context in section 3.3, where the background of current cartographic insights and their developments are briefly summarized. The nature of policy maps as part of planning and decision-making processes is further analyzed,

and developments in the emerging practice of PGIS are described and related to this study. A discussion of the map as source for controversy or consensus in policymaking is given in section 3.4. The chapter finishes with a conclusion about the powerful nature of maps.

3.2 Ontology of the map: Maps as models

Definitions of a map

What exactly makes a map a map? "A map is a *representation*, normally to scale, and on a flat medium, of a *selection* of material on the Earth's surface" (International Cartographic Association, 1980). This is an 'old' definition of a map, given by the International Cartographic Association (ICA) in the 1980s. With the wide-spread developments in Information and Communication Technology (ICT) since then, many new possibilities have been enabled for map making and map use. For example, applications like Google Earth present an 'interactive GIS-map' in three dimensions on the screen, where the map-user perceives that he/she can 'fly' over a digital globe, obtaining a bird's eye view, and select the view and data that is to be projected. Other applications are used to provide up-to-date traffic information or advanced dynamic visualizations[1] over the Internet to a wide audience.

A renewed definition of the ICA (see below) takes into account the changes that have taken place in the professions concerned with geographic information, but still, whether it is a static two-dimensional image on paper or a dynamic three-dimensional representation on a computer screen, according to the ICA, a map must always be an image:

> "A map is an *image* of the geographic reality, constructed of symbols, that gives a selection of the phenomena or characteristics, that is the result of creating work and conscious choices of its creator, and designed for use when spatial relations are of special interest" (International Cartographic Association, 2003).

The cartographers Kraak and Ormeling (1987) use a simpler definition than ICA for defining maps. In our research, we adopt the definition of Kraak and Ormeling:

"*a map is a spatial model*"

Many parts of the ICA's longer definition (see above; ICA, 1980) of a map that we referred to above, are embodied in the term *model*:

- "constructed of symbols" (ICA); every model is constructed of symbols
- "that gives a selection of the phenomena or characteristics" (ICA); a model serves to isolate a selection instead of representing 'everything'

[1] See for examples of three-dimensional and/or dynamic terrain applications http://www.terrex.com/www/3DVisualization.htm, http://www.rug.nl/rc/hpcv/projects/landscape?lang=en, http://www.mcw.nl/expertise_diensten/virtual_reality.htm, http://www.gis.ethz.ch/research/gis/gis_3dgis.php, http://city.lcs.mit.edu//city.html

- "that is the result of creating work and conscious choices of its creator" (ICA); every model is created, at least in ones mind, otherwise one would not speak of a model, note: an object is not a model until someone designates it as such or thinks of it as a model
- "designed for use" (ICA); every model is designed for a purpose, and with spatial models it is clear that spatial aspects and relations are of special interest

When we are talking about a map, in daily practice, one intuitively associates these terms with familiar contours of map images that we encounter in our daily practice. These map pictures have a repetition of patterns in their appearance, which make a viewer immediately recognize the picture as a map. Moreover, the structure of boundaries, colours, drawing techniques, dotted lines, shading, etc., combined with a legend, a frame, and a title, together make up the grammar by which the reader can easily understand what information is being presented to him or her. This perspective on maps, as a type of (pictorial) language with its own grammar and vocabulary, is supported by Harley (1988, 2001) in his statement that maps should be considered as texts. We support this claim. We consider maps to be a way of developing thought, by the interaction between a person and a map, and by the communication facilitated between multiple people using a map.

The core of maps

Mark Monmonier, one of todays well-known cartographers, explains maps by their basic attributes: *scale, projection, and symbolization* (Monmonier, 1996, p.5). The scale tells us how much smaller, or bigger, the map is than the spatial reality it represents. The projection transforms the surface of the planet into a, two or three dimensional, map space, made up by a *system of coordinates*. According to Monmonier (p.18), graphic symbols complement map scale and projection by making visible the features, places, and other location information represented on the map. According to this description, the map does not necessarily consist of a physical image. The activities of scaling, projecting and symbol construction form the basis of an apparent map, whether in concept or in physical shape.

Next to these three attributes that make up a map, we highlight two additional core characteristics that are present in every map: legend, and boundaries. A legend is used to provide a translation of the symbolization (graphic variables) and the represented phenomena in words. A legend is used to define what is included in the map, and how these issues are isolated from their surroundings; boundaries between objects and patterns are formulated. These boundaries are projected on the latitude-longitude grid. Together, the legend items and the boundaries, possibly drawn as a gradient pattern with several subclasses, but still bounded, on different scales make up a map image that expresses a certain imagined representation of the real world.

Purpose

As we include the users/makers of the map, in our study the *intentional* aspect of map use, including map making, is emphasized. The social process of map-building begins with a certain objective for which the map is called into being by actors. From there, a

map is the result of a process of meaning construction; selecting what is important, how it is important and how the selected objects and phenomena are related. In focusing attention on the elicited and mapped parts, automatically other aspects are neglected and marginalized.

Maps may serve multiple objectives. For example, topographic maps are multi-functional information documents; produced with multiple purposes in mind. Monmonier (1996, p. 18-19):

> "When the purpose of the map is specific and straightforward, selection of map features also serves to suppress unimportant information. But sheet maps and atlas maps mass-produced by government mapping agencies and commercial map publishers must address a wide variety of questions, and the map's symbols must tell the user what's relevant and what isn't. Without the mapmaker present to explain unfamiliar details, these maps need a symbolic code based on an understanding of graphic logic and the limitations of visual perception" (p. 18-19).

Two major types of maps are distinguished in cartography according to their primary purpose.

1. Topographic maps, which are designed to represent the geographic landscape as complete and multi-functional as possible.
2. Thematic maps, which are designed to communicate a particular prepared message.

Both types of maps can be used in policymaking. Topographic maps may often serve as a base layer for subsequent layers of policy information.

As part of a report on "Five selected main theoretical issues facing cartography"brought out by the International Cartographic Association, Freitag (1993) distinguishes four main variant functions of maps. Freitag (1993, p. 3): "We may use the invariant information function of each cartographic model (or map) to develop a hierarchy of cartographic models according to the spatial, topical and temporal information content of the models, the format of information etc." Freitag's four main functions are (1993, p. 3-4):

1. The *cognitive* function, which 'encompasses all processes and operations and all models which generate and enhance spatial knowledge'
2. The *communication* function, which 'encompasses all processes and operations of spatial knowledge transfer from a map maker to a user'
3. The *decision support* function, which 'encompasses all processes and operations which –based on the evaluation of spatial phenomena – result in spatial decisions and spatial actions'
4. The *social* function, which 'encompasses all processes which result not in spatial, but in social behaviour and actions', i.e. such as a professional function that considers the social status of the map maker.

Elaborating on this theory, in research on exploratory cartographic visualization, MacEachren and Kraak (1997)[2] distinguish four 'prototype functions of map making':

[2] See also http://www.kartografie.nl/icavis/com_overview.html (last visited in December 2006)

exploration, *analysis*, *synthesis*, and *presentation*. According to MacEachren and Kraak, the first two functions, exploration and analysis, occur mostly in early stages of map making when the content that is to be mapped is ill-known. The activity mainly involves 'visual thinking' on behalf of individuals. At these times, the map image is often changed, which requires an interactive setting. When the map mainly represents known information, its dominant function is to provide the information and synthesized results to a wider audience. Here there is less manipulation of the map and emphasis shifts from individual thinking to multi-actor communication.

We recognize these theoretical conceptualizations of the use of maps in different stages or modes of working. We used Freitag's and MacEachren and Kraak's classifications of these particular general functions as a starting point, but aimed to remain 'open' to see how, and for what purpose, the maps were actually used in the policymaking settings that we studied.

Defining maps by what they do

Dennis Wood, author of "The Power of Maps", explains maps by what they *do* for people. He states that maps have power because they *work*. Maps "make present –they represent– the accumulated thought and labour of the past… about the milieu we simultaneously live in and collaborate on bringing being" (Wood, 1992, p. 1). According to Wood, a maps' effectiveness is a consequence of the selectivity with which it is used to represent knowledge. This is extended by saying the maps work by serving interests. These interests are embodied in the map as presences and absences. A map works because of this 'interested selectivity'; visualizing this choice of word or sign or aspect of the world, but not that one, in order *to make a point*. Monmonier (1996) also emphasizes this nature of maps in his book 'How to lie with maps', which is modelled after Darrel Huff's classic 'How to lie with statistics'.

Maps in everyday life

Maps exist in many formats and types, and with an inexhaustible collection of themes and subjects. For example, city maps, weather maps, geological maps, demographic maps. The making of maps is not only practiced by people who are educated as cartographers. While the field of cartography is focused particularly on those documents we call maps, other disciplines make use of the map artefact because the instrument is helpful in their practice of analyzing and designing. This accounts, in particular, for professionals like geographers and geologists, but also for landscape/urban designers, spatial planners, environmental specialists, ecotoxicologists, historians, hydrologists, etc.

Maps are also a subject of everyday life. Next to spatial planning purposes, maps are used for path finding, for determining a route for holidays, for orientation in a stretched complex, like a campus of a university, or even to hang on the wall as piece of art. In the Western world, we are educated to read maps in primary and secondary school. Using a large base map of their country hung on the classroom wall, Western scholars learn the grammar, symbols and conventions of cartographic language smoothly, and almost unconsciously. A leading, hegemonic, view of the earth's surface is taught through existing conventions about how to map, e.g. cities, roads, territorial boundaries, and the legends of maps.

The ideas of private land property and nations, as sharply bounded territories, are deeply embedded in today's Western culture and Western thought. Parcelling land and imposing private ownership upon it is one of the fundamental principles of capitalist tradition. Today, in many parts of the world, this system of governance has come into conflict with traditional, indigenous systems of land management. Where communities can be migrating hunters-gatherers, borders with neighbouring tribes can be flexible, and grazing grounds can be overlapping; maps will need to take a different form from that of Western maps. Examples of such alternative land management traditions can be found all over the world, ranging from South-Africa, East Africa, Philippines and French Polynesia to Canada[3].

Geographic Information Systems

With the developments in Geographic Information Systems (GIS) and broader Information and Communication Technology (ICT), the map has 'moved' from the analogue document into digital form. With this transition, most map information is no longer stored as a 'map document' in the literal sense. The information on maps is disassembled into separate objects, points and line information, and into stored definitions of coordinate systems and projection rules. The information about geographical shape and location is stored in combination with attribute data off all sorts, for instance, type of land use cover, amount of households within a district, address, and so on (see Figure 3-1). The map layers are built up of either points, lines and areas (vector data), or as a filling of a continues grid (raster data). Note: an extensive introduction to GIS is given in Longley, Goodchild, Maguire, and Rhind (2001).

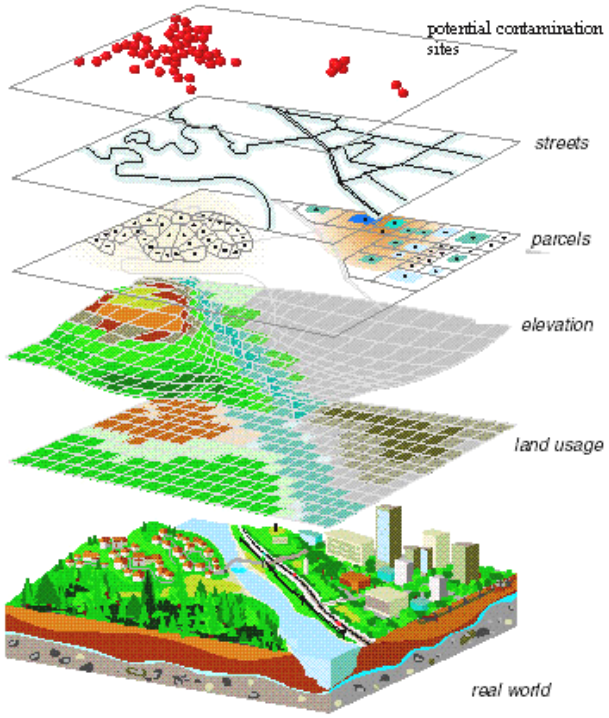


Figure 3-1. Example of how GIS information is built up from map layers overlaid above each other (source: web.mit.edu/kwk/www/BPHC.html)

[3] For examples of numerous case studies, see publications at http://www.iapad.org/books.htm and http://www.iapad.org/bibliography.htm

The user of a GIS can see all this information on the screen as a 'living' map; the user can make an analysis and if or when he or she wishes, print map images 'on the fly', and move within the map. In short: the user can interact with the map information. All kinds of phenomena can be stored in a GIS and retrieved by calling its legend item, in GIS vocabulary called a 'feature class'. Advanced spatial analyses can be made by combining different data layers using their shared geo-reference to a geographic coordinate system. A huge amount of geographical data can be stored, and cross-cuts of this data can simply be visualized by making a spatial query in the GIS application. A route-planner is an example of such a spatial query. According to many authors (see for instance Longley, Goodchild, Maguire, and Rhind, 2001), GIS has caused a revolution in the practice of map making and map use.

Distinguishing between maps and map images

In this thesis, we make a distinction between a *map* and a *map image*. A map, being a model, may be presented in the form of multiple images; for example, a page in an atlas can have one large map image that incorporates many legend items or a constellation of multiple small images. In the second case, the atlas page may consist of one theme, with the same landscape projected on all the images, but each time overlaid with one or a few different legend items used to show a different aspect of the main theme. In either case, one big image with many legend items overlaid or many small images portraying several legend items separately, we consider the image(s) on this atlas page to belong to one map model, and for the sake of visibility of overlapping objects and ease of reading, the map model might be published as one image or as set of multiple images.

We use the term *map image* when referring to an explicated, i.e. printed or projected, physical image of a map. A digital map, for example in a GIS, can have different appearances on the screen, caused by adding and leaving out legend items, etc, then the *images* on the screen change, but as long as only the visual representation is altered, the underlying *map model* does not change.

A map, or 'map model', is defined by its main theme, its legend items, its level(s) of aggregation, its projection, etc. The map images that belong to the same theme, group and type of map, are considered to be different images of one map. An example is a pair of map images that represent two different policy scenarios. We will refer to such pairs of scenario images as either one *map* or two *map images*.

Summary

In this thesis we characterize maps by:

- scale model
- projection, coordinate system
- symbolization, i.e. legend, graphic variables
- boundaries
- purpose –intention with map by makers and users
- selectivity and aggregation –related to purpose
- embedded in western thought by history and tradition of education
- geographic information systems: geo-information (map-pieces) in digital form
- graphical images

For a more thorough discussion of cartographic and geodetic aspects of maps, such as coordinate systems and projection algorithms, we refer you to the cartographic literature (Bertin, 1983; Ormeling and Kraak, 1987). A few basic aspects of cartographic theory are explained below.

3.3 Meaning construction with maps

In this section, we describe partial theories on maps as models. Firstly, we summarize the cognitive aspects involved in reading maps, based on the literature on visual information processing. Then, we describe the cartographic vocabulary and how maps can be deconstructed following the semiotics of Bertin (1967). This theory offers an explanation of how a map builds up a meaningful image for its audience, and is still relevant today for the training of professional cartographers – of map makers.

We found this theory useful for our investigation of the map images that were made and used in our empirical study; the cartographical classification of map aspects offers an instrument that can be used to distinguish between parts of the map and how they 'work' as part of a meaningful overall picture. We also used this theory in our analysis of map use in practice.

3.3.1 Get the big picture: visual information processing

People approach maps using their eyes, and process the visual information using their brains. This implies that theories on visual information processing, as part of cognitive psychology, can be applied to help us to understand how people use maps, or more precisely, how they process map information, technically and semantically. Examples of such theories are those about how people group information based on the Gestalt grouping principles of *proximity, similarity, continuation-and-closure and search for meaning* (see for instance Ching, 1990 or Anderson, 1980). According to this theory, people tend to group particular points/lines/areas/symbols on images based on how far these parts are apart, how much these parts resemble each other, whether it looks like they continue other parts, whether they seem to form a closed 'body', and whether they resemble a familiar object or image. From these grouped classes, the mind constructs relationships between the various elements of the composition expressed in an image.

These theories are used to try to explain how the eye-and-brain combination comes to an understanding of an image; with an early phase where the eye is steered to explore points/lines/areas/symbols on images, i.e. associated with an activity of 'discovering' something new; and a later phase, where the shapes and objects are recognised, i.e. found to be comparable with something familiar.

Deficiencies in human functions, such as colour blindness can cause a minority of people to have problems with reading maps. Colour blind people cannot differentiate certain colours, they miss part of the 'grammar' of the map. In practical map use, some of the involved actors may, literally, not be able to see the problem if it is visualized on a map of the wrong colour (see Walraven, 2002).

Bertin elaborated the theory about maps, with an analysis of how different graphic variables in diagrams and maps are built up to achieve a global perception of presented information; to 'get the big picture' (Bertin, 1967; 1981).

Map makers draw heavily on, explicit or implicit, conventions of how information is commonly classified and projected, which make a map easy to recognise. For instance, there is a legend; a contour used to express the frame of the map; categories and colours that are often to imply the same object or concept, such as blue for water and green for forest; and there are recognisable elements presented on the maps, such as the contour shapes of countries and the names of well-known places[4].

3.3.2 Semiotic analysis of the map instrument

Coordinate systems and Cartesian rationality

As Pickles (2004) calls it, the 'Cartesian grid' is very much embedded in the Western science way of thinking and reasoning. Cartesian rationality in the West plays a dominant role in how we structure and make sense of our surroundings. Location and physical shape define and imprint boundaries on the represented world. With most people in Western countries being educated to 'read' maps and learn from maps from childhood, we tend to think about the spatial dimensions of a map in the same manner as we look at the real world, taking the underlying assumptions for granted:

> "How big is it? How long does it last? These are the most basic questions a scientist can ask about a thing. They are so basic to the way people conceptualize the world that it is not easy to see that they imply a certain bias. They suggest that size and duration, qualities that depend on scale, are qualities with meaning, qualities that can help describe an object or classify it." James Gleick, Chaos: Making a New Science (p. 107)

Maps are examples of this Cartesian logic: a map 'catches' spatial patterns in a uniform, local or global, coordinate system, and agreements about this coordinate system set the basic standards for mapping.

Classification system of the map: legend, title and side-information

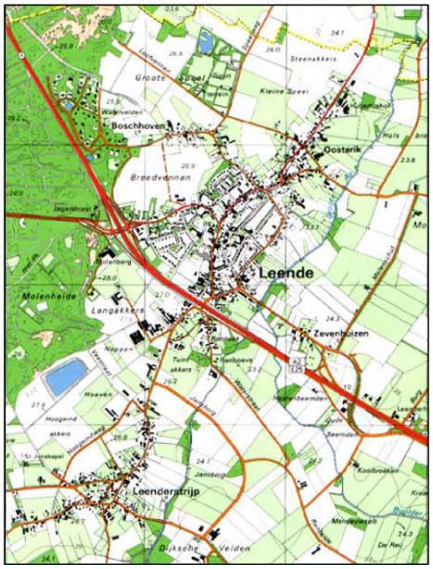
A map consists of a classification system. The space represented on a map is scaled down and simplified. Only a limited set of objects is represented on the map. On an analogues map, this classification system is defined by its legend. In GIS, it is defined by feature classes (the categories) and subsets of feature classes. The legend of a map denotes how a certain real-world phenomenon is symbolized on the map plane. The real-world phenomenon is referred to in words in the legend, and the visual appearance of this feature within the map frame is repeated in the legend using the same properties qua graphic variable, e.g. size, value, texture, colour etc. As such, the legend, together with the graphic variables, form an important part of a map's 'grammar': it forms the relationship between the mapped symbols and the real-world phenomena to which the map refers if a verbal translation is made. The exact verbal

[4] For people who have not been educated in reading maps, these conventions are not evident.

formulation of a legend item is important, for instance if there is a need to distinguish between ‘closed forest’, ‘open forest’ or ‘pine forest’ and ‘oak forest’. Often, a legend, or parts of a legend, are lacking. It is then assumed by the map maker that the meaning of the graphic variables used is self-evident for the map users, and that they can recognize the mapped features without an explicit legend.
The term side-information refers to all the information given on the periphery of a map image, or next to the map frame. Here, orientation is shown using a North arrow, the date of the map (up-to-dateness), its data sources, time-horizon (Wood: ‘thickness’ of the map), the author, etc. is added. Often, a map has a title that expresses its mayor mapped theme or its message.

Scale
In the field of GIS, researchers speak of scale and level of aggregation. Figure 3-2 shows how concepts like a highway and a built-up area are emphasized respectively de-emphasized in different map scales of the same map product. The shape and choices involved in conceptualization is thus scale-dependent. The ecological disciplines, more commonly speak of ‘grain and extent’ instead of scale. Grain reflects the smallest unit that can be measured directly and extent the largest.

In policy analysis studies, amongst others about ecological systems, much attention has been focused on issues of scale in the last few years. (Wiens, 1989; Longley et. al, 2001; Rotmans and Rothman, 2003; Karstens, Bots and Thissen, 2004); and recognition of the importance of scale in ecology has undergone a revolution in the last decade. Scale was the primary focus of the research called for by Wiens (1989) and modern ecological studies no longer tacitly imply that the “$1m^2$ quadrat” is an intrinsic property of nature. “Different patterns emerge at different scales of investigation of virtually any aspect of any ecological system” – (Wiens 1989, pp. 386).



Village of Leende, originally on scale 1:25.000. (Topografische Dienst)

Village of Leende, originally on scale 1:50.000. (Topografische Dienst)

Village of Leende, originally on scale 1:100.000. (Topografische Dienst)

Village of Leende, originally on scale 1:250.000. (Topografische Dienst)

Figure 3-2. An example of scaling and generalizing. All map images, originally on different scales, are now re-scaled to the same scale, representing an area of 3 x 4 kilometre within the map frame. Thus showing four times the same area at the same scale, but with different levels of generalization. (Source: Bureau Nieuwe Gracht, 2003, topography protected by copyrights hold by the Topografische Dienst).

Graphic variables

In his Semiology of Graphics, Bertin (1983, French edition Sémiology Graphique in 1967) founded a basic method for decomposing a graphics' visual characteristics. He structures the different ways in which points, lines and areas can be given their visual appearance, and how their mutual differentiations and similarities are marked in an image. In the logic of Bertin, the first characteristic of a point, line or area on a map is

its plenary position, its coordinates. Besides these obvious attributes, Bertin formulates six basic different ways to differentiate between visual appearances on a map: by variation in size, value, texture, colour, orientation and shape. This structuring of the visual variety or 'graphic variables' of a map can be used to decompose the patterns of a map. Bertin distinguishes these variables according to their visual shape and to what extent they structure information. (see Bertin, 1967 or 1983 for illustrated examples).

3.3.3 The relation between meaning construction and visualization of policy maps

Rather than using words, we will now aim to give an overview of mapping options through pictures. Taking two examples of map images, one of London UK and one of the Netherlands, we will give an idea of the variety of mapping techniques available for producing and using graphic and thematic concepts. The two examples used are policy maps used for spatial planning.

In Figure 3-3, the spatial spread of so-called 'strategic centres' over the territory of what is called Greater London is the primary *message* of the map to a reader. The more to the 'periphery' of the territory, less centres are seen on the map. The yellow shading is used to draw the readers attention. It is clear that these housing problems – the map legend explains that the yellow marked areas indicate that there is a housing problem in this territory– are concentrated in the immediate outer ring of the centre of London i.e. where the suburbs start. The map also tells the reader that these areas do not homogeneously form a ring based on geographical distance to the city centre. Thus the yellow colour identifies the location and size of the problematic housing areas. Overall, the picture is built up from a grid division of small raster cells. This gives the overall impression of a thematic, aggregate map that is assumed the result of a structured quantitative thematic mapping method.

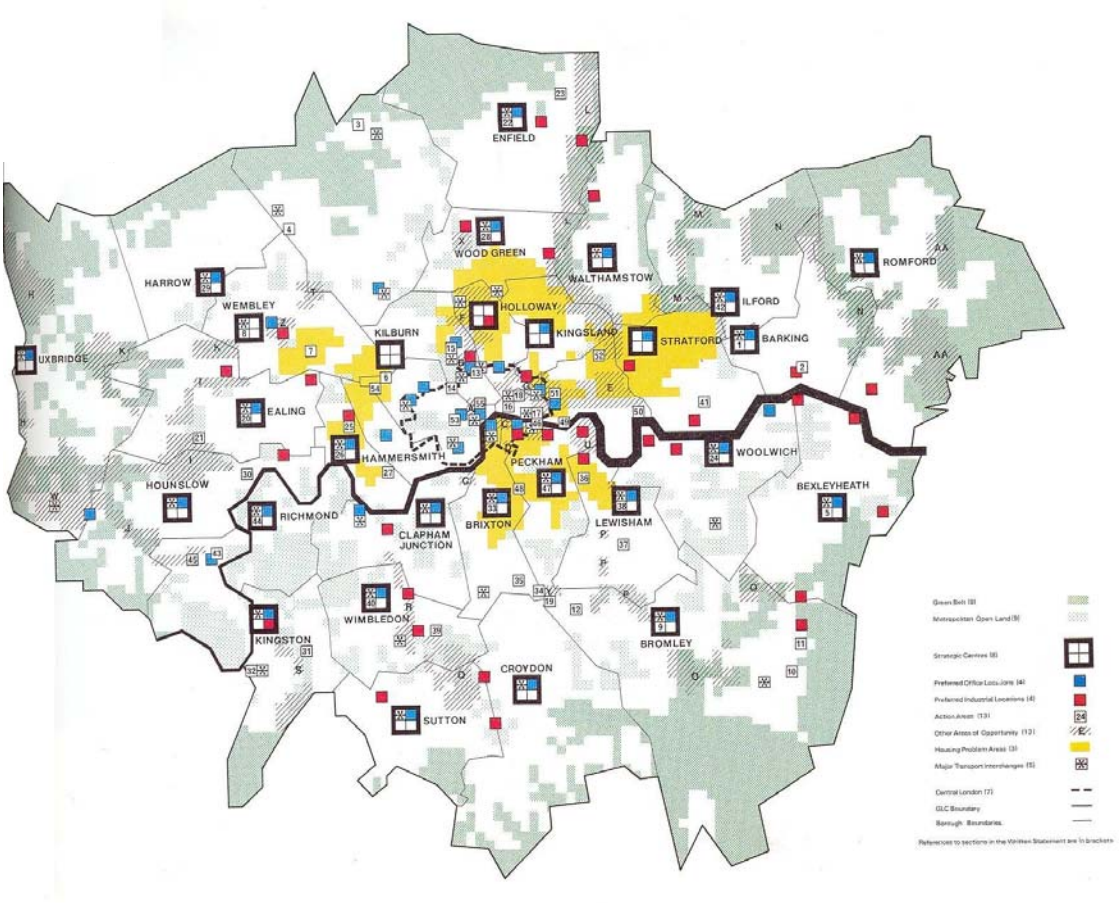


Figure 3-3. Key Diagram of the Greater London Development Plan, 1976. Policy map that presents, amongst others, areas with a 'housing problem'(in yellow), so-called strategic centres (in four-block squares) and the green belt around greater London (in grey) , laid out in a cubical raster. (Source: Greater London Council, reprinted from Gowling and Penny, 1988). See colour figure in Appendix 5.

In Figure 3-4, the relative relation between urban areas is emphasized. The tile of this map is "Urbanization". The message of this maps is that each of these spatial areas will be considered as strongly interconnected urban networks, and the development of the cities in these networks will be stimulated as part of the whole. The objective of the Dutch policy on urban networks is to stimulate collaboration and differentiation among the cities in a network. The yellow stars are used to denote 'key projects' that form the main focus of Dutch national policy. The map shows that four of the six key projects are located in the so-called Randstad in the western part of the Netherlands. Urbanization in this area is most extensive, represented by the large brown spot on the map, note: the map legend of Figure 3-4 explains that the brown spot reflects 'indicated, bounded bundling area' [of urbanization].

In an interview with a map maker from the responsible Dutch ministry in February 2004, we were told that relative arguments played a decisive role in the selection of urban networks during the process of developing this policy. As the landscape in the northern part of the country is relatively 'empty' and rural, the area around the main northern city, Groningen, is relatively urbanized compared to the rest of this county;

and while this area is far less densely populated than the other Dutch urban networks in urbanization terms, the landscape has an urban character relative to its immediate surroundings. An important argument to include this area as an urban network on this map –and thus in Dutch spatial planning policy– was that otherwise, it would be clear from this map that the Dutch national government was 'neglecting' the 'empty' north of the country. In practice, the area around the city of Groningen does not work as a network, but as a 'concentrated city': all activities are related to the single main centre, the one big city, so a policy based on urban networks does not really apply here. Using this example, the map maker explained how the classification of policy concepts does not always start from the point of substantive data collection, it can also result from political considerations.

For those wishing to look at a wider variety of extended literature on policy maps, see Keijsers and Witberg (2003), and Dühr (2005); and Ulied and Guevara (1999) and Faludi and Waterhout (2001) for specific stories on the making of European spatial planning policy and related map use.

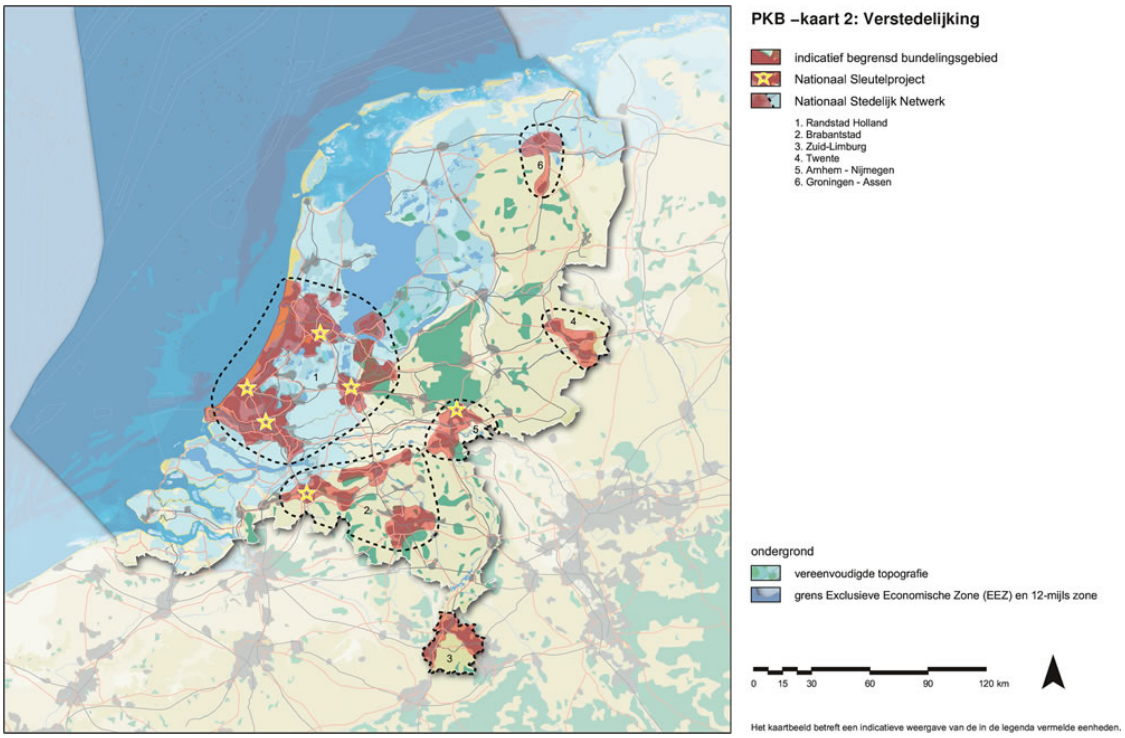


Figure 3-4. Policy map of urbanization in the Netherlands, part of the National Policy Document on Spatial Planning 'Nota Ruimte' (2004). (Source: Ministry of Housing, Spatial Planning and the Environment, National Spatial Planning Agency). See colour figure in Appendix 5.

3.4 Background: History of cartographic theory on map making

Map making is almost as old as human kind. According to the history of cartography[5], around 6200 BC in Catal Hyük in Anatolia a wall painting was made depicting the positions of the streets and houses of the town together with surrounding features such as the volcano close to the town. The wall painting was discovered in 1963 near the present-day city of Ankara in Turkey.
In the 16th and 17th century AD, when the Western European countries made their mayor discovery journeys and colonized large parts of the world, maps were a matter of national security and information capital. An example was the collection of memories and maps of Dutchman Linschoten (1562-1611), which provided precise information on the Portuguese sea routes to the East, of their re-supply points around Africa, and of their trading stations in the East (Schilder, 2003).

3.4.1 Birth of cartography as a separate academic discipline (1960 – 1980)

The 'classic' cartography of the 1960s – 1980s, focuses on the technical aspects of one map maker/map user interacting with his/her map, and the one-way traffic of a map maker's message to an (individual) map-reader. Jacques Bertin is seen as one of the founders of the modern 'science' of cartography with his Sémiologie graphique (1967). Bertin was an information graphics specialist who explained the sign system, and decomposed the cartographic variables (also translated as 'visual variables') that make up a map. According to Bertin, two exceptional attributes distinguish a map from other images.

- The supply of intrinsic information about spatial distribution i.e. a map is a scale model of distributions in space
- The construction of a constant and universal reference shape, such that all maps of the same region are immediately comparable, note: this characteristic relates to the strength of GIS for performing overlay operations

Bertin's theory focuses on 'objective' rules for communication with maps, decomposing map images into parts such as the 'graphic variables'. In the years to come, starting in the 1960s – 1970s, Geographic information Systems were developed, which had a huge influence on the field of cartography; and, in all these technological developments, the theory of Bertin remained applicable in computer cartography.

The different interpretations and approaches to maps are reflected by the different schools of thought to be found in cartography. Five main schools have been identified since the end of the 1960's (Ormeling and Kraak, 1987).

[5] See http://www-history.mcs.st-andrews.ac.uk/HistTopics/Cartography.html

1. *Cartography as a communication science*
   This view of cartography has found most supporters. Cartography is seen as a process to transfer knowledge on spatial issues. The map is seen as a means of communication. The mapmaker expresses his/her perception of reality through cartography into a map, map viewers base their perceptions on this map.
2. *Cartography as part of the science of sign systems*
   In this approach, cartography is considered a part of semiology (science of sign systems). The attention is focussed on the relations between symbols, and on their relative position in the image. Theory of this school systemised the relation between data characteristics and their graphical representation. Bertin (1967), a French cartographer, was a stimulator of this school.
3. *Cartography as a 'formal science'*
   This school, represented by Arnberger (1966), sees cartography as 'the science of logic, methodology and technique of map construction and map interpretation'. Cartographers should establish forms, methods and rules to represent spatial data correctly in maps.
4. *Cartography as a 'cognitive science'*
   The study of geographical patterns is central in this school. Cartography is seen as a method of study. According to this view, cartographic modelling aims to represent and analyse spatial systems of different complexity.

Ormeling and Kraak (1987) combine the communication and sign systems views in their cartographic approach, called the 'Utrecht school of cartography'. Influenced by the development of Geographic Information Systems (GIS), Kraak and Ormeling define cartography as "information transfer based on a spatial database, which can be viewed as a model of the geographic reality in itself."

3.4.2 The emergence of Geographic Information Systems (1970- present)

Advancements in computer power and software applications have revolutionized map making

With the introduction and spread of GIS applications to universities, governments and businesses, increasingly advanced tools and applications have been developed. The larger GIS software packages are Arc Info, Arcview and ArcGIS of ESRI, MGE and Geomedia of Intergraph and MapExtreme of MapInfo. In the late 1990s and early 2000s, the database software was linked to the processing of geographic information, in particular with database software Oracle Spatial. Together, the market parties formed an alliance called the OpenGIS consortium to deal with, amongst others, technical issues such as data exchange and standardization of data formats.

With the basic available GIS-software, governments could replace former analogue map rooms by digital ones. Furthermore, the nature of digital data storage and software processing enabled the embedding of GIS-components in larger policy analytic software models. An example of such a policy analysis model is the toolbox of components developed by Guy Engelen et. al., Research Institute for Knowledge Systems bv (RIKS). This toolbox combines software components with advanced

algorithms such as Cellular Automata, System Dynamics modelling and Raster GIS. Applications of expert models developed by RIKS are the Environment Explorer and WadBOS.

WadBOS is a decision support system (DSS) to support policymaking in the Dutch Wadden Sea, developed by the National Institute for Marine and Coastal Management and RIKS. (Engelen, Uljee and Van de Ven, 2003) See Figure 3-5. The Environment Explorer is developed by the Dutch National Institute of Health and the Environment (RIVM) and RIKS, and currently being used to construct and explore various scenario's, and assess influences of policies on spatial dynamics in land use, amongst others.

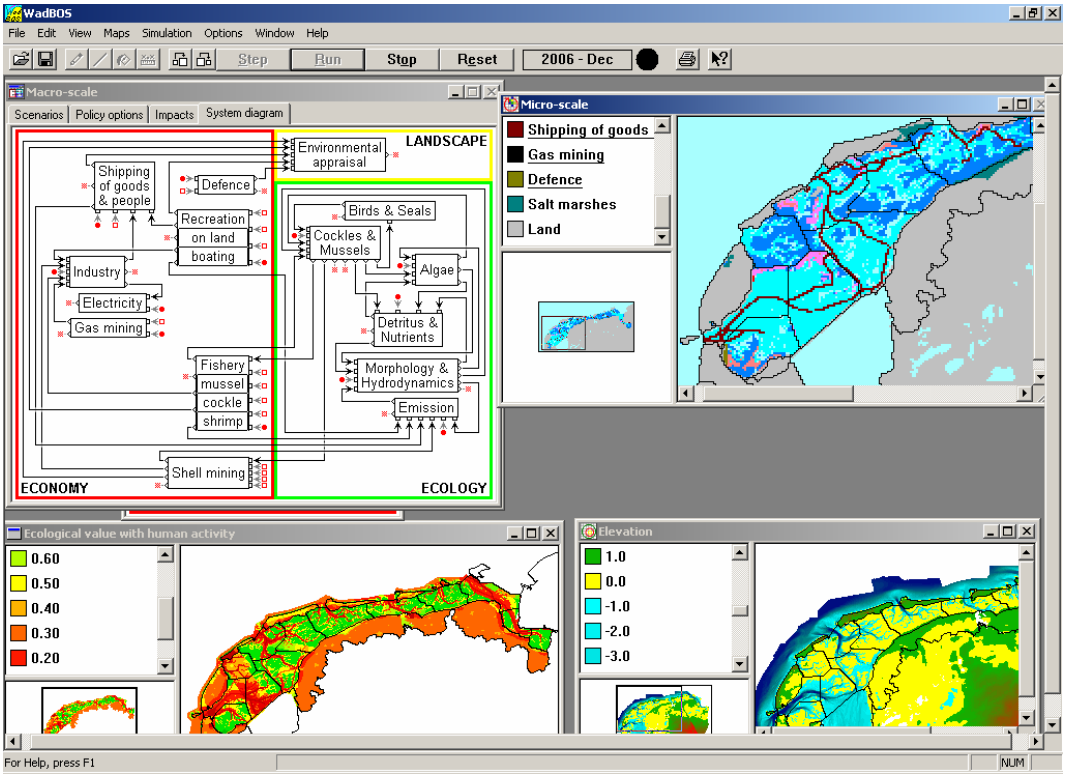


Figure 3-5. Screendump of the advanced digital policy analysis model Wadbos that incorporates raster-GIS technology. (Source: Van Engelen, RIKS, http://www.riks.nl/projects/WadBOS)

Management of GIS in organizations

With the introduction of GIS in many governmental organizations, both for strategic planning purposes and operational shift of analogue maps to digital ones for efficient administration, archiving and distribution purposes, many problems were encountered. GIS projects tended to be complex, delayed, costly, etc. Meanwhile, technological developments were at such a pace, that any large project was bound to be old-fashioned on the day of delivery. Medyckyj-Scott and Hearnshaw (1993), amongst others, looked at the human factors in the implementation of GIS in organizations. Issues such as the value and price of data, open access and intellectual

property rights, interoperability of data standards, and organizational aspects of working with digital geographic information are high on the policy agenda of multiple government departments.

3.4.3 The constructivist turn in cartography (1990 – present)

In his essay "Maps, Knowledge, and Power" (Harley, 1988, reprinted in 2003), Harley was the first cartographer of his time to envisage 'cartographic images in terms of their political influence in society' (Harley, 1988, p. 277)
Harley opposed cartographic theory that projected maps as "scientific" images, a view which, till then, had dominated for centuries (Harley, 1988 p. 280). Before Harley, cartographers had theorized about the distinction between 'correct' and 'false' maps and 'objective' versus 'propagandistic' maps. But Harley perceived all maps as *value-laden* images. Adopting the ideas of Michel Foucault on 'les mots et les choses', Harley (1988 p. 279) saw cartography as a socially constructed form of knowledge and power:

> "Just as 'the historian paints the landscape of the past in the colours of the present', so the surveyor, whether consciously or otherwise, replicates not just the 'environment' in some abstract sense but equally the territorial imperatives of a particular political system."

Harley's critique concerned the 'largely positivist way of cartographic thinking' and the metaphor of the map as a 'mirror of nature' that was represented in the 'voluminous literature on cartographic communication and cognition' (1989b, p. 6):

> For there to be a socially relevant cartography [...] there has to be a place in cartographic theory for interpretations that embrace a social dimension. We need to recognize unequivocally that the map is a socially constituted image and our definition of the artefact itself should reflect that recognition.

Harley formulated his proposal for a new perspective on cartographic thinking in the form of three "eminences" from which he traced 'some of the more specific ideological contours of maps'.

1. Conceiving maps as a kind of *language*. In this piece, Harley shows the political significance of statements made by maps (sometimes only by 'simply naming or locating a feature on a map').
2. The *'deeper' level of meaning* in maps, based on a distinction of levels of interpretation in iconology. This deeper level exists next to a 'surface' or literal level and is usually associated with 'the symbolic dimension in the act of sending or receiving a message.' Harley (1988 and 2003, p.54): "It is often on this *symbolic* level that political power is most effectively reproduced, communicated, and experienced through maps."
3. A perspective gained from the sociology of knowledge, for which Harley refers to Michel Foucault and Anthony Giddens to make his point that map knowledge is a

social product, where maps are an example of "authorative resources"[6], that work as instruments in social systems, and as such not only represent the world as seen from the viewpoint of governments, but also through their role in society reinforce the power of government. In words of Harley, maps 'manufacture power'.

Pickles (1995, 2004) went a step further than Harley. He took up the concept of mapping and cartographic practice as a 'way of seeing' or *spatial thinking* generalized for all practices of modern science. Pickles (2004, p.97): "Indeed cartographic reason seems to have been so powerful a force in the sixteenth and seventeenth centuries that it came to signify the most important forms of reason. To map was to think."

Pickles uses many examples of the workings of maps in the context of various Western practices, to show how maps and map making produce space, because 'maps precede territory' (2004, p. 145). Pickles uses stories and pictorial examples in which he links various elements of our 'everyday society' and Western cultural history. He criticises the taken-for-granted assumptions embedded in what he calls the cartographic gaze and the Cartesian grid, and the social implications attached to them.

With the example of the grand academic project Digital Earth Initiative (DEI), and emphasis on ever continuous surveillance of the earth surface, Pickles argues how geographic information technologies change the way governments operate. Not only the state of the environment is observed, also the public sphere is guarded with cameras and tracing cell-phones, thereby exposing ignorant citizens to more and more (state) surveillance. The information industry of geographic information, meanwhile, has evolved into an eminent business market in its own right.

3.4.4 Spatial Data Infrastructures and virtual globes (2000 – present)

The development of Spatial Data Infrastructures is a 'booming' industry in current research and public government institutions. This concept comprises the stimulation of storage, distribution and interoperability of spatial information through standardized and institutionalized infrastructures. Stand-alone geo-databases of governments should be embedded in such networks. Professionals who call for investments in SDI development, regard geographic information as vital to make sound decisions at the local, regional, and global levels (Nebert, 2004, p. 6-7). An example is the ambitious Global Earth Observation System of Systems (GEOSS) project. This project aims at making observation data from remote sensing satellites and other earth monitoring devices available to many users at a global scale. To quote a press announcement about the project, (http://www.epa.gov/geoss/, visited December 2006): "On February 16, 2005, 61 countries agreed to a plan that, over the next 10 years, will revolutionize the understanding of Earth and how it works." With initiatives like these, the inquiry and visualization of geospatial data has become a global, internationally embedded practice. In our view, the essence of this practice is still to 'catch' phenomena spatially distributed over the earth' surface, and thus to

[6] Giddens has introduced the concept of authoritative resources, of which the storage involves above all the retention and control of information or knowlegde – which is usually controlled by the state.

map, while the surveyors' instruments have changed from theodollites and levelling instruments into a collection of digital tools and technologies.

Today, one of the fastest spreading tools for map visualization, viewing and publishing/media broadcasting is *Google Earth,* and its 'simpler' 2-dimensional version *Google Maps*. The journal Nature on February 16th, 2006, titled "Mapping for the masses", focused on the development of what they call 'virtual globes' on the web. According to the editorial of Nature, "the opportunities and power of GIS are expanding rapidly because of converging technological trends." (Nature editorial, 2006, p. 763). According to a related news feature (Butler, 2006, p. 778),

> "one of the traditional roles of GIS has been to provide data to support decision-making. And environmental groups that have discovered GIS are starting to use it to change the balance of power in public debates. As more citizens become concerned about their local environment, easy-to-use virtual globes will facilitate the communication of spatial information between stakeholders and government agencies."

The creators of the 'virtual globe' Google Earth foresee that millions of people –"as many as possible" – will use and produce data sources, attracted by user-friendly features for viewing and inserting data (Butler, 2006, p.777, reporting an interview with Brian McClendon, director of engineering at Google Earth). The organization of Google Earth hopes that through this global use –and information insertion– consumers, scientists and others will construct a virtually unlimited network of spatial information or a 'virtual globe'. However, at the time of this research, the use of maps in the form of such virtual globes was not yet widely embedded in the practice of policymaking in the Netherlands.

For our research, the current developments in SDI's and virtual globes are a contextual factor, as in both of our cases spatial data of geo-databases is accessed, retrieved and used. However, in the cases we focus on observing multi-actor dialogues over maps, which take place in face-to-face meetings. Thus, the technology of the underlying ICT-infrastructure (with its complex and advanced data formats, interoperability standards, search-algorithms, etc.) is not of primary importance in this study, rather it is a tool.

We mention the developments in SDI because this stream in research has some tension with the PGIS movement that will be discussed in the next subsection. While the SDI movement seeks to achieve standardization and unity among practices of different communities and different nations, the practitioners united under the label PGIS seek to establish codes of ethics regarding how to collaborate with local communities in mapping exercises, with the local community being in charge of conceptualizing their surrounding in their own concepts. Although the two movements are not mutually exclusive, a distinction between a top-down frame of mind (SDI) and a bottom up philosophy (PGIS) can be distinguished.

3.4.5 Participation GIS and counter mapping (2000 – present)

The term (Public) Participatory Geographic Information Science was first expressed in a Specialist Meeting held at the University of California, Santa Barbara. As offspring of this conference, the book 'Community Participation and Geographic Information Systems' was published in 2002. This book sets out the foundations of PPGIS or PGIS (Craig, Harris and Weiner, 2002).

PGIS is considered to be: (1) a study of the uses and applications of geographic information and/or geographic information systems technology; (2) used by members of the public, both as individuals and grass-root groups; (3) for participation in the public processes (data collection, mapping, analysis and/or decision-making) affecting their lives. While the term PPGIS refers to many community projects in local neighbourhoods in Western countries, the term PGIS seems especially driven by the aim to do right to indigenous communities; to empower them (instead of representing them to get justice for them), and to let them find ways to improve their livelihood. The advocative use of maps by marginalized groups to stand up for their rights, is also called '*counter-mapping*' (see amongst others Pickles, 2004; Rocheleau, 2006).

In 2004, Giacomo Rambaldi founded an Open Forum on Participatory Geographic Information Systems and Technologies on the Internet, allowing practitioners and professionals worldwide to share information, ideas and experiences about Participative GIS practice and research. He defines PGIS as follows (Rambaldi, 2005):

> "PGIS is a practice resulting from a spontaneous merger of participatory learning and action (PLA) methods with Geographic Information Technologies and Systems. It builds on the integrated use of tools, methods, technologies and systems ranging from simple sketch mapping, to participatory 3D modelling, collaborative aerial photo-interpretation, and the use of GPS and GIS applications. With PGIS applications, indigenous spatial knowledge is composed in the form of virtual or physical, 2- or 3-dimensional maps that are used as interactive vehicles for spatial learning, information exchange, support in decision making, resource use planning and advocacy actions."

The concept has become popular especially in developing countries and in work among development aid organizations and local (indigenous) communities, such as illustrated in Figure 3-6.

Figure 3-6. Village elders identify important geographical landmarks of the boundaries of Sasatgre, North-East India, at a 3-D mapping exertion (Source: Pafid, 2003. For more examples of PGIS practice in developing countries see, amongst others, Technical Centre for Agricultural and Rural Cooperation (CTA), 2004; Koti and Weiner, 2006; Rambaldi et. al. 2006; and www.iapad.org).

The concept of PGIS is value-laden. The PGIS conference in 2005, Mapping for Change, Nairobi, referred to an ethical code of conduct (Rambaldi et. all., 2006). According to Rambaldi and Weiner (2005), PGIS practice has to be embedded into a 'well thought out process' including:

- understanding people's questions
- assessing the existing legal/regulatory framework
- jointly setting the objectives, defining strategies and actions including choosing appropriate spatial information management tools
- taking into consideration the issues of connectivity, human skills and capacities of actors concerned with the use of to-be-established systems

PGIS is thus a normative, value-laden concept. Rambaldi and Weiner (2005) eloquently state how, in their view, PGIS can contribute to good policymaking:

> "Sound PGIS practice empowers communities through visualizing and representing peoples' spatial stories (examples include indigenous land mapping, participatory 3D modelling, multimedia GIS, etc.). Planning and/or development agencies find data in this format very useful. Visualising geo-referenced indigenous spatial knowledge helps communities entertaining peer-to-peer dialogues and promotes their issues and concerns vis-à-vis planners and decision makers. The integrated and multifaceted process of which PGIS is a component, gives communities confidence in interacting with outsiders and adds authority to local knowledge."

We regard our empirical studies as instances of where PGIS is being practiced. A difference with the mainstream in this literature is that we did not focus on empowerment of a marginalized group of stakeholders. We also did not study indigenous communities or focus on regions in developing countries (although we consider the Dutch people, who made up the environment for our empirical observations, an indigenous community in their own right). Rather, we focused on

the Dutch government and how it employs maps to cope with spatial policy problems in collaboration with other (public and/or private) stakeholders. Another difference with (P)PGIS is that we do not necessarily focus on the inclusion of 'the public' at large in the policymaking process. Furthermore, we do not have a normative focus.

As mentioned in subsection 3.4.2, in our view the theory driving the developments of PGIS are in some aspects different, and sometimes come into conflict with the theoretic underpinnings of the developments labelled SDI. In this chapter we have aimed to position our research perspective in these fields of theory about maps and Geographic Information Science.

3.5 Maps as source for controversy and consensus in policymaking

Congruence or controversy over maps

In "Drawing the line, tales of maps and carto-controversy' Mark Monmonier discusses a sample of controversies over maps, ranging from historical 'famous' controversies such as the debate about the Peters projection (with a debate about superiority of projections and relative sizes of 'the North' and developing countries), to more local examples of siting nuclear waste dumps, designating flood plain areas and the creation of legislative districts in America. These tales of carto-controversy, as Monmonier calls them, 'opur widespread ignorance about how maps work'.

Maps may help bring the policymaking process a step forward by contributing to the gradual building of consensus. Consensus building can be aided by using/making maps, amongst others by drawing multiple alternatives on maps, by discussing boundaries on the map, or by visualizing the perceived problems of various actors on maps.

However, the same maps that contribute to consensus in one situation can be highly disputed in other settings. Evident reasons why actors criticize these maps are either because they really do not trust or believe the maps, or because the maps hurt their interests, and therefore the actors do not want to accept the map. The maps are then liable to become a centre of discussion. While in some cases such a discussion results in a clarification of issues and methodology, and results in deeper understanding, in other cases the discussion does not lead to a resolution and the controversy remains. Both scenarios of how a map might contribute to the ongoing decision-making process are viable. Both are logical. Whether use of a map results in the first or the last scenario, is often uncertain at the time the map is made.

There are some situational settings that we can imagine might contribute to a map's status as consensus-building or of discussion-evoking tool. For instance:

- If the map is made after an agreement has been reached; the map is the registration of the agreement, for example on the establishment of a nature reserve on a certain spot. The actual consensus is already apparent, when the map is produced. What is on the map is no surprise, and the map is already apparent in people's mind (for

instance, the actors have thought about an old map with the territory on it, but not classified yet as nature reserve).
- If the map is produced without consulting any of the participating stakeholders, naturally, an actor will have a more critical approach towards the map when it is made without its cooperation and the presented information is unfavourable for the actor's position in the process.

In practice, there are many subtle influences that contribute to the effect of maps during their usage. The success of a map can be the product of long debates and much preparations, before the actual map is published. We believe that the effect of a map can, to some extent, be estimated given knowledge of certain contextual conditions of an actual situation in practice. Our aim was to get to know and understand this process of (subtle) map use in practice.

Rhetoric and propaganda

In the literature, much has been said about the rhetoric and propagandistic nature of maps. In 'Deconstructing the map' (1989) Harley opposed the notion of 'rhetoric' as a reference to 'excesses' of propaganda mapping or advertising cartography. Harley (1989, p. 11): (italics added)

> *All maps strive to frame their message in the context of an audience*. All maps state an *argument about the world* and they are propositional in nature. All maps employ the common devices of rhetoric such as invocations of authority (especially in 'scientific' maps) and appeals to a potential readership through the use of colours, decoration, typography, dedications, or written justifications of their method. Rhetoric may be concealed but it is always present, for there is no description without performance. The steps in making a map –selection, omission, simplification, classification, the creation of hierarchies, and 'symbolisation' – are all *inherently rhetorical*.

Monmonier (1995) makes a distinction between maps that can be considered to be correct, that is, their premises are transparent and analytically sound, in his words, 'maps must tell white lies', and propagandistic maps, that distort reality further than they need or should. He states that cartographic propaganda is not as easily seen by the wider public as verbal propaganda, as people are commonly not aware of the selectivity of maps. Monmonier (1995): (italics added)

> (Inside cover): "Approached with none of the scepticism people bring to words, maps are rarely recognized as the ideological symbols they are. In fact, although few people realize it, maps can be powerful instruments of propaganda in science and public affairs, and they have had a disturbing effect on our view of the world, our health, and the impact of our votes."
> … (p. 297): "Subtle cartographic propaganda is common in many contexts and frequently misleading citizens who are *unaware* that maps are *highly selective and necessarily biased*. Moreover, a *stylish or intriguing map* becomes a *flag to rally around and parade behind*. When a cartographic banner passes by and its

supporters shout, bystanders take notice. Therein lies much of the power of maps – enchanting displays divert attention from their authors' motives."

3.6 Conclusion: Power of the map

Maps as powerful models

Maps are powerful models: but why are maps so powerful? There are several arguments why maps are special instruments. From an analysis of theories on maps and practice with maps, we have formulated six arguments as to why maps are powerful –or what makes them to be perceived as powerful.

One, they are external representations of how we view our spatial surroundings. By making our thoughts about the real world **explicit** and **fixating** these 'mental models' on paper or a digital device, others can take a look at them and respond to them. The map serves *as an artefact facilitating communication* between people.

Two, the map can make a surrogate for the world so that we can *see more in one view*. It is the **scale** that is at the core of the map, and which gives it its strengths. A map with a scale of one to one would not be much use for most purposes. Using a map, we can overlook many aspects of our nation at one glance. In reality, at about 2 meters of the ground, we can see, naturally, about 5 kilometres. Larger areas cannot be seen at one glance except from space[7]. Inherent to the character of maps as a scale model is the a specific feature that, within the map frame, all space represents something else; the 'blank spaces' in between lines on a paper map, also represents a location in the real world, and about these locations, the map tells us that the categorised phenomena from the map legend are NOT present at this location. Sometimes what is more important is what a map does not show, than what it does not tell you (Harley, 1988).

Three, the **visual** nature of maps employs the cognitive capacities of the human eye-brain system. We can translate the shapes we *see* in three dimensions in the real world onto a two-dimensional plane naturally and as a result of our early education. Naturally and by evolution, we have learned to rely to a great extent on our sense of vision, yet our eyes sense the three-dimensional world on a two-dimensional plane caught on the retina. In this way, our own vision-system works as a mapping process. All the visual signals that reach our retina (if the rods and cones function correctly) get transported to the visual cortex section of our brains, where they are interpreted. The graphical representations of a map follow the same process –the map is a 'shortcut' for the eye. A difference between an aerial photograph and a map is that a photo simplifies by the rules of resolution and light-sensitivity of the lens and film, while a map maker elicits and simplifies the spatial structures him or herself. He or she makes his/her choices based on meanings, purpose, etc., instead of light and resolution; and a map maker tends to build up a map in such a way that the artefact forms a 'natural' or usual representation of –our visual experience with– the three

[7] Note: This is also how small-scale base-maps are produced; from space, by aerial photography and remote sensing techniques.

spatial dimensions of the world by emphasizing shapes, locations and relations. Formulated differently, maps *represent our intuitive way of thinking* about our surroundings; the shapes of the real world are projected on a map like the shadow of a tree on the ground.

Four, maps attract attention as **pieces of art** with their visual appearance, artistic in composition, layout and collection of colours and patterns. Mathematicians can see the beauty in a formula, as they are extensively trained to read through and understand the language of the formulae: but for others than professionals of the same discipline, this *beauty* is less visible. Maps can be hung on the wall for everyone to enjoy.

Five, maps have gained an **authoritative status of their own**. Probably because they have been, historically and to date, such important documents, produced at high cost in the past and decorated to please emperors, kings and leaders of countries (Monmonier 1991, Wood 1992). As official, important government documents, maps have a long history. In historical times, maps were of vital importance to world leaders, for example to find 'routes to the East' and to take over profitable colonial trade routes. Maps have also been important in the Western world as a means to *register land ownership*. In addition, because education and science have used maps at large in *education and research* methods and because it is nowadays an almost implicit fact (taken for granted agreement) that these methods are valid and scientific, maps have the reputation of being sound and objective.

Six, maps are **political**. Coupled to private systems of land registration, public policy workers working on spatial issues have a long history of using maps. This varies from: strategic mapping for planning during a war; agreements on dividing natural resources –and human resources– based on the division of governmental territory; the planning of new canals and other transport routes (such as the secret 'route to the East' in the colonial era, or regional canal and roads); the locating of large facilities such as nuclear power plants and national parks; and finally, to supporting agreements on restrictions and obligations on using land for specific purposes such as agriculture and housing. Political decisions over maps often result in far-reaching changes in land use and in landscapes.

Maps as vehicles embodying stories

As soon as a map comes of the GIS or drawing table, it starts a 'life of its own' as it is used and changed during a policy process. Besides functioning as source of information, maps facilitate the communication between specialists, engineers, policymakers and stakeholders. Modelling issues into a map, and naming and labelling spatial relations allows the actors to become involved in an interdisciplinary 'platform' where the same map-language serves as the glue between different worlds. Maps have become physical objects, or artefacts, which actors use to tell stories and send mutually comprehensive messages. The selection, conceptualization, aggregation, generalization of data and how it is visualized, brings a subjective 'framing' to the issues communicated through the image.

How powerful this can be, can be illustrated with an example of a famous map that, through its powerful message, has influenced policy on a global scale. To our personal knowledge, the policy map images of the 'ozone hole' may be the most well-known and reprinted map image that changed world policy in the twentieth century.

In this example, the problem of lower measured levels of ozone is visualized using a dark spot, and because this region is believed to let through harmful solar radiation, the metaphor of a "hole" is made. The maps elegantly support this metaphor, particularly when shown in sequence to show how fast this hole has grown. (See Figure 3-7).

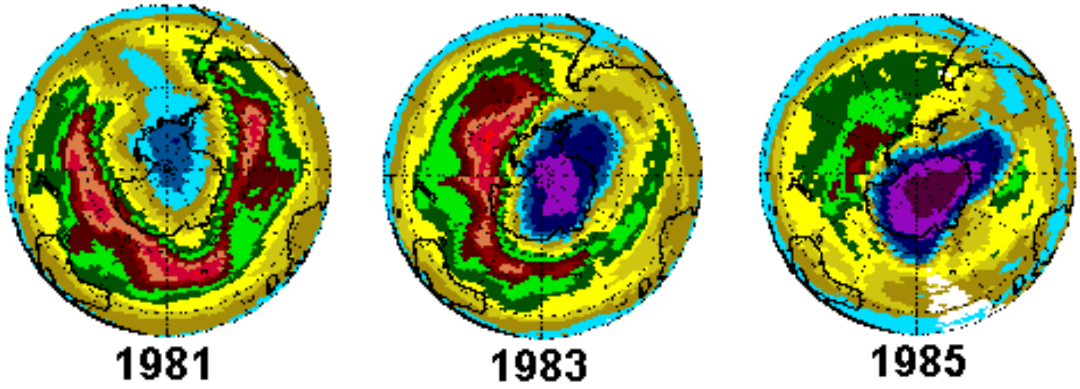


Figure 3-7. Historical map images of the ozone hole's rapid growth by NASA's Total Ozone Mapping Spectrometer (TOMS). Source: http://www.theozonehole.com/ozoneholehistory.htm. (visited November 11th, 2004)

4 THE NOTION OF FRAMING AND CONCEPTUAL MODEL

Framing with maps

"A designer makes things. Sometimes he makes the final product; more often, he makes a representation –a plan, program, or image– of an artefact to be constructed by others… Drawing and talking are parallel ways of designing, and together make up what I will call the language of designing."

–D. Schön in 'the Reflective Practitioner. How professionals think in action' (1983, p. 78-80)

4.1 Introduction

Our framework and method of analysis is presented in this chapter based on an overview and discussion of the research approach and the particular theoretic starting point.

In section 4.2, our research approach is explained in general terms as belonging to the stream of 'discourse analysis' in policy analysis. In section 4.3, we report our contemporary findings from the literature study on the subject of framing and frames, and we clarify the terminology used in this thesis. Our conceptual model is described in section 4.4, this model was used to analyze map use empirically. This conceptual model is expanded in section 4.5 and used to evaluate the effects of using maps. The chapter ends with an explanation of our approach to data collection and data analysis (section 4.6).

4.2 Discourse analysis

Discourse analysis as the roots of theory on frames and framing

We have adopted the methodology of discourse analysis for our research approach. The concept of 'frames' (and 'framing') is closely related to its epistemological roots

in discourse analysis. The explanation of the concept 'frame' by Rein and Schön (1994) embodies the presupposition that meanings are developed by social groups or communities, by social interaction. The empirical studies of 'frames' and 'framing' by Rein and Schön are carried out as an analysis of the discourses at hand, where the authors reconstruct the various narrative stories as they are told, these were then compared and (by cross-analysis) evaluated.

Different names are used by different authors to refer to this same group or type of analysis. While Van Eeten (1999), Howarth (2000), Hajer (2002), the European Consortium for Political Research (2002) and Van den Brink and Metze (2006) use the term 'discourse analysis', Stone (1988) and Roe (1994) talk about 'the construction of narratives', and Schön and Rein (1994) describe 'the practice of frame reflection'. All these methods are used to interpret an ongoing policy process, and they reconstruct positions and story lines on the basis of explicated statements and other observable spoken/written words.

Nature of discourse analysis

Although the idea of studying a particular discourse or debate stems from linguistic studies, the nature of the discourse analysis in policy studies is different. In linguistic research methods, the standard practice is to code words and to look at micro-patterns inside a certain text, which is possibly enriched with connotations about the verbal pronunciation. In policy studies, the focus lies on a more generalized level of abstraction. Empirical lines of argument are summarized into different 'stories' (also called narratives, perspectives, storylines or key-argumentations). These narratives are used for relating different positions in the debate to each other, and sometimes serve to explain why a certain viewpoint (narrative) dominated or 'won' the debate. Next to the used concepts underlying a particular story, the institutionalized relations of power serve as explanatory factors.

The type of discourse analysis, as it is applied by policy analysts, is based on the philosophical ideas of Foucault (1971). Foucault looked at the 'macro-level' of structural orders of discourse; by these structural orders, Foucault meant broad historical systems of meaning that included any meaningful political practices (referred to as discursive practices), which are relatively stable over considerable periods of time.

While other authors use discourse analysis to study a particular policy *issue*, Fischer and Forester (1992) use their analysis to study their subject of the practicing policy *analyst* and *planner*, calling this type of analysis a study of 'argumentative practices' (p.2.):

> "To see policy analysis and planning as argumentative practices is to attend closely to the *day-to-day work* analysts do as they construct working accounts of problems and possibilities. […] We can evaluate the analysts' arguments not only for their truth or falsity but also for their *partiality*, their *selective framing* of the issues at hand, their *elegance* or crudeness of presentation, their *political timeliness*, their *symbolic significance*, and more." (Italics added.)

The type of analysis described by Fischer and Forester (1992) and Schön and Rein (1994) was adopted in this research for studying the use of maps by practitioners. This analysis focuses on aspects as described by Fischer and Forester in the quote above (see italics in quote) and making use of the theory on frames and framing as described by Schön and Rein. The method of inquiry and interpretation is further explained in section 4.6.

4.3 Theory on frames and framing

Our theoretical starting point, the concept of frames is eleborated in this section. Today, the use of frames and framing, and the advice to reframe difficult policy choices, seems popular, both in the field of social sciences and the area of policy and policy advice. Fuelled by the bestseller on political framings "Don't think of an elephant!" by Lakoff (2004), framing has become a hype in political discourse in the United States. The theory behind this notion has developed through the years, and is in itself not new.

4.3.1 Framing and map use in literature

In 1996, Faludi articulated the 'arising issue of crossing frames' between urban designers, planners and the public. Faludi (1996) argued that while the power of images is recognized, their reputation as 'the glue holding policy together', could too easily and illegitimately lead to the acceptance of the spatial designer's claim for preeminence in planning. In Faludi and Waterhout (2002), the authors speak of 'the problem of the maps', referring to the lack of any policy maps in the European Spatial Development Perspective document. More planning authors see spatial maps as important devices not only in assessing policy alternatives, but also, and foremost, in instances of problem framing and agenda-setting.

For instance, Vigar and Healey (2002) point to the importance of visual imagery in their argument for a conscious framing of issues. They argue that the articulation of a storyline, in the framing of an issue, can be helped with the use of metaphor, trope and visual imagery: (p.524) "Visual images have commonly been used to express the key ideas of strategic spatial plans. Copenhagen's 'Finger Plan', the Dutch image of the Randstad of linked cities surrounding a 'Green Heart' and the 'Opening Flower' image used in a recent Lyons area strategic plan provide good examples."

The Green Heart example has also been used by Michel van Eeten (1999) in his argument on how spatial maps add to the controversy in spatial planning by locking into a certain framing of the problem (see chapter 1).

We regard the spatial policy map, used in a multi-actor context, as a functional device that through its *use* builds up, aligns, and sometimes counter-acts a particular (problem) frame of the exposed spatial (socio-physical) environment. Maps communicate what people have conceptualized, classified, measured and aggregated relative to the earth's surface, using tools such as GPS, remote sensing and GIS. These maps also build upon socially constructed boundaries that differentiate

properties and governmental territories. As such, maps are the product of a conceptual, technical practice that represents a worldview or frame of reference of how the makers perceive the territory, while the maps in their turn influence the frame of reference of its future users.

The phenomenon of frames and framing is a popular research topic, and is abundant beyond psychology in communication literature, economics, and in recent years also in spatial planning: but what a frame actually is, and what it constitutes, often remains implicit. Indeed, the concept of frames is problematic, as frames are abstract, mental, contemporary and context- and actor dependent. A selection of literature on this subject is summarized underneath, in order to analyze and clarify the phenomenon of 'framing'

4.3.2 The frame concept: definitions

According to the psychologist Allport (1940), a frame of reference "has to do with any context whatever that exerts a demonstrable influence upon the individual's perceptions, judgments, feelings, or actions. Often the influence is […] "silent." Of the existence of frames the subject himself is only partially aware, and unless he is well warned the investigator too may overlook them entirely. Many frames […] are neutral and impersonal in type, providing simple spatial and temporal orientations. Others are personal and ego-involving."

Kahneman and Tversky (1984) have experimentally shown the effect of problem framing. The people in their experiments responded significantly differently depending on how information on choices was presented. A standard example of a framing effect is the 'lives saved, lives lost' question, which offers respondents a choice between two alternative public-health programs to deal with an epidemic that is threatening 600 lives. Depending on how the question is framed people give significantly different answers.

- When asking to choose between the following alternatives: "If program A is adopted, 200 people will be saved" and "If program B is adopted, there is a 1/3 probability that 600 people will be saved and a 2/3 probability that no people will be saved", then 72% of the respondents involved in the experiment preferred program A.
- If the options are rephrased into: "If program C is adopted, 400 people will die" and "If program D is adopted, there is a 1/3 probability nobody will die and a 2/3 probability that 600 people will die", then 22 % of the respondents preferred option C.

In the example, program C is in fact equivalent to program A, as program D is equivalent to program B.

Kahneman (2002) points at the lack of consciousness that actors have regarding this framing effect and the actor's reaction when confronted with this: "If the same respondents are given the two problems on separate occasions, many give

incompatible responses. When confronted with their inconsistency, people are quite embarrassed. They are also quite helpless to resolve the inconsistency, because there are no moral intuitions to guide a choice between different sizes of a surviving population."

Kahneman and Tversky's research has had much influence on psychology and economics. In the field of policy analysis, Schön and Rein (1994) have become well-known for championing the idea of 'reframing'. They describe policy frames as 'taken-for-granted assumptional structures, held by participants in the forums of policy discourse and by actors in policy-making arenas' (Schön and Rein, 1994, p. viii). Rein and Law emphasize the communicative aspect. In their perspective, frames are (Rein and Law 1999, p. 93): "Structures that give form to processes of social interaction and communication, as a particular way of representing knowledge, or as an interpretative scheme that bounds and orders a chaotic situation to facilitate interpretation".

Schön and Rein started studying the idea of frames during the preparation of a course on social service systems, intrigued by the question how policy researchers made the normative leap from the is to the ought. According to Schön and Rein, the underlying assumptions that were taken for granted in the studies seemed to derive from generative metaphors, such as *housing blight* or *fragmented service*'. With their theory, Rein and Schön explain the nature of controversies in policymaking, and how these can be studied (Rein and Schön, 1994). They proposed 'reframing' as a way forward in solving stubborn policy controversies, but note that this might not necessarily lead to a settlement of the dispute (p.124): "Indeed, the better the participants understand each other, the more they may become aware of the depth of their disagreement". But such a dialogue, according to Rein and Schön, "is a critical condition for the further inquiry that may result in acceptable policy adjustments, or even in pragmatic resolution of policy controversies" (Rein and Schön, 1994, p. 124).

Lakoff, linguistic researcher on metaphors (Lakoff and Johnson, 1980 and 1999), defines frames as (Lakoff and Ferguson, 2006): "mental structures that allow us to understand the world. They are pre-linguistic – in the realm of concepts, not words. Framing is about characterizing values, concepts, and issues. Frames define the underlying problems, and by reframing one can point out when the real problems lie elsewhere."

Another *type* of description is given by Gamson and Ryan (2005) who use metaphors to clarify the concept in an academic debate with, amongst others, Lakoff (italics added by us to highlight the metaphorical expressions):

> "A frame is a *thought organizer*. Like a *picture frame*, it puts a rim around some part of the world, highlighting certain events and facts as important and rendering others *invisible*. Like a *building frame*, it holds things together but is covered by *insulation and walls*. It provides coherence to an array of symbols, images, and arguments, linking them through an underlying organizing idea that suggests what is essential — what consequences and values are at stake. We do not see the frame directly, but infer its presence by its characteristic expressions and language".

While all mentioned definitions are consistent, this last one of Gamson and Ryan appeals to us in particular for its association with maps. As Harvey (1988) and Pickles (1994) have argued, maps are not neutral 'mirrors' reflecting what exists and what happens on the ground, they reflect a culturally, socially and politically shaped view on reality. Maps do exactly what Gamson and Ryan describe: they highlight some events and render others invisible, based on an underlying idea of what is essential, thereby organizing the thought of the user. As such, maps thus frame the world, offering their viewers a particular conceptual *lens* on spatially related phenomena.

The definitions described above have many characteristics in common. All definitions point at the **relatively stable** state of frames, in words of structures or principles; at the **tacit**, implicit nature of frames; and at the **selectiveness** of interpretation and representation involved in framing, which constitutes a particular framing effect. We select these three characteristics, as being part of the theory about frames and framing, as key elements in our framework of analysis.

4.4 Frames and framing: our theoretical structure

In this section, we aim to clarify how we see frames, what elements frames consist of in our perspective, and what terminology we employ to describe frames and the processes of framing. In addition, we distinguish between types of logic or 'rationality' that we assume relevant classes in differentiating between actor frames.

4.4.1 Clarification of terminology

To frame

In our terminology, the term 'frame' exists both as a noun and as a verb –respectively a frame and to frame. The verb to frame is an action by someone –or group of actors– on something, namely an issue that is the subject of deliberation. In policy deliberation, the formulation and framing of the problem is called agenda setting in terms of political theory. The process of agenda-setting towards the resulting policy agenda is what we call the *framing process*. (Majone, 1989, p.1): "As politicians know only too well but social scientists too often forget, public policy is made of language. Whether in written or oral form, argument is central in all stages of the policy process. […] This process begins with expressions of general concerns and ends in concrete decisions." The resulting state is a framed problem or issue: a real-world phenomenon that has been given form and meaning in a certain, actor-related perspective.

A framing process is not assumed to stand on its own, but instead, is highly influenced by its *context*. Cultural and personal circumstances, historical backgrounds and developments all influence a certain interpretation of current problems and solutions. In policymaking, we assume that the *institutional structure*, that is, the official political and legal rules that apply for regulating (governmental) power, is of

great importance as they *dictate* who has ultimately decision-making influence in formulating policy.

A frame

The noun frame has a meaning of its own. The shortest explanation of a frame is a lense. In the context of deliberative policymaking, we interpret a frame has having an owner, an underlying rationality, an (indirect) appearance, and a resulting perspective. We have drawn a picture to clarify the terminology that we distinguish (see Figure 4-1).

Owner/user: a frame is 'carried' by its beholder. Besides the particular, personal and 'private' frame of individual actors, a frame can be held and carried by multiple actors collectively. Media and use of generic policy concepts contribute to the travelling and 'landing' of mental frames within a large audience. In democratic nations especially like the Netherlands, where the organization of public governance is shaped by mechanisms of elections and parliamentary voting procedures, the deliberative nature of policymaking and the selection-mechanisms for dividing power make the framing of issues an important element in the political system, as outlined by Chomsky (1986) and Lakoff (2004).

Underlying rationality: we assume that rationality consists of a certain set of values and a corresponding type of logic; from the basis of fundamental values, assumptions lead to a way of (logic) reasoning. The argumentation line that is constructed through these values and logic forms the mental infrastructure of how someone thinks and reasons about his/her world, and this structure of arguments is what we call the underlying rationality. Because a frame is defined as a lens through which actors makes sense of the world around them a frame is thus, in principle, coherent and consistent. The frame must provide *sense* to observed phenomena. Therefore, the lens itself is meant to produce coherent and consistent information. In a policy context, the rationality that underlies policy proposals draws upon fundamental values; normative assumptions about how the world should work come together with assumptions of how the world does work, what Rein and Schön (1994) have described as the 'leap from the is to the ought'.

The frame itself, with own visibility/manifestation, and an own focus: the frame of reference manifests through the use of certain terms, concepts, symbols, metaphors and images. The frame of reference involves a particular fixed interpretation through which some aspects of reality are assumed to be natural, similar to the phenomenon of sunk costs in economic theory. The frame of reference can be made visible through direct explanation or through a backward tracing of the sources of someone's perspective about issues; like an invisible *lens* that can be pointed out to exist because of the analysis of the projected images on a projection screen. Through its workings as a lens, a frame is also focused on particular aspects regarding what is considered *important and meaningful* in the rationality of the frame.

Resulting perspective(s): the arguments of an actor usually result in a certain – relatively fixed– *opinion* about a particular policy issue (a situation or new policy is unfair, inevitable, necessary, etc.) which we call his/her perspective. In this resulting perspective, particular arguments may be subordinate to others in the

actor's subjective view. The perspective reflects the actors' resulting judgement and his or herpersonal preference when he or she is, or might be, asked to make the final decision.

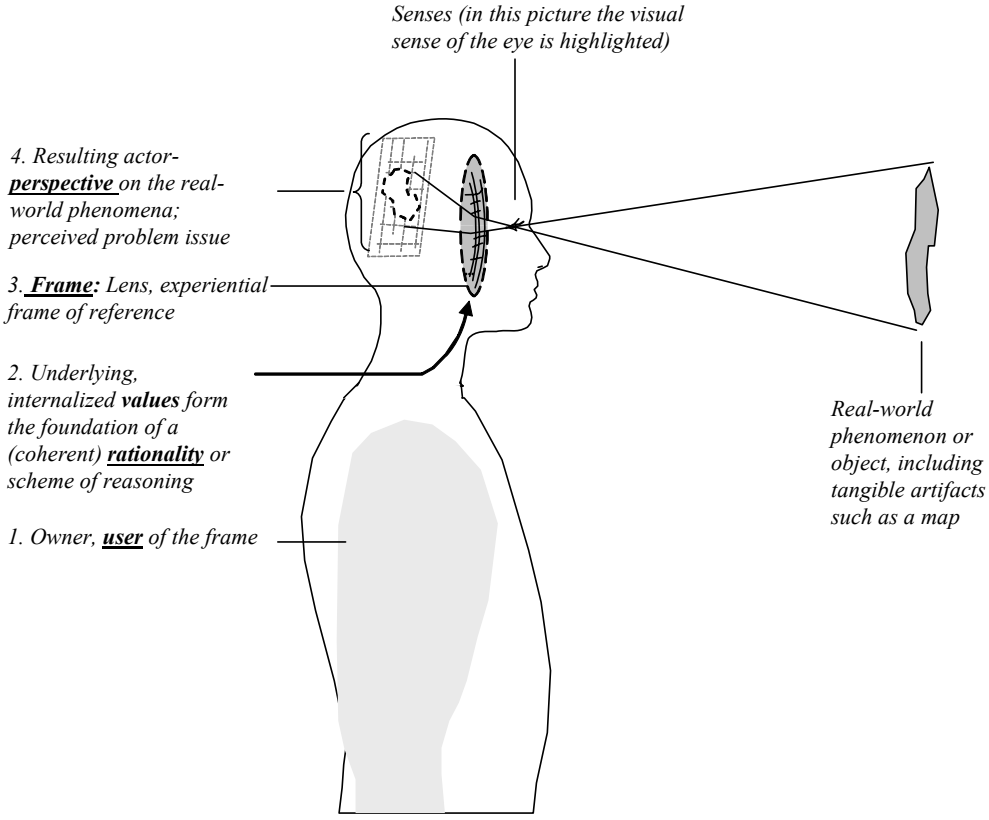


Figure 4-1. Scheme of a frame (lens) and a processing of building a perspective by observing an issue through a particular frame. This schematic representation is drawn with the theory of the embodied mind in mind.

4.4.2 Different types of rationality

One of the essential characteristics of frames is that they rely upon a certain tacit set of assumptions, or little theories of what is real and what matters: a frame presupposes a certain rationality. Situations in which framing effects are most prevalent seem to have one thing in common: there is not a clear basis for choice (Andserson, 1980). In complex decision-making processes, where uncertainties about facts are as prevalent as conflicts over values and value-systems/belief systems, this basis for choice is lacking. The theory of Herbert Simon (1978) about bounded rationality matches with the concept of frames that presupposes a limited lens of the observer; but as rationality would be bounded, this implies the existence of different types of rationality. Policy analysis authors (Wildavsky, 1979; Stone, 1988; Schön and Rein, 1994; amongst others) have pointed to bounded rationality in relation to different frames of reference.

Schön and Rein (1994) spoke of the *leap* from the "is" to the "ought". The distinction between articulating or discovering issues on one hand, and legitimizing actions or decisions on the other, is discussed in philosophy of science as the context of discovery and the context of justification. Wildavsky used these terms in his chapter 'Analysis as craft' (1979, p.388-389):

> "That problems have the same status as solutions is the basis for creativity in analysis. […] In *discovery*, analysis as problem solving is more art than craft, more finding new ways than persuading others of their feasibility and desirability. In *justification*, analysis is more craft than art… Shifting the *frame of discourse*, so that different facts become persuasive, suggests that art and craft are interdependent." (Italics added)

The distinction between context of discovery and the context of justification relates to an ex ante or ex post rationality in making decisions. Once the decision is made, arguments are aligned up for legitimizing the chosen option.

In multi-actor theories, there are various viewpoints on rationality. An important difference exists between the theories that presuppose a certain collective rationality or willingness to act in a socially engaged manner, and theories that presuppose an individual rationality with actors that strategically make choices to maximize their own individual benefit.

An example of the first is Habermas' ideological view of ideal speech and collective action (Habermas, 1988 and 1998). This philosophical theory on communication builds on the concept of *communicative rationality*. Collective action can be decided upon when common ground is found through a pure, transparent, open (ideal) speech act. This theory has met with the critizism from, amongst others political philosophers, as a naïve view on how the world works.

In a more political view on collective action, conflicts would remain even if communication was perfect, when interests were non-compatible. This last view on rationality, as proposed by for instance Hirschman (1972) and De Bruijn, Ten Heuvelhof and In't Veld (1998), focuses on the behaviour of individual actors in safeguarding their vital values and basis of existence, which *rationalizes disloyal and strategic behaviour.* The difference between these two extremes, that of Habermasian collective communicative rationality and the individual safeguarding rationality of Hirschman and De Bruijn et.al., illustrates the variety of rationalization patterns that could, when used to understand and make sense of the same empirical observations, arrive at very different conclusions.

While the above distinctions between types of rationality look at different actors (individual or group) or different contexts or moments in time (ex ante or ex post decisions), another classification of rationalities can be made by looking at the *nature of arguments*.

One of the main distinctions in policy analysis is based on the two paradigms discussed in chapter 2; the analycentric perspective on policy analysis and the discourse paradigm. An author who has eloquently described the difference between

the two rationalities embedded in these paradigms is Stone (1988) in "Policy Paradox and Political Reason."

Stone (1988) speaks to two different types of reason: the *political and the analytical*. She shows how concepts that are generally accepted within the paradigm of rational policy analysis, are in fact instances of framing. Common terms in the rational paradigm of policy analysis, such as objectives, efficiency and (quantitative) measurements are put in another light by showing their dependence of the chosen reference frame. For example, the neutrality of the term efficiency is questioned with the example of the problem of how to run a public library (recalled from Herbert Simon). In this example, the view on whether the library is run efficiently changes with every aspect taken into account or left aside. Clients of libraries might think that their library system is easier to use, and in this way more efficient to them, if it had many small branches located within walking distance of every residential neighbourhood: but the more branches, the more there will be duplication of collection; duplication can be seen either as waste or as enhancing ease of use. Stone (p.53):

> "Trying to measure efficiency is like trying to pull oneself out of quicksand without a rope. There is no firm ground."

According to Stone, political rationality does not take the objectives or policy goals as a starting point and then tries to reach it in an efficient way. Instead, she reframes the meaning of political reasoning into an investigation of and reflection on the trade-offs in dilemmas. Policy dilemmas call for deliberation, negotiation and decisions to be made about trade-offs between such subjective concepts as equity, efficiency, legitimacy, security and liberty.

In section 3.3.3 (Figure 3-6), we gave an example of a policy map of the Netherlands where two types of arguments were given for the selection of urban networks. The two arguments can be recognized as one a political and two an analytical argument.

The clarification of the type of rationality involved in map use (in the form of arguments expressed on a map image or stated as verbal/written explanation besides a map) will be part of our analysis and identification of frames. We assume these differences in rationality may lead to different perspectives being held on the same maps

4.5 Framework of analysis

Hypothesis

Our study entails the question of how maps are used in a multi-actor setting of spatial policymaking. In particular, we have wondered how maps sometimes seem to deepen conflict and fuel controversy, while in other, similar situations, they are seen as helpful aids for decision-making.

Our assumption is that an important function of the making and use of maps for spatial policymaking, among their various roles, is to build a collective frame of reference. As spatial planning concerns making decisions over space and its use, the projection of problems on to maps is logical. The various participants in a project will exercise their influence on the problem framing, among other chanels, through the maps. When stubborn conflicts over maps arise, we assume these can be traced back to incompatible differences between actors' frames of reference.
Our hypothesis is:

> *We can explain stubborn conflicts over maps in multi-actor policymaking as frame conflicts, and from this view we can explain actor-behaviour with respect to the conflicting maps.*

In order to study how maps function in policymaking, a conceptual framework is necessary to interpret the whole of *environment*, *use* and *effects* of the map. In the next subsection, these elements of our framework of analysis are described.

4.5.1 Context: Interpretation of the policymaking process

The rounds model on policymaking
As described in chapter 2, policymaking or decision-making is analyzed through various perspectives in policy analytic literature. Because our research interest is about interaction among actors (using maps for the purpose of making policy in a deliberative setting), we have chosen for an observation model (lens or oculus) of policymaking that emphasizes the aspect of interaction. Adopting Teisman's (1992) *rounds model*, which focuses on interaction, we assume policymaking processes to consist of different cycles or rounds. These are time-periods that are bounded by crucial developments. Identifiable turning points or junctions in the process mark the succeeding rounds.

The turning points of the rounds model can exist of sudden events like a massive flood or a terrorist attack, but also of foreseeable moments in time. The institutional organization of societies has many regular meetings and time schedules: amongst others democratic elections for a national government, annual budget determination, long-term policy programs and political recurring agenda's. In many Western countries, the hierarchy of regional and local zoning plans in the spatial planning systems plays an important role in the time-cycle of planning.

The rounds model is based on a descriptive analysis of decision-making; beginnings and endings of rounds are identified in practice (and in retrospect) rather than in the conceptual or idealized situation of decision-making. New rounds may differ in the constellation of actors involved, in agendas and in conditioning boundaries. Emphasis is on the dynamic world, where decision-making proceeds in various succeeding rounds and parallel arenas. During a round, actors interact to explore their individual and common goals, and their different views. Decisions on parts can lead to the 'closing' of one round and start of a new one where there are new

rules and new changes[1]. The decision-making process is perceived as a strategic game, where actors interact about common goals and their individual contribution and interests. As such, the rounds model is seen as a compromise between the extremes of the 'classic' phase model on problem-solving, which rationalizes systematically from a certain problem or objective, and the garbage-can model of Cohen, March and Olsen (1972) that perceives decision-making as an organized anarchy, where decisions depend on coincidental circumstances and pragmatics.

Map making and map use for the policymaking process

As said before, we consider maps to be models that follow a life of their own. They can thus follow another life besides that involved in the ongoing policy process. For instance, after a map has been discussed among decision-makers, in the map room civil servants may make their own changes and additions to the map. This independent life of a map is visualized in Figure 4-2, partially separated from the policy process that proceeds in time through various rounds. Multiple maps can be made and used in a policymaking process; in the scheme (of Figure 4-2), maps a, b and y are considered to be different maps, while y0 and y1 are considered to be two versions of one map.

The *policymaking process* is distinguished from the *process of knowledge production* in Figure 4-2. The intertwining of knowledge and policy processes is an important element in the discourse paradigm on policy analysis. According to, amongst others, Jasanoff (1990), Van Eeten and Ten Heuvelhof (1998) and Edelenbos (2000), the processes of knowledge creation and decision-making are intertwined in policy processes, but can nevertheless be distinguished and the boundaries between science and policy are, or at least should be, held upright by a division of responsibilities between politicians, civil servants, advisors/experts, scientists, etc. Things that cross this conceptual / institutional border between both environments have been called '*boundary objects*' (amongst others Bowker and Star, 1999). According to Bowker and Star, (p. 297), boundary objects 'are those objects that both inhabit several communities of practice and satisfy the informational requirements of each of them. Boundary objects are thus both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites.' We consider maps to be such boundary objects. We have drawn the position of maps in Figure 4-2 under the heading of the 'knowledge environment', but emphasizing that we consider map making and map *use* a policy analytical activity that takes place in both, or rather across the boundaries of, the policy environment and the knowledge environment. This is represented in Figure 4-2 by the relational arrows shown in the middle. These relational arrows mark the central focus of this study.

[1] In order to clarify the difference between rounds and discourses in our terminology, a discourse concerns the deliberations around a particular policy topic or cluser of topics. A discourse may endure various rounds

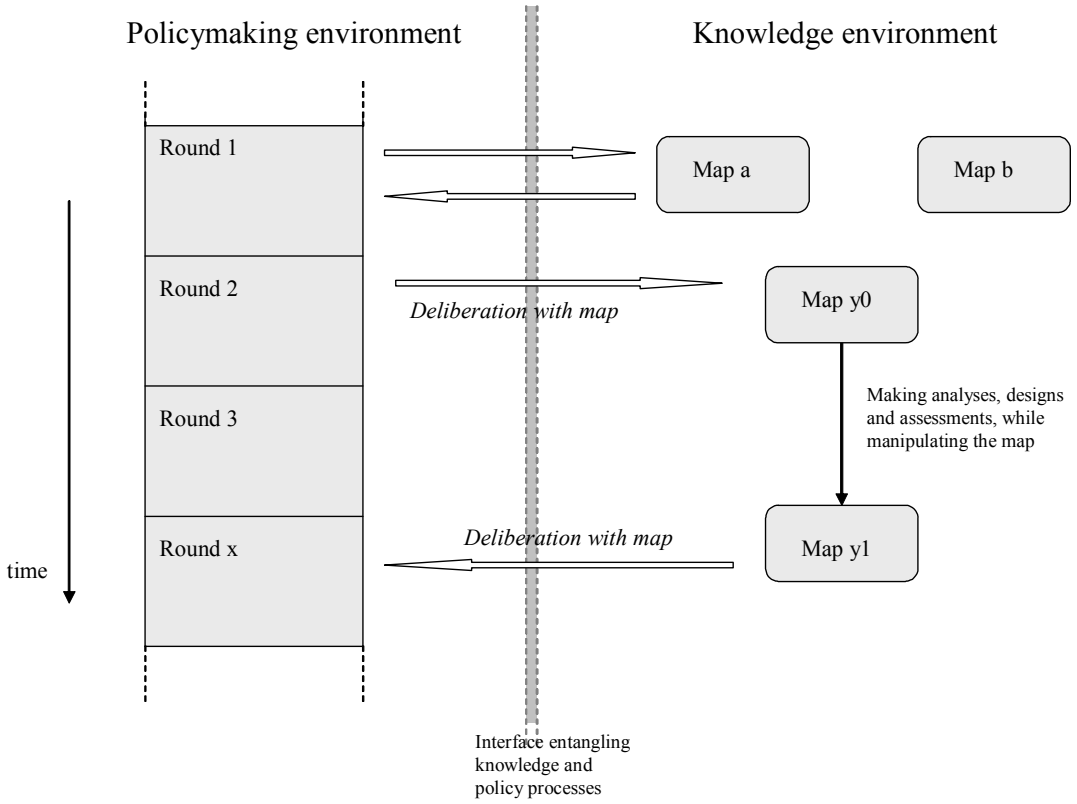


Figure 4-2. Conceptual model of map use in the context of policymaking. In this interpretation, knowledge processes and policy processes are conceptually separated but in time they are being intertwined through deliberation with (about) models.

While a map is formed and outcomes are generated, i.e. during the life of the map, it is simutaniously possible that the policymaking process has come to a new policy round. During the process of map making and map use for analysis, several instances of the map can be brought into the policymaking environment. For example by showing map images that visualize preliminary versions and preliminary results of the analysis to the policymaking participants. The knowledge process can then be adjusted according to new comments and the new questions of the policymaking side. In this way, the policymaking process forms the context in which the map(s) is (are) made and used: but with the different rounds, this context may also alter. The acknowledgement of the existence of these parallel and crossing time-lines is an important feature of the rounds model.

Within one policy round, it is possible to assume certain characteristics of the policymaking process as stable. This accounts, for instance, for the objectives of actors to participate in the process: but as soon as a wider view or longer time-period is taken into account, the characteristics of the policymaking process are all sensitive to change and the assumption of these characteristics as static features is only possible when considered as a certain 'snapshot' of the policymaking process at a certain moment in time. In the rounds model, the individual rounds are considered as relatively stable units or snapshots, in which the main issues, objectives and circumstances etc. remain relatively constant. The rounds therefore form a stable

environment in which rationalization as in classic policy analytical theory is, to a certain extent, possible. Here, this rounds model is combined with the notion of boundary objects.

4.5.2 Conceptualizing map use in a multi-actor setting

As explained, the theory on 'framing' of policy analysis forms our guide in studying the multi-actor practice of map use in policymaking. By selecting framing as our guiding theory, we know that we will be more sensitive to those aspects that are about meaning construction, than to other aspects, but we consider this acceptable as we expect to find an explanation for emerging conflict in this direction.

Unit of analysis

In our research, the 'activities where participants use maps in an interactive setting' are considered the object of study. We consider the institutional setup as a given reality. The life-cycle of a map is central. The life-cycle of a map consists of the making of a map (constructing a map from data, measurements, existing maps, tacit knowledge etc), the use of a map (adapting, manipulating, modelling, interpreting, drawing conclusions) until the dying phase of a map when it is left aside, forgotten, thrown away, rejected or destroyed.

The deliberations with and around the maps are focused upon, and therefore elicited from, their context. The instance of deliberation around particular policy issues, within a particular time-frame, is referred to as a *discourse*. A discourse is demarcated and bounded by the issues that are discussed, the goal of the interactions, and the time-frame or arena (constellation of the actor-network) in which the debates takes place. The discourse may be institutionalized in a particular project, with a planned time-frame and range of issues to be decided upon: but it can also be a spontaneous 'outbreak' of discussions around a particular, actual policy issue.

The use of one map within one discourse is our unit of analysis. The analysis is divided into multiple units of analysis when:

- multiple maps are used in one discourse (each map makes up a unit of analysis), or;
- when one map is used in different discourses (each discourse, separated by policy 'rounds', actor-arena or topical issues addressed, makes up a unit of analysis).

Framing process between micro and macro levels

We argue that every concrete map, that is used for assessment, or as a design for a final policy option, is built upon a conceptual model with its own ontology. This ontology is the underlying frame, the lens from which the actor simultaneously observes and makes sense of the world. In our study, we consider the making and use of models as a playing field, where framing mechanisms are part of the logics of the game. People play this game by influencing others, trying to make their own models dominant in the discourse. Schön and Rein (1994) emphasize the two distinct levels on which a policymaking process can be understood; on the visible level of decisions and options, and on a deeper level, the level of frames.

This relation between abstract frames and concrete actions has been studied in policy analytical literature before, by using policy narratives as object of study. Dicke has researched the dynamics of several frames emerging, dominating, and transforming into other frames, on different levels in Dutch and British national water management (Dicke, 2001). She researched these frames by analyzing the stories or policy narratives that represent the arguments why a problem situation should be dealt with in a certain way. The narratives reveal the line of reasoning from the frame, the mindset, to the actual viewpoint which policy actions should be taken. Dicke called the frames the ontology of the narrative. Dicke speaks of grand narratives and little narratives. Grand narratives resemble the overarching frames that determine an actor's position on more concrete policy levels. Examples of such frames are globality, sustainability, or progress. On the national policy level, this connects to the little narratives with concepts like rooms for the rivers or liberalization of the water market. Dicke's study of stories provides a structure for analyzing how actors view the world on different conceptual levels, and how the social mechanisms between them shape the ongoing policy discourses. She connects micro-stories with macro-themes and discusses the motives for these linkages. In these stories, she analyzes the dominance of one story over another, amongst others by recognizing and articulating the use of rhetorical devices such as metaphors.

In our analysis, we aim at relating specific perspectives of actors about the role of a map within their more abstract frame of reference. The line of reasoning between the substantive perspective and the underlying frame of reference (where someone's substantive perspective is comparable to the description of Dicke's little narratives, and someones frame with Dicke's grand narratives) is recorded with a number of entities. We have tried to analyze the various discourses with maps by distinguishing three levels:

- a substantive *perspective* on an issue
- a *line of reasoning* or logic for this perspective
- a *frame* of reference

This deconstruction of perspective, line of reasoning and frame of reference serves to elicit basic frame-differences between multiple actors in their use of the same map.

4.5.3 Evaluating the functionality of maps from multiple actor-perspectives

Multi actor perspectives

An important background question concerns the evaluation of effects of map use: How can the effect of mapping activities (maps, map making and map use) be understood and evaluated? Intuitive associations with success are catalyzing effects on the policy process and satisfaction about the maps with the participants. Likewise, unsuccessful map use is associated with unintended effects and side-effects, with consequences for controversy, obstruction and frustration in the policy process.

In the literature on evaluation criteria used in policy analysis, we see a large range of criteria. A literature scan by Thissen and Twaalfhoven (2001) searching for criteria to used to evaluate policy analytic activities led to a categorising of five kinds of criteria: input, content, process, results and use. The criteria were gathered from, amongst others, the sources Miser and Quade (1985 and 1988), Goeller (1988), Geurts and Vennix (1989), Fischer and Forester (1993) and Mayer (1997). According to Thissen and Twaalfhoven, evaluators of policymaking processes need not to take over all the criteria, but they will use a selection. Depending on context, nature of the problem and the policy process, and depending of the perspective of the researcher, different evaluation criteria come into play.

In practice, different actors have different *intentions* for the same map. As Zonneveld (1991, p. 64) expresses:

> "Spatial planning concepts do not interpret themselves. They are shaped by people and organizations that have given a certain meaning to these concepts. This meaning does not have to be the same for everyone."

Therefore, we evaluate the **functionality** of maps from the various distinctive actor perspectives. We speak of actor-time perspectives, because the perspectives are bounded by the actors that 'carry' it, and this carrying is bounded in time.

Criteria to classify the functionality of maps

As our object of study is fuzzy and complex in with respect to, regarding the different underlying theories and the socio-technical nature of the phenomenon 'map use', we formulated a simple framework for evaluation.

We have decided not to work with a pre-defined set of potential functions of maps and from that derive a fixed set of criteria. While we have prepared a list with common functions that practitioners aim to achieve with their maps, we found that this list grew longer and longer without seeing to what extent the functions actually worked out in practice, and without a means to delineate the boundary between one function and another. Instead, we have interpreted the roles of the maps through the collection of stated objectives of maps in the discussions over maps and the actual map uses that we have recorded.

As we have taken a *functional* viewpoint, the intentionality aspect is important: Did the map user or mapmaker achieve his/her objective with the map? Next to this, another indication is the satisfaction of participants with the result of their work with maps. In short, we evaluated the effects of map use on two dimensions.

1. What was the intention(s) the map? Did the map perform as intended and/or did unintended or unforeseen functions emerge in the actor's perspective?
2. Is the actor satisfied with the effect of the map?

Figure 4-3 reflects these dimensions. Note that one map can simultaneously serve multiple functions, from different actor-perspectives, and score differently on every perceived function. Our classification is structured as follows.

Map use that successfully achieves its intended function, serves its purpose as planned. We have classified this as '*functional as planned*'. In this case, all efforts in

making and using the map have been worthwhile, for the map use had a direct influence and resulted in the desired effect(s).

Map use that is perceived as satisfying but in a way that was not initialy intended, is classified as '*emergent functional*'.

When a map serves its function as planned, but nevertheless the (intended) effects remain out and thus the map's use does not bring satisfying results, we classify this as '*non-effective*' map use. For example, the intention was to clarify an issue, but using maps did not bring the intented structure and overview.

Finally, maps can result in counter effects that were not intended. For example, one could make a map to delineate certain trade-offs, with the aim to mediate in a conflict, but the resulting effect is a polarization of viewpoints instead of consensus on a possible trade-off. This is classified as '*dys-functional*' map use.

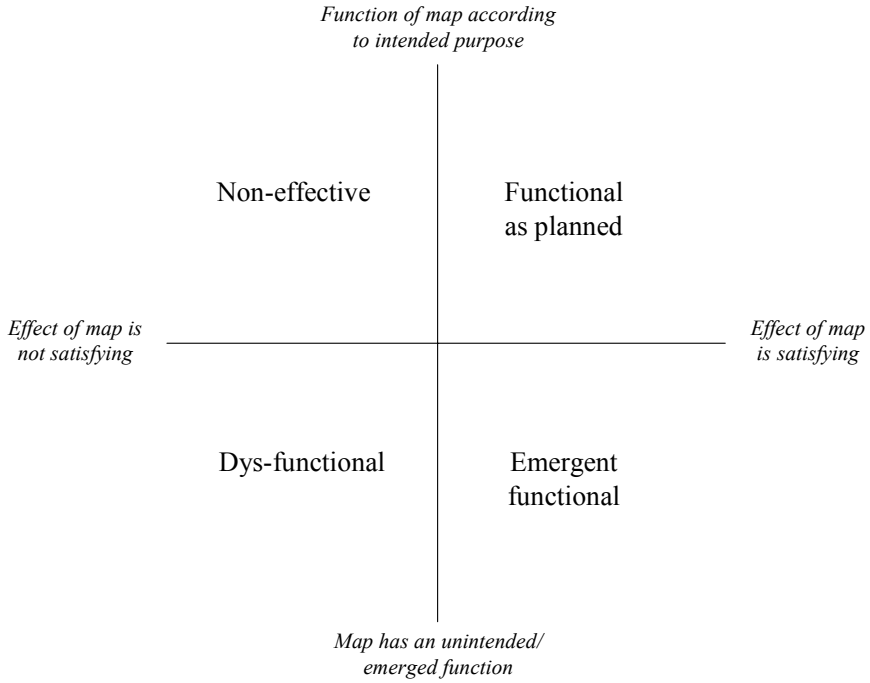


Figure 4-3. Classification of actor-time perspectives on map use

Overview of the framework of analysis

To summarize, the entire framework of analysis thus consists of:

- a structuring of the *contextual setting* in which the maps are used (according to the rounds model on policymaking).
- the *map use itself* (observed with a policy analysis and cartographic mindset. Based on the theory of frames and framing, the observations are structured into perspectives on map use functions, lines of reasoning and underlying frames).
- an *evaluation of effects*, from multiple actor perspectives (according to a classification of the functionality of map use into four main categories, ranging from 'functional as planned' till 'dysfunctional').

Match with other theoretical frameworks
This framework of analysis was developed as part of the study. With the emphasis on anticipated and non-anticipated effects (emergent functionality or dys-functionality), conflicting perspectives and a longer-term ongoing policymaking process, we used a different evaluation framework than for instance Vennix (1996) or Rouwette, Vennix and Thijssen (2000) who analyze and evaluate the making of models in groups.

We can position our focus and theoretical assumptions in the extensive overview of Jankoski and Nyerges (2001), who have provided a large structure of options, foci and classes in studying the topic of GIS for group decision making. In their terms, we have focussed on the constructs of the group process, on group participant influence, and on emergent influence (of the maps and of the participants). Within these areas of attention, we have chosen our own conceptual perspective for interpreting interactions between actors (about maps) and between actors and maps.

4.6 Inquiry

The followed research strategy consists of a set of methods and techniques according to the qualitative research approach(es) as described by various authors on qualitative methods and collected in Denzin and Lincoln (2000). We have combined a number of methods and techniques for the applied qualitative research. For collecting and analyzing empirical materials, we have exploited the following methods of inquiry and interpretation:

- discourse analysis
- case studies

The selection of discourse analysis as a research method is explained at the start of this chapter. The empirical observations are packaged in two case studies, where multiple maps have been used. The choice for case studies was made because cases allow us to study a phenomenon in its context, keeping the complexities of real-world cases part of the analysis (Stake, 2000).

In the research method, we have used Denzin (1990) as a guide for the interpretation of observations. We have made thick descriptions of our empirical observations, to reflect on the observed activities in their social and historical context.

4.6.1 Selection of case studies

The object of study was explored with two in depth case studies. As stated before, maps have an influence that is assumed as to be given. Therefore, we have not used a ‘control situation’ where no maps are used. Instead, two different situations of map use were compared. The selection of case studies was made according to the following criteria.

- *Variables that are kept constant*
    - Maps play a role: spatially related policies.
    - High pressure on space: situations of high rate of urbanization, pressure on environmental qualities, e.g. economic, ecologic and livelihood factors are under pressure.
    - Emphasis on early phases in policy analysis life cycle: emphasis on phases of scoping and design of policies. The implementation and monitoring phases are not included in the study.
    - Situations with multi-actor configurations: this way, we could expect to have the multi-actor aspect of map use –our object of study– included in the cases. We selected participative settings where we could expect combinations of the policy and knowledge process.

- *Variables on which we aimed for difference*
    - Different application domains: not only looking at one particular field in spatial planning, but comparing different problems to include different natures of different policy problems (water management, urban network).
    - Our ability to not-influence or influence (experiment with) the object of study.

The following case studies were selected.
Case 1: the Water Opportunity Map Delfland
Case 2: the Urban Network Game Brabant

The cases that were selected were in the Netherlands. The first case were chosen in the area of water management, as a practice for pilots using the new policy instrument 'Water Opportunity Maps' was expected to be fruitful as participatory policymaking context in which the use of maps could be actually observed and studied.

To 'complement' the specific issues in water management and the engineering culture that is dominant in the water sector, another case was searched for in the field of spatial planning. The assumption was made that this field is more experienced with carrying out integral assessments and mediations between several interests (agricultural, urban, infrastructural, water, ecological etc). The use of a *simulation game* as a second case study in this thesis was beneficial for the following reasons.

Firstly, in the simulation game, all policymaking activities of the multiple participants were open for observation by the game developers, while in reality many deliberations take place inbetween official occasions. In this way, it was possible to observe and record the way stakeholders use maps during their deliberations and negotiations.

Secondly, planning processes that normally take years are simulated in a time-span of one day (the first case study covered almost two years of observation). Dynamics in the interactions between participants are concentrated (speeded up). It is possible to see impacts of maps in succeeding discussions that take place in different actor arenas. The framework of this thesis emphasizes the multiple functions that a map

serves simultaneously, and the different objectives that various actors have using the same map picture in a policymaking process. It was assumed that in the game, as in reality, the same map pictures would be used simultaneously in multiple settings to meet the multiple objectives of several actors. This allowed us to follow the independent, own life, of the map.

In summary, the simulation game provided a laboratory environment to prepare for and observe map use and map making in action.

4.6.2 Data collection methods

In practicing the methods of case studies and discourse analysis, we applied the following techniques:

- participant observation
- self-preparing map support as part of the game development
- interviews, surveys and group evaluation sessions
- document analysis (including analysis of map images)

The cases were studied using a *participatory observation approach*, to observe the intermediate situations and effects of map use during the process. Furthermore, the data was collected using different parallel inquiry techniques (see Table 4-1). The participatory approach employed in the second case study was based on the principles of Kemmis and McTaggart (2000, p. 567-606). The implementation of these techniques is further described in the case chapters.

Data sources	**Case 1: Water Opportunity Map Delfland**	**Case 2: Urban network game Brabant**
Participant observation	x	x (using assisting observers)
Testing / Action Research (through self preparing map support in a simulation game)		x
Interviews	x	x
Survey		x
Evaluation session (using GSS)[2]	x	
Document analysis	x	x

Table 4-1. Overview of data sources in the analyzed case studies.

[2] GSS: Group Support System. This is a computer-supported application that can be used in group-meetings, amongst others for collaborative brainstorming, for quickly conducting surveys or collecting expert judgments and group preferences, and as such GSS is very suitable to support information-intensive group evaluation sessions.

Reconstruction of arguments through triangulation

A reconstruction of the policymaking process was made for each case study, from the various data sources using the rounds model for the historical structuring of activities. The making and use of (various) maps is structured and the life of the maps was judged from hindsight. (Some maps may be used in multiple policy rounds, others may have been used briefly). According to our framework of analysis, the use of a map is elicited, and if applicable, sliced into various rounds, resulting in a (number of) discourse(s) around a map. Then, the various perspectives on the map are distinguished. The information about these perspectives comes from direct observations, from interviews and from meeting minutes. According to our framework of analysis, the actor's perspectives about a map's functionality are classified into either 'functional as planned', 'non-effective', 'emergent functional' or 'dysfunctional'.

When multiple perspectives on one map could be distinguished –which was assumed to be the case in instances of conflict around the map– then the various argumentation lines for these perspectives were unravelled. Following the lines of reasoning of an actor in the process, it might be possible to reconstruct an actor's internal frame. Characteristic terms, vocabulary used by actor(s) in their proposals for action(s) using a map, and the functions of maps that were mentioned by actors, were all for eliciting implicit frames on the use of a map. As a surveyor makes a map, so a mental frame can be reconstructed by triangulating the various opinions and views of the actor that have been explicated in the discourse (by expressed votes, arguments, statements etc) (See Figure 4-4). Van Eeten (1999) gives an example of conducting this type of research for eliciting implicit problem framings.

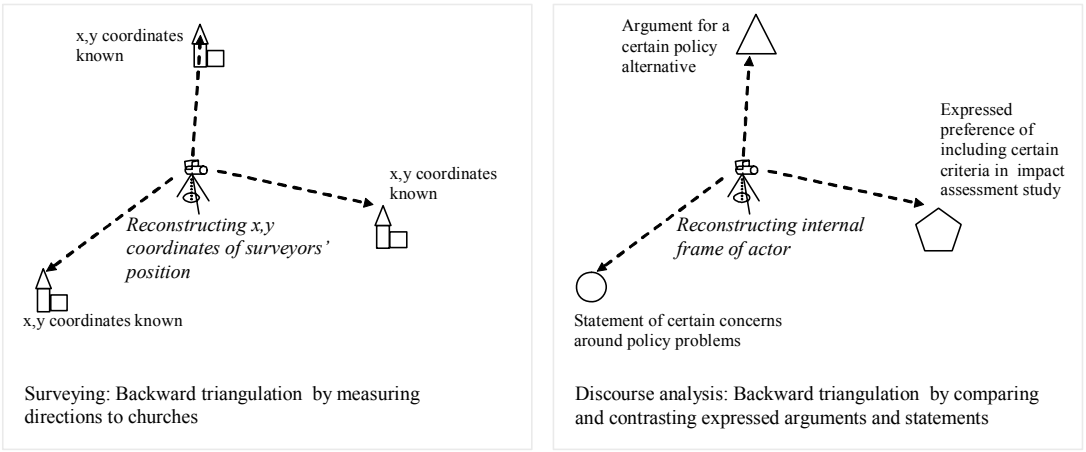


Figure 4-4. Triangulation in surveying and triangulation in analysis of discourse. The first type serves to reconstruct a spatial coordinate, the latter serves to reconstruct the internal frame of an actor.

Part II:

Case Study Water Opportunity Map Delfland

5 CASE DESCRIPTION: Water Opportunity Map Delfland

"It was like we were trying to cook a meal, but the recipe kept changing and changing."

–Verbal statement in project evaluation by a project group member of Delfland, 2002.

5.1 Introduction

The people in the Netherlands are proud of the countries water works. Engineers have built an advanced circulation system that controls the water circulation through rivers, canals, dikes, pumps, in order to keep dry feet. However, with a changing climate, and a more intense use of land for all sorts of purposes, the daily maintenance of the water system in its current state is no longer sufficient.

It is from this idea that a new policy instrument has come up. In 1998, the first Water Opportunity Map (in Dutch: "Waterkansenkaart", WOM) was presented by water board Rijn en IJssel and the province Gelderland. Soon, more of such projects were taken up, in different parts of the Netherlands. The instrument came into being through bottom up initiatives, to improve the coordination between water and spatial planning. In October 2000, there were seven water opportunity maps (WOMs) ready, twenty-five were in process and twelve were in the stage of ideas (Van Dijk, 2001). At this time, the exact definition and content of the instrument was not yet strictly defined. Titles, content, approach, and appearance of the WOMs diverged. The report of the Institute for Inland Water Management and Waste Water Treatment (RIZA) tried to make an overview of this variety and shared characteristics of WOMs. They defined a WOM as:

> 'A map or set of map images with explanation with which the regional water manager tries to influence spatial decisions on local and/or regional level for its territory or parts of it, based on its task and interests on behalf of the water system.' (Van Dijk, 2001, p.7, translated).

Through professional journals about water management, in policy documents and in workshops and conferences, the term WOM got more widely known. The general

opinion about the instrument among professionals was highly enthusiastic. Illustrative was the impression of the author of the RIZA report: "What struck me in all interviews and conversations, is the enormous enthusiasm of the people working at and talking about water opportunity maps. Everybody has its own ideas about this new instrument, the creativity is big and expectations are high." (Van Dijk, 2001, p.3, translated)

In the year of 2000, also the water board Delfland started with a project to develop a water opportunity map. As opposed to earlier WOMs, this water board had taken up the idea to develop the WOM in a participative process with municipal and provincial spatial planners. They aim to develop a visionary view on their water system for the future, in an area where land use is rapidly changing. The WOM Delfland project formed a fruitful environment for studying the usage of maps as tool in collaborative policymaking, because:

- the water board deliberately took up a collaborative approach
- the water board aimed to develop new policy within this project
- there is a clear expectation that maps will be used a lot during the process

Besides above criteria, this case study was particularly attractive because extensive observation of the process was quite well possible. The project ran in the same time as the PhD-research, so that both the beginning and end of the project could be followed, and the location of the project was close to the University, which made field research, among which visiting many meetings, possible without loosing much time for travelling.

5.2 Background

The Water Opportunity Map is a relatively new policy instrument aimed at better coordination between water managers and spatial planners. This is considered necessary as the water system and land use system get more and more entangled. The world's population is becoming more and more concentrated in urban regions located close to river deltas and coastal areas. More than half of the world's population now live on three percent of the earth's surface defined as *coastal zone*. Due to this process of urbanization, in many places the function and quality of the soil has changed: marshes have been drained, sand dunes have been built on and rivers have been narrowed or dammed up. In recent years, the combination of climate change and human intervention in the soil has led to serious flooding in many parts of Western Europe[1]. Water management is nowadays a high priority on the political and social agenda, both in Europe as in the rest of the world. The current trend in policymaking on water issues is to involve multiple actors in the processes of water planning and water management (France, 2002; Connick and Innes, 2003; Ridder, Mostert and Wolters, 2005; www.harmonicop.info).

[1] In 2002, Western Europe was startled by serious flooding along the Elbe and the Danube. In addition, the low-lying Netherlands was threatened with floods in 1993, 1995 and 1998 along the Rhine and the Walloon rivers.

5.2.1 The Dutch water management system

In the Netherlands, being a river delta, the issue of water management is particularly important. In addition to the predicted climate change, also subsidence plays a role in the Netherlands. Movements in the earth's crust and human intervention - such as mineral extraction and a lower groundwater level (due to agriculture and urban expansion) - will result in noticeable subsidence. Climate change and subsidence together can signify disastrous consequences for the Netherlands.

Around half of all of the land in the country is below sea level. These low-lying areas are protected against the sea by rings of embankments called dikes. A sophisticated and partially automated system is used to *pump* the water behind the dikes out of the *polders* into so-called *bosom waters*, which are finally drained off into the rivers or the sea. This work involves many organizations, materials and people. Laws and standards have been put in place to determine the level of the waters in the polders and rivers. Pumping stations are used to pump the surface water away or admit fresh water in case of a drought. Standards have been defined for the height and width of the river banks and dikes (which are continuously monitored and maintained).

A special institutional system exists for water management, with democratically governed organizations called *water boards*. These organizations are responsible for the management of dikes, pumps and water levels in their region. As a sector organization, these water boards stand besides the 'normal' government organizations of municipalities (local), provinces (regional) and ministries (national). The water boards stretch out over regions that are in size in between municipalities and provinces, but their borders do not match with either one. This is because territories of water boards are bounded by water-related borders in the water system.

A new policy paradigm: space for water

The threat of climate change and the subsidence of the ground make heavy measures necessary. The urgency of the problem is twofold: heavier rainfall is expected due to climate change, which may cause flooding in parts of the country. This has already happened for a few winters. Another consequence of climate change is dryer summers. The traditional Dutch water system is built and optimized to drain the water away. Nowadays, drinking water companies almost have a lack of water in dry summers.

Floods of the Dutch rivers in 1998 were the immediate reason why the Dutch government founded the Commission for Water Management in the 21st Century. This commission examined the desired structure of the Netherlands' water systems in relation to spatial and socio-economic developments (WB21, 2000). The commission's report launched the concept of "space for water", a new philosophy on water management in order to make the water system more sustainable and more robust. This philosophy supports the search for more compatibility with natural processes so that the resilience of water systems can be restored and utilized.

Instead of fighting the water with higher dikes and faster drainage system, policy measures that had dominated Dutch water management for many years, the land should retain water and facilitate the increased flow of water with broadened rivers and new water storage areas. During periods of high rainfall, these so-called emergency overflow areas or inundation areas can be used as collection areas for water in order to prevent flooding in other (built-up) areas. As summarizing sound bite, WB21 has formulated a three-step approach for water management: retention, storage, drainage (see Figure 5-1). This three-step-approach means that water should be retained if possible, otherwise stored and as a last option be drained away. This serves as alternative for the older culture of draining away as the one and only option for water management in the Netherlands.

Figure 5-1. The three-step approach for water management: retention, storage, drainage (source: WB21)

The actual incorporation of these initiatives into spatial planning is a slow process. Space is a scarce commodity in the densely populated Netherlands where both the Meuse and the Rhine flow into the sea. The price of land is high and private, public and social parties are competing for the same blocks of land. The extra claim of water interests on space only increases the scarceness of land. An extra complicating factor is that the amount of space required for water is difficult to estimate. The degree of climate change and its effect on the water system involves many uncertainties. Large-scale adaptations to the water system are planned on the strength of the available experience and expertise. In spatial planning, however, decisions are based on an integral consideration of all claims to space. Water is just one of the many claims and it not infrequently receives the lowest priority of all.

The recommendations of the Commission for Water Management have resulted in a request from the national government to provinces to draw attention for water in the making of spatial plans. On their turn, the province asked the water boards for their vision on water management in their territory, with the new philosophy in mind. The water boards were asked for a vision on a more sustainable water system in terms of a 'water opportunity map' (WOM) and a water test. These are, respectively, recommendations made beforehand and assessments afterwards with respect to the spatial plans of municipalities and provinces. Both the water opportunity map and the water test are new policy instruments that have been designed as a consequence of WB21. However, these policy instruments did not (yet) have any official

administrative status at the time of 2001. Their impact depended on the willingness of parties to adopt the recommendations.

5.2.2 Water board Delfland

In this case study, we have observed the development of a WOM in the territory of water board Delfland. This water board is situated in the western –low– part of the Netherlands. It comprises the cities of The Hague and Delft, and the largest greenhouse area called Westland. It is also situated along the coast and the mouth of the main trench of the Rhine, through the harbour of Rotterdam. The total spatial system of Delflands'surface waters reaches till territories of neighbouring water boards in the North and South-East (region Leiden-Zoetermeer and region Rotterdam). n the West, Delflands territory is bounded by the North Sea. And in the South-West, the New Waterway forms the border.

In the area of the water board, also called Delfland, flooding has been a problem in the winter seasons of 1999, 1998, 1995 en 1993, especially in the Westland part with many greenhouses. Dryness had been 'almost' a problem many years ago, in the dry summer of 1977. As a consequence of that summer a pipeline construction had been build that brings in fresh water from a lake south of the Rine mouth, the Brielse lake. Figure 5-2 shows the current territory of Delfland. Simultaneously, this map image also shows an example of present day cartography.

Figure 5-2. Current territory covered by the water board Delfland. This map serves to inform the general public through the water board's website. (Legend: the colour with lightest value represents areas with greenhouses, the darker value represents urban area, the middle value represents agricultural land or other type of land cover, and). (Source: Delfland. Available at: http://www.hhdelfland.nl,)

The water board has many terrain maps in its' archives, and many years of experience in map-making. The oldest map in their archives stems from 1545. Famous is the topographic 'Cruicius' map of 1712. This expensive map, made with help of 25 copper tables, shows an overview of the Delfland territory in that time (see Figure 5-3). Note that this map is not North oriented, in contrast to the map of Figure 5-2, but somewhat West oriented with the shoreline above. The red towns somewhere in the middle is Delft, the one along the shore is The Hague.

Comparison of the maps of Figure 5-2 and Figure 5-3 gives an idea of the urbanization process of the last three ages in this region (although both cartographies can give a biased few, depending on possible differences between what is considered as 'urban' in both periods, and cartographic conventions). At the moment of this case study, the urbanization process is still increasing.

Figure 5-3. The historical Cruicius map. The cities The Hague (towards the upper right corner) and Delft (almost in the middle) are surrounded by polders. The top of the map shows the sea. Note that the map is not North oriented, but somewhat West oriented with the shoreline above. (Source: Delfland).

The polder system

In a polder system, both the supplied of water in dry periods, as the drainage of water in wet periods, is controlled. In dry periods, certain pumps let water in –without pumping, because the water flows automatically from the higher bosom into the lower polder area. The water then makes a circulation through the polder area while lots of the water evaporates, through the ground and the air. In rainy periods, a lot of water falls in the polder area; since this flows automatically to the lowest point of a polder, at that point there has to be a pump station which brings the water to a bosom canal, and then to the sea or the river.

At the time when WOM Delfland is being developed), it is a relatively new idea to store water temporarily in case of sever rainfall in so-called *calamity polders*. Later, this term is reformulated as *emergency overflow areas*. These temporarily storage basins could be used in case of emergency (estimated at once in 1000 years) for collection of water during peak-hours, in order to prevent flooding in other -build-up-

areas (this in accordance with the recommendations of WB21 for more “space for water”).

Also, *water storage basins* (reservoirs) are though of as possible solutions in times of severe drought. Only in this case, the usage is the other way around: the storage basins are always filled. In case of severe draught, these basins can be emptied in order to fill up the needed minimal water level in the area.

The two types of water basins are complementary to each other: emergency overflow areas are dry areas in which extra water can temporarily be drained. Whereas water storage basins are permanent lakes that can be emptied in case of need. These two types of water basins can be combined: this is called ‘stacked storage’. The water basin has to be filled and refreshed continuously for sake of water quality, while extra storage capacity is necessary to store water surplus in extreme rainy periods.

5.3 Project plan

5.3.1 Initiation of the project

At the start of the project, in 2000, the instrument WOM is not yet a clearly defined instrument, also what an ‘opportunity map’ is, is still vague. But, multiple water boards are experimenting with making WOMs and also some provinces and municipalities are actively practicing in the development of water visions (Van Dijk, 2001). The province of South-Holland had requested the water board Delfland to make a water vision on their region, because they have the most expertise with the water situation in the region. And thus because of their expertise and their responsibility for water management, the water board is expected to give an expert opinion on problems and possibilities for spatial planners from a water management perspective.

Delfland interprets the request for a water vision as the production of a policy document with multiple map images, together called the WOM. The main emphasis lies with spatial map images. These maps formulate and visualize the spatial vision of Delfland on water management, just like the map images in a legal structure plan (in Dutch ‘streekplan’) do.

Tender procedure before initiation of the project

The project was prepared by the higher management levels of Delfland, that is, the Board of Directors and managers of department Integral Water Management. In autumn of 2000, Delfland sent out a tender to water consultants.

The requested WOM was described as a combination of *several maps* with explanation. Noticeable was the explicit request for *a collaborative approach* with other stakeholders, in particular local and regional spatial planners (municipalities and province). This aspect was not performed elsewhere in earlier WOMs. The collaborative approach was stimulated by one of the *Hoogheemraden*, who had seen

the added value of collaborative approaches around water issues in her other job as Assistant Professor in Policy Analysis.

The content of the WOM is shaped around the production of several different maps. These maps contain different themes. Together, they would formulate Delflands' vision on the water system in relation to space. The final results would be presented in a policy document and distributed among primary and secondary target groups (see former section). In this policy document, one '*overview map*' would summarize all important issues as *the* WOM map image. The method how to arrive at this desired result is not yet crystallized by the time of the tender procedure. Several consulting parties (water engineering firms and water and landscape design firms) were invited to write a proposal and work out a proposal of their own.

Requirement of GIS compliance

In the tender proposal, Delfland also asked for an end product that could be integrated within the Geographic Information System (GIS) of Delfland. This last requirement had been defined because the WOM is seen as a regularly, repeatable process rather than a single project. "The WOM is a process, not a project" (the team leader integral water management, verbal statement may 2001). In this point of view, it must be easy to maintain and update the WOM, and it must be possible to use WOM maps for further usage in the future. Therefore, the higher management has preliminary set the requirement for a digital, GIS-compliant product. For this purpose, Delflands' GIS-office would provide the necessary and available base data from their geo-databases as input for the project. Furthermore, they would incorporate the resulting map information (also called 'geo-information' or 'GIS-information layers') of the WOM as part of Delflands' information organization.

In December of 2000, a project team has been formed and the consultant LWT has been selected. The scope of the project is still vague, though it is clear that the ideas are conform the advice of WB21 (see par. 5.2.1.).

5.3.2 Participants in the project

Internal organization

The department *Integrated Water Management* (IW) of Delfland is the initiator and is leading the project within the water board.

The project-team is heavily staffed with various different expertises, as representatives of all departments were incorporated. The facilitation of the participatory process with external parties, as well as the production of the maps, has been outsourced to a consultant. The consultant, hereafter called LandWaterTech (*LWT*), is one of the biggest engineering firms in the Netherlands, with much experience in water management. In total, the project team exists of ten people, with eight civil servants of Delfland and two external consultants of LWT:

- Project-leader of Delfland

- Process facilitator -originally of LWT, later replaced by a manager of Delfland[2]
- Primary project executor; water expert of LWT
- Communication assistant
- Six specialists from different departments of Delfland: a hydrologist, a water level controller, an expert of dikes and weirs, an expert on water quality, an ecologist and a legal expert specialized in spatial planning.

Next to this project team, a *steering group* is established as a link with the political representatives of the water board organization. They would meet at a low frequency to monitor progress and decisions. In addition to this project group and steering group, extra expert-teams of specialists within Delfland would come together on ad-hoc basis to analyze local and special issues in between meetings of the project group. These are the so-called expert teams.

INTERNAL			
Group	**Actors/People**	**Tasks**	**Involvement**
Project team	Eight civil servants of Delfland and two external consultants of LWT, led by Delflands' project leader	Executing the project	Contact in project meetings, ca. once a month plus 'homework' and informal deliberations
Steering Group	Two Directors, a manager of department IWM and the project leader of the WOM project	Guiding and controlling the progress and quality of the project	Contact in steering group meetings, once in ca. three month
Expert teams	Six experts -for the Oostland area	Assisting project team with substantial analyses on water management and specific issues in the areas	On ad-hoc basis
Democratic body of the water board	The Board of Directors, called Dijkgraaf en Hoogheemraden	Takes official decisions and forms the daily management of the water board	At the start, concept and at the end of the project
	Democratic Counsel (the elected chamber of representatives of the water board)	Approves decisions of the Board of Directors and executes democratic control	At the end of the project

Table 5-1. Configuration of internal people involved in the project organization

[2] After the first 4 month, the hired process facilitator is replaced by LWT, because the original facilitator leaves the organization. Later in the project, the facilitator is replaced by someone from within the water board, of the Department *Integrated Water Management* (IWM).

The 'Dijkgraaf and Hoogheemraden (D&H)' make up the daily Board of Directors. These titles are typical for the Dutch democratic structure of water boards, which have a similar organizational structure as Dutch city-governments. *Democratic Counsel* of elected Hoogheemraden forms the official democratic body of the water board, and thus they have to approve the decisions of D&H. See Table 5-1 for an overview of the project organization.

External organization: Participatory setup
Delfland wanted to make a highly supported vision, both within the organization and with stakeholders from the side of spatial planning. In this light, Delfland invited stakeholders of spatial planning (municipalities and province) to join them in the process. This participatory approach with spatial planners is proposed and stimulated by a responsible member of the Board of Directors. This has led to discussions within the management of the water board, on two topics: a) should the WOM be made in participation with it's target audience of planners, or should Delfland develop it's own vision first, b) who decides what in the setup of the project; to what extend are Board Members, who are democratically elected representatives, involved in how projects are substantially being worked out by civil servants.

According to the project plan, the original idea was to make a WOM in participation with municipalities and province. But after a process-audit with a process management consultant, where different levels of participation about interactive policymaking have been considered, this role for municipalities and province is weakened (see chapter 3 about levels of participation). Originally aiming at *co-production* with spatial planners, participation is then limited to a role as *information-providers* at the beginning of the process and as first *peers* of the preliminary results. The WOM would remain a Delfland's product instead of a co-production. This was decided because otherwise, the water board was afraid it would have to compromise its standpoint twice; both in making this WOM, and in implementation of plans. Also, the group of possible participants is divided into two 'rings': primary and secondary stakeholders (see Table 5-2). The secondary stakeholders are only informed through regularly media -a regularly newsletter of Delfland- that the WOM project is running. Contacting them will be part of a follow-up action, as will be prepared in a communication plan. See Appendix 1 for an overview of the participants in the case study.

Even though the level of participation of external stakeholders is limited, the input and dialogue with municipalities and province, as primary stakeholders in this matter, is considered useful by the project team of Delfland: (Delfland project notes, April 2001)

- to get information on the spatial (urban and rural) developments in the region
- to introduce what a WOM is and raise support of spatial planners for the final WOM-product
- to get acquainted within the actor network of spatial planners
- for spatial planners of municipalities and province to learn about water management and the approach of Delfland in this matter

EXTERNAL **Group**	**Actors/People**	**Tasks**	**Involvement**
Primary stakeholders	Spatial planners within the region: • The province of South Holland • Municipalities -27 in total for the pilot area Oostland[3] • Haaglanden[4]	- Providing information on spatial and water-related issues/plans in the area - Giving feed-back on the project definition and concept WOM - Learning about (Delflands') water management - Participating in discussions, forming a network related to water management	Three or four times during the project (considered as external participants in the process)
Secondary stakeholders	Other stakeholder groups in water management water/land use: • Agricultural organizations • Environmental groups • Neighboring water boards • Chamber of commerce • Etc.	- Possibly participating in follow-up (implementation)	No direct contact in this stage (considered as not actively involved)

Table 5-2. Configuration of external people involved in the project organization

5.3.3 Project scope

Project goal
More and earlier communication with municipalities about spatial developments is absolutely necessary, is the commonly shared opinion within Delfland (observations of deliberations in project meetings, in the period December 2000-March 2001; interviews with project members, Carton 2001). Delflands' overall goal with the WOM project is

'to affect spatial planning and to improve Delflands' image as a progressive institute'

as stated by the initiator at the start (verbal statement of project leader, manager and Board Member in interviews, 2001). Delflanders think of themselves as a 'traditional, technically oriented' organization. They aim to improve communication with their network relations. A WOM is seen as an instrument that stimulates communication

[3] During the pilot, two municipalities have merged into one: Pijnacker and Nootdorp merged into Pijnacker-Nootdorp.
[4] Haaglanden is a representative body of the urban-agglomeration around The Hague

and cooperation between spatial planners and water managers. Therefore, the project is considered an opportunity to 'do things better' this time. The product WOM itself is described as follows (Delfland, 2002, translated):

"The WOM Delfland is a sectoral vision, from the perspective of water management, on the spatial developments in the territory Delfland, explained in text and a number of maps. This document has the following functions:

1. to map out the spatial claim for water, with the accompanying arguments
2. to give a judgment on the suitability of locations for urban developments
3. to state conditions for the internal (re-)structuring of locations
4. to provide background information about the water system, its working, and bottlenecks and opportunities in this system

Spatial scale: starting with a pilot area

In the beginning of the project, project members of Delfland felt 'uneasy' about the vagueness of the content and purpose of a WOM. In every meeting, questions came back on the question what the priorities would be in this policy document. Agreed was to start with one of the four sub-areas within Delfland as a pilot area. In this way, the amount of participating municipalities and area-specialists, as well as the amount of spatial information and would be limited. Efforts could be focused in depth on one fourth of the total spatial area. However this area was smaller in size, it was particularly not the intention to work out the final maps is greater detail. The focus should lie on the polders and connecting (bosom) canals, not on 'local individual ditches'. Because municipalities usually focused on small, local-level zoning plans, this was a foreseen pitfall in the collaborative process.

The making of the total WOM would be executed in a succeeding step. The WOM of pilot project Oostland would form the prescriptive format and example, and the applied method could be 'copied'. Finally, all partial WOMs would be integrated into one document. By forcing an interaction loop with this setup, the quality of the WOM could benefit from opportunities for improvement and updates.

The pilot study would focus on the area of Oostland. This area was selected because of its physical characteristics. The other three sub-areas had a monotonous character, either as urban area, or occupied with glasshouses, or as agricultural-recreational (green) landscape. The landscape of Oostland was a mixture of these. With this diversity, the total scope of water-related issues could come on the table in the pilot phase. In this way, it was expected to reduce the amount of new issues and new types of information for the succeeding phase and overall maps. Figure 5-4 shows a photo of a bosom canal in Oostland with an agricultural area in the background, and a nature reserve in the far (the bushes at the horizon are part of the reserve 'Ackerdijkse Plassen').

Figure 5-4. Rural landscape in the region Oostland. The photo gives a view of the bosom canal, lower polder land in the background, and on the left a pumping station, built in the style and incorporated as part of a house. (Photo: P. Musters/ Delft Integraal)

Issues incorporated in the WOM

The project group noticed that Delfland should have a long-term vision on water and space in the long term: but since such a vision was lacking at the moment, the group decided to develop such a vision for the pilot project themselves. "We need to manage with what we have got. It is not our task to develop a new vision for Delfland, but we need to draw up some shared ideas on paper, in order to have a frame of reference and basic principles to work with in Oostland" (verbal statement project leader, March 2001).

In order to have a global framework that set requirements and objectives for the pilot-project Oostland, targets were determined for different parts of the water system. For this purpose, an inventory was made of various problems and solutions in a large table. To give a handhold and structure for the vision exploration, the hired water consultant made a framework of several dimensions, visualized in a table structure. The table categorized problems and potential solutions for different themes, in different parts of the water systems, and for different time horizons. Table 5-3 gives an overview of this framework. By filling in this table, the consultant made an inventory of concerns and opportunities as seen by the experts of Delfland in the meeting discussions. The resulting table was the basis for the document "official vision" (in Dutch: ambtelijke visie, which emphasized the source of the document, made by civil servants, not yet approved by the political representatives) Table 5-4 illustrates various collected issues that are mentioned in this document to be incorporated in the WOM.

ASPECTS OF FRAMEWORK	SUBDIVISION
Theme of water management:	• Water quantity –surplus • Water quantity –shortage • Water quality
Part of water system:	• Bosom land (high land) • Bosom (this is the water infrastructure) • Polder (low land)
Potential problems and policy measures:	• Bottlenecks • Solutions
Time scale:	• Present (short term) • Future (long term)

Table 5-3. Framework used in the inventory of targets for three different parts of the water system

ISSUES for WOM	
Examples of potential problems	**Examples of possible policy measures (tactics)**
- Implementing emergency overflow areas - Implementing water storage basins - Installing a higher or a flexible ground water level - Increasing dikes and quays - Isolating water circulations with low level of water quality - Disconnecting the rainwater that runs off from roofs and/or streets in build-up areas from the sewage system (letting the rainwater infiltrate in the soil)	- Shortage of percentage open water (this is the amount of water surface in relation to surface of build-up area, especially problematic in greenhouse areas) - Lack of drainage capacity due to small size of watercourse or pump construction - Insufficient height and strength of quays - Low level of water quality (high levels of phosphates and nitrogen) - Drought of the soil - Salinization

Table 5-4. Illustration of potential problems and possible policy measures to incorporate in WOM

The issues were collected and structured into large overview matrix-tables. These tables served as overview of the substantive issues that should be explored and literally 'mapped' in the WOM project. Table 5-5 gives a shortened example of such an overview table, on the topic of water quality.

	Bottlenecks in water quality [present]	[future]	Solutions in water quality [present]	[future]
Reservoir-land	Pollution by point sources	Decrease of point sources?	Clean up sources of drainage	Further cleaning of sources of drainage
Reservoir	Incoming water is immediately polluted or transported to the sea	More need for water in dry periods	Direct incoming water 'from clean to dirty'	Separated flows carrying on and off
Polder	Seeping water /chlorid	…	Retention of clean water	…

Table 5-5. Example of a table with tactics (measures) for bottlenecks on behalf of water quality

5.3.4 Process design

When the project group was installed at Delfland in November 2000, the first ambition was to finish the WOM of the pilot area before summer 2001, and finish the other areas shortly after the summer. But the start-up meetings of the project group and steering group took a long time. Many questions, many of which raised by the hired consultant LWT, were being discussed, thought over, and reconsidered. From December 2000 till March 2001, several meetings were held in which the discussions comprised:

- the formulation of the scope of the project (described in the former section);
- the objectives and status of the WOM instrument;
- the general long-term vision of Delfland on water management in its territory;
- the level of influence of municipalities; and
- the practical aspects of facilitating the participatory process and the 'roll out' of the WOM, formalized in a communication plan.

These discussions were consolidated in the development of three different documents:

1. the official vision document on the level of Delfland (written by hired water consultant of LWT)
2. a communication plan for the WOM (written by the hired process facilitator of LWT)
3. an analysis of the area Oostland and a collection of specific bottlenecks/ opportunities in this area (by expert team Oostland, collected on several maps and notes)

In the spring of 2001, after some delay, the process for making the WOM of the pilot area Oostland was described as follows: (presentation on May 31th, 2001)

Approach and time-schedule WOM Oostland	
- 1st Information meeting with participants	*May 31th, 2001*
- Constructing vision for area Oostland	*June*
- 1st Work atelier with participants (municipalities and province) of Oostland	*July 5th*
- Bilateral meetings between Delfland and external participants individually	*July-September*
- 2nd Work atelier with participants Oostland	*1st week in October*
- Constructing concept WOM Oostland	*October 2001*

5.3.5 Method for developing the WOM

In this section we explain the analytic method to develop the WOM as it was followed generally by Delfland. We describe this method rather extensively, because it comprises our main object of study; how maps are being used (in a collaborative, policymaking setting). This usage of maps depends, amongst others, on which methods are applied. And within these methods, weather and how maps are used as part of the input, process or outcome. An extra reason to explain the followed method in detail is the vague or implicit nature of this subject: there is a wide variety in types and approaches of making a WOM (Van Dijk, 2001); there seems to be a lack of literature on methods or methodologies for making WOMs (or these type of policy instruments); and also the method of Delfland has remained rather implicit.

The substantial methodology to make the WOM has never "really" been explicated inside Delfland. The work plan to make the WOM comprised only a process-design that signified who should be involved as participant in what phase (initiation, design, concept version). How the steps would be processed analytically was part of the search-process in the pilot project. The manager who intervened in a conflict in 2002 formulated it as follows:

> "But what is the methodology? There must be a methodology for making a Water Opportunity Map?! Do others follow a certain procedure, are these methods available? Can someone explain the method to me, how we can come to the end product?" (verbal statement in project group meeting, March 2002)

The two succeeding project leaders of Delfland and the primary project executor of LWT had ideas about the approach, although these were not put onto paper as a detailed plan of work. The project leader verbally explained these thoughts stepwise in the succeeding meetings, using the scheme with the time schedule as heading. As the WOM project of Delfland was of experimental nature and it was executed as collaborative effort, at times consensus about the (next step in the) method was lacking. Therefore we describe the main lines of how the method 'emerged' from various discussions, choices and changes during the process.

A number of maps

In general, the idea is that the issues stated in section 5.3.3 should be visualized on a map. Conceptually, no distinction is made between making the policy vision and making the map images. The map images are seen as the embodiment of the vision. According to this idea, four different types of maps would make out the content of the WOM, accompanied with explanatory text:

1. Water Wish Map images (WWK) with vision on the water system
2. Map of future spatial developments
3. Suitability map images
4. Final WOM map image

The first map type, the WWK, formulates the vision on the water system as a sustainable and self-sustained system in the future, spatially projected on the map. The second map summarizes the collection of potential future spatial changes in the landscape. The third map advices –positively and negatively– about land use changes. It indicates which areas are considered as unsuitable for urban development or greenhouses. The fourth and final map is a summary of the above maps 1, 2 and 3, indicating the most important threads and opportunities in one image. This map should be an 'eye-catcher' that can be hung on the wall and is easy-to-use for both spatial planners and 'Delflanders', both civil servants and governors.

The total of policy measures (tactics) that Delfland proposes in the final WOM document should form a coherent whole, focussing on the integrated system of water and its surrounding spatial landscape. It should also be co-ordinated with other projects of Delfland and related governmental actors, such as the neighbouring water boards.

In Figure 5-5 an overview is given of the various map types 1 till 4. The general analytic tools comprise the development of map layers and the overlay of different layers into one map. For making the maps, expert knowledge as well as database-information is used. The method is constructed around the formulation of targets (for the future state of the water system) and criteria, and the assessment of locations (including the water system) on these criteria and targets. Together, these should result in the design of a vision (WWK) on future water management and the formulation of advice to spatial planners (suitability map). During the process of making the WOM, several questions about the method have raised and several adaptations have been made. In particular the role of the map of Spatial Developments has remained a subject of questions and discussion, on whether this map should be incorporated in the final WOM document and map, and whether it should be used as input for making the Suitability Map. Therefore, the arrows indicating these relations in Figure 5-5 are dotted.

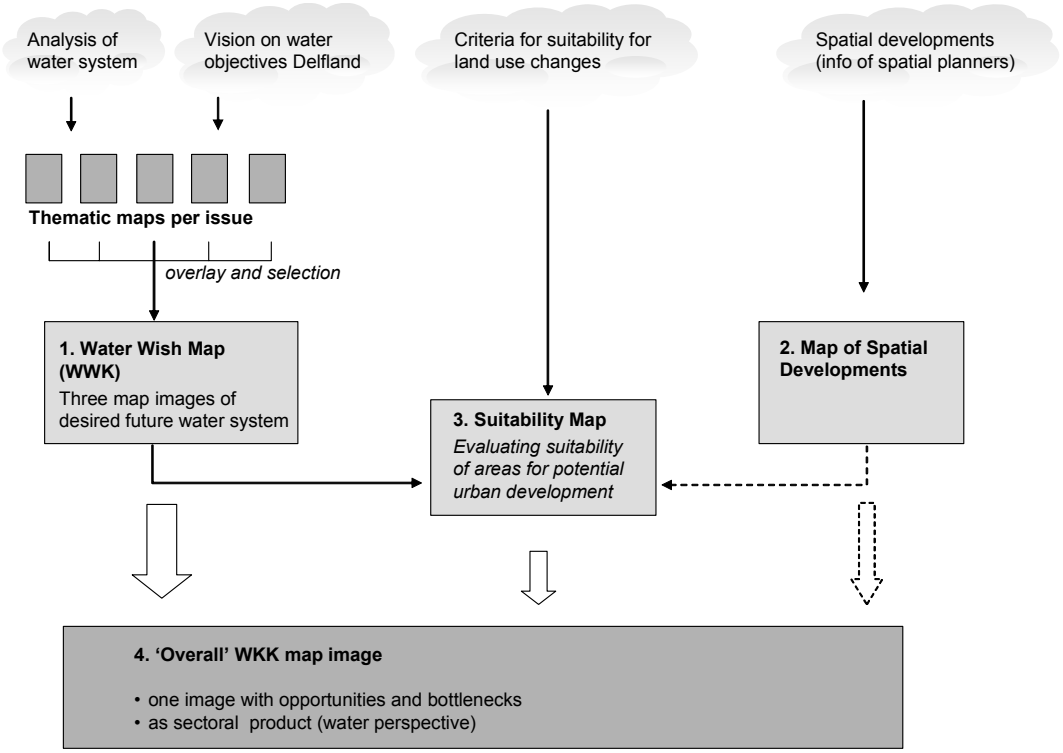


Figure 5-5. Overview of the mapping method (Source: Delfland)

Presentation of resulting policy document
The order of processing the maps is independent of the order of presenting the results. For the sake of optimal communicability, the set of maps is ordered in the end report according to the following configuration:

- primary map: the final wom image (map 4)
- secondary map: the vision on the water system expressed in the set of wwk images (map 1)
- tertiary map: the advice on urban development expressed in the suitability map (map 3)
- appendix: the inventory of possible future developments in the landscape expressed on the Map of Future Spatial Developments (map 2)

5.4 The project process in retrospect

This section explains the project process as it evolved. This is described as a so-called 'thick description' according to qualitative research methods using case studies (Denzin, 1990). Our intention with this thick description is, to demonstrate the dynamics in the project process. We have said that map use is highly contingent with its context.

We present the description of the decision-making process first, in order to explain the interrelationship between the ongoing decision-making process and the different stages and instances of map use in the next chapter.

We have followed the rounds model of Teisman in order to explain the process of Delfland. This model structures policy processes according to so-called crucial decision-making moments. As this model structures processes according to events – the crucial decision-making moments– that have yet taken place, it can only be applied in retrospect. (In constrast with the classical phase model, as explained by for example Miser and Quade (1985). The phase model can both be used to reconstruct policy processes in retrospect as to prescribe a plan how the process ideally ought to be structured.)

The rounds model of Teisman focuses on a specific policy theme and reconstructs which actors have made decisions about this theme. The outcome of the policy process is determined by the coherence in a series of decisions taken by different actors. In this series, there are important partial decisions that change the course of the process in a different direction or cut off certain possible alternative directions. Such decisions could be official decisions taken by a governmental institution, such as a new law or policy program, but also the forming of a coalition between actors or the decision of a stakeholder to exit the collaborative process.

The reason why we use this rounds model to reconstruct the process, is threefold. Firstly, the rounds model focuses on the interaction between actors. In order to study the role of maps in interactive settings in particular, obviously these interactions are of most interest to us. Secondly, this rounds model emphasizes the dynamics of a policy process. The dynamics of a policy process is an important contingency factor in our conceptual model to reconstruct map use. Thirdly, it fits with the ideas/theory about *framing* of Rein and Schön (1995), because in this rounds model, 'progress' in the policy process is considered as an increase of the level of *congruence* in perceptions and behaviors of actors, which in its turn evolves from the interactions. In our view, this level of congruence is an explication of the dynamics in differences and similarities between actor's mental frames into one (more or less coherent) typical framing of the problem.

5.4.1 Early activities

Round 1. Preparation *December 2000 –February 2001*

The atmosphere in the project group was ambitious and exited in this round. A new type of project was to be executed, and the project group was appointed to do this. A lot of questions surround the mysterious name 'Water Opportunity Map', and the combination with the desired collaborative approach with external stakeholders made this project a real challenge. In the first meetings, especially ontological questions about the WOM were being raised. What is it, what does it mean, what purpose does it have, how does it look, etc. The hired water consultant made overviews of issues in tables (see Table 5-3, 5-4 and 5-5) and on a pair of two sketches. With these sketches, he aimed to clarify the discussion on what a sustainable water system should look like in Delfland, on the long term. We have labeled these sketches as 'map 0', since they did not belong to the 'official' group of maps mentioned in section 5.3.5 and Figure 5-5, that were incorporated explicitly in the methodology. But as they were made and used in the process, we have incorporated them in our analysis.

In order to specify the problem of climate change into concrete policy targets, the water expert made rough estimations on the quantitative aspects of the water system

in the future. He made his calculations for the water shortage problem. The need for water in an 'extra dry summer', which statistically happens once in 35 years, was 7.33 m^3/s (Meeting notes, January 10th, 2001). This amount of water served for uses like extracting drinking water by the drinking water company, and for sprinkling by farmers, but also in order to keep the water level in the canals high enough for a healthy aquatic ecology. In a dry summer, the need for water was estimated on 5.78 m^3/s. Theoretically, a supplement of fresh water was available from a lake in the south (through a pipeline construction underneath the New Waterway of the Rotterdam harbour) and the canal system north of Delfland. Together, these supply sources could contribute 6 m^3/s. This meant a shortage of 1.33 m^3/s in an extra dry summer. This shortage could possibly be bridged by various different measures, such as the creation of reservoirs (water storage basins), but also other measures are mentioned like selective drying of areas in case of drought, or the re-use of so-called 'effluent' for the drinking water industry.

Estimations for the problem of flooding were not made. The urgent problem of flooding in the lowest areas in the territory, which caused economic damage to greenhouse exploiters and inconvenience to citizens, was already being dealt with in a parallel project, called ABC-Delfland. In this project, some bosom canals were broadened and the capacity of pumping stations would be increased within the next five years (especially in the greenhouse area 'Westland', where the flooding problems manifested). In a follow-up of this project, all polders should be calculated in order to specify and quantify new bottlenecks on the longer term, on the detailed level of the polder system (instead of the bosom canal system). Meanwhile, the WOM project served to identify opportunities and suitable locations for extra measures in the long term.

Round 2. Communication plan *March – April 2001*

On the substantial side, the project team formulated sixteen potential measures for solving problems of water shortage, water surplus and water quality. On the process side, there were many changes in this period. A personal career move caused the change of the process facilitator of LWT (February 2001). This caused some delay in the process, because Delfland was not content with the replacing consultant. LWT suggested that the technical water expert would become the new project leader at LWT. This was unacceptable in the eyes of Delfland. The project leader had accepted the water technician along with the process facilitator, but she did not see the water technician as a communicator of facilitator. Nevertheless, it was decided was to proceed, with a new process facilitator of LWT and LWT's water expert.

The new process facilitator held a 'process audit' in order to fill in questions about the desired influence of external participants, process objectives and preferences and habits in communication approaches of Delfland. In this audit, the communication objectives with the WOM were again a point of discussion. Should the WOM visualize the collaborative vision of the water board and spatial planners as a collaborative outcome of the interactive process, or should it formulate the vision of Delfland? The process facilitator explained the levels and the implications of giving influence to external stakeholders. While the initial idea had been to commit to a real co-production of the WOM product, this was reconsidered during the process audit. In

particular, one of the Hoogheemraden expressed his doubts about giving stakeholders real influence in decisions:

> "This way, we would have to make concessions twice: both in the process of making the WOM vision, and afterwards, when the spatial planners, both province and municipalities, can decide what parts of our WOM they are willing to incorporate in their plans. We should give them our un-negotiated view first."

Consequently, the level of participation of the spatial planners was changed from co-production of policy towards information provision. When the process facilitator delivered his product of a concept communication plan in April, the opinion of the steering group was devastating. According to them, the plan was too vague, it was an 'off the shelf plan' that could fit any general project and it did not comprise a time-schedule for concrete actions. This round came to a closure with the removal of the hired process facilitator. The team leader of the department Integral Water Management replaced the process facilitator; he would chair the meeting with the external stakeholders at May 31st.

5.4.2 Interactive meetings

Round 3. Meetings with external stakeholders *May – August 2001*

In the project meeting of May 7th, it appeared that the project leader of Delfland had got overexerted. She was replaced by a new project leader. This caused some new delay. The new project leader was a junior project leader at the department Integral Water Management. The team leader of this department, who would also chair the meetings with external stakeholders, would support her. The new project leader made a refreshing start by structuring and clarifying the status of various working documents, and the roles of project group, steering group and expert teams. The planned meeting with external stakeholders for May 31st was kept on the agenda.

Individual experts of Delfland were given 'homework assignments' to make a vision map on the topics that were elaborated in the last meetings. From the formulated list of sixteen potential policy measures, nine topics were found suitable for incorporation as legend items on the Water Wish Map. Among them were: flexible water level; more open water; strategic water reserves; calamity polders; improvement of flow rate; and nature friendly canal banks (list project group meeting May 7th, 2001). Every topic was elaborated on an individual basis, so that each topic could be handled by the most appropriate specialist. (But each specialist had got the same map as background sheet of the water consultant. This way, they would keep the same level of aggregation and it would be easier for LWT to digitize the information in the GIS.)

In the next project group, just before the meeting of May 31st, every map was presented on the overhead projector and discussed among the project group. It turned out that there was a lot of confusion about the meanings and definitions of the topics. For instance on the topic 'more open water'. The following questions passed in the discussion: Did the expert draw contours around areas where there is an opportunity to create more open water, and if so, for what reasons (because of the landscape, or because of possible linking with existing projects that cause changes in the landscape)? Or did the expert draw contours to indicate where more open water would

be required? And what kind of 'open water' is being considered; real lakes, or a widening of the existing canal structure? Does the deepening of a canal also fall under the definition of creating more open water? And how much open water is being considered, a large amount or a small increase? These kinds of questions were being answered by the map makers and discussed. Accordingly, the specialists got new homework to improve the maps.

The choice to incorporate suitability advice maps in the WOM appeared to be a difficult point. Both in the project and steering group, there was a long debate if Delfland should incorporate such maps in the WOM. On the one hand, the water board did not want to offend the spatial planners by 'taking place at their chair and doing their job of pointing out where new developments may and may not take place' (verbal statement of Director, meeting in May 2001). On the other hand, Delfland wanted to point out in an early stage where it was really problematic to build houses from the perspective of water management. And also they could point out in an early stage that extra measures (with extra costs attached) would be necessary in areas where it was, however possible, not favourable to transform rural land into urban areas. Finally, it was decided by the steering group to incorporate such a suitability map into the WOM document, but not as the primary map.

The first meeting with the external stakeholders was a boost in the process. The project leader and a water specialist had prepared a presentation. Most of the stakeholders had accepted the invitation; the meeting was held with 18 people. The spatial planners of municipalities listened interestedly to the presentation. They appeared very 'blanc' on the subject. None of the participants posed a critical question.

In the invitation letter, the water board had asked the external stakeholders to bring relevant information for input in the WOM project. But some of the participants brought a pile of thick policy documents, and the project team wondered how to deal with all this information. The project team decided not to try to elicit the relevant information from these thick documents, but instead, to ask the stakeholders with direct questions what would be the most relevant aspects to incorporate in the WOM from these policy documents.

The second meeting with the external stakeholders was scheduled for July 5th. The project leader and team-leader prepared the set-up for this so-called work atelier. They designed a similar setting as the first informative meeting; a plenary setting with presentations and questions5. The project group had given itself the task to finish the setup of the Water Wish Map by July 5th. The external participants could then react and respond to these maps.

But while preparing these maps, it appeared to be a lot of work, with many questions unanswered, even within the restricted circle of project members. The individual maps, drawn by various experts per issue (see Figure 6-7) arose even more questions than in the former round. The questions dealt about boundaries, about different qualifications, and especially about argumentations behind these choices. Some maps were better funded with arguments than others. It became clear that the time-period was too short to integrate the information into a coherent product yet. Therefore, it was decided to present the current, individual map sketches of the experts to the external stakeholders.

[5] This setup for a work atelier surprised us, as we had expected an active workshop with division in groups and active group work. But according to what we observed at Delfland, there seemed to be a usage in traditional meeting settings, with plenary settings, and discussing paper work that has been sent around.

Because there had been only few questions in the first meeting, the project team anticipated that not many reactions would be evoked after presenting these maps. Therefore, the idea was taken up to add bilateral meetings in the planning. In one-to-one conversations with every external stakeholder individually, the team expected to get more reactions and more questions. The limited group size also offered an extra opportunity to explain specific aspects of the WOM or the water system in general into more detail. Furthermore, the intimate setting of bilateral meetings served to tighten the relations with spatial planners of the various municipalities and province.

The bilateral conversations were planned in groups of two civil servants of Delfland (of the project group or expert team Oostland), often with two people of the external stakeholder. In total, 9 bilateral meetings were planned in July, August and the beginning of September. For every meeting, the responsible representatives of Delfland had received an agenda, a package of maps that were presented on July 5th (with plastic sheets attached for writing comments), and a separate, bigger map for drawing up possible future spatial developments in the area.

Round 4. Converging all information *September – November 2001*

On September 7th, the information of the individual meetings was submitted back at Delfland in a long meeting of all the people who had participated in a bilateral meeting. All sheets were projected on a large screen. All team members were apparent to clarify the remarks on all the sheets. The consultant of LWT collected all remarks and would digitize them into the GIS. Next meeting, he would give feedback on the results.

At the time of the next project group meeting, on September 19th 2001, the region went through a period of continuous rainfall. Calamity phase 2 of the organization had just been imposed. Half of the project group was absent, because they had a role in the plan of the current alarm phase. In a small group setting, the bilateral meetings were evaluated. They had turned out a good idea. The project members found it striking to recognize the need for repetition and education in the various bilateral sessions with municipalities. Furthermore, a general impression of the reactions of municipalities was, that they found the maps ‘not visionary enough’ (verbal statement project leader, September 19th 2001).

The project leader planned a next meeting in order to gather with a more complete project group. She also explicitly asked for support on the work, because of the workload. LWT agreed to execute the homework on the maps. Project members would edit the accompanying texts. On October 8th, the Water Wish Map would be compiled from the information. The combination of information proved to be more work than expected. LWT made many adjustments and interpretations in order to combine topics on a limited number of map sheets. From these maps, new problems and remarks came up. Also, the project members of Delfland were unpleasantly surprised with the low graphic quality of the compiled map images of LWT. After this meeting, the project leader fell ill.

During a period of relative silence, an extra expert in the field of spatial planning took action. The spatial planning expert was added to the project group since September, to fill in this specialization on spatial planning ‘language’. The specialist reminded that she needed results of the WOM project by January 2002 for her task to give Delfland’s official input for the provincial Structure Plan. This had been an agreement with the former project leader, but had fallen out of sight in the transfer of the project

to the second project leader. In order to speed up the process, the team-leader planned a special 'marathon' session on December 3rd (2001). In this session, called 'vision workshop', the project group would have to come to an end product for the Water Wish Map. Simultaneously, the team members would try to expand this to a global vision for the scale of Delfland's whole territory, since this vision was needed on a short term for the provincial Structure Plan.

5.4.3 Intervention by higher management

Round 5. *December 2001 – March 2002*

Although the atmosphere was very constructive at the Vision workshop, two members of the project team had critics on the current product and way of working (see the Text box 5-1)

The deadline for giving input to the provincial structure plan was near, and the spatial planning specialist decided to take care of this in her way. Together with a hydrolic specialist and GIS-engineer of Delfland, she drew a vision map and sent this to the province, as input for the Structure plan in name of Delfland. This map was not completely in line with the evolving maps for the WOM. For instance, the potential areas for water storage basins were divided into two groups: warranty, and search spaces. The spots in Oostland were classified as search spaces. Claims for water storage basins were drawn in another area, Midden Delfland. This new map had never been discussed within the WOM project. In January, the conflicts raised a climax.

On January 11th 2002, a small group of the project team gathered for an extra meeting because of the recent developments. Two specialists said to loose trust in the end product. They pointed at the WOM Schieland as the new example to follow. This Water Opportunity Map of the neighbouring water board had come out recently. With this map as example, the two specialists argued for a distinction between 'hard' and 'soft' demands for space. Others did not agree that the followed approach should be changed. Again there was a discussion whether the uncertain need for water storage basins on the long term should be put on the map as hard demand.

No consensus about the approach was achieved. The meeting ended abruptly. The outcome was that two separate versions of advice would be sent to the steering group, who would have to make choices based on the two advices.

Debate in the Vision Workshop: Numbers, spots and terminology

In the Vision workshop of December 3rd, the debates get more concrete. Also the contours on the maps get clearer. The team-leader chairs the session. He recapitulates the goal of the workshop as to 'develop a creative vision on the territory of Delfland' (verbal statement, meeting December 3rd, 2001).

It is clear that the needed space for water storage (both for calamity polders and water storage basins) is a central issue in the WOM. The project group calls back into memory any rough estimations on the need for water basins. The project group translates earlier calculations about a need of ca. 8 m3/s water supply in extra dry summers, into 8 million m3 water volume to store. If water would be stored in basins with a depth of 2 meter, this would mean a need for 400 hectares of water storage basins (and even more, towards 650 hectares, if considered that a base level of water should remain for the sake of sufficient water quality). The hydrologic expert has doubts about the calculation: "These numbers are in my opinion working hypothesis, we should not make these numbers public."

The spatial planning specialist does not agree with the water storage basins in Oostland. She pleas for a larger scale perspective: "We should also co-ordinate this with our neighbouring water boards. There are ideas for a recreational lake in the Green Heart. This (the water shortage problem) is a border-crossing issue, there are also financial funds available." However, the project leader wants to keep the earlier decision to aim for and claim as much water storage basins in Oostland as possible.

Another conflict rises on the specific issues of calamity polders and water storage basins. It is discussed if these two options can be combined. Half of the group would advice against combination, because of the water quality (use of areas as calamity polder would let in dirty water into the relatively clean water storage basins). But the other half sees an added value in the combination, because it saves hectares in surface by 'stacking' these two functions. In their eyes, this is a nice example of 'multiple use of space'.

The hydrologic expert is requested to make rough quantitative estimations on the need for open water and calamity polders. This has been asked before. He explains now why he does not agree to that approach: "I cannot calculate a quantity about the future need. I cannot play for oracle. I also want some political cover for a change. Because if I give numbers here, I have implicitly taken the decision that we will prevent damage actively with overflow-like polders and how much of them we want to have… In my view, we would visualize on the WOM locations that are suitable for potential policy measures, not to visualize the need for such measures. " This view is not shared by everyone. The team-leader concludes: "This issue needs a process approach."

The spatial planning specialist has critics about the terminology. She has written a memo with many comments on the map images and the accompanying text. The hired consultant of LWT finds many of these terminology aspects a minor issue: "You should look through that today."

This meeting marks the moment where consensus is more often lacking than reached. Many issues, which were now more concrete than before, proved to be perceived very differently by the project members, who stem from different departments within the Delfland organization.

In hindsight, the responsible Hoogheemraad said: "The making of maps is really good for the organization. It forces people to make choices. Before, all these different opinions could 'live' next to each other" (interview, December 2001).

Text box 5-1. Differences between perspectives in the WOM process get visible

It was clear for the steering group that the project has run into a deadlock situation. The steering group informed the new daily director of the organization (an interim manager) and asked her to intervene. She interfered by holding individual interviews with the key persons of the project. In February, she decides to act as temporal chair of the project team.

The interim director took a number of hard decisions, after having heard all individual opinions and discussion in the project meeting. She presented these decisions with some humour and flair and made clear that this was her 'final word' to settle the debates. Her decisions were accepted in the project team. In our observations, the way the interim manager acted, with a cheerful appearance and many little jokes, had large impact on the group. The status of the director, being part of the higher management seemed undisputed. There seemed to be a relief that the interim manager acted like an impartial judge who settled the hard choices and took responsibility for it.

The map sheets made by LWT remained of the same low cartographic quality. All Delfland project team members agreed that the resulting map images lacked graphic quality. Some lines were too thick, some colours were 'illogically' chosen, etc. Despite many remarks to the LWT consultant, this was not improved. His arguments were that the graphic layout would only be 'a fix afterwards'. The people of Delfland disagreed with this.

The interim manager decided to hire a new consultant in March 2002. She wanted to force an end product and finish the pilot project Oostland. The newly hired consultancy firm, BNG, was a landscape architect. BNG got the assignment to write the texts, in a jargon and 'language' that would fit with the world of spatial planners. Because the new consultants normally work for spatial planners, they were experienced with spatial planning policies and texts. In order to prevent troubles with the previous consultancy firm LWT (for instance on copy write), it was decided that BNG should use the Water Wish Map images of LWT and the suitability map images of LWT in the final document. BNG got the assignment to make a summarizing overall map image, and to produce the spatial developments map.

Round 6. Presentation of maps to external stakeholders *April – August 2002*

In April, a new time-schedule was made. On June 6th, there would be a third workshop with the external stakeholders, approximately a year after the first and second workshop. Around this date, the WOM results would also be presented in various committees in Delfland internally (see document Planning finalization WOM, April 16th). From March till May, the project team and BNG worked hard to finish the WOM document. In the meantime, the critical spatial planning specialist left the project, because of a change of jobs.

On June 6th, the concept map sheets were being presented to the group of (primary) external stakeholders. All the various maps, both the Water Wish Map, the map of Spatial Developments, the Suitability Maps and the summarizing Map, were hung on the wall (see Figure 5-6). In a presentation, the various legend items and issues were explained by the project leader. Next, the stakeholders were invited to walk around the maps and discuss and put their remarks on and next to the maps. They were also asked to write positive and negative critics next to each map. These comments were

separated in two groups: remarks for substantial issues and remarks on cartographic aspects.

Figure 5-6. Third workshop with external stakeholders at Delfland, June 2002.

The comments of municipalities were critical, but constructive. They complimented Delfland for coming with this information on a (potential) long-term policy for water in this area. This overview was lacking in the eyes of participants.

An important point of critic, or rather a question, posed by many of the participants, was the question how much of the spots for calamity polders and storage basins is needed. Did Delfland need them all or is there a choice? The municipalities would like to have some flexibility in to incorporate the requested 'more space for water'. In this light, one municipality also pointed out the financial aspects of the policy maps. He remarked that if Delfland put its cards to claiming all the spots, then he wondered how much money they have put aside to obtain these grounds.

But in the eyes of Delfland, the water board would not buy these lands. In their view, water policy should be a shared responsibility in spatial planning. One of the policy instruments that the water board had at its disposal to make spatial claims legally binding was the Water Test. New spatial plans of municipalities were obliged by law to contain a 'water section'. This section had to be approved by the responsible water board. Delfland presented the WOM maps as a substantial framework that would be used in the evaluation for this Water Test. However, Delfland could not answer with certainty that they wanted to implement all the indicated water basins (for surplus or shortage). More research on this was necessary. But as starting point, Delfland wanted to warrant these appointed areas, to keep them available for possible water storage, and not appointing new functions at these locations while the water

board would be working out its plan in more detail. So, the water board asked for time and commitment to this phased process of searching 'space for water'. For this, they needed the cooperation of spatial planners. With this answer, the water board admitted that it should be possible in the future to better define the total amount of space for water storage, and thus the 'room of play' between available and needed space.

One map was considered as very sensitive, in the eyes of some municipalities; the map of Spatial Developments. As civil servants, the participants explained that they could accept these maps as a 'thought experiment' with a rational collection of information, but that their political representatives would probably fall over the presented information: "If you would present this map to our political representatives, BOOM. The process likely will be blown up."

Besides these two main points of critique, the municipalities expressed their appreciation of Delflands work and their transparency and information towards the spatial planners. Due to the delays between the participatory meetings, the municipalities understood that it was a very difficult project. The overall judgement about the various map images of the WOM was really positive.

Meanwhile, the WOM was presented also in various internal bodies and departments within the water board. Multiple positive feedback reactions encouraged the ideas in the project group that the resulting product was good. In the end of June, also the Board of Directors (D&H) and the Democratic Body of the water board bended over the final document. The final document had become a thick book of 70 pages. The Board of Directors decided to stipulate this document as a working document for internal use/attachment, and demanded a managerial summary version. In the Board's eyes, the thick policy document was unclear and hard to read. The managerial summary should become the final policy document.

5.4.4 End and follow Up

Round 7. Group evaluation *September – November 2002*

In the summer of 2002, the project leader of Delfland changed jobs, but would finish the project for the pilot area Oostland (on an hourly basis). At the end of August, there was a concept version, but it would take until November 2002 before the officially stipulated version would finally be printed.

The interim manager planned an evaluation for the month of September. The project had gone through much delay, and the costs for personnel and external consultants were high. The evaluation should shortly look in retrospect on problems in the working process, and result in process recommendations for the making of the WOM for the whole territory of Delfland. In the evaluation assignment, Delfland asked explicitly for recommendations on the process aspects of making the WOM for the overall aspects. The water board was satisfied about the substantial result.

The evaluation was executed by a team of the faculty Technology, Policy and Management, by doing interviews with some project team members and the organization of an evaluation workshop with all the project team members. In this workshop, a Group Decision Room (electronic meeting system) was used to facilitate and record brainstorming and commenting rounds, while keeping the individual remarks anonymous. In this meeting, the general view on the project was that it resulted in a good end-result, but that the process was problematic. From this

evaluation workshop, 7 problems were summarized that would need improvement in the next process (Eeten et all, 2002):

1. Clearer division of tasks and responsibilities of steering group, project group, external advisors, project members, project leading and spatial planning partners
2. Explication of process design and facilities for controlling the progress
3. Collaboration with spatial planning partners should be organized on a brother basis, or even apart from, this WOM project
4. Integration of the several sectors within Delfland should be organized better
5. Facilities are needed to deal with an absent strategic policy framework
6. More effective input of external advisors
7. Setting free enough human capacity, and protection of the needed human capacity for the project.

This project had seen a 'coming and going' of people: the process manager of LWT, the first project leader, the second project leader, the spatial planning specialist, all had left the project for various reasons. At the end the interim director had come –on a temporal basis, and a new consultant had been hired to finish the WOM document. This added to the feeling with other people of the project team that they lost the 'solid' ground under the project. Also, with these changes, the demands and requests for the content of the WOM kept changing. As one expert put it:

> "It was like we were trying to cook a meal, but the recipe kept changing and changing. This way, we could not get further."

In a separate interview, the interim director explained her impression of the process. In her eyes, making the WOM required a more strategically thinking, a tone that had not got enough attention during the process. The making of the WOM identified policy issues that needed a political decision (made by D&H) rather than analyses and endless substantial debates in the project group, according to the director. In separate meeting she had held with municipalities on other issues, the municipalities showed less willingly to cooperate on the issue of long-term water policy than the water board had been expecting. The director used an anecdote about one of the managerial meetings with a municipality in the Westland greenhouse area to illustrate this. The municipality in the anecdote only wanted to negotiate about land-buys. They saw Delfland as a '*milky cow*' for getting commercial prices for lands; while Delfland did not have the intention, and financially would not be able, to buy all the lands needed for water management. Instead, the water board wanted to ask the municipalities what their input was to prevent new floodings. In the perspective of the interim director, the collaboration on future water management between spatial planners and water board would yet need a long time.

Round 8 Follow-up of other areas *January 2003 – February 2004*

After the Oostland WOM was finished, the project had a break. Since the project leader of the WOM had left for another company, there was no 'logic' project leader. Also the interim manager, who worked for Delfland on a temporal basis, left. After some while, the project was followed up with a new project leader.

We no longer followed this follow-up project by intensive observation or interviews. A year later, in February 2004, the overall WOM of Delfland would

finally be finished with a policy document for the whole territory of Delfland. However there would still be many changes in respect to the Oostland version, the main type of maps and topics on the maps would remain the same. The final document was called "Water opportunities Delfland: The space for water in the picture."

5.4.5 Relation between policy rounds and map use

In the pilot project WOM Oostland, multiple maps were being used in several rounds. Also, some maps were made in more gradual steps than others. In the next chapter, we focus on each map individually, as these are our main unit of analysis. In Figure 4.5, we have visualized the relation between the maps and the policy rounds, by drawing time lines that show when the maps were being made/used.

In the first round of the policymaking process, sketches were being made of the area. These are classified as map 0 in
Figure 5-7. The following chapter starts with these map images.

Map 1 in
Figure 5-7 is about the Water Wish Map (WWK), also called the vision map sheets. This map is developed in several stages, from round 2 until round 5. As described in the former sections, many developments happened meanwhile.

Map 2 in
Figure 5-7 is about the map with spatial developments. Next to the WWK, this map is another part of the final WOM document. After the first inventory of spatial plans with municipalities in round 3, the map has been unused for some time, when the project group was busy with the WWK. In round 5, the map is finally finished by the newly hired consultant BNG.

Map 3 in
Figure 5-7 is about the suitability map. Already in the preparation and first round of the project, whether such maps would be made and included in the WOM is a point of discussion within Delfland. Some other WOMs of other areas contain these so-called suitability maps, but others only contain a vision on the future water system like Delflands Water Wish Map (WWK). The suitability map is developed after the other maps that together make up the WOM. After the first version is set up in round 4 according to a set of criteria for suitability, the map is finished in round 6.

Map 4 in
Figure 5-7 is referring to the summarizing opportunity map image, which visualizes all the most important aspects of the other maps. This map is drawn up when all the other maps are ready.

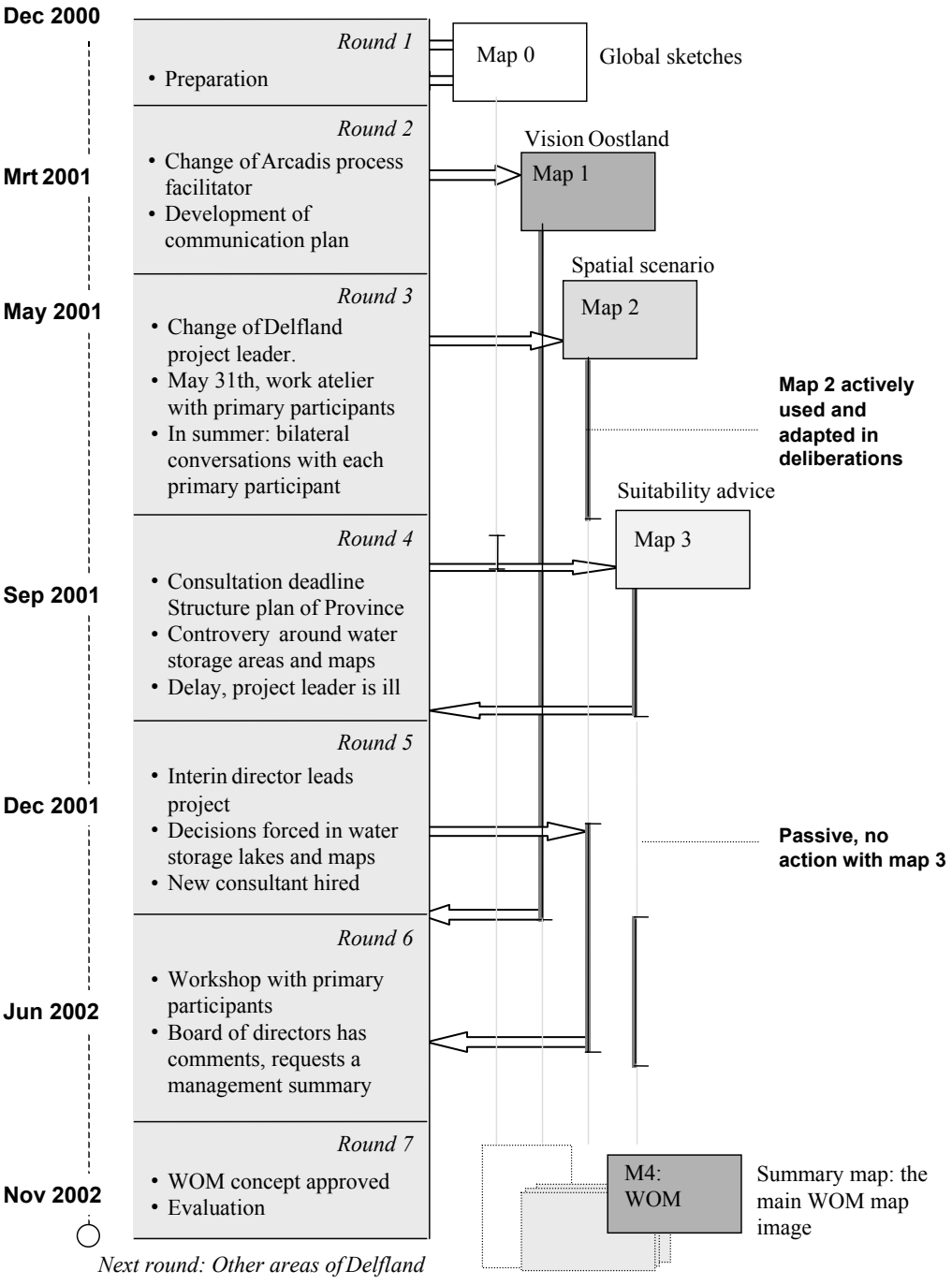


Figure 5-7. Timeline with usage of maps in various policy rounds

6 MANY IMAGES: ANALYSIS OF MAP USE IN THE DELFLAND CASE

"A map that helped the author detect a meaningful pattern can also help the reader appreciate the pattern's coherence and understand its significance"

–M. Monmonier in 'Mapping it out' (1993, p 210).

6.1 Introduction

This chapter specializes on the various maps that have been used in the project Water Opportunity Map (WOM) of Delfland. The conceptual framework of chapter 4 is applied on the several maps.

In the descriptions of how the maps have been used, this chapter builds further on the names of stakeholders and time-periods –'rounds'– in the process, according to the project description in chapter 5. (The schematic overview presented in the last section of chapter 5 provides a useful summary on the project rounds and maps that forms the context outline for this chapter).

In the succeeding sections, various maps will be described in parallel. In section 6.6 a cross-analysis is made of the various maps that circulated in the WOM project, to analyze their roles, their contribution to the emergence of consensus or conflict, and the interpretation of these in terms of frames and framing processes. The chapter ends with conclusions on the contributions of the maps to the overall policy process.

6.2 Sketches on water circulation: "Clockwise or anti-clockwise?"

This section deals about the map or set of two map images that is numbered "Map 0" in the previous chapter (Figure 5-7). This map is not an official map, nor are the map images part of the final policy document. Instead, the map sketches were made spontaneously during the debates in the early rounds of the policy process, when the project group had to define its direction and find its way. The narrative of this unofficial map is incorporated because of the influence of the map, in combination with the arguments of the map-author, on the group.

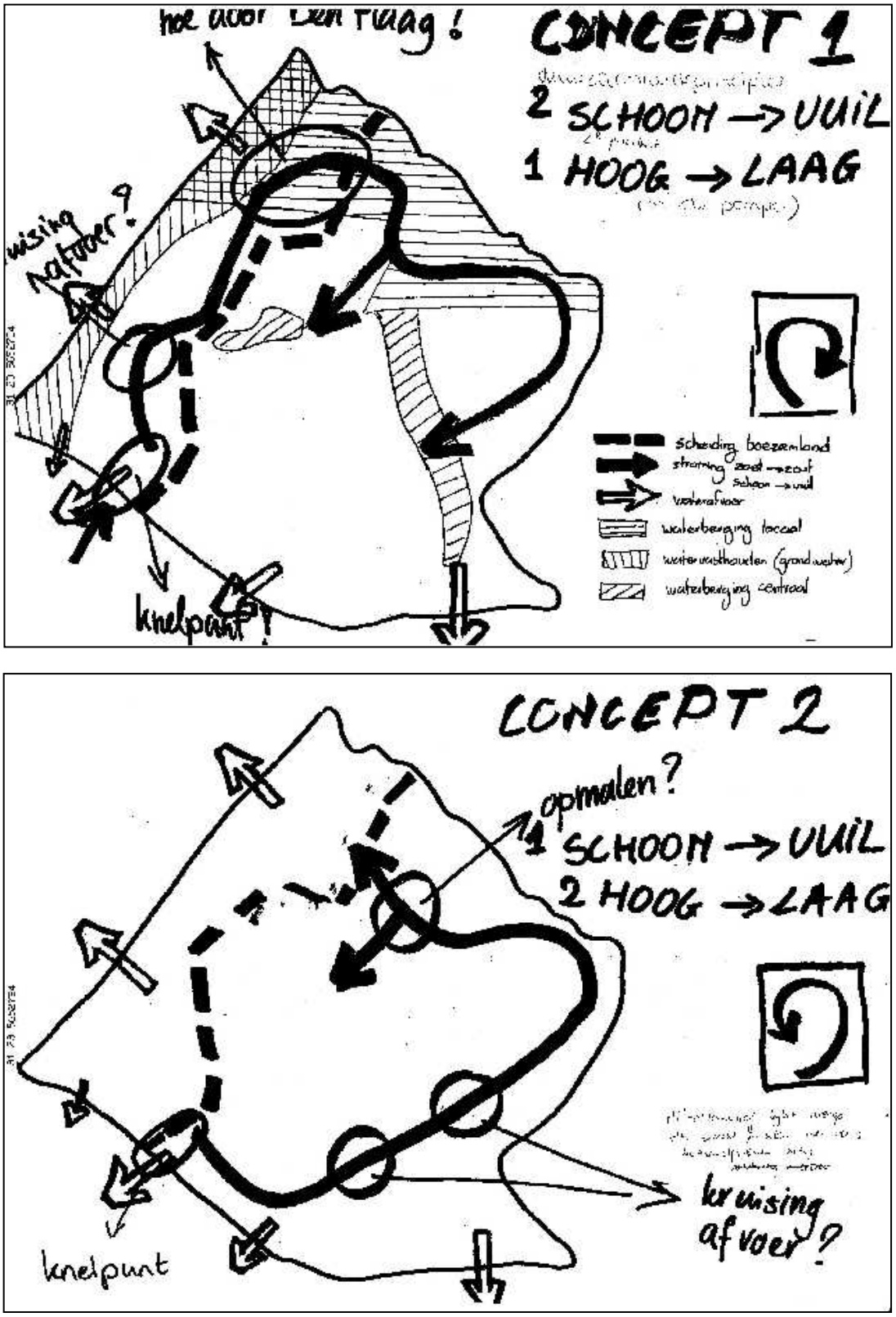


Figure 6-1. The two sketches of water circulation through the territory. Upper sketch: Principle for circulation 'from high to low areas' gets priority. Lower sketch: Principle 'from clean to dirty' gets priority. Potential problem 'hotspots' are expressed with circle symbols and remarks.

6.2.1 Description: Two scenario sketches in debate on sustainability

The first map in this project was drawn during the *first policy round* where the project members prepared for a Start Document. This document would be used as starting point for vision-design in collaboration with municipalities. A few workshops were planned in December and January 2000-2001 for this purpose. In the first workshop, the project members and board members had a long discussion on what should be considered as 'sustainable water management'. In order to force a choice and to clarify the discussion, the hired consultant made rough, abstract sketches of the area according to information and discussion of the experts.

These sketches showed one of the first major policy choices to be made about the water system (see Figure 6-1). The water now runs trough the area from higher to lower areas, roughly clockwise. But this way the water runs through the polluting areas first, spreading the dirty water afterwards to clean areas. From perspective of water ecology, this is the wrong order. The water circulation should run from clean to dirty, according to the directive of the National Commission on Water Management in the 21st Century (WB21, 2000). But when this directive should be applied rigorous, it would mean that the water circulation should be turned upside-down, in anti-clockwise direction. This would also mean that the water should be pumped from lower to higher areas, which is somewhat against ideas of sustainability; energy would be necessary to force the water from lower to higher areas, against its nature.

The two drawn sketches showed the two extreme alternatives for water circulation, each with different priority of sustainability criteria:

1. Clockwise alternative with as primary criterion that water should run from clean to dirty
2. Anti-clockwise alternative with as primary criterion that water should flow from higher to lower areas.

The project group of the water board liked the idea of the anti-clockwise water circulation, and simultaneously acknowledged that at the moment, the actual hydrologic water flow resembles the clockwise alternative. They agreed to follow the new policy principle 'from clean to dirty' where possible, and to explore the consequences.

One individual objected. He objected to the approach taken. He argued that these decisions should be based on more quantitative knowledge of water flow rates and based on norms how much water surplus or water shortage should be accommodated in the policy of the water board. He argued there is a limit in the responsibility against the risk of flooding, which are being defined by legal norms. The visionary, sketchy approach without sound, quantitative estimations, lacked strong argumentation, in his view. But others did not, or at least not openly in the meeting, expressed their approval with this objection. The water consultant emphasized the visionary status and the early phase of the project. According to him, calculations would be necessary in the future, but at this moment they needed a starting point with a clear,

homogeneous idea of what sustainability means in the collaborative eyes of Delfland's experts. The group agreed to continue with the exertion and to explore the implications if the anti-clockwise water circulation would really be constructed.

A new problem in this idea is that a river has to be crossed by the water system. However this is technically possible (with a construction called 'syfon'), these plans would be far-reaching. Agreed was that this is something outside the scope of this project. The idea could be ventilated as (re-)newed idea into other committees, but in this project one would work with the actual reality and not 'walk ahead' towards such fundamental changes. The river crossing also reminded one of the project members of a very old idea, to 'let water from the river into the area'. Immediately, a reaction of recognition went through the group. "This is an old cow?!", someone verbally expressed the general intuitive response. And the group apparently automatically and unanimous agreed to put this subject to a rest. Apparently, this was really an old cow and it had not been a success story.

As crossing the river at this point was thus not an option, this then led to the consequence that the North-Eastern part of the Delfland area, Oostland, could not be reached by the 'grand water circulation'. The remaining option is to isolate the area and make it an independent, self sustained subsystem.

During this discussion, a very rough vision map was established with ambitions for each of the four subsystems of Delfland. For the purpose of presentation to the external stakeholders of municipalities in the area, the final vision was redrawn on a map with some topographic background. This vision map was later called the '*clover-leaf*' because of its visual appearance (see Figure 6-2).

Later usage of the sketches

After the principle choice was made for a new, ambitious vision for a sustainable water system in Delfland, the focus was changed into the pilot area Oostland. The sketches of the water circulation on the level of Delfland were not used anymore, or discussed in meetings.

The project went further. During the rest of the project, the map was used at two short moments in the discourse among participants.

The first occasion was in October 2001 (round 4), during a workshop on the Water Wish Map (WWM) (Figure 6-3). One of the project members asked as reflective question how the actual WWM map relates to the early vision on a sustainable water system. He referred to the sketches of the clockwise and anti-clockwise water circulation:

> "And how does this new vision relate to the old sketch with the clockwise circulation?… If we look back, how does this result of today relates to our preliminary vision in January; did we loose that vision out of sight or does the original idea still remain?"

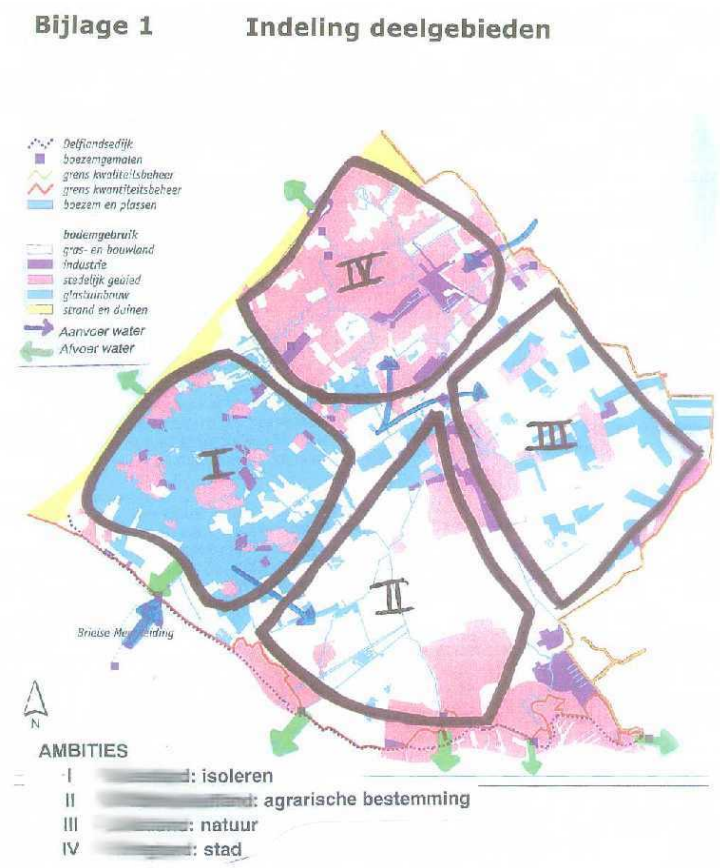


Figure 6-2 Cloverleaf: ambitions for each of the four sub-systems of Delfland's surface water. The four spatial subsystems are marked by manually added boundaries and numbers. In the lower legend, these numbers are explained in terms of ambitions with land use in these areas. This legend reads (translated to English): I: Isolate. II: Designate for agricultural land use. III: Nature. IV: City.). The arrows on the map represent how water flows into and out of the region of water board Delfland.

Figure 6-3. Project group members around maps in October 2001, when is reflected upon the early idea and choice for the anti-clockwise circulation.

The second occasion was in March 2002 (round 6). A newly hired consultant was pleasantly surprised by seeing these sketches. They had been involved in the project since December 2001, in order to produce a final document out of all information and to write the texts in the style and language of spatial planners. They had been given a lot of information, but these sketches had not been a part of that. The new consultants conceived the sketches as an important piece of information. The black and white sketches gave them new insight in the underlying ideas of how Delfland thinks about its water system for the long term.

In the next subsection, we evaluate the role of the map in all the occasions, both in the first, fourth and sixth round of the policy process.

6.2.2 Analysis of map interaction

In the above section, we have evaluated the role of the map according to actor evaluations. In this section, we aim to reconstruct the choices in map makingand map use that influenced the interactions between actors. For this purpose, we have applied our framework on map use on the case. Underneath, we have structured the factors of this framework according to the subdivision in context, interaction process and map.

Context

This map was drawn during the first policy round. The sketches were made in a meeting that was meant as substantial preparation before the interactive process with spatial planning stakeholders would start. In this early phase, the aim was to make a clear collection of problems and aims of Delfland. The project members were uncertain in the –for them unfamiliar kind of– assignment. The actors had no clear ideas of the resulting water opportunity map product (interview report Carton, 2001). But they had much faith in the skills of two hired advisors, a process facilitator and technical expert. The project initiators of Delfland had much confidence in the hired process facilitator for his style of facilitating groups and guiding discussions towards a plan[1]. However the hired water expert was criticized for a lack of experience on communicative issues (he had made an impression as a very technical oriented water expert), but his advantage for Delfland was that he had developed another WOM before and he seemed to have a clear idea and plan in mind.

As a new project with no example of previous WOMs, the whole project had an atmosphere of going on a discovery journey. The policy process was in a very early stage where the problem had yet to be defined. Many questions characterize the discussions:

- “What is a WOM?”
- “How does a WOM look like?”
- “What should we have decided on beforehand, before meeting with municipalities?”
- “What is our purpose, goal and ambition with the WOM?”

[1] In round 2, this process facilitator left the project. See section 4.5.1.

In the described debates of the project group, a shared perspective was apparent around the following problem definition: *"In the future, a more sustainable water system is needed."*

Interaction

The map represented one of the (many) questions to answer in this exploratory phase of the project. The explicated objective with the map was to find a group answer on the following question:

"How would a sustainable water system in Delfland look like?"

The involved actors were the project members of Delfland, stemming from the four different departments that execute the tasks of the water board. The question was heavily discussed in two succeeding meetings. The settings in these meetings was very informal and very constructive, although many people seemed not quite used to the goal-searching approach and the early stage of the process. In the discussions on the second next meeting, the map author had elaborated his quick sketch on paper and had made copies for all participants. His –individual– intention was to clarify the discussion on the question 'what is a sustainable water circulation?' For this purpose, two options were articulated with both the same abstract end-goal, namely sustainability, but with opposing priorities in the translation (operationalisation) into concrete policy measures.

Map

The theme of the map is clearly the general water circulation, as designed according to different guiding principles for sustainability. This theme and message of the map are not made explicit in a title or otherwise. The expressed title, 'concept 1/concept 2' do not provide a clue about the substance. In this case, there is no need to add these on the map document, because the map author was there to add all extra information by means of verbal explanation. It is therefore hard to understand the map by others when this explanation is missing.

The status of the maps was very cursory and informal. Available instruments there were only pen and paper. The appearance of the map was dominated by the first impression of a very 'quick and dirty' draft sketch, emphasized by the broad black-and-white hand-drawn lines. The water circulation theme is almost the only drawn legend item. It is even repeated as symbol on the right. No background topography is apparent. The scale is small and the level of aggregation is very abstract. Only black and white colors are used. The message of the map author, which he states as explanation alongside this map, is that the group of project members should make a choice between these options.

Choices explained by the map-maker

At the end of the meeting, we briefly interviewed the author of the map, and asked him in a view open questions: "Can you tell us about your actions concerning the

making of the two sketch maps?" The author of the map explained that he made the maps in order to structure the arguments of the discussion on sustainability. He has structured the arguments into two extremes and on a visual map to make the implications concrete of different views on sustainability. He used only black and white pencils and a small size (A4) paper, *on purpose*. He explained that these simple sketches should be used in order not to loose one self in details. According to him, people of water boards, who are maintenance-oriented, have the tendency to detail all information. While these choices at hand are about policy-oriented ambitions, on a very abstract and exploratory level, and only limitedly of technical nature. This is something the practical water experts are not acquainted with. Working with these maps is one of the means to create a deliberation process that go beyond the terrain of each individual expertise.

Using these simple black-and-white sketches, which visualize no other data than the question at hand, the map author aimed to structure the discussion and direct the arguments towards a generalized level, about values behind 'good water management', and towards design choices.

With the presentation of this set of map images, the values that lived among project members were visualized and exchanged among the participants. These values were the group's beliefs on which should be the most critical criteria on sustainability, in Delfland's water system. Through this short exertion, the participants not only learned from each other how they think about these values and design choices, but they also get trained to take decisions in this particular team setting.

According to the map author, putting extra energy in such a sketch would serve no purpose, and would only cost extra time (for instance to add titles or making a more 'official' map on a computer, with help of GIS or graphic software). After the principle preference for the order in sustainability criteria is decided, the maps' purpose is over. Attention will be focused on other questions and issues. This was another, practical reason why he had used simply pen and paper to draw the map. Also the clover-leaf was a pen-and paper map. Next to the same practical argument of saving efforts, an extra argument to choose for pen-and-paper here was to emphasize the preliminary status and visionary character of the concept to external participants. They should not get the idea that Delfland had already developed its vision and was 'misusing' the participative process for gaining support for already decided ideas.

Functionality: Evaluation from multiple actor perspectives

Role of the map in round 1

A clear choice was made for the anti-clockwise vision. Holistic thinking dominated the discussion. As the group reached consensus, the level of conflict was reduced. The question of what the project team members see as sustainable water system, is clearly answered with a preference for a concept that is visualized as an 'anti-clockwise water circulation'. As this was the purpose for making the map, the map served the role that was intended. Also the effect on the process was positive, as the group succeeded in taking a decision. This results in a very positive valuation on the dimensions of successful map use as presented in our conceptual framework, with the classification 'functional as planned' (see Figure 6-4)

During the discussions, one of the water experts of Delfland put critical remarks at the idea of choosing between visions while the problem was not accurately diagnosed and measured. But after the rest of the group voted for the clockwise vision. And after arguments that this was 'just an exploration, not yet quantified' and 'we just want to discuss some basis assumptions', he cooperatively kept his objection to himself. The map was lost out of attention since.

Life of the map afterwards

In round four, (October 2001), one of the project team members referred to the water circulation sketches, while posing the question how the result of the Water Wish Map relates to the preliminary vision of January 2001. A reaction of silence followed. Then the water expert repeated his objection towards this map. He rejected the map for in his opinion it was

> "not accurate enough, not valid and too future oriented."

In his opinion, the quick way of working undermined technical validity and therefore he had not perceived and still did not believe the map and the concept of clockwise water circulation as very useful (map use classified as 'non-effective')

Others did not really react on this, but instead went on looking at the new map images. They seemed to be familiar with this objection and everyone agreed in this disagreement of personal opinions. Instead of repeating the debate, focus was on reflecting how the Water Wish Map for the pilot Oostland had become and how this would fit into the overall Delfland area. A general conclusion was, that the ambition for a clockwise water circulation needed to be readjusted downward. The circulation reversing was too extreme, too radical in an area where the water system hardly gets any space for flexibility. Nevertheless, the implication for Oostland, which would have to become independent and self-supporting, would more or less still be standing. According to this argument, the map with its clockwise circulation concept had had some function; especially as a trigger for setting this ambition for Oostland highly on 'keeping and retaining more water' (map use classified as 'emergent functional').

In round six (March 2002), the newly hired consultant was pleasantly surprised by these maps:

> "So they do have a vision at Delfland?! Why did'nt they provide me with these maps? I thought they had no underlying vision! Now this is eventually a map that expresses a direction for the future, instead of following the developments as they come…There should be an underlying vision, otherwise the WOM might be blown down by critics of spatial planners."

He explained that he had got the assignment to make a water opportunity map document, but that he had the impression that the water board had no vision behind their produced maps. He had verbally asked at Delfland about the long term vision, but had not got an answer on this question. With these 'quick and dirty' sketches, he

finally got hold of information on what the underlying vision of the water board really is about. Here, the map served as 'unofficial document' to inform the newly hired consultant with underlying, global ideas. Here, the map served an unexpected function ('emergent functional').

	#	C1	C2	C3	C4
EVALUATION PERSPECTIVE	*Actor*	*Group of project team members (1)*	*Water expert*	*Group of project team members (2)*	*Newly hired consultant*
	Time-period	January 2001	January and October 2001	October 2001	March 2002
INTENTION	*Objective of the (group of) actor(s)*	Discuss and decide on future ambitions	Objecting against the map; disagreement with approach	Reflecting by comparing this 'old' ambition with new vision	Getting to know more of the 'underlying' beliefs, ideas and visions of Delfland
OUTCOME	*Action/Effect*	Principal decision taken by group	Objection not shared, not adopted by group	Qualitative comparison of maps. Conclusion: the overall idea has not remained upright, however some parts have	Reassurance that indeed there was a larger, more fundamental idea and vision behind the produced concept WOM maps
EVA-LUATION	*Functionality*	**Functional as planned**	**Non-effective**	**Emergent functional**	**Emergent functional**

Table 6-1. Different actor perspectives on the usefulness of the left/right circulation map

Synopsis: Evaluations depending on both actor and locus (moment in time)
To summarize, we have four different perspectives on the usefulness of the map (see Table 6-1 and Figure 6-4). They are numbered perspective # C1 - C4. The valuations of the usefulness of the map are seen from different actor perspectives (except the pair C1 and C3) and at different times. (The perspectives of C1 and C3 are owned by the same group of actors, but on different moments in time. The perspectives of C1 and C2 share the same timeframe, but seen from different actor-groups. This also counts for the pair C2 & C3). Each time, a different effect is considered according to a different intention with the map. Reading the columns in Table 6-1, each valuation follows as a logical conclusion, by reasoning from the particular viewpoint (actor and time perspective) and from here comparing the intention with the resorted effect.
For example, The evaluation perspectives C1 and C3 stem from the same actor group, but the evaluations differ (see Table 6-1). But although the actors are the same, the settings differ; the map is used in another moment in time, and is used for another

purpose. There is a deviant evaluation on both occasions, which stems from another actor (perspective C2, belonging to the water expert).

The described evaluation perspectives, both C1 and C3, belonged to the largest part of the actor constellation at that specific setting. They formed an actor-coalition that dominated the decisions taken on both occasions. In January 2001, this was the decision of setting the anti-clockwise water circulation as the primary ambition for the ideal water system. In October 2001, it was the group's conclusion that this ambition was too far fetched and therefore not realistic, but nevertheless the vision had value as motivator to keep and retain more water in the territory.

Since these two perspectives belonged to the largest and decisive part of the participants, these are the most visible opinions about the map, and resulted in the most concrete, tangible effects. The other two perspectives remained the judgments of individual actors.

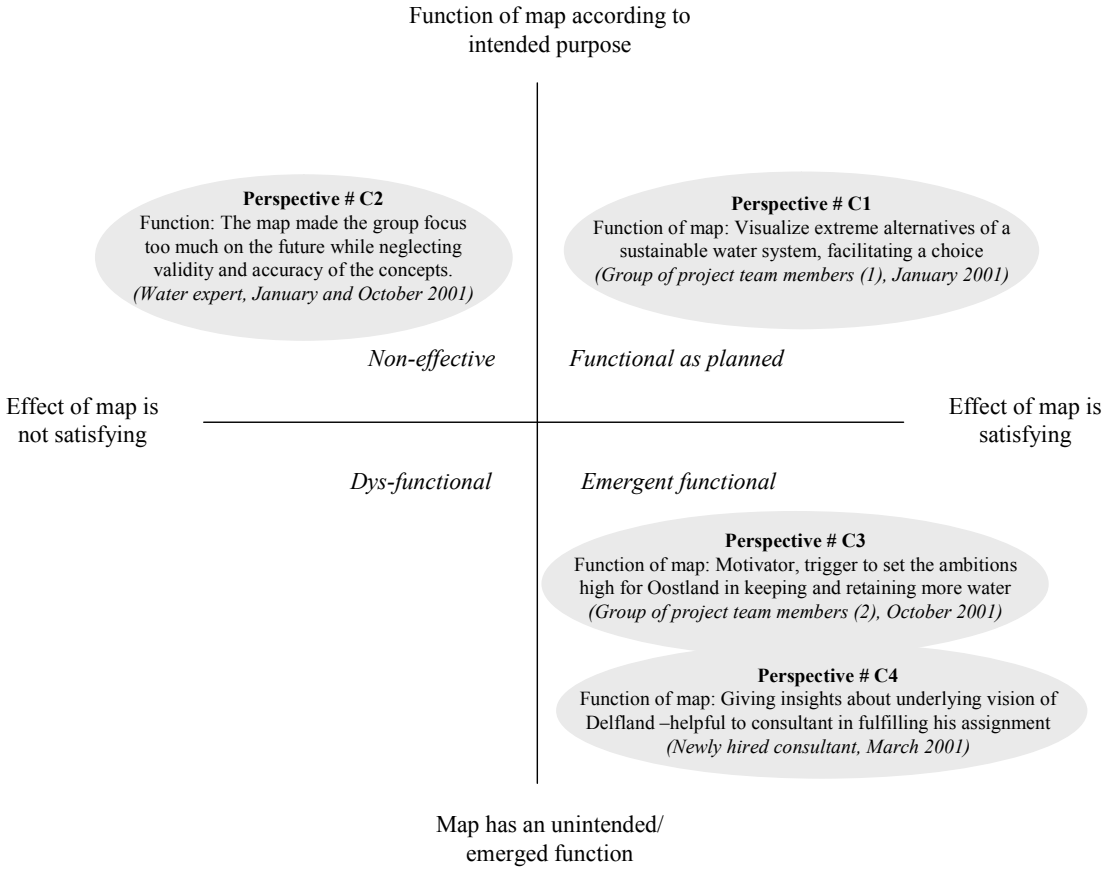


Figure 6-4. Overview of actor evaluations on the role of the map

How the map functioned from the perspective of the map author

The map author had in this case a conscious strategy why he drew the map the way he did. This lends the particular instance of map use for an elaborative analysis of his considerations. As we analyze the process from the perspective of the map-author, trying to 'look through his eyes', we analyze here the process from the perspective of a design frame, as this is the dominant frame of reference from which the map-author reasoned.

In our observation, the various discussions were 'caught' into one coherent picture by persuasive debate by the map-author with the sketch map. The map author has influenced the framing process both by how he made the map, but also by how he influenced the context in which the map was used. In our view, this has been a subtle process on various 'levels', both macro (problem formulation) and micro (layout of the map, emphasis on preliminary status).

What helped for the map author in the process of getting his ideas across, was that the project was yet in an early phase where the project team was new, and people had come to the project with an open, constructive attitude and with trust in the project leading. As the external consultant who produced the maps had experience with other WOM projects, he was supposed to have know-how on the subject and the process.

In our interpretation, this anecdote makes up an illustrative example how framing processes are intertwined with the policy process; not only on the aspect of problem formulation and not only on the layout of the map, but crosscutting through various levels in a process of group deliberation and conceptual modeling. The model, its classification system and its status all fit with the problem formulation, and with the design frame as held by the map-author. When this coherent 'picture' is understood and shared by the group, a decision can be made easily. The map-author has made his choices on 'what to map' and 'how to map' consciously, and this has proved successful. As the group indeed was successfully persuaded into making a choice between the proposed options, the map was successful in its purpose as it was intended by the map author.

Functionality in hindsight

An interesting subtlety of evaluating a map is illustrated in the perspective C3 (Table 6-1). This perspective evaluates what has left of the primary vision of the clockwise map. The general end-conclusion of the group is positive because some parts have stayed standing, although the main idea was originally much more ambitious.

Its original intention in January 2001 was to create a new vision, one that underlines concepts of *sustainability* and *space for water*. Then, in October, it is the general conclusion that not much has been left of the originally mapped idea. Apparently, the map has not had much power in influencing the states of mind of the group during the intermediate period between January and October 2001. Therefore, we could easily imagine that the group would have emphasized that the majority of the plan had vanished underway and thus the original concept of the clockwise map has had very little influence, thus evaluating the usefulness as 'non-effective'. So what reasoning was it, that let the group conclude positively in the end?

Firstly, the question was put in words where the normative judgment was already encapsulated in the question: "If we look back, how does this result of today relates to

our preliminary vision in January; did we loose that vision out of sight or does the original idea still remain?" In this quote, the first option is referred to as 'did we loose something out of sight', which does not really sounds very positive. The second part, 'does something still remain' sounds like it applies for a positive answer. Secondly, the group was de-facto examining its own working process. And although the project team members are quite critical, in the end it would be a far-stretching conclusion to set the diagnosis that as a group, everyone had wrongly 'lost something completely out of sight' and thus did a bad job. Thirdly, the group evaluated the continued effect of the original concept in the same light as when this concept was developed; the two maps showed two *extremes*. The maps were made to clarify a preference. The clockwise concept, option 2, was preferred somewhat above the other, but this does not mean that the final vision should 'be' option 2. The final vision was expected to be somewhere in between the two extremes.

Related to this, the choice between the two options was not so much a choice for a particular *map*, but a choice between sustainability *criteria*. The group concluded, that although the final map might not look like the original clockwise circulation on the original map, the basis assumption that lied at the basis for this map was still very much conserved in the processed plan. Namely; water should flow from clean to dirty and not the other way around. This assumption does not necessarily lead to a 'one-and-only-possible' design of a clockwise water circulation. With the clover-leaf map, the assumptions were translated into rough ambitions for each of the four sub-areas. The ambitions for the area of Oostland were set high on keeping and retaining more water and this point mainly still holds in later rounds. The maps thus served their most important purpose; namely to clarify the ambitions for the scale level of Delfland's territory and anchor its conclusions in the minds of the group members.

To summarize the above, the original maps were not so much evaluated as a plan that should just be detailed and carried out, but they were evaluated from the same perspective as they originally had; as extremes, as means in a thinking process about criteria. The maps helped in designing and prioritizing these criteria. This was the first intention of the map author with the map, and the same reason why the project group still valuated the exertion of having made that map as positive when reflecting back in a later stage of the process.

Line of reasoning and frame of reference

In Table 6-2 we have typified the rationality that was found dominant in the valuation of the map. This table is structured in three parts, broken down in sub-parts. First, the actor-time perspectives and map valuation are repeated. Added to this part is the actors substantive view on policy issues in relation to the map, which is summarized with a quote. Then, in vertical direction, a 'line of reasoning' is summarized that relates the arguments expressed by actors to their valuation of the map. We have distinguished values, intentions with the map and proposals for action with the map as subparts of the line of reasoning. In the last row, we have selected terms from the vocabulary of the participants discussions that characterize their arguments. These used words were expressed repeatedly in verbal discussions and minutes of meetings.

As part of our discourse analysis method, we have used these words to reconstruct the frames of reference of the actors. According to theory on frames (see chapter 4), in the words of Lakoff and Johnson (1980), a word evokes a frame. And vice versa, in the words of Schön and Rein (1994), a word reveals an 'underlying' frame of reference. The selected words and their associated frame of reference at the bottom of Table 6-2 serve as intermediate step in our analysis and interpretation of the functionality and roles of the map. We only selected words that are differentiating between the perspectives, thus the word 'vision' is not collected as it is used by all the vocabularies.
In the cross analysis of the various maps used in the Delfland case, the various map valuations and their underpinnings are structured further. Based on the various maps and their usage, a limited number of aggregate frames are screened out that together can explain the various roles of the map and the emergence of conflict.

In the line of reasoning by the map author, shared by the group of project team members in perspective C1 and C3, we trace vocabulary and an attitude that is typically characteristic for an engineering approach, with words like design and feedback. The rationality complies to the construction of a 'new' idea. From all possible combinations and priorities one could set for the idea of a sustainable water system, two options of an infinite range of possibilities are concretized. (After all, the water could also run through the area in many different versions. Seen from above, the circulation could also look like a Christmas tree, a labyrinth, a star-shape, etc.) In the sketches, these possibilities are reduced into two –more or less feasible and desirable– distinct options. The simplification of possibilities and desirability into two concrete and distinct options is made by the map-maker. The map images are a result of listening to all the arguments in the current discourse, and channeling these into a conceptual interpretation of the Delfland water circulation. This map is not derived from existing plans and 'hard' data, and structured analysis. Rather, the unique characteristics of the Delfland area (with a large glasshouse area, nature and urban areas) are combined with distinctive qualities of sustainable water systems. This combination leads to the concepts of the sketched water circulations. The options did not serve as blue-prints for implementation literally, but they were meant to be implemented in the 'mental frames' of other people. The map depicts the alternative routes of water, as 'seen from above'. The construction and transfer of these mental frames into the minds of the group members is an illustration how the "solution space" of policy problems can be cognitively framed into models of water circulation.

In analogous way, we can reconstruct the lines of reasoning for the other qualifications summarized in Table 6-2. The water expert of the perspective C2 disqualifies the mapping exertion as being "not accurate enough, not valid and too future oriented". Evidence for the feasibility of an alternative water circulation is yet lacking. Empirically based assessments on the 'real' cleanliness of the water in the anti-clockwise alternative are lacking. The requested guarantees of accuracy and validity point to a type of rationality that reasons from the perspective of science, of (scientific) research.

Similarly, the perspective C4 points to design rationality with the quote of the newly hired consultant "…Now this is eventually a map that expresses a direction for

the future, instead of following the developments as they come. ” In addition to this, the consultant has also points out why he needs an underlying vision. Namely to improve the claims and/or messages of the WOM towards spatial planning audience. This expresses the related reason behind the assignment for the new consultant; they need to improve the text in order to increase the persuasive quality of the final policy document. This aspect also touches on what we have qualified as a *negotiation frame.* The improvement of text and maps, by some critics in this discourse called ‘brushing up the image’, can in our view be seen as an attempt to behave strategically ‘handy’ in the dialogues with other stakeholders.

Synopsis: contingency between frames and evaluation?
We argue that these different frames are at the basis of the different perspectives on and evaluations of the map. Noteworthy is the deviation of the frame of reference in perspective C2 in relation to the rest (see Table 6-2). This frame is classified as purely *analysis*, while the other frames are pure or mixtures with the design frame. The purely analysis style is the only style with a radically different evaluation of the map, being negative instead of positive.
Also, we have seen that the evaluation C3 was the most hesitating judgment of the map; the valuation was positive because the perception of ‘the glass half full instead of half empty’ dominated, but this evaluation might also have dipped into the negative side. The frame attached to this perspective, C3, is the only one with elements of the analysis style in it, which overlaps with the frame of C2.

According to our theoretic argument –namely that these different frames are at the basis of the different perspectives on and evaluations of the map– these correlations between frames and conflicting or non-conflicting evaluations are not coincidental but contingent; if two actors A and B share the same frame, than there is a greater likelihood that their evaluations of the map will be similar to each other than when actor A and B employ different frames of reference.

	#	C1	C2	C3	C4
ACTOR-TIME PERSPECTIVE	*Actor*	*Group of project team members (1)*	*Water expert*	*Group of project team members (2)*	*Newly hired consultant*
	Time-period	January 2001	January and October 2001	October 2001	March 2002
PERSPECTIVE on POLICY (View of policy issues in relation to map)	*Map valuation*	'functional as planned'	'non-effective'	'emergent functional'	'emergent functional'
	Views	"In the light of the national policy 'space for water', we should (re-)consider what a sustainable water system in our region looks like."	"Quantitative modeling has always worked in history in keeping control over the system."	"Very little might be left of the 'old' ambition, the clockwise vision might have gotten too far out of sight."	"We need to know the 'core belief' of Delfland about how their water system could/should develop. It seems there is no underlying vision for the WOM"
	Values	Sustainability and innovation are vital: "We should innovate, work with the new ideas of WB21"	Norms and hydrologic models are vital: "Regulations should be implemented through norms. The WOM should not be built on 'visions' or 'castles in the air."	Sustainability and innovation are vital: "We should innovate, work with the new ideas of WB21"	Response of other actors is vital: "There should be an underlying vision, otherwise the WOM might be overthrowed by critics of spatial planners."
LINE OF REASONING (From perspective, via objectives, to the actions taken)	*Intentions with map*	To clarify priorities over values concerning a 'sustainable water system' and to get used to thinking in spatial concepts	To protect hydrologic engineering values of 'to measure is to know' (Dutch expression)	'Just checking'; to make sure the vision is still evolved according to plan, by asking the group to give feedback	Need to find and strengthen arguments for the final WOM product, to improve and explain the claims/messages of the WOM towards spatial planning audience
	(Proposed) action with map	Learning by doing and searching for new methods; exploratory approach aimed at design of ideas	Arguing against approach and plea for more research; protective approach aimed at analysis, understanding of problem	Comparing vision at the start and halfway the process; reflective approach	Trying to find out what Delflands underlying views/values are about the future of their water system;
FRAME OF REFERENCE	*Characteristic terms*	*Ideas, explore, communicate, values, learn, design*	*Norms, measurement, analysis, research*	*Check, feedback, reflection, compare, 'out of sight'*	*Arguments, claims, message, values, core belief*
	Dominant function of the map	**'Map use for value exploration and design'**	**'Map use for analysis and measurement'**	**'Map use for reflection and feedback'**	**'Map use for explaining message'**

Table 6-2. Different lines of reasoning behind the actor's actions with the map

6.2.3 Conclusion: Function of the circulation sketches in the policy process

The consensus on the choice for the anti-clockwise concept in the first policy round shows a firm narrowing (framing) of the possible directions for a vision on the water circulation. Besides framing mechanisms, we also found two occurrences of –attempts to– reframe the problem:

- The first occurrence was when the water expert argued against the approach (perspective C3), but he didn't succeed to reframe the approach.
- The second occurrence was when the project group reflected on the resulting vision in comparison to the anti-clockwise concept (perspective C4). The concept of the anti-clockwise circulation was no longer seen as a real target aimed at to implement as much as possible, but as an idea-generator and motivator to formulate the ambition on Oostland to become a self-sufficient system, which large capacity of water storage.

It was conspicuous that no one posed the question why a choice had to be made between two extremes. And if a choice was to be made, why not developing mixed concepts in between the two extremes. Why couldn't it be dependent on local circumstances which criterion serves sustainability best?[2]

The map established an explicit link between sustainability and the spatial distribution and circulation of water. One of the reasons why this map was so powerful, was that the experts of Delfland had never thought before of the possibility of turning the water circulation into a totally different direction (in fact, the opposite direction). The sketches embodied this *new idea*.

With this idea, both the map and the approach with the map (focusing on the long term future, working with abstract concepts rather than concrete technical details) matched with the general characteristics of the setting. These characteristics are described by the potential contingency factors of the context: the ambition towards innovation instead of technocracy, the trust in the person who proposed the approach and the map, the early phase of the project, where much is unknown and abstraction is thus allowed/desired, and the constructive attitude of the project team members, in this fresh project group.

Pen and paper techniques

The used techniques for making the map were chosen consciously. This case shows four reasons why pen and paper was used on purpose, instead of GIS or other mapping instruments:

1. To draw a spatial structure that had never been visualized before: drawing the implications if the sustainability criteria would strictly be followed in the re-design
2. To keep the discussion on a generalized, abstract level; discussing the general concepts instead of focusing on details

[2] For example, at locations where the differences in height are relatively large, and the variations in water quality are rather small, one could choose the water circulation to flow according to the criterion of heights.

3. To emphasize the preliminary status and visionary character of the concept
4. For the practical reason of saving time and money in making the map; like the idea of 'drawing a sketch on a cigar box'

Comparing two different actor evaluations

However there was one critical perspective towards the approach with and usefulness of the map, this point of critique was put aside by the majority of the group. In our view, this perspective nevertheless deserves some credit. There are actually two different stories embedded in the discussion between the perspective of the majority and the individual water expert with the deviant opinion.

One is the story about the control over the 'logistics' of the water system. This story is about the historical perspective, about the development of the region –both the land and the water, which has resulted in a tightly constructed logistic water system. For decades, the landscape in the territory of Delfland has been under heavy pressure. Many sectoral claims are put on the same acres of land, for housing, infrastructure, agriculture, recreation and nature. This has caused the water system of Delfland to be restricted into a tightly strained and optimized water system. Deep insight in the water system is needed to keep the system predictable and controllable, especially when implementing changes in parts of the system. This deep insight in the water system is very valuable in itself, and should not be replaced by 'wild ideas' that intend to initiate large projects with huge uncertainties, for the sake of innovation. This story lies at the basis for the frame of reference (worldview) of the water expert.

The other story is about 'bending' the existing direction of taking water measures. It is about rethinking water management. According to this view, the development of the land has to be reconsidered because the management of water is reaching its limits in the face of climate change. If people keep reasoning from the existing situation, radical changes will always remain out of sight. This story wants to 'lift out' the water system from the current situation and think through what would be the best for this system in a future where climate change has already occurred. The 'whishes of water' should be thought over first, and from that, implications for the land should be taken into consideration, instead of thinking only the other way around. This second story makes of the frame of reference of the rest of the project team and the map-maker. The two stories show the dilemma that is being faced in today's water management practice; enforce a shift in way of thinking and making policy to manage the water system (think and experiment more broadly with 'new' measures other than 'standard' technical procedures), or continue proven way of working with enhanced technology. Both strategies aim to make the water system more sustainable, but according to different beliefs.

To conclude, the map proved useful in a number of instrumental respects. The perspectives showed different argumentations with the map and different emphases on the function of the map. In our interpretation of the analysis, overall, the vision maps served a number of functions.

1. As engineering tool

The style of the map is remarkable. While one would expect with the word 'map' a sophisticated, fine detailed and fancy looking product, this map model is what Dutch engineers call 'a sketch on the back of a cigar box'. Something that is quickly drawn for the sake of sorting something out crystal clear, or for explaining the concept graphically to another, but which is meant to be thrown away as soon as the drawing is finished.

On the pair of images, 'pure' models are presented, each model easily comprehensible about how the regional water system works or should work. Although the maps show spatial water circulations, the choice discussed deals about underlying values of sustainability. All the elements of the map comply to the characteristic of simplicity; with an abstract scale, only two colors, only one legend item, etc. Both to keep speed in drawing the picture (efficiency), to emphasize the low status of the map as 'thought experiment' in order to get the expert so far as to make a choice, and to *simplify the arguments into the least amount of key-aspects that make up the choice.*

With the maps, the map makergot the implicit frames that lived in the minds of several water experts, about sustainable water circulation, *clarified* and *transparent.* In a later phase, these images could communicate the underlying concepts of how Delfland thinks about its water system to the new external consultant. In this way, the maps functioned as thought experiment.

2. As motivator of new ideas

The drawing of the two extremes, especially the anti-clockwise concept, *opened* the discussion of possibilities to radically change the existing water circulation. This issue was raised for the first time; it was a new, *innovative idea*.

With the map, the spatially related sustainability criteria were formalized into an actual alternative spatial concept for the water circulation.

3. As negotiation space

In the objective to find a group answer, there is an implicit assumption how the group answer will appear from the individual ideas. Apparently, the decision-making rule is consensus among the large majority of the group. The objections of one of the group members are put aside. The majority of the group agreed on the *simplification* of the question into *two extremes*, and to *choose* between these extremes. The map makerhad successfully drawn the discussion in this direction.

4. As symbolizer and communicator: mental mapping instrument

The conceptualization of possible implementations of the two sustainability criteria gave *handhold* in the discussion because two concepts were designated and labeled: the terms "clock-wise" and "anti-clock-wise", as well as the term "clover-leaf" are actually *metaphors* that originate from the visual appearance of the maps. There is no clock, or no clover, but the lines on the map are intuitively associated with these objects. Giving the concepts presented on the

map images these nicknames, the abstract subject of regional hydrology becomes communicate-able to lay-people and experts of other domains.

5. **A not-fulfilled but latent role: the map as first step in hydrologic-spatial modelling**
   One actors criticized the validity and the sense of reality of the mapping exertion. This actor argued that these choices could not be made without first developing and analyzing an extensive quantitative hydrologic-spatial model of the whole territory. This standpoint was overruled by the majority that thinks otherwise, and whose opinion –in this case– dominates.

6.3 Making a vision map: The Water Wish Map

One of the biggest parts in the project comprised the formulation of a vision for the desired water system in the future. In this second map discourse, the general objective was to formulate a so-called 'target image' (Dutch: wensbeeld) for the pilot area Oostland. The previous map narrative was already related to this process, as it set the preliminary requirements for the Oostland vision. While the previous map story narrates the primary debates in the earliest phase, which were meant as exploration phase for the overall WOM process, this story tells the particular process of working out the broad ideas into detail. Multiple map images were produced as part of the process working towards a WWM. The activities and intermediate (map) products should result in a formulation of the desired future state of the water system for pilot area Oostland. The 'making of' this map took a very long time, as can be seen in Figure 5-5. But before describing the process of how the WWM came about, we will describe the method applied. Underneath, we explain the steps for developing each of the four different maps, as it was planned by the project leader.

6.3.1 Approach for developing map 1: the Water Wish Map (WWM)

The WWM consists of a set of thematic map images. These images together represent a coherent vision on the desired situation of the water system in the future. The whole of bottlenecks and desired measures should be clustered and ordered in a few main themes, visualized in a limited number of map images (the map images together form 'one map', namely the WWM). The following three main themes are in mind as the main topics:

- Water surplus (how to arrange the water system in a water surplus situation)
- Water shortage (as above for a water shortage situation)
- Water quality

This separation in topics does not mean that the vision on the different themes is developed in separate, parallel lines. On the contrary, the idea is to develop an integrated vision on water quantity (water surplus and water shortage) and water

quality, as all project team members acknowledge that these issues are intertwined. The separation in topics on the final map serves the purpose of clear presentation and structured communication of the information.

The WWM is being developed through the following methodological steps:

Step I: Formulation of issues and potential policy measures

The project team, together with an expert team, formulates and specifies different problems and solutions, and from that identifies potential policy measures and possible bottlenecks. Together, these are the substantial, water-related issues for the WOM.

Step II: Constructing spatial maps per issue

Different specialists work out these different issues and draw the spatial extend on thematic spatial maps[3], separately per issue. Because the WOM comprises new issues that have not been explicated before, relied is on the expert knowledge of different specialists. The specialists draw up two types of map images:

a) maps visualizing suitable locations for policy measures (tactics) and
b) maps visualizing spatial extent (spread) of problems.

On the first type of maps, locations are marked where the policy measures could possibly be implemented. On the second type, different classifications of the problem situation (bad, poor, potentially problematic) are being attached to the marked locations.

These maps will then be discussed among experts, the project team, and with the primary stakeholders. Additional information can be basis for changes and additions.

Step III: Combining issues by overlaying map layers

The primary project executor (hired from LWT) digitises the various map information into a GIS. This means, that each thematic map will be a separate map layer in the GIS, based on the same map area. Then, cross-sections can be made through the different map layers, and different layers can be visualized simultaneously in the same map image (see figure 6-4). From these overlays, different conflicts between themes should become visible. These conflicts would be solved in the project- and steering group[4].

Step IV: Selecting and clustering policy measures into a policy vision

All themes, worked out on separate map images, are then be clustered and ordered in a few thematic maps by the project team. These map images together will form the 'Water Wish Map' WWM. Additional explanatory text will also be added.

[3] Later on, the project group will find itself in confusion because they have not clarified the spatial spread of bottlenecks from the spatial implications of potential solutions on their maps.
[4] A resolution mechanism for solving these conflicting issues or for prioritizing issues is not set on beforehand; this will be experienced as a … (gemis) later on.

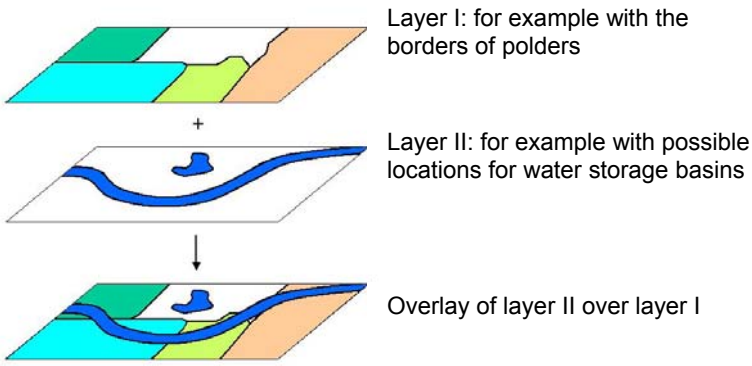


Figure 6-5. Example of GIS-layers overlaid above each other

In this procedure, step II is explicitly participative, with consultation of the primary stakeholders. Also the other steps would be executed with participatory meetings. Step I involved two meetings with the primary stakeholders. Step III would be considered homework for the water board, after which the results would again be presented and discussed with stakeholders in participatory workshops.
While this overview summarizes the conceptual method as how the water board aimed at arriving at a desired result, the next subsection describes the process as it went in practice.

6.3.2 Description of the life of the map: "You shouldn't map it this way"

This map is made during a long, time-consuming process. During the process, project leaders changed multiple times and the hired consultant was replaced. The project description according to the rounds model, as written down in the previous chapter, serves as process framework. In this section, the seven rounds with their numbers are referred as they are described in chapter 5.

Decisions on the scope in policy round 1
In the first round, brainstorms served to come up with issues that might or might not be incorporated in the WOM project. This was part of the defining and clarifying of the scope of the WOM. In this first round, no specific maps of the Oostland area were created. There were, however, issues discussed that would set the prerequisites for the target image of Oostland.
Briefly, these could be summarized as follows:

- The decision to set the time horizon for the target image for Oostland at 2015 with a forward view towards 2030 (see Text box 6-1).
- The formulation of the target for Oostland to become self-supporting, according to the (new) view on sustainability, which proclaims water holding prior to water storage prior to drainage (in Dutch: vasthouden – bergen – afvoeren).

A mini-story: Drawing to settling the time horizon

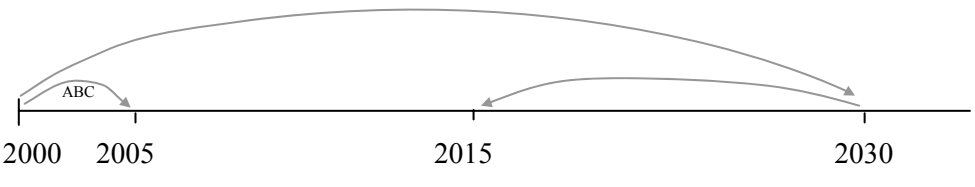
During the first workshop on December 1st (2000), people argued heavily about the time horizon for which the water vision should be developed. In order to line up with zoning plans of spatial planners, a time horizon of 10 years is adequate. But to anticipate on climate change, a longer time-span of about 30-50 years would be better.

In the deliberation, the time horizons of other projects were mentioned, to compare and relate to. The regular water management plan of Delfland is prepared for 2015. An other project called ABC Delfland, which comprises the widening of canals and other measures against flooding in the Westland area, focuses on 2005 for implementation. But the objectives of water board are to be prepared for climate changes on the longer term, up till 2030 – experimental calculations have focused on future scenario estimates as far as 2050.

Instead of participating in the discussion, all the facilitator of the participative workshop did was quietly drawing a time line on a flip-over, as in the figure underneath. He took his time drawing the horizontal time axes. Then he placed the four numbers of the years. The large arrow from 2000 till 2030 was drawn very slowly, and finally, after the small forward arrow pointing at 2005, he drew a 'backward' arrow from 2030 back to 2015. As people where talking, some people curiously had a look at what he was doing.

Suddenly, one of the group member came on the idea that the two time horizons do not exclude each other, but are in line with each other. The vision could be made for the long term of 2030, and by reasoning backwards the long-term vision could be operationalised while fitting it on short term policy measures for Delfland.

This little example of a micro-discourse shows a part of the refinement of group facilitation, as well as a refined functionality of a drawing during deliberations. (In this case it was the time that was mapped, instead of the geographic space that is central in this thesis). In this small interaction moment, it seemed like the group came on this idea themselves, helped by the silently drawn time-line. While the verbal discussion slipped into a discussion for choosing between planning horizons of either 2030 or 2015, this very simple timeline figuratively mapped the route that relates the two possible time-horizons towards each other. The plan was quickly decided: there would be two horizons in line with each other; first the group would make a very broad-brush and aggregate map of the desired water system in 2030, and after having done multiple analyses, a vision map would be produced that would target at 2015, while 'fitting' in the larger framework of the short-time (2005) and long-term (2030) visions.



Text box 6-1. Timeline, drawn to support the discussion on scope of the vision in terms of time-horizon.

Large explorative maps of expert team in policy round 2

During the second round, an ad-hoc expert team of the area made an inventory of important issues, e.g. bottlenecks and opportunities, and a description of the water flows of the whole Delfland area. This was meant as home-work for the workshops with external participants. The expert team made four map images. For all these images, a large paper map (size A0) is used as background, with topographic data of the canal system as it was taken from the GIS system of water board. On this background, the experts have worked out four map images, with the following titles:

- Water Quantity
- Water Quality
- Supply (of water)
- Drainage (of water)

This separation of water quality and water quantity as separate themes is usual in water management in the Netherlands. Water quantity aspect comprises the dimensioning and management of water levels, dikes and pumps (pump stations automatically pump water of the polders over the dikes into bosom canals when the water level has exceeded a certain norm). Water quality concerns chemical, biological and ecological characteristics of the water in all canals and lakes, and ecological values of water shores and wetlands. A typical water quality problem is pollution, amongst others by nitrogen and phosphates (in Delfland, pollution by the glasshouses is an important issue).

The experts have drawn the maps mainly from expert knowledge, that was available in the group. Their hand-drawn spots indicate where the experts saw (potential) problems and possibilities for policy measures. On the Water Quantity map image, these are formulated as follows:

- Areas that are vulnerable for flooding;
- Areas with shortage of storage capacity;
- Areas appointed as potential water basins (for water storage in extreme rainy situations);
- Areas with opportunities for establishing a flexible water level,
- Etc.

The experts have added a connotation on the Water Quantity map image: “Area ‘Green-blue swing’ => *multiple use of space*; functions as buffer zone in between urban areas, nature, and recreation”. With this indication, the experts express their notice of the special project of spatial planners called Green-blue swing (in Dutch: Groenblauwe slinger). In this area, other projects and stakeholders already foresee a combination of ‘green and blue’ land use functions. This gives good opportunities for linking up water functionalities with those other projects.

On the Water Quality map, the experts have classified the water quality. Texture stripes of different colours mark the areas and appoint them in the categories bad, poor, potentially good and good water quality.

On the Supply and Drainage maps, arrows are drawn over the main canals to indicate the direction of the water flow in the two different situations. The hired water

consultant of LWT wanted to learn about the precise water flows in summer and in winter times, and he had not got this information out of the GIS-information. In the GIS of Delfland, all canals are apparent in different data layers, but the direction of the water was not in there (From the perspective of map-making, usually a 'static' picture of earth-related geo-objects is visualized. People are not used to map dynamic movements into a 'static' model such as the currently used GIS). Because this information is important for localizing and choosing options for water storage, the water consultant digitised and added this information into the GIS, visualized as arrows (see Figure 6-6).

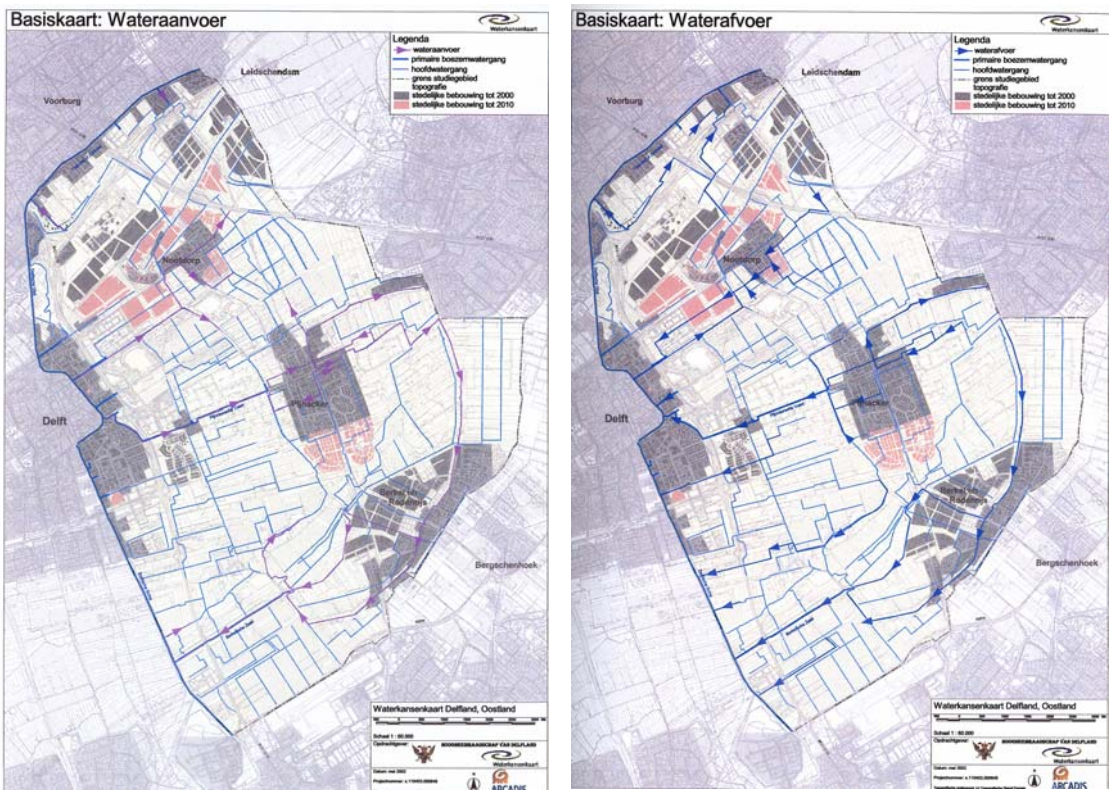


Figure 6-6. Digitized version of the direction of water flows in supply and drainage situations (respectively in dry and wet periods)

The maps were not directly used by others than the expert team. There were no copies of the original A0 papers. The hired water expert of LWT kept the originals. In the meantime, the attention of the project was focused on the making of a communication plan, and on organizational and personal problems; the process facilitator of LWT had been changed, and also the project leader of Delfland fell ill and decided to leave Delfland.

Round 3

With a new project leader, new spirit came into the process. Clear maps of proposed policy measures were found desirable. As the large A0-maps were very 'indicative' and on the overall Delfland scale, individual experts were asked to map out specifically the borders and different topics on separate map sheets, for Oostland.

These images would be prepared on a tangible format (A4). All topics would be worked out in detail on separate maps.

Several specialists prepared one or several map sheets (by hand, on A4 paper with the same topographic background). On these maps they visualized possible search spaces, based on tacit knowledge and expert judgment. In the preparing meetings, all participants could propose a topic 'for on the map'. Most of them were agreed upon, resulting in no less than eleven legend items. They varied from 'bottlenecks in circulation' till 'reservoirs for water conservation'. The themes were not formulated unambiguously. Some were formulated as problems, others as solutions or measures. With these maps became clear 'what was not clear' among the stakeholders; a long debate started why these spots were drawn as they were, and how the legend items should be (re-) defined. In this discussion, gradually a structure was created between problems, measures for these problems and criteria. As the criteria got more operational, the spots on the separate hand-drawn thematic maps became more and more defined. Eventually, *ten themes* were formulated and explained in text as well as a map:

1. Potency for water storage (preservation lakes)
2. Need for more open water
3. Opportunities for management of flexible water levels
4. Potency for calamity polders
5. Room for improving the flow through canals
6. Room for dikes
7. Water quality
8. Water related nature
9. Opportunities for 'decoupling' (no longer connecting rainfall-pipes –of rooftops– to the sewage system, but instead infiltrating rainwater into the groundwater)
10. Future spatial planning developments

Two themes, groundwater problems and dredging locations, had been screened out from the above list. Argued was that these issues cover indirectly related but 'separately treated' problems that the water board already deals with in other projects/departments. Moreover, these themes were found too complex to take into account in this first version of the WOM.

Figure 6-7 shows one of the hand-drawn maps on which optional areas are filled where more 'open water' surface could be created, in order to increase the water storage capacity of the area. The thematic maps were bundled, colour-copied and distributed among the project team members in order to discuss each of these themes with the primary stakeholders.

Again, the size of A4-maps[5] was on purpose as discussions characterized as 'Not-In-My-Back-Yard' arguments should be avoided. In the meetings at the water board, this syndrome was referred to as "talking about this or that small canal behind that back yard".

[5] One map, that of future spatial planning developments, was printed on A3-size.

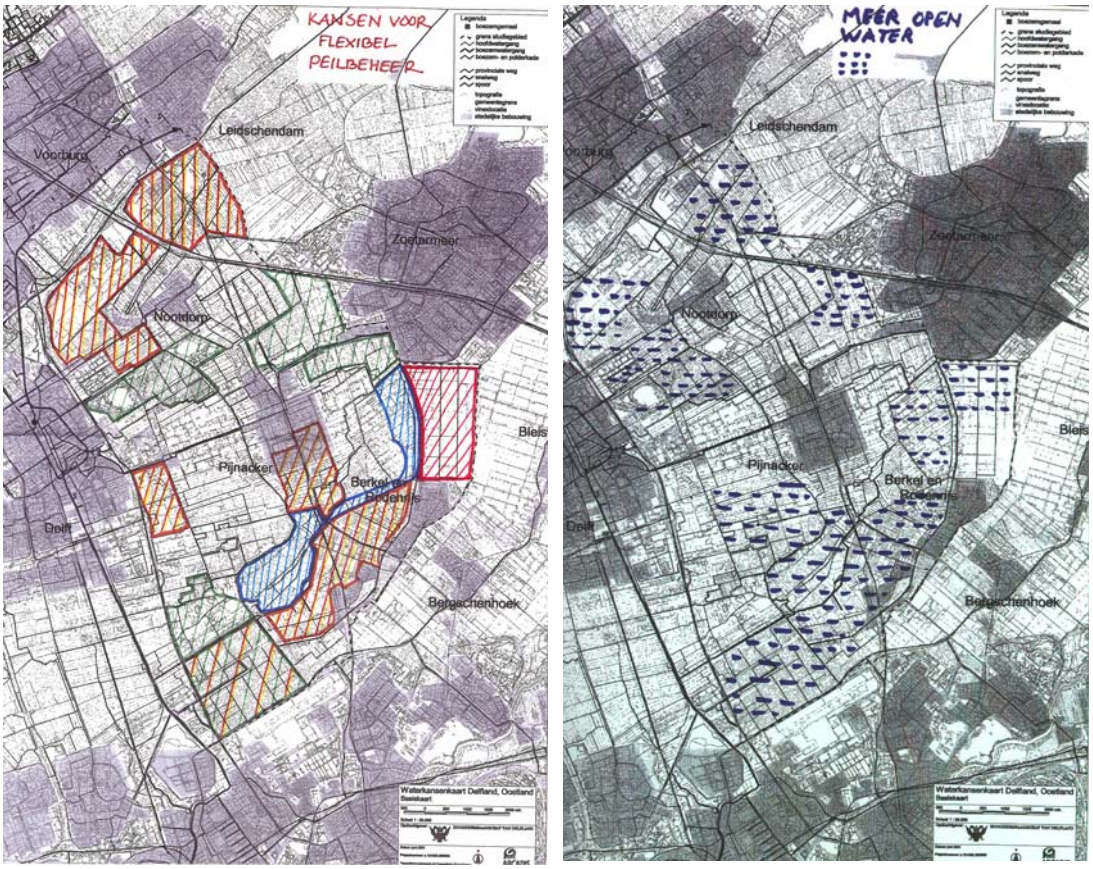


Figure 6-7. Two hand-drawn thematic maps with (left) 'opportunities for maintaining flexible water levels' and (right) potential locations to create more 'open water' surface. These maps are part of ten thematic maps presented to and discussed with municipalities.

We have observed two of the various bilateral meetings with municipalities. These bilateral meetings were planned after the work ateliers proved too big in number of actors to get the information and discussion that Delfland had hoped for. The bilateral meetings were spread over the project team members (in pairs of two people) and spread over the summer of 2001. In the conversations that we witnessed, detailed issues within the municipal territory were discussed, which made clear that the civil servants of both the municipalities and those of the water board knew the terrain well; polder names and dikes were referred to of which all members were up-to-date about status and problems. The maps were used in these discussions to appoint exact locations, to verify if both actors were referring to the same spaces or objects, and to record suggestions and remarks of the municipality over the thematic maps made by the water board.

The thematic maps were taken home by the water board after the bilateral meeting had finished. One map made up an exception. This map was about 'spatial planning issues', printed on A3-format instead of A4. This image was handed over to the municipality with the question if they could fill in possible future spatial planning developments that could be relevant for the water system/water board, and return it later. This way, the municipality would have time to do its homework, but the map

image provided by the water board would ensure that the returned information would be in a format tangible for the water board for further processing.

Round 4
After this inventory of problems and possible solutions, it was the intention to make three integral maps, with the following titles:

- Vision in shortage situation (shortage of water or 'dryness')
- Vision in surplus situation (surplus of water, in Dutch called 'wateroverlast')
- Vision on water quality

For this transformation, all remarks gathered in the bilateral meetings were discussed in a long project meeting, were each of the topics was discussed individually, and decided upon whether to take over suggestions or not. After this long meeting, the consultant would digitize all information that was agreed upon into a Geographic Information System (GIS). As the overlays of individual maps showed competition between different measures, trade-offs should be made. Now, it turned out that the different departments within the water board had opposite opinions about priorities in making these trade-offs.

Also after the various options were digitized in GIS, conflicting options remained; different policy measures are proposed, digitized on the several GIS-map layers. Many specialists had the feeling that the integral GIS-maps somehow did not represent the message that they had constructed in their minds. But despite repeated remarks on the appearance of the map-sheets, the consultant kept regarding this as a presentational fine-tuning issue that should be adjusted at the end of the process:

> "Please do not look at the layout of the map images. I will improve the layout once the content of the maps is ready and the images remain substantially unchanged. Otherwise, I keep changing the layout over and over again."

Another conflict rose on the integration of the map on search areas for *calamity polders* and search areas for *preservation lakes.* These are 'temporal water storage basins in case of almost-flooding', respectively 'permanent water basins for storage of fresh water'. The discussions went on and on in a number of internal meetings within the water board (up till eight), and about six month of silence passed without new meetings between the water board and municipalities.

This conflict, that resorted in a deadlock situation, concentrated on the water shortage map. The potential transformation of grassland polders into permanent water storage basins was so controversial, that some argued to 'take this legend item off the map'. Even a potential combination of such a water storage basin with functions as calamity polders (lands to inundate, e.g. let the land be flooded in controlled manner, in case of emergency due to heavy rainfalls) was highly disputed within the water board organization. The main argument to take the water storage basins from the map, were threefold:

- Water shortage is a long term problem, while water surplus (with threat of flooding) is very urgent. Mapping these issues on the same maps would indicate a similar relevance for both problems

- There are many uncertainties and other possible solutions open for the potential problem of water shortage, so this problem need not be emphasized in this phase, and mapping a possible measure would be premature
- the idea of water basins for shortage situations are 'hard to sell' to municipalities. For it would mean 'their' grasslands would be transformed into a lake permanently. This while calamity polders are usually grasslands, with only a minor change of being flooded once in hundred years.

Defenders of the water storage basins on the map, argued that this issue would require the largest amount of space and is the most difficult to reach.

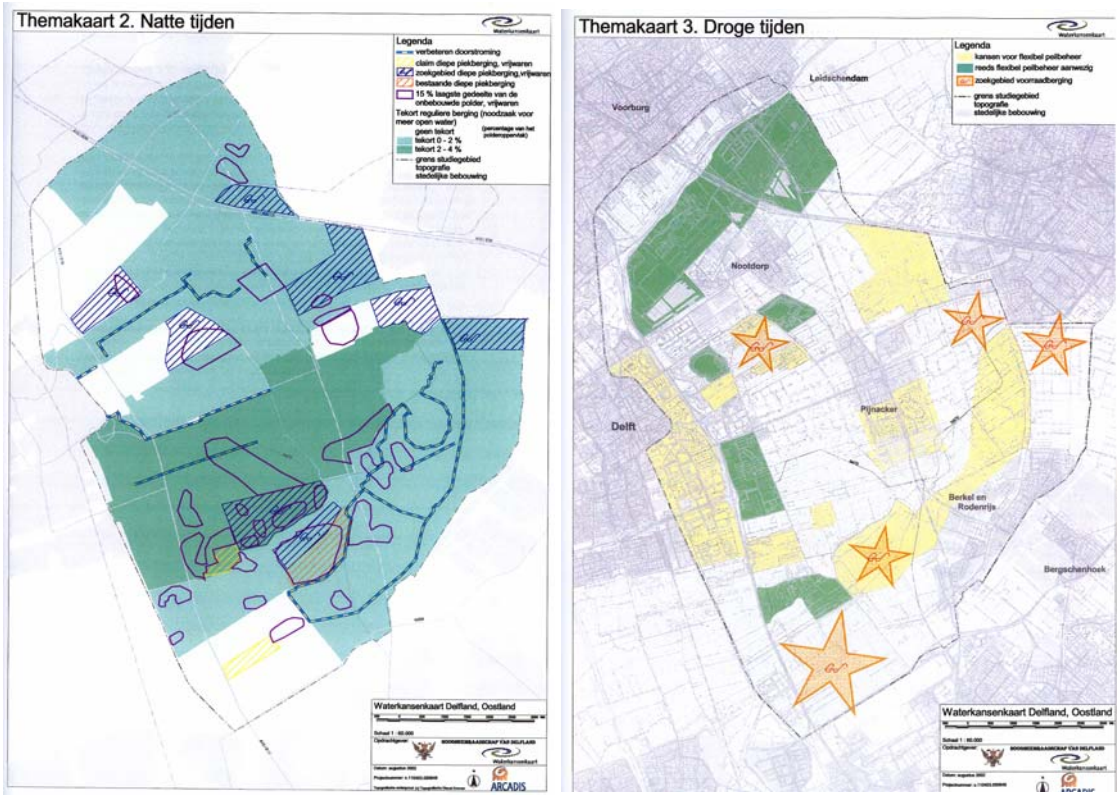


Figure 6-8. GIS-overlays of various policy measures in the area Oostland. Left: water surplus situation. Right: water shortage situation. Some search locations overlap. See colour figure in Appendix 5.

Input for the provincial Structure plan

In the meantime, the project was gained up by the process of the Province South Holland who was preparing its Structure plan for the region. The (extended) deadline for giving input was January 2004. The responsible policy worker spatial planning within Delfland, who had not participated actively in the project team thus far, now raised her voice. The map should give useful input for her task to provide information in the structure plan process. She had warned the previous project leader for that, and now, she saw her worries come true. Above the slow progress in the project, she also

now saw that the evolving direction on the maps raised her objections; on the policy options (and locations) for dealing with water surplus and water shortage, and also with the funded argumentation for the spots on all maps, including water quality. The spatial planning expert stated she did not want a 'naïve map'. Especially locations where spatial planners had already far-fetched plans, she saw it as unrealistic and therefore –untrustworthy to try to 'lock' the whole area as a water board with a vaguely calculated and well-funded claim.

In the meantime, the deadline for sending in information to the Province for official input in the Structure plan came closer and closer. Eventually, the spatial planning policy worker decided to 'fix' her own task and send a map of her own to the province, separately from the Water Opportunity Map project, without consent or consultation of the WOM project leader. In just two evenings, she composed a map with the hydrologist and the internal GIS-worker of the Delfland organization. This action lied a 'bomb' under the relation between the spatial planning expert and the project leader of the WOM-project. In the project meeting of October 2000, this resulted in a deadlock situation.

Round 5

In November 2000, the political responsible member of the board of Delfland appointed a new chair to the project team in order to force decisions. The new chair was one of the new directors of Delfland, an experienced interim manager who was hired to manage an organizational transition.

Meanwhile, the map that was produced for the Province had to be accepted, as it had been given out officially and the interests of the water board had been well represented on the map. On one major point the map had raised questions for the water board; on the map had been a request to the Province to allocate a particular region as 'search space' for water storage, but this area did not correspond to the ideas agreed upon in the WOM project group. On this point, the spatial planning expert had worked solo. In later rounds of the WOM project, the exact locations would have to be sorted out further, and it looked like that would result in other search locations; a point that would have to be sorted out with the Province later, once the WOM would be ready.

To settle the dispute of the calamity polders versus preservation lakes, the director of the water board decided to give priority to calamity polders. But in the meantime, the project leader had the map maker replace the bounded areas or the water storage basins by indicative star symbols (Figure 5.6, right map), in order to still try to keep them on the map, yet in another, 'lighter' form.

The new chair also clarified that a clarification of priorities was missing, and there was no conflict resolution mechanism in solving conflicts about such priorities. Therefore, she decided to temporarily stay involved in the process as project leader, and to take the 'hard' decisions herself, as being the responsible director.

Round 6. Final Water Wish Map (WWM)

Delfland also wanted to make a 'synthesis map' of the most important issues. Here, the priority between policy measures was highly disputed. Not all measures would be included in this summarizing map, and some issues would visually lie 'on top of other

spots' on the map. In every meeting, there is discussion about the presentation of the information on the maps. A special meeting is organized to evaluate the cartographic layout of the map results and to formulate specific cartographic advice for LWT. A communication officer of Delfland gives much critique on the layout of a number of maps, referring to rules of thumb of graphic design.

Finally, a new consultancy firm was hired by the new chair, to come out of the discussions and to finish the maps. The consultant of LWT had spent many (expensive) hours without reaching progress. Furthermore, the current map images did not have the visual quality that might be expected of a consulting expert. A third argument for hiring another consultant was that the spatial planning expert of Delfland left the organization. In order to fill in this expertise, another consultancy firm with expertise in the field of spatial planning was hired.

Instead of copying the GIS-maps, these landscape designers listened to the various arguments why individual policy measures are more important than others. They re-shaped these arguments in three groups:

1. Water claims: options that are not negotiable according to Delfland. These claims are necessary according to Delfland in order to keep their 'base system in order'
2. Water wishes: strong requests towards spatial planners to adopt zones or search locations in their plans for the sake of water management. These are 'no regret' options for issues that might be hard to deal with if actions are postponed into the future.
3. Water opportunities: other ambitions, that deserve extra attention of water managers and planners, although these issues are not funded by 'hard' arguments yet.

This way, the status of different spots and contours of the map where differentiated explicitly, as a settlement of the disputes. The consultant proposed to make different vision maps for each of these three themes. The themes were embraced as a good representation of the people's intuitive thoughts. The lower priority could be based either on a minor level of importance or due to high uncertainties about the future.

The chair decided, having heard all arguments, that search areas for calamity polders have the status of a claim, and the search areas for preservation lakes have the status of wishes. The stars of water basins thus could stay on the map. (In the end, the status of calamity polders would be split in two groups. Some areas were being formally approved and appointed as calamity polders by the political representatives, others still remained in the status of 'further study necessary'.)

See Figure 6-10 for the final Water Opportunity Map, its 'main image'. This map summarized the most important issues of the WWM images of Figure 6-8 (Those map images were also taken up in the final WOM document as thematic background information). At the end, The Water Wish Map images turned out to serve the primary information for the resulting 'main image'. While on beforehand the suitability maps were expected to provide equally important information, the topics on those maps were not taken over on the main image (but the suitability maps are also part of the final document, like the WWM maps and the spatial planning map).

The map maker did not use GIS for the final layout of the main WOM image. He redraw the picture, as the GIS-package did not offer the options and *subtleties* that manual (computer-added) drawing offers. For instance, choosing specific patterns of texture, drawing a red line just next to a blue line instead of above it, giving a symbol a little 'shade', etc, is not possible with the standard layout-options of the current GIS-package used in this case[6].

Figure 6-9. Primary stakeholders at the workshop on June 6th 2002, commenting the concept maps.

On June 6th 2002, the spatial planners of municipalities and province are invited to review the concept results (See Figure 6-9). They do ask a final question: what is the 'room for maneuvering' in these maps? The planners judge that clear search locations have been appointed. But:

> "How many of these spots, or how many surface, do you actually need of all these search locations? Do you need half? A quarter? And which locations would be most effective from a water management point of view?"

The workshop leader explains that 'for now, we claim all appointed locations'. During the project meetings this issue has been discussed. And as a result of the workshop with stakeholders, this question is again on the agenda. Some project members have had the ambition to go one step further, for instance by indicating how much water volume (or areas in hectares and depth) should be needed. Information about this could be indicated on the map by adding hectares and heights to the appointed search

[6] The GIS used here is Arcview of ESRI.

locations. However, this discussion is cut-off by the interim project leader. The project has to be finished quickly, and giving more information for negotiation could turn against the water board if later; more precise studies could turn out that more space is needed than assessed in the broad-brush analysis of the Water Opportunity Map. Claiming all search locations for now and lobbying for this statement of the water board is regarded by the interim as the target function of the Water Opportunity Map.

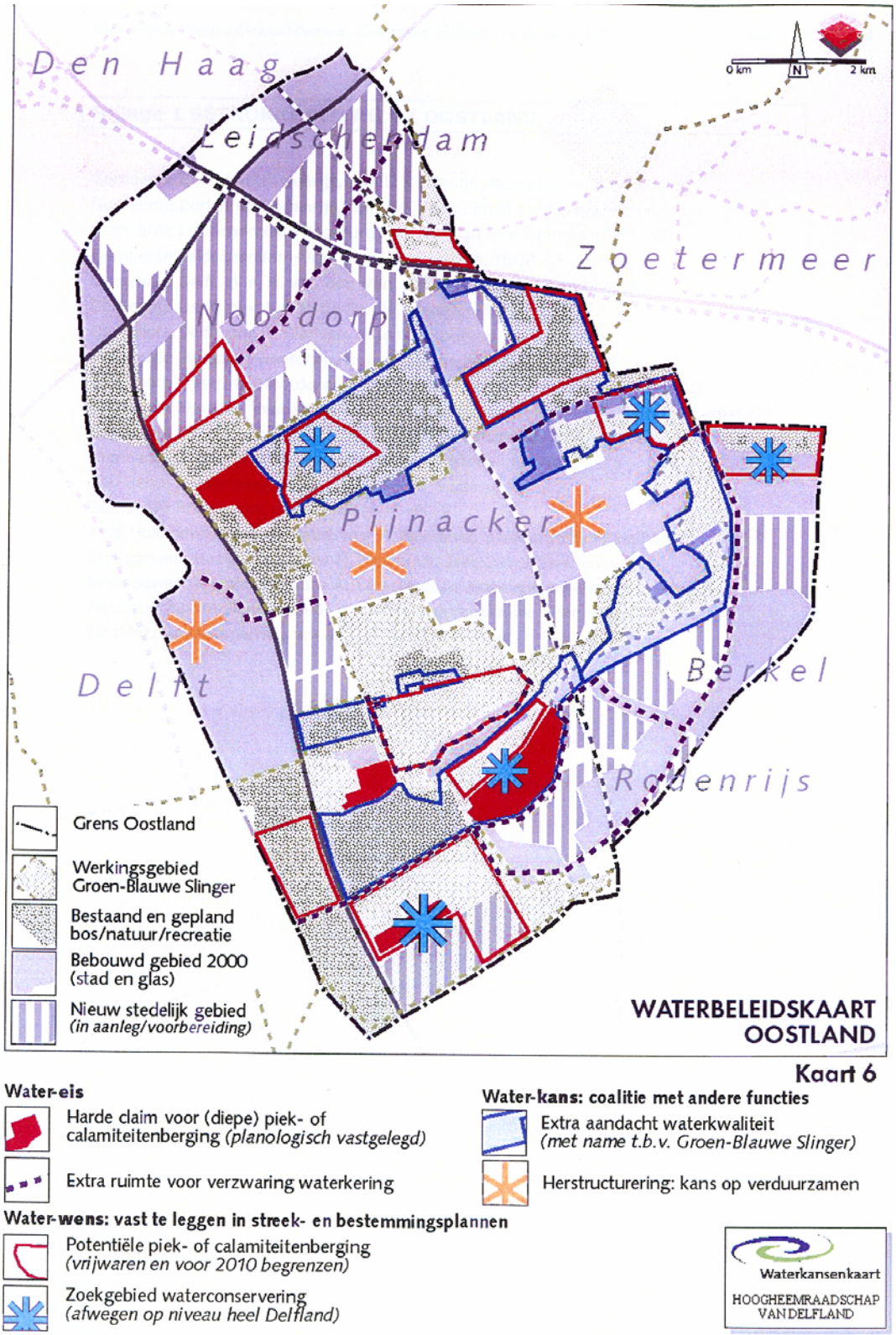


Figure 6-10. Resulting Water Opportunity Map of Oostland.
See colour figure in Appendix 5.

6.3.3 Analysis of map interaction

Our interest is lying in the role of the maps in this ongoing process. Obviously, the making of the Water Wish Map comprised more than doing an analysis and presenting the result. A vision had to be formulated, and the formulation was explicated in the shape of a map. That it had to be a map was undisputed. This was already enclosed within the name. What should be on the map and how the map should look like were the subject of many discussions. In the next subsections, we discuss the context, interactions and the map.

Context

The making of the Water Wish Map has taken a long time, and has proceeded in multiple rounds of the policymaking process. In the different rounds, the emphasis of the process has shifted from collaboration with spatial planners of municipalities and province, towards negotiation with them on claims for 'space for water'. The spatial planning specialist of the water board, and the new interim manager who got involved in the project respectively in round 3 and 5, contributed to this shift in approach.

The differences of opinion could not be solved in harmony within the project group, although all the team members were from the same organization. The maps did not offer clues to get out of the conflict in round 4. The overlapping areas on the maps worked as points of attraction. The conflicts focused around these spots. The spots on the map seemed to 'compete' with each other. When no compromise or other solution seemed available, the spatial planning specialist decided to make her own map for the input in the provincial Structure plan. Finally, the interim manager settled the disputes by taking the controversial decisions herself. As a director, she was higher in hierarchy within the organization, and this solved as conflict resolution mechanism.

The making of the WWM took place in a constantly changing environment. Two different *general objectives can b*e identified for the overall process:

a) Arrive at a cooperative relation with municipalities and province
b) Arrive at a substantive claim on space from a water perspective

As stated above, the objective shifted during the various policy rounds. In the beginning, the emphasis laid on the first objective, whereas in round 4-5, the emphasis shifted to the latter. In this case, it were not so much the participants who made the switch from the first (a) to the latter (b) objective, but instead, the involvement of different people internally in the project team shifted the dominance in the succeeding rounds. In the beginning, the responsible political representative of the water board had plead for a very open, collaborative approach. There was more attention for building a relationship with other stakeholders than on the substantial aspects of the matter. The first project leader supported this approach. The second project leader believed in the retention of clean water as important sustainability solution for the long term, and wanted to have this incorporated in the WOM.

The spatial planning specialist who was added to the project team in round 4, did have a different opinion. She plead for a less open, more negotiating approach towards municipalities and province. She wanted to state claims for those issues that Delfland had funded, preferably quantitatively specified arguments (and no claims for long term issues that yet incorporated many uncertainties). The interim director, who joined the team in round 5, also emphasized the negotiation aspects with municipalities. All these shifts caused the feeling with the other project team members of the *'recipe that kept changing and changing'*.

The problem situation was to find an answer on the following question: 'How does the desired future water system for Oostland look like'? As preparation for this discourse, a few experts of Delfland had held two technical meetings together in order to draw up an analysis of the area in the current situation. This served as base for making proposals on future policy measures. In the next stage, all experts did their homework individually, on separate topics. The assignment for them was to draw up their tacit knowledge into a vision for the specific topic. Then, these separate maps were showed and discussed by all project participants, including civil servants of municipalities and province. They gathered in a workshop on a vision for Oostland in the summer of 2001. Since the feedback of external participants (municipalities and province) was poor, bilateral discussions were organized where all topics were discussed and maps were commented. This was followed by internal processing of all information by the project members of Delfland, assisted by their water consultant.

The policy process was in a design phase where several policy measures had to be developed in coexistence with each other, and integrated into a coherent vision. The status of the maps was yet informal, but got more definite and thereby more 'official' during the process.

Contextual dynamics: Conflict due to parallel project

The making of the Water Wish Map was influenced by a parallel project, namely the spatial Structure plan process of the province. This process was running during the vision-building activities of Delfland. The expert of Delfland on spatial planning had warned for the dates that the province needed input for their structure plan. These dates are strictly applied for all government involved in spatial planning in the province. In the beginning, the spatial planning expert seemed a passive project member. Her involvement had to fill in the gap on expertise of spatial planning that fell after the first project leader left the organization. As the time for giving input for the province, got closer by December 2001, the spatial planning experts got more engaged and expressed more and more critics. In the end, she decided for herself to make her own map to sent to the province, in parallel of this project. That map was made in a somewhat secret process between three experts, the hydrologist, the GIS-expert of Delfland and the spatial planning expert, out of sight of the WOM project. This contributed to the conflict on the vision map in the water opportunity project. Trust among project members was damaged. By sending a different map to the province, the spatial planning specialist had no options left for the project group; if the WOM would become different than, and thereby inconsistent with the map that was

sent to the province, the water board would look like an unprofessional organization and would have some explaining to do.

Interactions

According to the different objectives of actors, there were two different intentions with the vision map images:

a) To generate a vision that synthesize the analysis so far, that serves for deliberation and mediation with municipalities
b) To consolidate claims of Delfland towards the Province (primary) and the municipalities (secondary)

The first intention, to generate a vision for deliberation denoted as (a), corresponds with the first objective mentioned in the previous section; to create a cooperative relation with municipalities. The second intention, to consolidate Delfland's claims, corresponds with the objectives of actors to negotiate on claims. The project leader of the water opportunity map clearly represented the first objective and intention, to create a cooperative relation with municipalities. The spatial planning expert of Delfland embodied the opposite objectives. The other project members had so far followed the line set out by the project leader. Most of them kept aside in the conflict on the vision map.

In the many meetings were the various topical map images were prepared and processed, arguments were posed and shared. Through this process of debate and deliberation, many topics and items were exchanged during the meetings. The options comprised:

- *Options in policy strategy* of Delfland towards others (the participation/negotiation approach), respectively
  (a) mediative and collaborative or
  (b) advocative.
- *Options in priorities* in Delflands' WWM vision, respectively
  (a) focus on long-term problem of water shortage or
  (b) shorter term problem of water surplus.
- *Options in mapping*: choices in priorities, in clustering of measures and in presentation of the WWM. The group agreed that the graphic design of the maps had to be improved. The clustering proposed by the new consultant BNG was accepted. On the prioritization of issues, the conflict concentrated on the spots of calamity polders and water storage basins.

The discussions about these options crosscut the above structure of option types. Form of map layout, priority-setting over substantive policies, as well as strategy how to approach the other actors, were intertwined discussions. Moreover, the options in mapping were argued for because of reasons of strategy and reasons of policy priority.

An example is the replacement of the legend item for water storage basins into indicative yellow stars. At this point, discussions about strategy (mediative or advocative?) and priority (short term need of coping with water surplus or long term

need of coping with draughts?) were directly related to the discussion about the legend of the WWM: Water storage basins on or off the map? What order of themes – order of legend items in the legend– and thus what map layers 'on top'? Storage basins overlapping with calamity polders or not? Area-contours or indicative point symbols?

To conclude, the steps of technically making the maps had been clear. Data collection, explication of (implicit) expert knowledge and overlay of map layers made up the ingredients of the 'method'. However, how to deal with trade-offs and conflicting interests was not figured out on beforehand. This proved to be a major obstacle in the project group discussions. When the map layers were overlaid, a hierarchy became visible between relative importance between different measures as well as concrete conflicts on certain areas of the map.

Map

Methods and tools

In section 6.3.1, the step-wise approach for arriving at the WWM is summarized. Overlay was the important principle lying behind the construction of maps, alongside information retrieval from implicit expert-knowledge (out of the minds of the water experts) and existing information in Delflands (GIS-) databases. The succeeding set of map images did not emerge from a straightforward process. Meeting after meeting, a set of map images was presented and discussed, with as a result new assignment and guidelines to the hired consultant what should be changed.

In between the meetings, new versions of maps were prepared by the water consultant LWT, with help of GIS. These were printed and distributed for deliberation in meetings. Because it was technically not very easy or 'handy' to make digital documents that could be read and printed without GIS software (and most participants did not have this software on their computers), map images were distributed on paper.

Because the textual documents were always distributed by email, there was a parallel information flow of images and texts. This sometimes resorted in questions on the versions of maps. In general, however, this was not perceived as a big hindrance. During the vision building process, the idea came up to present the end result on the Internet with help of new web-GIS software. But this issue was not heard of anymore later in the process.

Intermediate map types

Grouping the various sets of map images, the following types of WWM have circulated successively in the process rounds:

1. *First-hand-drawn versions by experts,* based on their tacit knowledge. The first exploration of existing knowledge and issues was done by a team of experts in a collaborative session. The maps were drawn on large topographic base maps, which had been printed on A0-format. The experts marked spots with pencil, in different colours and line textures. The boundaries of the spots followed the demarcations of polders and ditches of the topographic background. In a next round, the various drawn issues were elaborated upon

into various themes by the project group. The various experts were given homework to extend/improve 'their' themes on separate map images. These second hand-drawn maps were drawn individually, on A4-format.

2. *Commented hand-drawn maps* drawn up in bilateral conversations with municipalities. All hand-drawn maps (A4-format) were copied in colour and overlaid by a transparent plastic sheet. On these plastics, the comments of municipalities/province would be collected, and successively digitized into GIS layers. For each bilateral meeting there was a set of 8 map images provided. The A4-format would allow easy handling in meetings and would force the discussions to remain on a high-scale level, because the small map size does not enable distinction of detail on the maps. After the round of bilateral meetings was finished, the various comments were collected and taken over theme by theme so that all municipal comments were combined on one map image per theme. The digitizing of information into GIS was executed by consultant LWT.
3. *Overlays of themes* on a set of GIS-images printed on paper. The map-layers were printed in various combinations on paper maps, in a long deliberative process with various iterations and alterations. Also the presentations were adjusted by changing graphic variables and descriptions of legend items. During the conflictuous meetings in round 5, the calamity polders and preservation lakes were visualized with only a contour line or little texture, in order to see the complete border lines of every topic. Later, preservation lakes were replayed by yellow star symbols. The calamity polders got an extra symbol (a symbol of glasses), to emphasize their status as search areas.
4. *Publication map image* with redrawn layout for improved graphic appearance. With the switch to a new consultant in the end phase, a landscape architect firm, the WWM map was remained in the GIS-format prepared by LWT but the final water opportunity map image was re-drawn with non-GIS graphic software.

Emergence of borders on the maps

When the boundaries around spots of various themes became clear, also the overlap between various options and issues became visible. Some locations seemed suitable for all the various purposed like creating calamity polders, water storage basins, water related nature and a flexible water level. The boundaries seemed to deepen the conflict. Star symbols were an effective means to keep the calamity polders and water storage basins both on the map, with a lower status for the water storage basins. Because this spot was visualized without borders, it was clearly a search location.

Message of the map

The various temporarily versions of vision maps reflected the different positions in the debates. According to some, the map had to look 'more visionary', both in terms of layout and content. According to others, such as the consultant of LWT, the WWM was just a technical representation of the inventory and analysis of information, and the layout was not important. According to the hydrologic experts, some borders or legend items were not well supported by convincing evidence or data and should be

taken off the map. Norms should be explicated either on the map or in the accompanying text.

The final map is restructured according to different policy priorities, decided upon as response of the proposal by the newly hired landscape architectural consultant and under pressure of the interim manager and steering group. These priority categories were implemented as groups of legend items on the final WOM map image:

- Water claims: 'base system in order'
- Water wishes: 'no regret' options for issues that might be hard to deal with if actions are postponed into the future.
- Water opportunities: other; 'nice to have' options

This mend a shift in way of thinking, away form the substantive subdivision of themes in terms of water surplus, shortage and quality. The change of categorization seemed to open a sheer of relieve in the project team, according to our observation of attitudes, level of critique in the remarks and emotional expressions on the group members' faces. The restructuring of legend items was seen as way out of the endless debates, and the presentation skills of the new consulted landscape architect were appreciated in redrawing the maps graphically for the final WOM map image[7]. The final main map image was quickly accepted by the project team.

Functionality

During the lengthy process, many maps had been made and commented in the process towards the final map images that would together make up the WOM. We can elicit various evaluations of the map due to the different actor perspectives.

Perspective #W1 (project team members in round 7, end of the pilot project)
One perspective is that as evaluated in September 2001 by the project team members at the end of the pilot project on region Oostland. Looking back at the project, the project team members agreed that the process had taken too much time, but that the resulting product was of good quality (Van Eeten, van der Voort, Carton, 2002). This included the thematic map images of the WWM. The maps represented the negotiated perspective on which the project team members had agreed –after the number of conflicts had been settled. The originally technical step-wise approach had been followed, and carried out as planned when ignoring the time-consuming conflicts and delays in making trade-offs. In the process evaluation, the project team members were of the opinion that a formalized conflict resolution mechanism and decision structure had lacked, but that the substantive approach to make the maps had worked out. We interpret this as that the use of the maps had functioned as planned in achieving initial objectives, thus classifying the making of the maps in hindsight as 'functional as planned'.

[7] The fact that the thematic map images were not redrawn, was a negotiated agreement with the switch of consultants; LWT would not agree if their products (and thus particially their intellectual property) would be reprocessed by others.

Perspective #W2 (spatial planning expert and project leader in the middle of the project, round 5)
The lack of a procedure in case of emerging conflicts, however, had contributed to the long and time-consuming delays. In the fifth round, a conflict emerged about priorities and negotiation strategy, and the extra meetings discussing the maps did not fulfil the hope that the conflict would be solved. On the contrary, more debate over the maps resorted in more deadlock, and the difference of opinion deepened, until an (interim) director interfered and decided on the controversial issue. Seen from the perspective of the project leader in the middle of the project (round 5), the maps had worked as polarizer, which in turn had paralyzed the participative approach. This was a non-expected effect with negative implications: the use of maps had become 'dys-functional'.

Also the spatial planning expert was unhappy with the WWM, in particular the slow and participative approach which in her eyes led to a low quality product. By making a parallel map solitary, the spatial planning expert to certain extent undermined the authority of the WOM-project. Similar with the viewpoint of the interim manager who took over the chair of the WOM-project, the spatial planning expert argued for a more strategic approach, and objected to elements of the WWM-map that would become dys-functional in her view.

Perspective #W3 (political representative/ board member, in hindsight)
Apart from the evaluation by the project group members, we spoke about the project with one of the board members once the WOM of Oostland had been finalized. Overall and in hindsight, she valued the process positively, including the conflicts and the longer duration and associated extra costs. She regarded the WOM as an important project in learning about and changing the 'way things are going' in the organization's practice:

> "the map making activity forced our civil servants to make choices. This brought all different opinions and views to the surface. Before, the organization worked while all these opinions ran through each other. Now, we as organization saw we had to reach one line of vision and decide on fundamental choices."

The board member was positively surprised about this effect. According to this perspective, the process of map making–that had centered around the succeeding WWM images–, including its conflicts, had led to the positive side-effect that the organization had been forced to make decisions. This can thus be classified as an emergent property of the map making process: 'emergent functional'

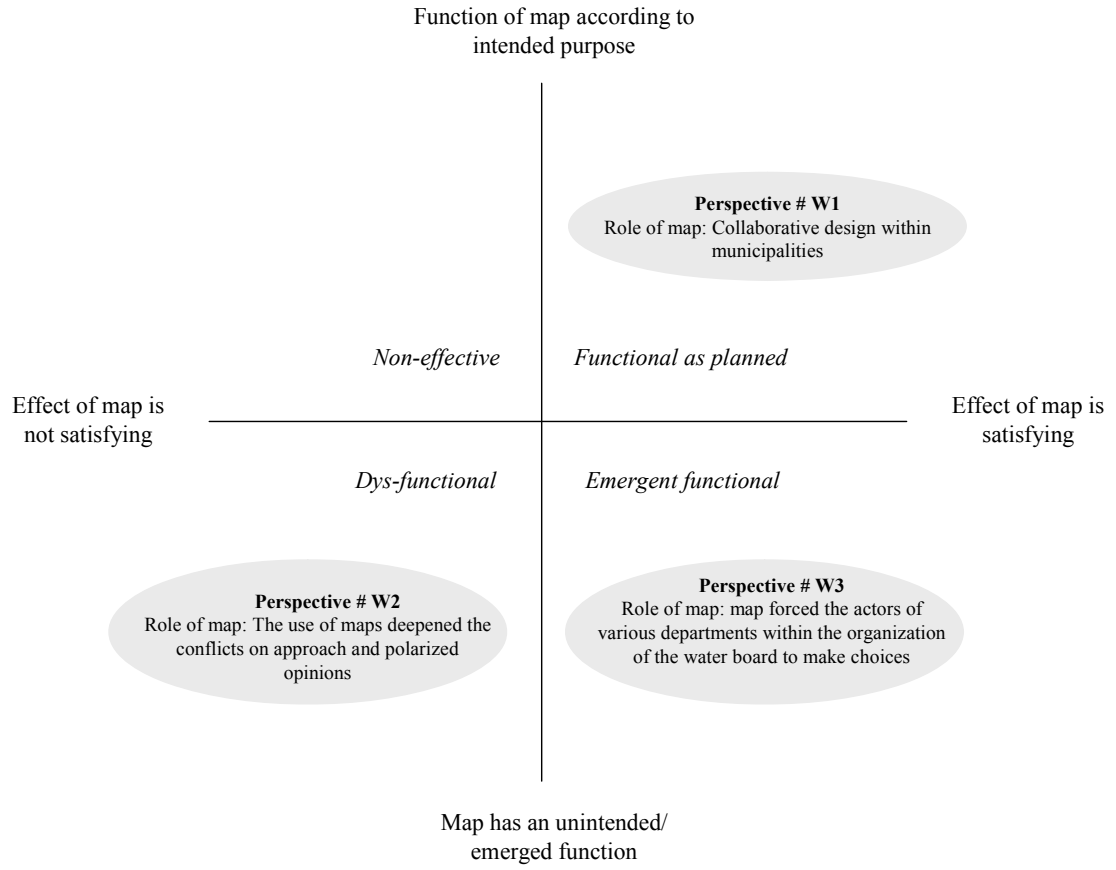


Figure 6-11. Schematic overview of different actor-time perspective on the (making of the) WWM

Line of reasoning and frame of reference

We have thus set out three perspectives on the making of the Water Wish Map (#W1,2,3) (See Figure 6-11). From the interviews that we have had with the different parties involved, we have reconstructed the argumentation line that make up the essence of the valuation of the map. In deconstructing the underlying frames that lead to the valuation of the map, we have grouped perspective #W1 and #W3 as these lines of reasoning were hardly distinctive (whereas the formulated valuation of the map were). The (re-)constructed frames of reference we recognize a different expert attitude and a different negotiation strategy. In the first frame, we recognize an engineering, designers approach. Something needs improved. This something is the reputation of the water board. That is even of more importance than the whole substantive matter, so is agreed among the project group at the start of the project. Only relying on quantitative analysis and existing norms is seen as a pitfall in this perspective. Creativity and allocation of new opportunities should be enabled during the process. In order to create a fruitful ground for enabling the formulation and implementation of innovative combined water-and-spatial policies in the future, communication within the water board as well as with the primary stakeholders should therefore be open and extensive. Most importantly, spatial planners and water managers should learn from each other.

The other frame is almost the opposite in reasoning how the WWM should function in relation to the external stakeholders. The making of the WWM should follow hard facts and norms as much as possible, in order to be consistent with historical viewpoints of the water board and in order to make a strong claim, advocating the interests of the water board in the spatial planning arena. The policy questions that come up in the project group should not be negotiated in the project group, paralysing the progress of the work, but delegated 'upward' in the water board organization in order for the board of directors to make a strategic choice. 'Hard' analysis serves the purpose of advocacy of the water board. Input of external stakeholders is valued as information input (facts) and expressed concerns (anticipate on future criticism), not as partner in designing a new vision.

Table 6-3 summarizes these two opposing frames. We have summarized these frames as:

1. Map making for mediation (combining creative design with consensus seeking)
2. Map making for advocacy (combining factual analysis with preparation for confrontation)

	#	W1 and W3	W2
ACTOR-TIME PERSPECTIVE	*Actor*	*Group of project team members (#1) and Board member (#3)*	*Spatial planning expert and Interim project manager intervening in paralized project (#2)*
	Time-period	September 2001(#1) and Januari 2002 (#3)	December 2000
SUBSTANTIAL PERSPECTIVE	*Map valuation*	"functional as planned" (#1) resp. "emergent functional" (#3)	" dys-functional "
	Views	- Municipalities and water board have lost regularly communication with municipalities. - Reputation of water board needs improved. Normative attitude ("water board always sais 'no'") needs to be changed into a 'co-thinking' approach.	- Municipalities do not act constructively but see the water board institute as cash cow for selling land. - The water board must take responsibility to defend water interests in spatial planning arenas with different (competing) interests.
LINE OF REASONING	*Values and their meaning*	- For a sustainable water system, collaboration is vital. - For the WOM project, this means that creativity and community building are most important.	- For a safe and sustainable water system, a strong and responsible water board is vital. - For the WOM project, this means that information analysis and legal procedures are most important.
	Intentions with map	- Generate shared vision within water board and with municipalities on future water system. - Arrive at mediated map.	- Work out vision map at water board with use of information of municipalities. - Arrive at advocative map.
	(Proposed) action with map	- Use map making exertion primarily to design a shared vision on sustainable land and water management. - Visualize ideas and future opportunities. - Make deliberated choices in map-making.	- Use map primarily to lay a claim to preserve space in spatial planning processes for water management purposes. - Visualize 'hard' facts and norms. - Make strategic choices in map-making.
FRAME OF REFERENCE	*Characteristic terms*	*Collaboration, creativity, shared, design, ideas, future opportunities, deliberative*	*Responsibility, procedures, claim, 'hard' facts, norms, analysis, preserve, strategic*
	Dominant function of the map	**'Map making for mediation'**	**'Map making for advocacy'**

Table 6-3. Argumentation line behind distinction of two conflicting frames of reference in the WWM process.

6.3.4 Conclusion: Functions of the map in the discourse

The role of maps in a clash between frames

The making of the Water Wish Map, took a long period of time. And it led directly to the resulting integral 'one-map-image summary' that was the main map image of the resulting "Water Opportunity Map" document.

In the long process that eventually led to the main WOM image, a clash has obviously appeared. At the beginning of the emergence of conflict in round 4, it appeared as if he conflict centred on the maps. At first, the choice for either calamity polders or preservation lakes was highly contested. Then secondly, the parallel map that was sent out to the Province became the prominent problem. But as the conflict unfolded, it became more and more a personal issue between two camps/persons. The relevant question for this research is, did the maps contribute to the conflict, did they deepen the controversy? And was the conflict a clash of underlying frames?

Our analysis concludes positively on both questions. The formation of spots on the maps for various kinds of measures did stimulate the appearance of multiple spots on the same location. While further analysis of the separate optional measures could have dismissed certain options, or could have brought more nuanced policy measures to the table that would have been optimized for local conditions, the current way of working maximized the amount of 'broad brush' spots on the various thematic maps that would then conflict in the overlay analysis exertion. Putting boundaries around very uncertain measures on different topics (water surplus and water shortage situations) in this case deepened the conflict more than necessary.

The conflict also manifested a clash of underlying frames. This was especially visible in the conflict between spatial planning expert and project leader. In Table 6-1, this clash between frames is expressed. The two frames are fundamentally different in their way of valuing and assessing how 'strong water policy' comes about. While the 'map making for advocacy' frame identifies procedures and regulations as cornerstones of good water management, the 'map making for mediation' regards collaboration at the level of local governments as cornerstones, which has been neglected in the past. The second frame has much trust in municipalities as partner, while the first frame sees municipalities as strategic actors with competing interests regarding the use and exploitation of lands. This is expressed in the argumentation of the interim manager who spoke of the attitude of municipalities as regarding the water board as a 'cash cow' for selling land.

To conclude, we have thus assessed the use of maps as having an exacerbating effect on the discussion. Broad brush spots with marked, overlapping boundaries increased the appearance of conflicting options. We have also attributed the emerged controversy to a clash of underlying frames. The implication of the second questions partly turns the first question irrelevant; if the underlying frames clashed, this could very well have surfaced no matter what kind of tool or model was used. In this study, alternative scenarios how this process would have developed if the maps would not have had a central position are not researched. We just notice that both the underlying frames clashed and that maps aggravated the conflict by sharpening the conflicting

claims on space. This could lead to an upward spiral of more and more conflict, where both competing camps took control by controlling the maps. The spatial planning expert in this case went to make her own map.

In the climax, the conflict between the two camps became more personal, regarding the comments expressed during the meetings and gatherings between the competing camps and the project team members who took a peripheral standpoint. In our view, this is a character of 'real' controversies. The substantive side of the conflicting viewpoints, however, brought to the table exactly the core questions in the WOM-process:

- What are the biggest uncertainties, how far to go with anticipative policy against the uncertain scenarios of climate change?
- What are the 'best' and most cost-effective measures regarding future water surplus, shortage and water quality?
- How to deal with rapid spatial developments in the region and how to approach/collaborate with the other regional/local governments in the region, regarding space and water policy?

In our view, the use of maps has functioned in this process as an instrument that facilitated 'backward reasoning'. Tacit knowledge and expert opinions of experts at water board, municipalities and province have been incorporated in the process of producing the maps. In making these information sources, with its embedded assumptions and estimates explicit, the WWM maps became an embodiment of the internal frames of actors involved.

This went well as long as the diverging phase lasted; new ideas were simply embodied in an extra thematic map layer. But when these had to be integrated with each other, each individual map layer already had got its own 'author' and representing actor. Trading off one map layer for another, became part of the negotiation within the project team. And as the interim manager had commented, an order of priorities had not been set and a procedure for conflict resolution had not been apparent.

The obvious solution was to send the information with corresponding explanation to the steering group and this happened eventually. Why this had not been decided upon earlier, remains an open question. Possibly the project leader, not experienced with these kind of sensitive policy issues, felt it as a 'surrender' if decisions would have been delegated to the steering group. Perhaps the project leader was afraid her viewpoint would 'loose' in the steering group. The replacement of the areas by indicative stars reflects a strong will to keep signals/search spaces of preservation lakes literally 'on the map'. Revealing the true agendas of the individual actors, however, is beyond the scope of this project.

Function of map: forcing choices

For as far as the use of maps is concerned, the perspective #W3 of the political representative/board member is enlightening. In her analysis of the project, the board member concluded that the maps had been very functional in forcing the organization to make clear choices. While previously, different worldviews could live next to each other in different departments and individuals of the water board, this vision, expressed in map images of the final WOM product, embodied a document with a number of policy choices being made and new choices agendized. Instead of many differentiated future visions, the process had aligned up 'the' general perspective of 'the water board'. Although the project had been expensive in the eyes of the interim manager, the board member did not seem that concerned about the financial aspects. As a communicative instrument, the maps had been very functional in her opinion.

We agree with this last viewpoint. However the facilitation aids by the hired consultants could have cost some finances, the internal hours of the employees of Delfland would have been paid anyhow; in this respect, the project would only have drawn away human resources from other projects. But if this project was seen as one of the most important ones of the organization, as it was, this did not need to be a mayor problem, in our perception. Communicating with spatial planners of municipalities and province was exactly what national policies wanted to see happening at local and regional levels, according to policy documents like WB21.

Function of maps in communication between planners and water managers

We have noticed a huge difficulty in communicating and finding a common vocabulary in the first participative work ateliers of the project. The maps appeared to us as a language that all participants understood. However the exact arguments for a certain thematic map were not always deliberated in depth, the implication of each map was being discussed extensively. This was especially the case in the bilateral meetings. In our view, bringing a package of preliminary thematic maps as discussion agenda to the municipalities and deliberating each of them in small group setting was one of the best decisions made in this project, and one of the mayor success factors.

The long period between these bilateral meetings and the presentation of the conceptual results to the municipalities was considered a downside in the general opinion of the municipalities, as expressed at the meeting where the conceptual results were presented. But it also signalled to the municipalities that it had been a difficult and thoughtful process, where they had not been bothered with extra meetings. The substantive end result was okay in the eyes of most participants. The differentiation between claims, wishes and opportunities on the maps were complimented for as clear distinction of priorities. The fact that the conceptual results were presented to them, with the opportunity to make suggestions for change, was highly appreciated.

On the question of Delfland's presenter whether the participants would use the maps, the participants answered that they regarded the WOM document as valuable information in their own development of policies and plans. A municipalities have to consider water aspects in new spatial plans due to national policies, they are better informed 'ex ante' by this piece of information. However, whether they would adjust their spatial planning policies due to this vision document, remains an end responsibility of the municipal planners themselves, they also made clear.

Unconscious role of map-making: Time horizon of the vision

The Text box 6-1 shows an example how the making of maps, in this case a mapping of time on a one-dimensional graph, influences a group without explicit claims or requests to accept the suggestion that was silently drawn by the process facilitator. The fact that the timeline is there, and that people take notice of it, seems enough to steer the ideas that come up in the group and frame the debate in the direction of a combination of time horizons.

Whether this framing happens on a conscious level or unconscious level, is ambiguous. The silently drawn timeline, and how it structures options A and B (different time horizons) next to each other, makes the group 'see through' that the options not necessarily excluding each other.

Whether the individual group members become aware that this is already in the mind of the facilitator, or that they unconsciously feel that they came up with the idea themselves, does not change the result; in the end all group members agree that the different time horizons can be 'translated' into each other as long as the medium-term and long-term vision are coherent with each other. This shared understanding of coherence between different moments in time is communicated by the graphic that 'maps the continuum of time'. Whether the facilitator did this drawing to 'manipulate' the discussion on purpose or whether he was just structuring his own thoughts on paper while listening to the arguments, is of minor relevance for its effect on the group (and beyond the scope of this study, which is focused upon observable map use activities in the group). Whether it was a consciously planned or unconsciously evolved act of the facilitator, this anecdote serves as example how a picture can quickly unite peoples' mental frames of reference. The fact that this anecdote led to un-anonymous consensus, however, cannot be attributed solely in the power of the timeline itself, but more so to its validity; the timeline fits the perspective of the participants what the WWM vision maps should be about.

Final thoughts

The various roles of the WWM map images are described above. Summarizing them into bullets could simplify these roles more than desirable. Overall, the communicative function of the maps was central;

- Communicating within the water board about implicit worldviews and expert opinions of civil servants at Delfland,
- Communicating what optional policy measures are in mind and which ones are incompatible, and
- Communicating a general perspective about water management in the region to spatial planners of municipalities and province.

In this communicative function, the maps deepened conflicts over conflicting policy measure; competing spots on the maps polarized the debate. This conflict resorted in a deadlock situation which was solved by intervention by higher management. The higher management made a crude choice in the controversy; calamity polders (measures for water surplus situation) would get priority over preservation lakes (measures for water shortage situation). If the spots for preservation lakes would not have been replaced by indicative star symbols, they would have been 'screened out'

of the final image. The action of the project leader to led the preservation lakes being replaced by 'light' indicative star symbols, kept them literally 'on the map'. This instance shows that the *cartographic layout* offers room to maneuver between uncertain policy problems and measures on maps, but that simultaneously the *conceptual structure* of layers that is imposed by (GIS-) maps tends to visualize and thus signal conflicts between layers that in itself are yet abstract.

6.4 The suitability map

The suitability map serves as advice on land use functions from a water perspective. This map advices positively and negatively about the suitability of locations for changes in land use –in general, whether an area is considered suitable for urbanization, including the development of houses, industries or greenhouses. On a map, regions are marked as 'suitable', less suitable or unsuitable.

6.4.1 Followed method

The idea is, likewise as the Water Wish Map is constructed, to make spatial overlays. How exactly, would be crystallized during the process. The method that was accordingly followed looks like the set-up of a multi-criteria scorecard. In the method of multi-criteria evaluation, different policy options are assessed on various criteria; the outcome of each assessment (each option on each criterion) is presented in the cells of the scorecard. In this case, there are various criteria for assessing the suitability of each location with regard to water management. Instead of presenting results in rectangular cells, the area-bounded evaluation is presented in different layers of a map, each layer representing one criterion. Together, these criteria add up to an overall suitability advice.

A suitability map can be based on the current situation, or can anticipate on the desired state of the water system in the future. The Delfland map is to anticipate on the proposed future situation that is formulated in the WWM. For instance, in areas where Delfland would like to implement a water storage basin, the water board will advice against urbanization because of this reason of 'reserving' this land for water storage. Therefore, the proposed measures of the WWM are input for the suitability map. The following steps are processed to develop the suitability map for Oostland:

Step I: Set a starting point in time as the baseline for advice

The spatial landscape is in constant change. This continuous change raise the question on which moment in time the suitability map should 'step in'. At the moment of developing the WOM, large development sites for housing are being developed in the various municipalities within the territory Oostland. Also, there are many development plans already approved, and construction works are already planned in the next coming years. It would seem "too late in the day" if Delfland would advice against these plans at this stage. But somewhere in time, there has to

be drawn a line if Delfland wants to influence these choices in the future. Therefore, the project group chooses a starting point in time for the suitability advice.

Step II: Develop a set of criteria that specify if land is suitable for urbanization

The project team develops criteria for suitability for different type of land use changes. There are two types of criteria: a) criteria related to characteristics of the landscape and b) requirements that stem from needs of the water system. These requirements are distilled from the Water Wish Map (WWM). The characteristics of the landscape are mostly 'hard' criteria that are obtained from the geo-database of Delfland, such as relative heights of the surface, ground water level and soil type.

For each criterion, a scale or threshold value is to be determined. For instance, on the criterion of groundwater level, at which height of the groundwater level is an area not considered as suitable for development?

Step III: Apply the criteria and make up the map.

The primary project executor takes up all criteria and collects and processes the data on these (location-bounded) criteria. The geo-database of Delfland serves as main data source. Also the WWM map layers are overlaid in order to identify locations where rural areas should be reserved for water-related policy measures. These areas are also marked as unsuitable for urban development.

Step IV: Revision and finalization

The project team (visually) evaluates the resulting map and adds explanatory text. Changes and additions are to be processed, including the adjustment or addition of criteria.

6.4.2 Description of the process: "Areas of attention"

Rounds 1-4

The making of a suitability map is envisaged as part of the WOM. In the first round, the project leader has collected and looked at other WOMs made by other water boards and governmental bodies to look for examples. In some of the other WOMs an advice on suitability of lands for urban developments was included, on others this was not the case. The ambition is stated to make a suitability map as part of Delflands WOM. However, whether such a map should be part of the end product or not remains a point of discussion from the early meetings until round 3. But as the project meetings are mainly dedicated to prepare the thematic maps for the Water Wish Map, the suitability map is not yet high on the agenda up until round 5.

Another discussion is whether this map should use the map with possible future spatial developments as input information. One of the project team members argues that this should not be the case; it should be an advise regarding all possible future developments, regardless whether these are already planned or not. Argued is to keep the current state of land use functions as a reference situation. Another team member

however is against a negative advice on projects that have not yet been implemented in practice, while their go-no go decisions have already been decided upon for a long time. She argues that it would look stupid if the water board would suddenly advice negatively on all these projects in hindsight, after the water board has not given official objections to these projects in the official consultation periods of these projects. This question is discussed in the steering group.

A third discussion is for what types of land uses a suitability advice should be prepared. For instance, should an advice be prepared for a change in land use from an agricultural function to a destination as nature reserve?

Eventually it is decided during the summer of 2001, through conversations within Delfland (in between the project meetings) and within a steering group meeting, to proceed with the making of a suitability map, but to keep it a question mark whether and how to incorporate it in the final document. In principle, the current situation would be taken as a reference situation, and it would be reflected upon in later phases how the currently planned development projects would show off in the resulting map. Furthermore, it is decided to make a suitability map only for land use changes from a rural function to an urban or 'built-up' function. Under a rural land use function is considered mainly agricultural lands with a 'soft' soil type like grass. A built-up function comprises housing and business parks including greenhouses; land use functions where the soil's surface is covered by rooftops, concrete and glass.

Round 5

Besides conflict over the Water Wish Map that peeked in round 4, critique has also raised on the approach of the suitability map. In January, the consultant of LWT shows a concept suitability map based on the criteria that have been formulated for assessing suitability.

The suitability map is made up of different 'base maps' that each represent a suitability criterion (See Figure 6-12). On the final map, these criteria are overlaid. When the classification 'unsuitable' overlaps on multiple layers, the final suitability map shows an increasingly dark-red colour. From the project group, fundamental critique is raised against the reasoning behind the classification of light till dark red colours. The project group members explain to the map maker that it does not matter in their eyes on how many criteria an area has scored badly, but how bad an area has scored on the various criteria; if an area has a very low relative height compared to the local situation, this characteristic can make that area far more 'unsuitable' than a location that scores moderate on all the other criteria.

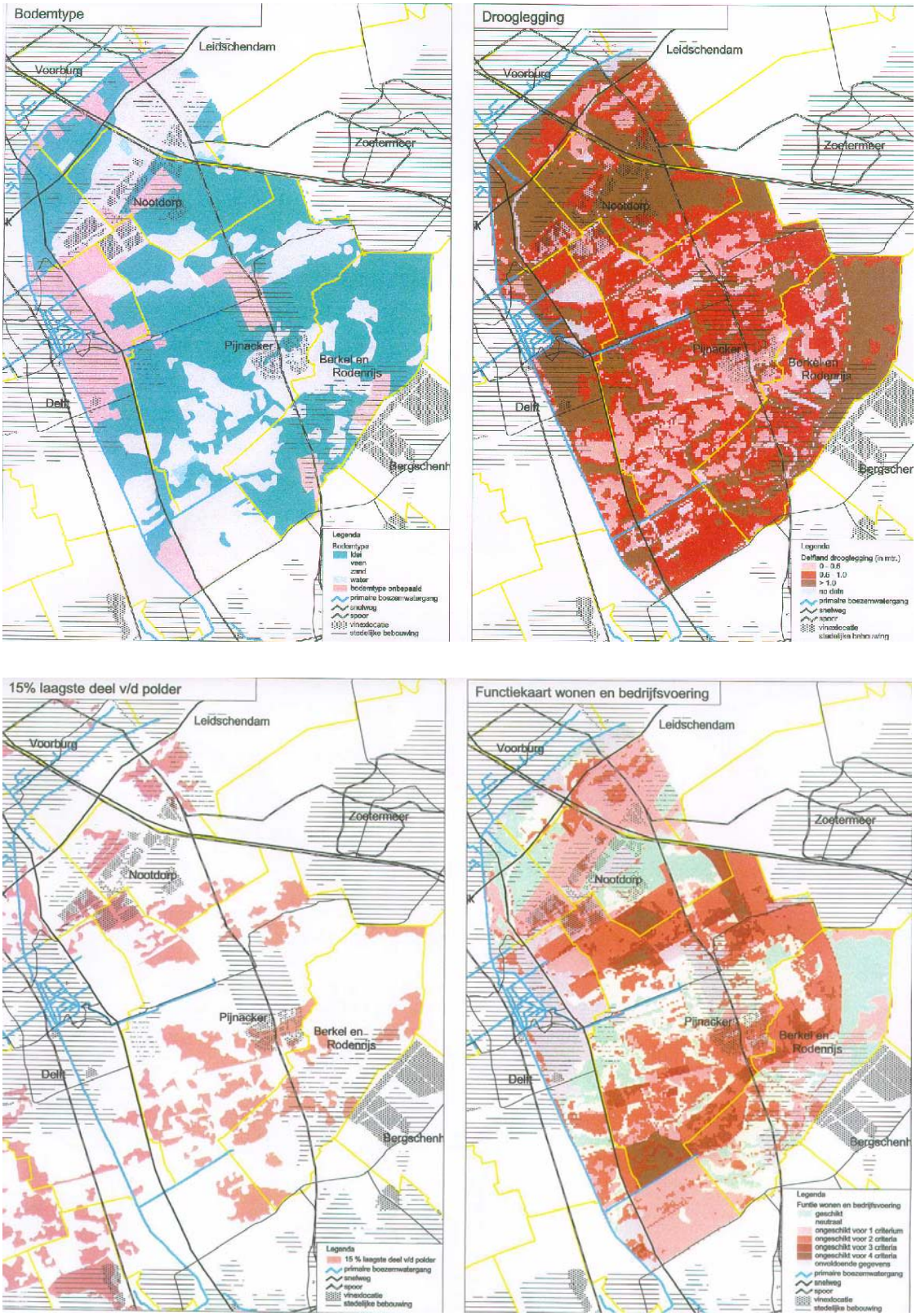


Figure 6-12. Concept suitability map as prepared by LWT (lower right map), and three 'base maps' that make up criteria for suitability; respectively on 'soil type' (upper left) 'level of reclamation' (upper right) and '15% lowest area of a polder' (lower left). There are 4 criteria for suitability; the base map showing nature areas is left out from this picture. The darker the red colour in the concept suitability map, the more unsuitable the area; relative to 1 till 4 criteria. See colour figure in Appendix 5.

In one of the Suitability Map versions, LWT has made a map print of the whole territory of Delfland, not just of the pilot area Oostland. As all base data for the suitability map was available in the GIS database, this is a concept Suitability Map for Delfland as a whole. The project members are shocked about the result. The nature reservation area Midden Delfland remarkably 'speaks out' from this map with having a green colour. This indicates that the whole nature area is suitable for urbanization. A project member formulates the dissatisfaction felt that this map is counter-intuitive:

> "It looks like Delfland gives the signal to go ahead and develop these areas for urban purposes. I am sure that that is not our recommendations to planners. Such an advise would do bad to our reputation."

The consultant defends his position that this 'is what comes out of the analysis'. The project group then comes to the conclusion that the system of criteria and assessment should be adapted. A new debate follows: is it acceptable to 'shape' the criteria towards a result that is 'intuitively' desired? Does the spatial land use function of nature make an area unsuitable to develop from a water perspective? A separate criterion for unsuitable, due to 'area is reserved as nature', is introduced.

In this period, the WOM of a neighbouring water board (Schieland) becomes available. Two project members of Delfland highly appreciate this document and the maps in it. They notice how the WOM image of Schieland explicitly formulates the reasons why an area is less suitable on their maps, and use this map as example how the cartographic 'logic' of the suitability map of Delfland should be constructed (see Figure 6-13).

After the consultant of LWT has produced various concept versions of the Water Wish Map and the suitability map when each time the project members were dissatisfied with the cartographic logic and visual appearance of the maps, a new consultant, BNG, is hired in March 2002. This consultant is asked to work towards an end result in a condense period of time, based on the data produced so far (there is a negotiation on intellectual property and use of data with consultant LWT).

While the first consultant of LWT attributed much value to the collection of soil type-data from map layers coming from the GIS-archives of the water board, in the opinion of the second consultant of BNG this data is of limited value. According to this consultant, being a landscape architect with knowledge of this area, the soil layers of peat in this region are on various places that thin, that they could hardly be called 'peat' as soil type. Furthermore, the soil types are so mixed on relatively small distances that it is not valid to interpolate soil types in between measurement locations, according to BNG ("If you drill here [pointing at a map], you will find another soil type as dominant than when you drill 50 meters further away").

The BNG consultant finds a future vision for the region more important as input for the suitability map; because this map will preserve space for calamity polders, preservation lakes and areas with high water quality, which then should be safeguarded of the competing land use of urban development. In their opinion, such a future vision on the region should come from the water board instead of following an facilitating the spatial planning developments as they are foreseen by spatial planners

of the region: “Delfland, if they do not watch out, becomes the service ‘sewage and drainage’ instead of remaining a full water board authority. Because, if the urban developments proceed in the speed they have done, then all the rural area in this region will be transformed in concrete, asphalt or glass.”

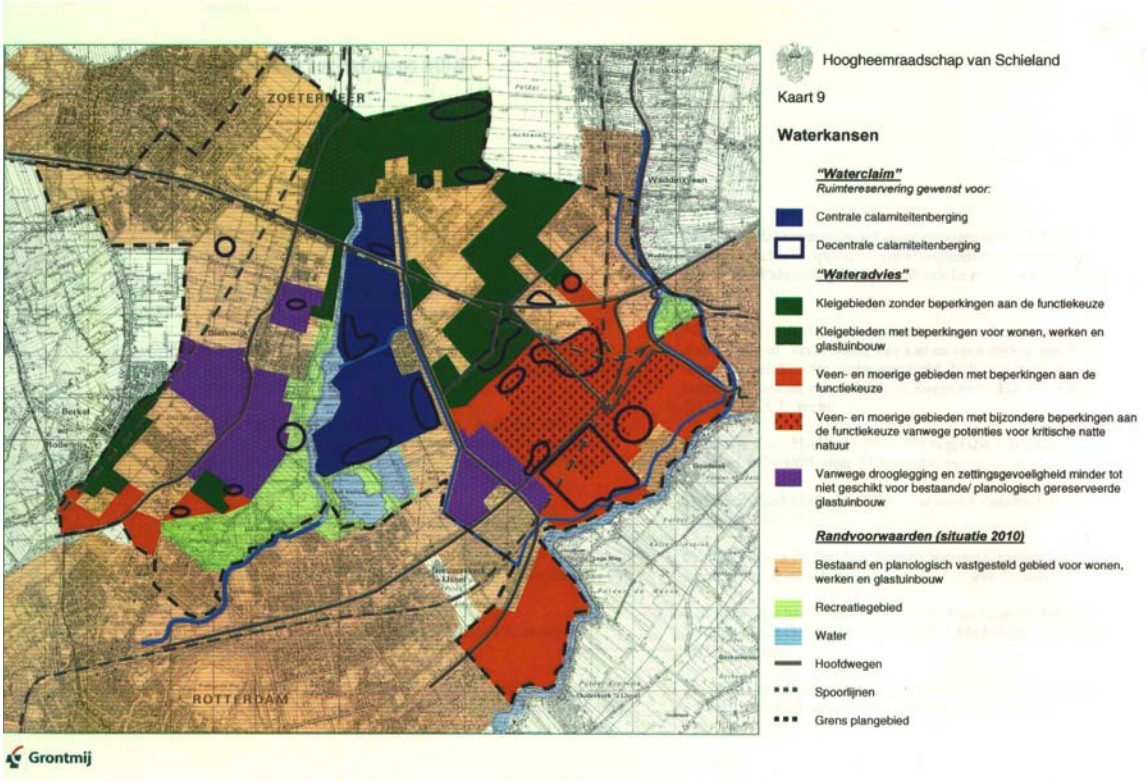


Figure 6-13. Map of neighbouring water board Schieland, with claims for water storage areas combined with advice on suitability of lands for (urban) development (the green orange and purple legend items). Notice how the legend items are formulated in long sentences; in these formulations, the arguments for suitability are incorporated. See colour figure in Appendix 5.

Layout of the final suitability map image

In the final summary document, the layout of the map is altered by the second consultant on the basis of earlier versions of the first consultant. While the first consultant uses red in various saturation degrees to differentiate between levels of suitability (see Figure .....), the second consultant uses different graphic variables to distinguish between levels of suitability reasons for the determination of suitability. As explanatory graphic variables, a mixture of textures and colours are used: red contours and filled red areas, purple areas, white semi-transparent spots (overlaid over a purple or green background), blue contours-with-striped-texture areas, and green areas:

- The green colour obviously stands for areas that are ‘suitable’ for urban development.
- Red colour stands for areas where the water board wants to reserve space for calamity polders. Filled red spots are already designated as calamity polders, areas

surrounded by a red contour line are appointed search areas, in focus of further study of the water board concerning climate change measures. These areas are assessed by the water board as unsuitable for urban development.

- Purple spots are areas with a peat soil, or areas where the level of reclamation is limited –this is the height between the ground level and the ground water level, as it is maintained by the system of polders, bosom and pump system. These areas are assessed as an "area of special attention". During the process, the difference between the landscape characteristic of peat soil or limited level of reclamation was found to be irrelevant, therefore the two criteria are merged into one.
- Overlaid over either green or purple areas are the white semi-transparent spots: these are relatively small areas, because they are defined as the "15% lowest part of the polder", after the example of the suitability map of Schieland. This is a relative measure: of each polder, the 15% surface with a lowest ground level is selected. This criterion is of relevance because in each polder, rainwater will automatically 'sink' into these local points within a polder, before the water is 'drawn' towards the first pump of the polder system. Thus, no 'steering' of the water on this scale is exercised by the water board in this phase of rainwater processing. The lowest parts of a polder are most vulnerable to flooding and damage caused by high water levels in wet seasons. The semi-transparent white spots are assessed as 'unsuitable' for urban development. Note that an overlay of this legend item over red spots is not necessary, because 'red areas' are already appointed as unsuitable for urban developments due to their status as calamity polder.
- Of different colour and texture are the areas that are called "areas of attention with regards to water quality". This area is marked with blue texture stripes and a blue contour line. Relative to the red contour, this legend item is more 'present' on the map because of the added texture stripes. These are added because of two reasons: 1) part of the project team found that water quality and ecology should be emphasized on the maps because of their intrinsic importance and because they want to stimulate attention for these issues (and thus have it literally placed on the map), and 2) the blue areas are much bigger than the red contours, which are of mediate-size and of a 'logical' shape such as a square or rectangle shape. This while the blue contour line is capricious, surrounding a long-stretched volume with an irregular shape that is at times very narrow and at other places wide. To conclude, this criterion about water quality has evolved from the added criterion 'area is reserved as nature'. The possibility to achieve a good water quality is apparent at the appointed locations on the map because of nature development investments (project Green-blue Belt).

Round 6

The suitability map is, in contrast to the expectations of the project team members, received without a sense of confrontation by the spatial planner- civil servants of municipalities and province in the workshop with the primary stakeholders. The stakeholders express they are happy with a clear advice from the side of the water board.

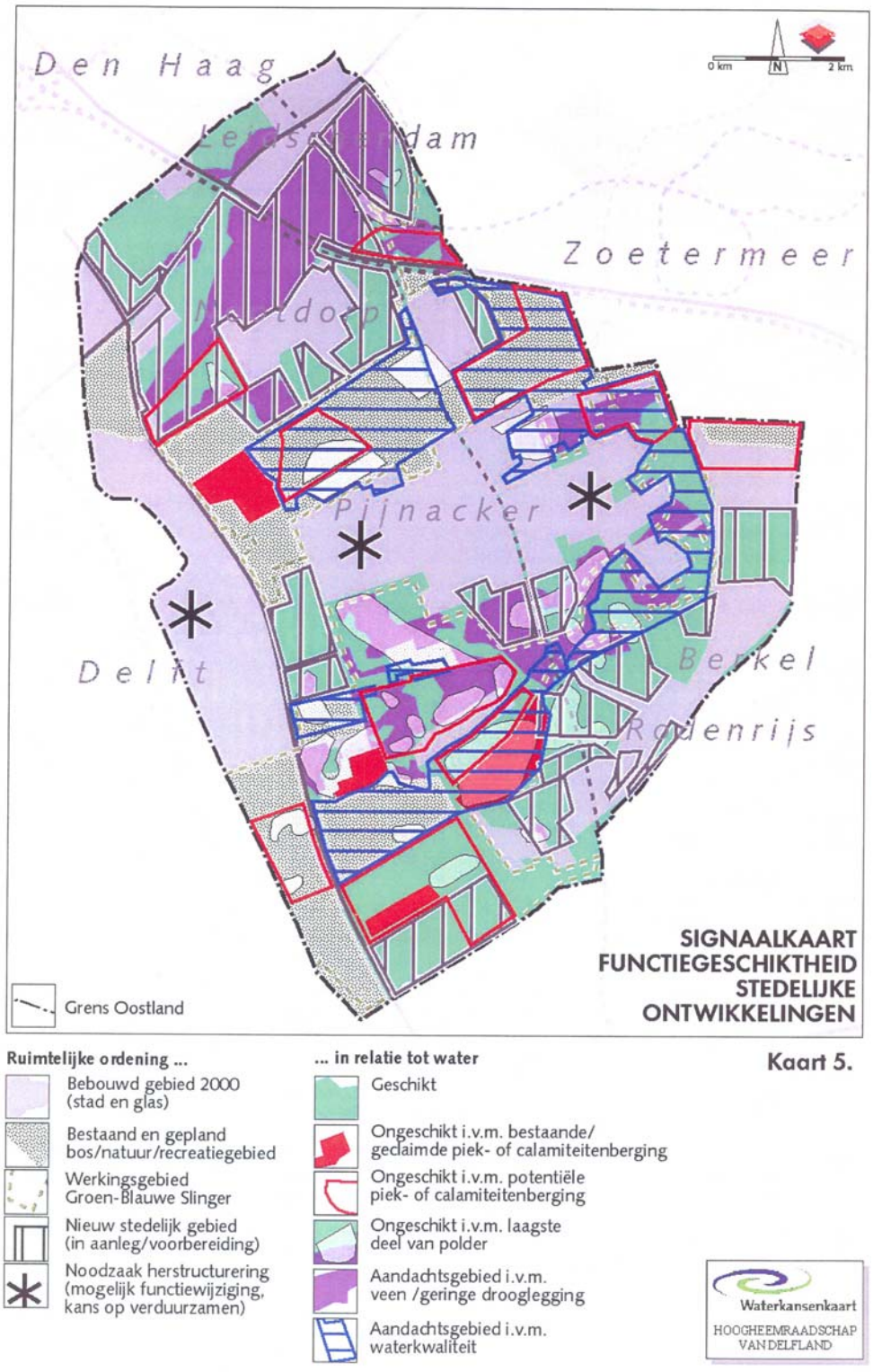


Figure 6-14. Final suitability map of consultant BNG, with explanatory legend items. See colour figure in Appendix 5.

6.4.3 Analysis: Sham certainty?

Context

In the beginning of the project, the ambition is formulated to make a suitability map. But as the other part of the WOM, namely the Water Wish Map, is getting all attention in the first stages of the process, the suitability map is pushed to the background. When the bilateral meetings are being prepared, the suitability map comes back as a topic of discussion on the project teams agenda. Meanwhile, the project team has learned and faced much difficulties in preparing the thematic maps for the Water Wish Maps, and have become more hesitant about taking up new challenges.

However, the steering group has directed to carry on with the idea of a suitability advice, and to reflect later on the concept results. In a 'backup' option, the suitability map could be left out of the official final document, while the concept version could remain useful inside the water board as internal information. This decision is acceptable for all project members.

Interaction

While much attention went to the formulation of elements for the Water Wish Maps, the formulation of criteria for the suitability map went rather unnoticed in rounds 1 till 4. More important was the discussion if the map should be incorporated in the product of the WOM document after all. But when the first concept suitability map was released in round 5, a lot of discussion starts, both over the logic of the criteria, the resulting overall assessment and on the appearance of the map. Some questions were asked about the underlying data, but on this matter the discussions were quickly settled.

Discussion focused upon the substantive result and to its graphical appearance. According to the map maker of LWT these two issues should be treated separately, but the project group did not agree with him. For instance, the system of overlaying multiple criteria and according to the sum of criteria applying a light or darker red colour, is the provision of 'sham certainty' in the perspective of project team members. This is not only a matter of cartographic layout, but it represents a misleading interpretation of the underlying substantive information. As the succeeding versions with substantive and graphic adaptations were not getting closer to the level of acceptance for the project group, the trust in the capacity of LWT decreased.

Map

The map image has known many versions and different outlooks. The layout of colours and textures in the latest version (Figure 6-14), as opposed to the original (Figure 6-12), explains explicitly the reasons why an area is considered as suitable or not. (See the legend in Figure 6-14, after the abbreviation "i.v.m." which means "in relation to").

The use of colours in the latest version is somewhat confusing: the semi-transparent white spots, which are classified as 'unsuitable', do not perceive to be unsuitable for the casual map reader by its neutral white colour. On the latest version the colours red, purple, purple-white and even green-white all stand for a classification of less or unsuitability. This while the first map shows different gradients in the red colour, from light till dark red, which immediately give the map-reader a 'look-and-feel' idea for what areas are not suitable, associated with the colours of a traffic light (green: go ahead, red: stop). However, the first map does give a biased view by the stapling of criteria. It implies that the more criteria are assessed negatively, the more unsuitable an area becomes. This is not the case; the use of colours introduces more accuracy than is embedded in the data, as the suitability of various criteria are not explicitly added up and given a 'total judgment' that relies upon the sum of individual criteria. The first map thus introduces a sham accuracy. In the second map, the priority choices are made explicit in the legend, differentiating between 'unsuitable' and 'area of attention'.

Functionality

The layout of colours and textures in the latest version (Figure 6-14) is more functional than the original (Figure 6-12) for informing to spatial planners the reasons why an area is considered as suitable or not, and more valid than the original because of the sham certainty as discussed above. On the other hand, we have doubts about the cartographic appearance of the final map image because of the use of colours that do not associate well with unsuitability or a gradual scale (ordinal scale) of suitability. This accounts in particular the semi-transparent white spots. Also the texture of the blue legend item 'area of attention with regards to water quality' is limiting the overview over the various criteria and the territory as a whole. But if one reads the map as a 'look up table', that is reading the legend item first and then tracing this information per legend item on the map, the map works; all information is on it.

Although we can distinguish different perspectives, we have not really found difference of opinion in the valuation of the map images besides the consultant of LWT. (Who argued for a strict separation between content and cartographic layout). In the analysis, we have excluded the perspective of the consultant of LWT as his work was taken over by another consultant in the project before the making of the map was finished.

In all perspectives, the map was eventually functional as planned. Although some parts would have been worked out slightly differently according to the various project team members, in the end the map is a product in which the various perspectives have been involved and have left their traces. For every perspective we conclude that the map has functioned mostly 'as planned'.

Perspective #S1 (voiced mostly by the hydrologist of the water board)

1. The suitability map should not anticipate on future spatial developments; the assessment of suitability should be based on the current state of land use. Otherwise, vision is mixed up with analysis. The suitability map should only be part of the WOM

if it can be backed up by unambiguous data and thorough analysis. The map image is a strategic map that need not necessarily be distributed to other stakeholders. It could remain an internal document, if the criteria for suitable or unsuitable areas cannot be made 'hard' enough. Then, the water board can do further research on individual project once these are proposed by spatial planners. The map would then serve as internal 'alert tool' or screening instrument; proposals for urban development that fall within areas marked as suitable can be advised positively upon, while proposals that are within unsuitable regions need more research and anticipative actions from the water board. These anticipative actions would then include a possible negative advice, appointing on the consequences for the water system, and demanding extra measures on behalf of the water system to be incorporated in the particular development project. In this perspective, the role of the map is to serve as *objective advice (external) and 'alerting and screening tool' (internal)* .

Perspective #S2 (voiced mostly by the project leader)

2. The WOM project is supposed to be an open, participative process. The communicative aspect is more important than the substantive part. For an open communication, the assessment of the water board on suitability of areas for urban development is relevant information for spatial planners. As Delfland wants to be involved in earlier phases of planning processes (and not be invited for the technical implementation once the spatial plan is already worked out in detail) this anticipative advice should be provided by the water board; so that a dialogue with spatial planners on suitability of locations is started. As the vision of the future water system of Delfland is relevant for a sustainable water system in the future, the WWM should count as input for the suitability map. While the suitability map is based on analysis as much as possible, it should be designed as to encompass a future oriented perspective. The map serves particularly for *collaboration, to make water management considerations transparent.*

Perspective #S3 (Interim project manager and spatial planning expert of the water board)

3. The water board would make itself untrustworthy if it would suddenly advice negatively on all sorts of areas where urban development is already certain, and where Delfland has never advised to stop the planning process. Delfland should look pragmatically at the various planned urban developments, as to decide whether to consider those areas as 'already planned urban area' or whether it is regarded as rural area that should be advised upon. The method of applying criteria which are then 'objectively' assessed is not fruitful. It treats the complexity of the matter with a rigor that looks more justified and objective than it actually can be. There are too much uncertainties due to climate change, lack of data and lack of understanding of the water system on a detailed level. Above this, planned developments such as nature are directly steering the water quantity and water quality, so the process of planning water and planning lands must be seen as rolling timelines ('play leapfrog'). Awareness of and creativity in dealing with these timelines is needed to create an up-to-date, relevant and effective suitability map. The major role of the map is to *influence politics.*

Line of reasoning and frame of reference

In perspective #S1, the Suitability Map should not be subject of negotiation (‘every time negotiations sneak into the map’). The map should the result of objective measurement and objective criteria. Where uncertainties are prevalent, no advice should be given to outsiders.
But in the eyes of the other participants, uncertainties are part of the problem and should be coped with. In their opinion, only proclaiming further research is no solution. The argument to emphasize the consequences if spatial planners want to build in areas that are less suitable, is embraced by the others and taken up on the map.

In perspective #S2, the more transparent Delfland can explicate its concerns why areas should be suitable or not, the more understanding between planners and water managers on each others work can grow, and this offers fruitful ground for combining insights, ideas, problems and solutions. The various criteria for suitability and assessment methods can and should be experimented with. When municipalities would find the resulting advice counter-intuitive, or if they disagree with the resulting advice, a dialogue about it would be started, and this is the essence what the WOM should be about. Thus, transparency and dialogue about the maps with primary stakeholders should not be avoided.

In the perspective #S3, the view of perspective #S2 is regarded as somewhat naïve. If the internal ‘homework’ of the water board would not be done properly before presenting information, this would be bad publicity towards the other stakeholders. A concern is that the development of the suitability map would become subject to a process of wheeling and dealing; stakeholders could try to influence the water board while competing with the others, where each municipality tries to maximize ‘suitable’ lands on own territory. The making of the suitability map in this scenario could become a political process, with the suitability map of Delfland as ‘battleground’. Furthermore, aside from the risks involved in damaging Delfland’s reputation, in this scenario, the risk is that Delfland as water board would make compromises twice instead of once; firstly in making the suitability map, and next in trying to implement its policy. In this perspective, Delfland should keep her end responsibility to produce her own view without prior input or consent of the other stakeholders.

	#	**S1**	**S2**	**S3**
ACTOR-TIME PERSPECTIVE	*Actor*	*Some project team members, voiced mostly by hydrologist*	*Some project team members, voiced mostly by project leader*	*Interim project member and spatial planning expert*
	Time-period	All	All	All
SUBSTANTIAL PERSPECTIVE	*Map valuation*	"functional as planned"	"functional as planned"	"functional as planned"
	Views	- Suitability advice is okay as long as it can be based on sound criteria and objective assessment, backed up by evidence.	- A suitability map image is a good instrument to communicate expert knowledge of the water board to spatial planners	- Map may lead to (functional) sensitivity with municipality, but not to controversy.
LINE OF REASONING	*Values*	- "Delfland, as water expert, should provide objective information, these should not be politicized on beforehand." - Be a reliable, knowledgeable governmental actor. - Uncertainties should be researched in greatest depth when becoming part of decision-making	- "A participative approach will lead to better communication, trust-building and eventually to better quality of land and water policy" - Acting openly and transparently over assessments, uncertainties and tacit knowledge is vital for sustainable policy	- "Map should serve interests of water board, these should not be compromised in the process of making the map" - A water board should do its homework, act constructively and stand for water interests - Map must be of good enough quality to stand out critique
	Intentions with map	- Keep uncertain parts and educated guesses internally as strategic information - Provide those results of analysis to external stakeholders that are undisputable	- Elicit and explicate (tacit) knowledge for deliberation and joint vision-building - Create an advice that anticipates on possible future spatial planning developments	- Act cautious about this sensitive information, first discuss map with befriended municipalities
	(Proposed) action with map	- Proposal to keep map as internal document. Hesitant, but accepting the decision to make map public	- Discuss map with primary stakeholders, satisfied with decision to proceed and keep map part of WOM	- Hesitant about including map in WOM, but proceeding process of map making and deliberation with stakeholders
FRAME OF REFERENCE	*Characteristic terms*	*Evidence, depth, objective, internal/external strategy*	*Openness, participative approach, tacit knowledge, transparency, joint vision-building*	*Interests, compromise, stand out critique, strategy with befriended stakeholders*
	Dominant function of the map	**'Map making for internal alerting and screening and external objective advice'**	**'Map making for collaboration and transparency'**	**'Map making for influencing politics'**

Table 6-4. Argumentation line and frame of reference behind perspective on suitability map

6.4.4 Conclusions: "Every time negotiations sneak into the map"

Functions
The functions of the map clearly divert according to what perspective towards the maps considered. We enumerate these map functions, or purposes of actors with the maps, as follows:

- Use the suitability map as instrument for a (new) internal formal procedure of alerting and screening new spatial plans of others
- Distinct uncertain from 'objective' knowledge on suitability and present the latter as advise to stakeholders
- Use the map to strengthen collaboration with stakeholders on joint land-water policy
- Use map to provide transparency in water management considerations: offer insight in 'design-guidelines' that Delfland would attribute on formulating advice about individual planning decisions
- Use map to influence spatial planning decisions: both through formal canals, requesting for 'claims' with spatial planners, and through informal channels, namely by constructing a dialogue and building a relation with planners

In the last row of Table 6-4, these various roles are summarized in short, for each perspective. However, these differences in perceived role of the map per perspective did not co-occur with a varying valuation of the resulting map. Apparently, the resulting map somehow came to incorporate the different functions that actors intended with it well enough. We interpret this as a case where various frames are successfully intertwined into a coherent whole.

System of criteria and assessment
Emphasis was put on an explication of why areas were assessed as less or un-suitable. The reasons were incorporated in the maps legend. This marks an important difference with the earlier version. In that map, criteria were only numbered 1 till 4. The project members were alert in their objection against the way of visualizing levels of unsuitability according to numbers of criteria.

When the intermediate map about the whole territory of the water board gave a counter-intuitive result, the criteria and method of assessment were reconsidered. Point of surprise was the nature reservation "Midden Delfland" being marked suitable for urban development, standing as eye-catcher on the map with a distinct colour. The project members felt uncomfortable because they wondered to what extend they were applying "how to lie with statistics" or in this case "how to lie with maps" by adapting criteria until a desired outcome is achieved.

In our view, this reflective question is certainly marking the slippery slope of defining an assessment framework. But by explicating the reasons why each criterion is leading to a decreased level of suitability, the water board certainly remains on the 'white' side of manipulating the figure. In this case, the shaping and reflecting on the assessment criteria and its result indicates an iterative process of modelling and learning.

Cartography

The cartography of the Suitability Map and final WOM image have been a source for headache. For the project members, the choice of legend items and cartographic variables is an essential part of the process. This while for the consultant of LWT, it was a matter of selecting data layers in a GIS and manipulating the properties for these data layers a little (colours, texture, line thickness), for as far as the cartographic options of the GIS would allow.

In the final result, produced by consultant BNG, the criteria are satisficingly combined into one picture, each criterion visualized as separate legend item. Cartographic options such as line texture and semi-transparency are exploited to overlay all information and still get a readable, plausible map. In our interpretation, the final Suitability Map makes a compromise in offering overview, simplicity. In our view, certainly the thick line texture of the blue legend item should have been replaced by another less-disturbing cartographic variable in order to facilitate image-wide overview for the map-reader (thinner lines; or an 'emptier' texture pattern, for instance with small dots; or a semi-transparent blue colour).

That said, the final image does represent the idea of the water board with a set of well-framed criteria and a well-thought method of assessment, that is, which criteria go before others. The use of various colours distinguishes clearly for which aspects an area is less suitable. The map also shows, that some urban developments have already been planned on places that are not really regarded as suitable. This message is underscored by the water board, and eventually it has been decided not to keep this insight-in-hindsight hidden from the map.

6.5 Other maps

Besides the maps that have been analyzed in detail in the previous sections, there were still several other map images that played a role in the map making and map use process of the WOM project. First of all, the map of Future Spatial Developments that has been described in chapter 5 as part of the method of the WOM, has not been described. In the process, this map has not got much attention. We have chosen to work out the circulation sketches in depth, as that was part of the vision-building process and as such more central in the WOM project. Nevertheless, the map of future spatial developments is briefly discussed underneath. Another and last map that is being discusses, is a map that describes the current water system in Oostland. This anecdote was remarkable in our opinion on the aspect of cartographic choices in map construction.

6.5.1 Map of Future Spatial Developments: "So they'll know we are informed"

Approach for developing the map of Future Spatial Developments
Next to the thematic maps on water management, Delfland also decides to make a map with a collection of possible *future spatial developments,* from the side of spatial planners. The collaborative process of the WOM offers a new platform for informing (both informally and formal) to possible new spatial plans that are yet within the minds of spatial planners, but not yet officially ratified. Delfland also plans to make a map of these preliminary plans and ideas for future spatial developments, because the region of Delfland is one of the quickest changing regions in the Netherlands. In twenty years, the landscape will have changed considerably (among others: large development sites of housing; new roads; transformation of agricultural land into recreational and nature areas; etc). Consequently, in order to make a good long-term policy on the water system and how it fits into the spatial landscape, also the landscape dynamics should be overseen.

Therefore, Delfland asks municipalities to provide information about future spatial developments in the first workshops. But at this event some municipalities gave huge amounts of reports, with the words 'it is in here'. Because the project team did not think it was efficient to go through these thick documents, they put forward their own 'blanc maps' in the succeeding bilateral meetings and asked civil servants of municipalities to talk about their ideas and plans in the region. All collected information is combined as an information layer (with the different marked areas) in the GIS. LWT processed the data into various data layers. However, the project group did not think highly of the result: 'no future estimation speaks from this map'. Their idea was to make future scenarios based on the collected data, not just stapling collected data into GIS-overlays. Apparently, the project group has another idea of a visionary map than the consultant of LWT.

As it was decided halfway the project not to use this map as input for the suitability map, because that map would be based on current spatial situation rather than future foreseen land use changes, this map became a rather isolated part of the WOM document. Voices were raised to leave it as an internal document. However, it is decided to proceed because the political representative of the water board deemed the information important for the water board. The assignment is handed over to the new consultant BNG. This consultant is familiar with the area and with spatial plans in the area. He has made an additional analysis of planned future infrastructure projects. On the basis of own and the existing collected information of currently planned urban extensions, a new scenario map is drawn where urban developments could likely be expected in the future.

In this map, all areas that could possibly be candidate for urban development in the future are marked in red. (This comprehends all probable locations, but the total may thus exceed the real envisioned locations, because a choice for one location in reality might 'dismiss' another candidate location). See Figure 6-15.

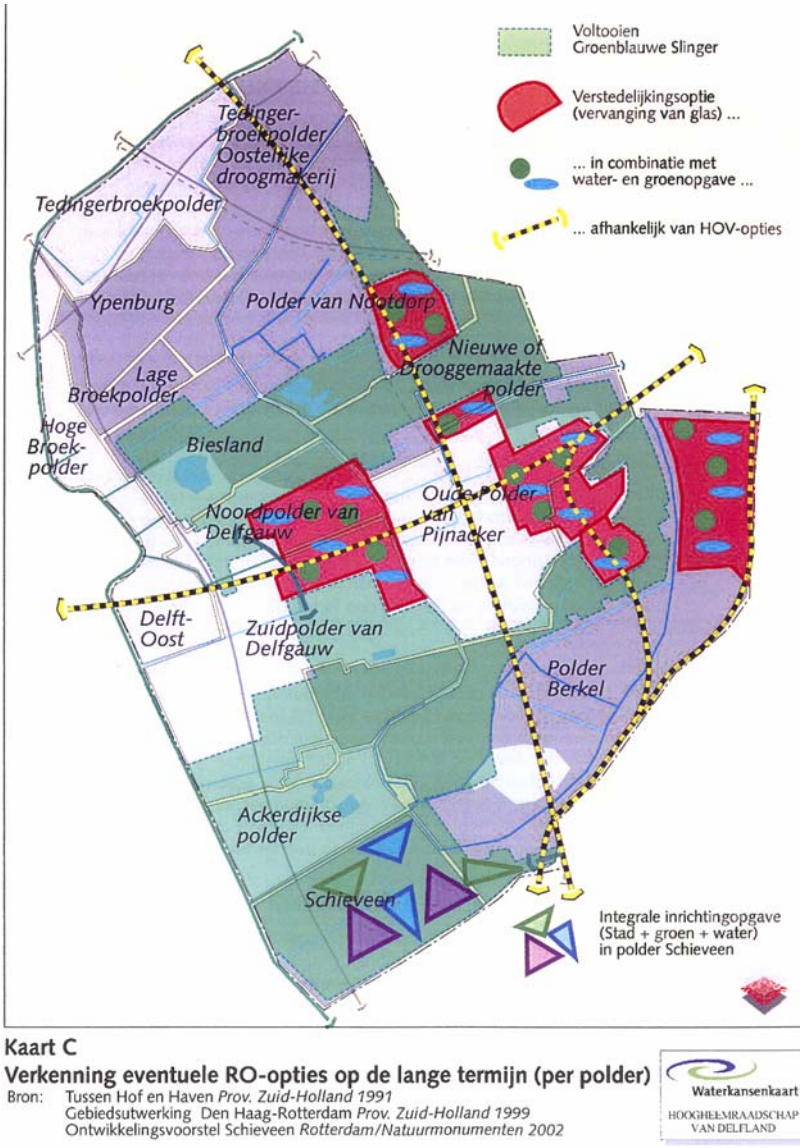


Figure 6-15. Map of Future Spatial Developments, final version. See colour figure in Appendix 5.

Life of the map in the discourse:
Participants of the municipalities that come to see the concept results on June 6th in 2002, have the most doubts with this map. One civil servant of a municipality:

> "This map can form a potential 'little bomb' with our political representatives. They might appreciate the other map images, but if our political representative sees this map, the red spots may work as a red lap on a bull."

Not all stakeholders see this map as sensitive as suggested. But multiple municipalities do agree that with this map, the water board comes very close to the work and responsibility of the municipalities. Something that might be (seen as) complicating.

Members of the project group accordingly suggested to keep this map as internal document of the water board. After all, the primary stakeholders would not need to be

informed of these plans, which they had prepared themselves. In a later steering group meeting, these reactions are discussed. Nevertheless, the water board decides to keep this information in the WOM document. In an interview, the responsible political representative declared: “We want to inform them that we are informed.” She explains that the water board wants to be invited to planning meetings about these locations in the early stages of the development project. For that to happen, the water board will need to find a way to get informed on the start of such projects and get a ‘feet between the door’.

Analysis
The role of the map shifts from the objective to get informed, as water board, towards the role to
“inform them that we are informed”. The map is regarded as potentially controversially for political representatives of municipalities. The reason is twofold:

1. The water board seems to ‘go and sit on the chair of the spatial planner’
2. The go or no-go decisions of these development project are taken in a delicate strategic game between local governments, regional governments and private parties, which is per definition sensitive and geopolitical, with large and competing interests at stake. This process is therefore not very open.

In this case, we do not need to analyze (multiple) frames in order to explain a potential controversy. The explanation of competing interests and geopolitical game is explanatory enough. It seems that a map on this subject –in this region– will always be sensitive for conflict and controversy.

6.5.2 Maps describing the water system: One assignment, two very different maps

Description
A part that was yet to be filled in the final WOM document at the end of the project, was a map that would explain the main characteristics of the water system in this area. The municipalities had requested this in the second exploratory meeting in June 2000. By coincidence, the assignment to produce such an overview map was set out to both an engineering firm (the first consultant) and a landscape designer (the second consultant). The assignment was to make a map ‘that explains the water system in a nutshell to spatial planners’. Figure 6-16 shows the two resulting images.

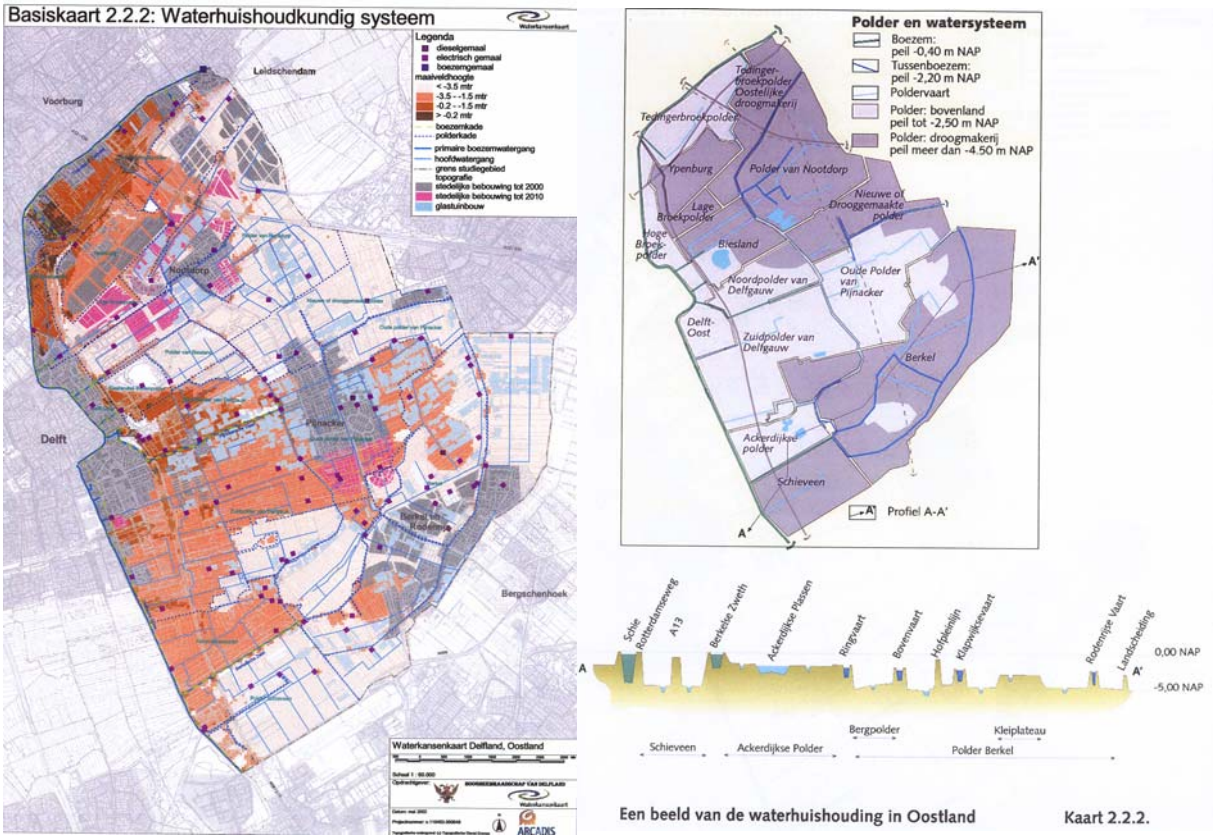


Figure 6-16. Explanatory map of the water system made by two different consultants. Left: map result from the GIS database. Right: map result drawn by landscape designer.

Analysis

The difference between both images is striking. The engineering firm used huge amounts of data stored in a (GIS-)database (left image), the landscape designers created a map by drawing the lines themselves (right image). On the left image, overlaying several layers of the GIS-database makes the map image. Every pump station is apparent on the map. The map has a high level of detail. However, the right picture tells us more about the coherence and relations of the water system: the canals are drawn with different thickness to differentiate in importance; the 'high' areas and 'low' polder land show in gray and white; and an extra vertical intersection is added underneath the map image, as to explain the regional height differences and the polder-and-canal system.

Role of the map: One purpose, two different messages

The assignment was exactly the same, but the starting point from which the map maker reasoned and gathered their data brought them to completely different maps. The first map shows accurate and detailed information if you need the location of pumps, small waterways etc. Also the built-up area of towns and villages are

represented (grey). With its title, long legend, and referral (in Dutch: 'renvooi') in the lower-right, the map looks official.

The second map does not provide information where all the pump stations are located. Instead, the major parts of the water system are emphasized: bosom (green), lakes and canals (blue), and low and high polder lands (white and grey). Added is a cross section that emphasizes and provides height information in order to understand the relative position of different polders (with its geographic reference indicated on the map above, like in details of a construction drawing)
Especially with this added crosscut, the internal working of the water system is more coherently visually explained. The repetition of polder names and colours (green, blue) in the map and cross-cut strengthen the fit between crosscut and map. According to the theory of Tufte (1990, 2001) on graphic information design and visual explanations, this second map would do a good job in 'telling a story'. This map looks rather professional.

What is most remarking about these two maps, in our view, is how the left map shows a complex picture. It seems like this map is produced for experts who know how to interpret the data. This while the assignment was to explain the water system to planners, 'in a nutshell'. The right map shows a simpler picture, with water flowing to a limited number of (main) canals back to the bosom. For a lay-person, the map (or better formulated: the water system) can be understood if carefully 'reading' through the visual explanation. We leave it to the reader to make an overall value judgment about the visual explanatory capacity of each map.

6.6 Cross analysis and discussion

6.6.1 Screening, abstraction and interpretation

From the three analyses of the circulation sketches, the Water Wish Map and the Suitability map, we have in total sketched ten different perspectives, each with its own 'local' view of the used maps. I use here the term local to emphasize that the maps are valued in a particular situated setting, appointing to the relation to a person and a time-span for each perspective.

These ten perspectives, together with the observations of the process, actors and maps, have been subject of cross-analysis in order to analyze and aggregate the correspondences and differences between the various (in itself unique) frames of reference. The frames are screened and clustered from a policy analysis/communication point of view, focused on an understanding of the dynamics with the maps. They are coded:

- C1 till C4 for the perspectives on the Circulation sketches
- W1 till W3 for the perspectives on the Water Wish Map
- S1 till S3 for the perspectives on the Suitability Map

A limited number of archetypical frames is distilled through a process of orientation, screening, abstraction and interpretation that we associate with the method of 'backward triangulation' from surveying, but here applied in a qualitative way on a social topic (see section 4.6.2). The perspectives are compared on their rationality; the line of reasoning between opinions and values, with their focus and scope. These are summarized in Table 6-2, Table 6-3 and Table 6-4.

The following criteria were applied on the screening;

1. Resemblance, binding aspects between frames of the different clusters C, W and S.
2. Differentiation, contrasting aspects between the frames within one cluster

Intermediate results of this iterative analysis are reflected on:

- Coherence of the constructed conceptual models representing an archetypical frame
- Explanatory power of the conceptual models for the different valuations of the map and the emergence of conflict or consensus

The result of the abstraction and interpretation is made up by three archetypical frames. The labels that have been chosen for these frames are analysis, design, and negotiation:

- An 'analysis frame' that primarily perceives maps as a *scientific model*. The vocabulary and way of thinking is along lines of 'normal science' with use of standardized classifications and rigorous measurements.
- A 'design frame' where maps are conceived as *construct of art*, where craftsmen use the map as a graphic language to express their ways of seeing and designing reality, using a trained eye to look creatively at options and landscape patterns.
- A 'negotiation frame' where maps are viewed as *strategic representations*; as metaphors and as political artefact. Being an instrument in decision-making, maps are subject of influence exercised by one or multiple parties. Like formulations of proposed laws and concept decisions (of which some are determined by means of a map), a map is considered an artefact of consolidation of decisions made –or policy agenda of choices to be made.

Table 6-5 summarizes the result of the interpretation process into the three archetypical frames. Each of these frames represents another 'atomair' belief system that is in itself coherent. When also allowing for pair-wise combinations of these idealized (model) frames, six mixed frames of reference are covered:

- analysis
- design
- negotiation
- analysis-design
- design-negotiation
- analysis-negotiation

With these three frames and their mutual combinations, we can explain the different valuations of the maps (see Table 6-5). (This does not work the other way around; a

same valuation of the map does not necessarily come from the same frame, as can be seen at the suitability map). The next subsection describes these frames in detail and argues how the frames work explanatory for the dynamics in map use.

	Perspective and its view on the function of the map	**Valuation**	**Vocabulary**	***Frame***
	Circulation sketches (C)			
1.	# C1. 'Map use for value exploration and design'	Functional as planned	Ideas, explore, communicate, values, learn, design	*Design*
2.	# C2. 'Map use for analysis and m measurement'	Non-effective	Norms, measurement, analysis, research	*Analysis*
3.	# C3. 'Map use for reflection and feedback'	Emergent functional	Check, feedback, reflection, compare, 'out of sight'	*Design and analysis*
4.	# C4. 'Map use for explaining message'	Emergent functional	Arguments, claims, message, values, core belief	*Negotiation*
	Water Wish Map (W)			
5.	# W1. 'Map making for mediation'	Functional as planned	Collaboration, creativity, shared, design, ideas, future opportunities, deliberative	*Design and negotiation*
6.	# W2. 'Map making for advocacy'	Dys-functional	Responsibility, procedures, claim, 'hard' facts, norms, analysis, preserve, strategic	*Negotiation and analysis*
7.	# W3. 'Map making for mediation'	Emergent functional	Collaboration, creativity, shared, design, ideas, future opportunities, deliberative	*Design and negotiation*
	Suitability Map (S)			
8.	# S1. 'Map making for internal alerting and screening and external objective advice'	Functional as planned	Evidence, depth, objective, internal/external strategy	*Analysis*
9.	# S2. 'Map making for collaboration and transparency on land-water policy'	Functional as planned	Openness, participative approach, tacit knowledge, joint vision-building	*Design and analysis*
10.	# S3. 'Map making for influencing politics'	Functional as planned	Interests, compromise, stand out critique, strategy with befriended stakeholders	*Negotiation*

Table 6-5. Overview of perspectives with their associated archetypical frames

6.6.2 Three frames and their logic: analysis, design and negotiation

The names of the frames reflect what we found as essential difference in the three frames. Aspects like vision-building, participative policymaking, communicating with stakeholders, learning, were words that were agreed upon by everyone involved. Therefore, these terms have been left out from the title of each frame. Beneath, the three frames are explained.

Analysis frame
This frame reasons from a 'classic' view on rationality. Knowledge must be backed up by scrutiny and tested evidence: 'to measure is to know'. It is characterized by large amounts of data that need to be collected, monitored, and mapped, before decisions can be made. But what data need to be collected is assumed to be 'given'; they sprout from scientific knowledge and expert insight. This approach is closely related to the widespread use of Geographic Information Systems (GIS). GIS allows the users to perform spatial analyses 'on the fly'. On-screen, 'dynamics maps' can be shown, with endless variation in visualizations of the large spatial data-set. Aggregation and validity are important issues in the building of such geo-databases. The maps are used as an interactive model, but the structure of the map must be logical; each spot on the map should be properly defined and clearly bounded. The essence of the map-making/map use process is seen primarily as a process for research and assessment.

Design frame
This frame reasons from 'softer' premises such as creativity, 'beauty' and intuition. The frame is related to the craft of urban design and landscape architecture. These professionals use maps to consolidate and express their thoughts. They design their ideas by drawing. Maps are used to present and express all kinds of ideas, variants and possibilities. The author designs something new in space, which did not exist before. Direct observations of landscapes and experience in the art of designing serve as base techniques in the search for patterns. A concept is being composed from a select number of choices, which may or may not meet given requirements (a next step is either to adapt the concept or to adapt the requirements). Maps are used as a visual language and the essence of the map-making/map use process is seen primarily as a process for creating and presenting options and alternatives.

Negotiation frame
This frame is based on political reasoning. It differs from the analytical frame as Stone (1988) differentiates analytic rationality from political reasoning. Maps are political devices in discourses of decision-making; they communicate ideas and perceptions, and advocate opinions. Maps are also used as instruments to communicate and consolidate decisions and agreements on space. As such, a map reflects a political agenda and is perceived and reviewed from this negotiation point of view. The essence of the map-making/map use process is seen primarily as a process of geopolitical deliberation, strategic behaviour and social negotiation.

Comparison of frames

Most interesting for our study are the comparisons between these different frames. We have structured the differences between the frames according to our conceptual framework. The overview of this comparison between the frames is presented in Table 6-6. The columns present the three frames, in particular their mutual differences. Horizontally the table is split up in the three parts that make up our conceptual framework: Interpretation of the policy process, map use, and the map itself.

Regarding the policy process, the frames differ in the urge that is felt, the focus on problematic aspect of the process, and the perceived limitations within which the use of maps (has to) take place. On the use of the map, four roles of maps are formulated that are most dominantly 'in focus'. The last role formulates a summary of how the role of the map is regarded according each frame. With respect to the map image itself, the dominance of a particular frame in the map making process seems to be correlated with the appearance of the map images. This accounts for boundaries, choice of legend items, and cartographic choices of the overall image. Other aspects of the map are not always explicated. For example, the 'message of the map' is not always written on or besides the map, and the perceived message depends on who 'reads' the map. A map-reader with an analysis frame may 'get' a different message than a map-reader with a negotiation frame. For this last part of Table 6-6, the maps were subjected to a close inspection and the various analyses of their cartography in sections 6.2 till 6.5 were compared.

Actor perspective	**ANALYSIS frame**	**DESIGN frame**	**NEGOTIATION frame**
Interpretation of the policy process			
Urge	• Gain knowledge	• Create new ideas	• Choose
Focus	• Research and assessment	• Creation and presentation of alternatives	• Interaction and arranging trade-off
Perceived limitations	• Bounded by norms, problem scope, available data, scientific uncertainty (in climate change), technologic considerations	• Bounded by conditions, imagination and considerations of 'beauty'	• Institutional constellation and timeframe, limits in water systems capacity to be changed, pragmatic and strategic considerations
Map use => Function of the map			
Visualization -	• Serve as visual interface to the data of the underlying spatial model	• Elicit and explicate patterns in the landscape, generate 'back talk'[8]	• Assist in moving latent arguments[9] towards an explicated policy agenda
Modelling -	• Reassure transparency and validity; consolidate scientific evidence	• Articulate (new) concepts about the landscape	• Serve as supportive medium for sharing or distributing information
Communication	• Clarify (causal) mechanisms in the physical (land-water) system, present consequences	• Express ideas and options; present (land-water) vision being a result of crafts work	• Persuade actors with an argument or story on (land-water) policy measures, presented graphically.
Overall:	• *Map use seen as science*	• *Map use seen as art & craft*	• *Map use seen as politics*
Appearance of the map image			
Overall image	• Specific, detailed information	• Abstract, metaphoric information	• Dedicated, selective information
Legend items	• Rigorously defined categories and sub-classes	• Conspicuous names with ambiguous interpretations	• Few legend items - only those (to be) decided upon
Boundaries	• Sharp boundaries	• Sketchy boundaries	• Boundaries on or off the map[10]

Table 6-6. Resulting overview of how three different frames, each with its own type of rationality, perceive the use of maps in policy debates.

[8] Back talk is described by Schön (1983) as the phenomenon that a design, once explicated as graphic drawing, figuratively starts to 'talk back' to its creator. A halfway designed plan limits the degrees of freedom, and simultaneously offers new insights on the possibilities and problems.
[9] The latent arguments exist of opinions, ideas and knowledge that may yet exist in implicit, tacit form.
[10] Whether the boundaries are deliberatively put on or off the map depends on the negotiation strategy (e.g. an advocative, mediative or strategic strategy).

6.6.3 Dynamics in map use: Emergence of conflict understood as process among frames

With the three frames, we have tried to identify the values that were cause of conflict over the maps other than geopolitical interest-based conflict over land or resources (such as the well-known Not-In-My-Back-Yard-behaviour). We found these frames fundamentally different and clashing on several occasions in making and using the Circulation Sketches, the Water Wish Map and the Suitability Map.

Emergence of conflict
In the use of the *Circulation Sketches*, the participant with the analysis frame held a deviating opinion on the usefulness of the exertion. The making of these abstract sketches from the mind was referred to as 'castles in the sky'. People with the design frame and negotiation frame (related to perspectives C2 and C4) regarded the maps as useful, in conceptualizing and communicating the 'underlying' assumptions and priorities about sustainability of the mayor water flow through the region. In the discussions around the Circulation Sketches, the analysis frame was the 'outlier'.

Perception C3, where a reflection on the maps were made for the purpose of feedback, was identified as being built upon a mix of analysis and design frame. This frame represents a 'middle ground' that is formulated in hindsight. To the arguments of the analysis frame is 'admitted' that the map is not found very effective in really achieving to 'get' at the desired option of the anti-clockwise water circulation. From the design frame point of view is argued that the map had served another purpose, namely to set an ambition for Oostland as a self-sustainable area. In the end, because the Circulation Sketches did not play any official role, the discussion about the quality and status of the map itself was no longer relevant by that time. Thus, the conflict between the people with an analysis frame and a design frame is evaporated.

In the making of the *Water Wish Map*, the opinions aligned up into coalitions. The competing coalitions either attributed an advocative role to the map, or a mediative role. We have conceptualized the advocative role as a combination of the analysis and negotiation frame. People holding an analysis frame or a negotiation-advocative frame agreed with each other. The mediative perspective on the map can be explained as a combination of a design frame and a negotiation-mediation frame.

People holding a frame that is dominantly a negotiation frame were thus flexible. This flexibility fits with our observations in the discussions. In the succeeding meetings where the controversy unfolded, some questions were asked about the (negotiation) strategy of Delfland towards the other stakeholders. With these questions, it was tried to find a consensus on the question to what extend the strategy should be advocative or mediative, to find an answer from their whether the maps should be produced dominantly by 'hard' data and evidence, or by 'softer' innovative ideas and sketching of long term possibilities. For the people with a negotiation frame, it did not matter which approach would be chosen intrinsically. The negotiation strategy with most potential for achieving Delfland's objectives and serving its interests could be followed. This discussion over strategy was raised in parallel of the

concrete (competing) options of water storage basins and the calamity polders that were heavily debated. Thus, it was tried to 'solve' the different views on various levels, both on the substantive, as on the process level. It is in this situation thus not so that the differences in underlying assumptions and values were not discussed. But even though a lot of aspects of the conflict were discussed, an agreement was not reached. The maps did not offer an option for 'reconciliation'. In terms of Van Eeten (1999), a map did not offer a way out of the deadlock. However, after the interim manager had intervened on settling the dispute, the final map image did show a kind of a compromise, where the calamity polders have been overlaid by star symbols. The water storage basins, where the discussion was mostly about, remained on the map, although not with a contour-lined shape by indicative point symbols that suggest a 'search location'.

In the making of the *Suitability Map*, the criteria, assessment method and cartographic layout were points of debate. According to a project member the map should be more objective: 'every time negotiations sneak into the map' signals an analysis frame. The members that argue for a the collaborative approach, aim at designing the land-water system in a collaborative engineering process among spatial planners and water experts. This last approach is found naïve by the interim manager who leads the project at that time, stating that the water board should not make compromises about its interests twice, one while making the maps and once in implementation. This last argument clearly stems from the negotiation frame. The three frames build on each other and the end image is a result of the entanglement of the three frames, worked out in criteria, assessment, and representation on the map.

Overall, the conflicts seem to have had their own usefulness. The participants appreciate the substantive results. The three frames with concurrent roles of the map, analysis, design and negotiation, have all contributed to the final outcome.

One other potential conflict: In the Map of Future Spatial Developments
The chapter has included one other map that was found potentially sensitive for controversy: the map with Future Spatial Developments. The conflict did not arise not during the process of making the WOM, but is warned for by a civil servant of a municipality for the next stage when the map document is formalized and officially distributed to the political representatives of the municipalities (the participation of municipalities in the WOM-process was executed on the level of civil servants).
Could this potential for conflict also be explained with the same concepts? We think we can, by classifying the behaviour of a probably reaction of a municipality as 'strategic negotiation', that is, negotiation with strategic behaviour to advance one's position as municipality regarding other municipalities or the water board (for instance, trying to use the water board as cash cow), while the water board has used a combination of all three frames, of which the analysis and design frame have certainly dominated large parts of the process, in trying to look creatively to possibilities within the current and future landscape and to analyze objectively where the water system is problematic and should be improved.

- In scenario 1, the municipality would relax its pure (in this case strategic and advocative) negotiation frame and adopt some parts of the analytic and design frame. A second process of finding common ground, likewise as in the process of making the suitability map, could lead to a mediated understanding and perhaps even consensus.
- In scenario 2, the frames of both actors would drive apart. In this scenario, each actor tries to influence its power by effectuating their formal authority, and by influencing the network of (governmental) actors in their favour, for example by advocating the own standpoint at the province.

However, we do not need three frames to explain this type of conflict. The concept of 'Not-In-My-Back-Yard behaviour', or more general the theory on strategic behaviour in negotiation, as one particular frame, is enough to explain both standpoints in one conflict over a map.

6.6.4 Cartography during the process of map making

Remarkable is the correlation between frames of the map-makers and cartographic appearance of the map. The appearance of issues on the map did less depend on the nature of the problem than on the frame of the map author, so it seems. The use of a GIS, graphic software or 'manual' drawing tools, the choice of aggregate scales (circulation sketches) or detailed base maps (base maps for suitability map) indicate a difference between the design frame and the analysis frame. Although this should not be seen as a 'rule' that always counts, we found the pattern of choices in map making clearly differing between people with a predominant analysis frame or a design frame. People with a negotiation frame, in our case usually not the people who themselves 'held the pencil' or operated the computer software to make a map but instead, just gave directions, seemed more flexible. They could form an alliance based on a coupling with the arguments of the side of the analysis frame, or the arguments raised from a design point of view. (This could be frustrated to experts who believed in a more rigid way in its own belief system with its own values, either in analysis or in design.) The maps that stem from the negotiation frame are selective in what legend items are put on the maps and which are left off, and what boundaries are emphasized and which others have been de-emphasized (different colours) or replaced by indicative symbols.

The choice for a consultant also imply a choice for a frame of the map-maker, and in this case also the choice what map making software and style of graphic layout is being employed. The two maps that describe the system (*Figure 6-16*), each from another consultant, represent a fundamental difference in approach:

- In one approach, layers of GIS-data are stapled. Colours are used to represent different classes of topography (indicating height) that are available in the GIS database. All pumps are shown as points. The map shows much detail. *This map reflects an analysis frame.*

- In the other approach, a map is drawn from scratch, with indication of polder names. Only minor topography is added (grey for one class of relatively higher grounds). A separate cross-cut of the landscape is presented under the map, which schematizes the vertical landscape (heights, polders, bosoms) according to a cross-cut line that is indicated on the map above. The colours of the water, in green, light-blue and dark-blue of map and cross-cut scheme correspond, as well as the indicated polder and lake names. The interplay between parts of the picture makes this map explaining the water system like a process of story-telling. *This map reflects a design frame.*

Cartographic layout: a final tough or part of the mapping process

We do not agree with the consultant of LWT that map cartography is a minor issue that should be dealt with only once, at the end of the process. Also the intermediate maps serve their function as instruments in jointly forming a conceptual model of problems, policy measures, possible consequences and trade-offs regarding land-water management. This conceptual model is made explicit and communicated about through the maps. In this case this language of the communication is graphic. The language of map makinghas its own structure, logic and way of meaning construction. We regard cartography not only as a final layout or as unpractical theoretical framework to do map analysis, but as an understanding of how this graphic language works during the process of map makingand map use. We distinguish in this interpretation of cartography three main elements that make up the cartographic language:

(a) *Structure:* the graphic does not interacts linear as a text, but present information structured in layers. In the Circulation Sketches, many 'formal' cartographic items were missing, such as a title, a scale, topographic background, etc. Yet, the projection of arrows that represent geographic locations make these sketches a map. The final WOM image, with its hierarchy in legend items (between policy claims, wishes and no-regret policy proposals), is an example of a more advanced structure of the map. But also here counts, like the Circulation Sketches, that the map derives its 'power of the map' of the fact that it is highly simplified, and the result of a conscientious screening process.

(b) *Logic:* The making of the Water Wish Map and Suitability Map shows how the participants are 'dragged' into a method of structuring information based on spatial correspondence and based on graphic appearance; where it matters which legend item lies on top, whether the information is presented by point symbols or area symbols (stars or contour lines for water storage basins), how the legend items are categorizes into groups (claims, wishes and no-regret structure, or water surplus, shortage and quality), etc.

(c) *Meaning construction:* The maps incorporate implicit associative and metaphorical mechanisms, such as the use of green and red colours for suitability respectively unsuitability, and called-upon metaphorical associations such as the 'clockwise' circulation sketch and the 'clover-leaf', names that are derived from a different interpretation of the arrows and contour lines on the maps.

As for the cartographic layout of the maps in the Delfland case: Simplification, screening out those elements that make the difference or define a concept or mechanism in its pure, essential form (modelled, thus idealized) seems to be key in map-building.

6.7 Conclusion and reflection: "The map making forced to make choices"

6.7.1 Functions of the map

The maps show to have taken up many roles. As can be seen in the case, the policy maps serve different purposes at different times. Actors have different individual intentions in the process, hold different frames or worldviews and use different strategies to achieve their objectives. All this influences how they use maps (and models in general), and how they perceive the function of maps in policy deliberations. The functions that were observed and 'administrated' in this process were diverse. In our interpretation of the analysis, overall, the maps have had several functions.

The functions of the **circulation sketches** are summarized as follows (see section 6.2.3). This pair of map images served:

- As *engineering* tool
- As *motivator* of new ideas
- As *negotiation space*
- As *symbolizer* and communicator: mental mapping instrument
- A not-fulfilled but latent role: the map as first step in hydrologic-spatial modelling

The **Water Wish Map** and the intermediate maps are evaluated as having been (dys-) functional in the following ways:

- *Manipulation of discussions.* The circulation sketches and thematic maps were drawn on a particular scale by the map maker to "keep the discussion on a main level, namely that of the overall water system, and not "get stuck into discussions about details". Also in the Text-box about the drawn timeline for settling a time-horizon for the Water Wish Map was an example where the map maker influenced/'manipulated' the debate.
- *Deepening emerging conflict:* Putting boundaries around very uncertain measures on different topics (water surplus and water shortage situations) in this case deepened the conflict more than necessary.
- *Forcing the organization of Delfland to make choices:* The board member concluded that the maps had been very functional in forcing the organization to make clear choices. The vision, expressed in map images of the final WOM product, embodied a document with a number of policy choices being made and new choices agendized. The process had aligned up 'the' general perspective of 'the water board'.

- *Communicating:*
    - *Setting and sharing priorities within the water board:* About implicit worldviews and expert opinions, deliberating what optional policy measures are in mind and which ones are incompatible, and making the final choices official policy
    - *Carrying the message proactively to stakeholders:* Better inform spatial planners 'ex ante' by sending out a message with the water board's general perspective about water management, with explicit claims, wishes, and advice, and actively inviting planners of municipalities and province to discuss these, as part of two-way communication (participation on the level of consultation).

The **Suitability Map** has been registered for the following functions:

- *Alerting and screening:* Use the suitability map as instrument for a (new) internal formal procedure of alerting and screening new spatial plans of others
- *Clarifying, and differentiating significant from uncertain knowledge:* Distinct uncertain from 'objective' knowledge on suitability and present the latter as advise to stakeholders
- *Strengthen collaboration:* Use the map to strengthen collaboration with stakeholders on joint land-water policy
- *Provide transparency, offer insight:* Use map to provide transparency in water management considerations: offer insight in 'design-guidelines' that Delfland would attribute on formulating advice about individual planning decisions
- *Influence others planning process:* Use map to influence spatial planning decisions: both through formal canals, requesting for 'claims' with spatial planners, and through informal channels, namely by constructing a dialogue and building a relation with planners

This variety of map functions is not complete in describing the scope of map use. Artefacts can be used creatively for all sorts of functions that they have not been designed for. On the other hand, looking at other examples of policy maps in the Netherlands and the way they are produced, like (other) Water Opportunity Map processes and Structure Visions, the above functions are generally applicable to participative map making and map use practices. In our interpretation, the most prominent role of the maps was lying in its communicative function. The function that in our view was most remarkable or notable role was the maps' driving force to make choices.

We have generalized the above types of functions into a list of 12 map functions that can, in our view, be expected in policymaking. In this list, we have distinguished between various types of negotiation that we have observed (notably to express spatial claims and thereby polarizing the debate, or to mediate between spatial trade-offs).

Generalized list of map functions in policymaking:

1. Analyze problem, clarify and model spatial issues
2. Synthesize results of spatial analysis

3. Design; visualize spatial patterns
4. Coordinate information; organizing and distributing function
5. Agendize; alerting function
6. (Re-) frame the problem
7. Stimulate creativity
8. Express spatial claims. Also: polarize
9. Persuade, make argument
10. Clarify spatial conflicts
11. Mediate between spatial trade-offs
12. Drive to make/consolidate choices

Emergent map functions

The function of forcing to make choices was implicitly apparent from the beginning, in the formulated objective of making a vision. But this term of a vision did somewhat 'hide' the implication that tough choices between competing (future) options and time horizons would have to be decided upon. Thereby, the function of the map as a force to make choices appeared as an emergent functionality in this analysis (see section 6.3). In the sketch maps on water circulation, the clockwise and anti-clockwise maps, the forcing of a choice worked successfully. But in the making of the Water Wish Map, the map images with water basins only seemed to exaggerate and deepen the discussions. Nevertheless, when this choice was finally made on a non-participative basis, by the intervening interim-manager, the maps were again successful in communicating this choice to the external participants group of municipalities and province.

Another map function that came as emergent in the analysis was the informing of the 'underlying' vision of the anti-clockwise water circulation to the second consultant of BNG. This functionality could not be foreseen, as it had not been planned to switch between consultants during the project, but the presentation of those sketches to the consultant of BNG helped them in understanding the ideas of the water board in their work of finalizing the WOM document.

6.7.2 Manipulation with maps

One of the described roles is that of manipulating discussion. While the term manipulation has a negative connotation, in this case we do not intent to judge whether this manipulation by drawing a certain map is 'good' or 'bad'. Following the lines of theory about frames and framing, we consider that much part of such 'manipulation' by drawing maps happens unconsciously.

As experienced map-makers have internalized so many heuristics and rules of thumb how to begin, structure, and present a map, for them it is not a matter of conscious manipulation but rather of expressing their thoughts in their language. We have observed map-makers/users use their maps in a daily manner, without consciously choosing every word or every graphic.

This is in line with theory of linguistics such as Lakoff and Johnsson (1980), who show in "Metaphors we live by", that frames are everywhere. They illustrate how

metaphors are more widespread than the name metaphor suggests, arguing that many words/expressions have become so embedded in daily language and thought that the character of the metaphoric analogy goes largely unnoticed and its mechanism is working largely unconsciously (for example, the words "up" for a positive development and "down" for a negative development).

In the case, the title of the 'clover-leaf' map and the "clockwise" circulation sketches are examples of maps were a metaphoric label was put on the map without a clear manipulative objective in mind to steer the policy process in a certain direction. The metaphoric titles of these maps are used to build a simplified interpretation of the abstract patterns on the map, on the basis of frame analogies with more tangible phenomena.

Map as graphic language

In the former section, we have discussed the cartography of the maps and their relation to the three identified frames. We have illustrated how the maps came about. Fragmented through the descriptions of the process of map making and map use, the maps themselves are taken up as illustrations (figures). With the overall story per map, we aim to show how their structure, logic and meaning was constructed and sometimes emerged from the interplay of various people each with their own frame.

Direction was sometimes centred in the hands of the map maker(Circulation map) but other times the power of direction was divided over multiple persons. This makes it impossible to speak of one map author. For instance, the final WOM image is created by BNG, but based on the data given by LWT, which is collected from Delfland and primary stakeholders. Furthermore, BNG is guided by background information and guidelines of the project team. Thus, in the case of the Water Wish Map (and the Suitability Map as well) there is not a single expert map maker who determines the cartographic language; the map is the result of a distributed explorative process, with many participants involved. The (intermediate) maps have functioned as graphic language. Remarkable in the case is that legend items appear to be a red line in the process. It deserves united attention to formulate them specifically and clearly, and to explain them. They form the kernel of the mapping language (Carton, 2002).

Map as model: Conscious versus unconscious framing

We have formulated three archetypical frames in this case that explain the emerging conflicts. These frames have been elicited with help of discourse analysis, a method that uses explications of actors as data material, and includes the language-character of what has been explicated (in text, or in this case also in maps) in the analysis.

According to the explanation of framing theory as explained by Lakoff (2004) in "Don't think of an elephant!" and earlier by Majone (1989) in "Evidence, argument and persuasion in the policy process", the use of language is influential in policymaking, and simultaneously more fundamental than just 'mere rhetoric'. A conscious framing of issues is helpful in getting across ones message, as argued in Lakoff (2004). Schön and Rein (1994) emphasize that these framings often remain implicit, taken for granted, while they represent fundamental values that make people's argumentations 'leap' from the descriptive to the normative.

Whether it is possible to always frame issues consciously, is an actual question. Observing, identifying and naming policy issues automatically inhibit an act of isolation of something complex into a fragmented element, namely the policy issue. We have not directed our study to find a sharp distinction to what extent acts of framing happened consciously or unconsciously. However, in this case signals are present of examples where maps are more and less consciously framed.

The drawing of the clockwise and anti-clockwise circulation sketches are an example where the map maker explains his conscious choices in scale-choice, use of black and white colours, and use of thick arrows. The example of the Water Wish Map, where the second consultant of BNG restructures the legend item into new categories (claims, wishes and no-regret) is an example where the reshuffling of legend items bring as result a new way of framing Delfland's message, which is suddenly acceptable for the project team members, while the predecessor maps of LWT were not. Where the consultant of BNG was able to consciously reframe the map to an acceptable image, the consultant of LWT had not been successful in his attempts to satisfy the project members by the adaptation in selection of legend items or changes in the layout.

6.7.3 Mechanisms in coping with emergent conflict

How actors coped with map controversies: Mechanisms distinguished from practice
One of our research questions is to observe and identify underlying *mechanisms* that are co-determining the *functional influence* of a map in a policymaking process. In the conceptual framework, the functional effects of a map, from an actor-perspective, are divided in four categories: functional as planned, non-functional, emergent functional and dys-functional.

The maps were found sensitive for conflict in the case. But in the emergence of conflict, the tension around a map was often released again by a proposed action of one of the actors. We have identified a number of social *mechanisms* of how the maps have functioned. Or rather, of subtle inferences how people coped with emergent conflict, often trough the use of the map.

These mechanisms stem from the observed strategies how the people in the case study actually dealt with the tensions inherent in map models while using sketches, GIS-analyses, map images or spatial designs. We have structured the mechanisms according to the characteristics of framing as described in Chapter 4.

Mechanism 1: "Change the cartographic layout of a map"
It is not an actual change of policy, but a cosmetic change of how the proposals are visualized on a map, with which a conflict around a map can be settled. The change of water reservation lakes into indicative stars in the case did not change the idea of the policy, but it made the status of the plan look less definitive. On the other hand, by letting the proposed borders off the map, this could open room for further discussion on how to implement water retention best in the actual terrain, instead of evoking NIMBY-reactions with municipalities. In this way, the replacement of coloured spots

into indicative star symbols was in itself a way of cosmetically 'putting the problem under the carpet', but simultaneously making room for further collaborative elaboration.

In terms of our theoretic framework, this mechanism is oriented at the visibility of a frame. Map-makers can 'mask' aspects of their frame of reference by cartographic subtleties.

Mechanism 2: "Change the scope of the map or the scope of the mapped policy issue"
The clock-wise/anti-clockwise water circulation sketches in the case were made on the scale of Delfland, although the actual pilot project would only take one-fourth of that area as spatial scope. The higher map scale served to stimulate large-scale thinking. When objections against this pair of map images was formulated by the hydrologist, the temporary character was emphasized, and its consequences for the pilot project were given as argument for this large-scale thought exercise. Later in the project, when the water reservation lakes were a controversial legend item, it was proposed to get back to the larger scale of Delfland and also consider terrain of neighbouring water boards in the search for space for water reservation. This playing with scales gave flexibility in the conflict that firstly appeared as a 'yes or no' to including water reservation in the policymaking process at all. Using maps of different scales helped in seeing the problem in successively wider and in-depth perspectives.

In terms of our framework, this mechanism is oriented at the focus of a frame. The mapview dictates what is 'in view' and what is 'beyond the horizon'.

Mechanism 3. "Change the scope and classification of a policy issue"
Legend items are central elements in the map making process according to this study. In the case, the order and structure of legend items was altered when a new consultant was hired for making the final map image. Policy issues were restructured into groups according to priority and room for negotiation allowed by the water board (See Figure 6-10). The first group of legend items, structured under the classification of 'claims', was considered non-negotiable.

This mechanism is oriented at the rationality in a frame. A new classification system in a map offers a renewed way of 'seeing' the world, with a reshaped frame of reference.

Mechanism 4. "Change the function and status of the map in the policy process"
There were critical remarks in the case both against the making and use of the clockwise/anti-clockwise circulation map and the suitability map. In arguing for the inclusion of these maps in the policy process despite these critics, it was argued that these maps would have a low, contemporary status. They would in first instance only function as internal documents in the water board organization. Later in the process, it was decided in the Steering Group that the suitability map would be included in the resulting policy document for external stakeholders.

This mechanism is oriented at changing the process of framing. By offering the possibility to rethink and decide on the acceptance of 'the whole' later, it is possible

to temporarily fixate assumptions. This way, the process is "pressed ahead" while a promise is made in order to 'silence' the voice of dissent.

Mechanism 5: "Handle over the arguments involved in a conflict to decision-makers in charge and let politics decide"
This mechanism implies a shift of responsibility in decision-making, away from the policy preparation place where the problem is analyzed and ideas are processed into plans by experts and stakeholders (amongst others). Instead, the problem is transferred higher in the institutional hierarchy, into the political environment where choices between alternatives are made by democratically chosen representatives. This mechanism implies "may the best frame win". Instead of reframing a policy issue into a problem definition that is satisfycing for all participants, or finding common ground by moving two frames into one, the people carrying conflicting frames may compete by presenting their perspective to the representatives. This happened when the interim-director intervened in the conflict about the Water Wish Map and collected all opinions, in order to make decisions in the Steering Group.

This mechanism is oriented at the contextual setting, transferring the sensitive issue from the substantive policymaking environment towards the institutional decision-making structure. The frames involved remain the same, and maps may be used to explain the competing frames in the wider political context.

With these five mechanisms, we can 'fill in' the concept of frames (and framing) further, building upon the conceptualization as envisaged in section 4.4 and represented in Figure 4-1.

6.7.4 Substantive frames in the maps: uncertainty, anticipation and proportionality

The frames that have been formulated in this chapter have been oriented at the process of map making and map use. Next to these process frames, the maps themselves served as substantive frames on how the participants perceived their regional environment and its water problems and water opportunities.

Looking at the various map images, one impression stands out: many areas in this region are marked with some policy spots. The concept of "Space for Water" of the national Commission 21st century has certainly worked out. (At least on the administrative side of policymaking; what will be implemented eventually remains to be seen.)

A question that was raised at the presentation of the concept maps was *how many of these spots are needed*. The municipalities understood that flexibility is built in the maps, as many areas (of calamity polders and water storage basins) were appointed as search locations. The water board answered they would actually claim all territories for the time being, until new research would give more certainty about quantities of water. But multiple municipalities wonder whether that would be proportional.

This anecdote reflects a dilemma how to cope with the uncertainty of future climate change and future water run-off. In order to build in robustness, the water

board had appointed more and wider areas as being needed for water management purposes than what can be proven to be surely and absolutely necessary from the actual quantitative information. By appointing these areas as 'search locations', the water board safeguards the status of these areas, so that they cannot be developed in the meantime: the water board thus 'buys time'. On the other side, the municipalities do not want to see their territory 'locked' for development if this estimation of quantity is out of proportion: the water board might buy its time on the cost of the space for manoeuvring of municipalities.

The dilemma about level of proportionality would be deliberated further in the political arena, among political representatives and in parliaments of the water board, municipalities and province. Nevertheless, the uncertainties that had already been present during the map making process, as well as the ambiguity around strategy and methodology, did allow for many degrees of freedom in the pilot WOM project. The 'space' or divide between the three archetypical frames could thereby become wide. This seems to have attributed to the possibility of emerging conflicts within the project.

Part III:

Case study Game on Space

Simulation Game of Brabant City Network

7 CASE DESCRIPTION: The Game on Space in Brabant

"Although the outcome of the game is not very attractive, I think the process is very realistic"

–Verbal statement of participant in evaluation discussion about the game, November 11th 2002.

7.1 Introduction

This chapter is partly based on Carton, de Jong, Leijten et. al. (2002), Mayer, Carton , de Jong et. al. (2004) and Mayer, Leijten, Carton et. al. (2004).

7.1.1 A second case study

After the Delfland case, we have opted for a second case study. In chronological order, this second case succeeds the Delfland case. In the Delfland case, we have drawn conclusions about the roles of the various types of map support. We have clarified how the use of maps, and perceived usefulness, differs for different actors. We have discovered a difference between three frames.

With this second case we want to verify if this difference can also be traced in a professional planning practice context. With the close engagement in seeing how the map artefact is used in action by a mixed group of stakeholders and professionals, we aim to elaborate on the frames, the process of framing in multi-actor settings and the possibility of generalizing the findings of the first case. For this purpose, we aim to engage closer with the supposed frames of actors. We thus want to use this case to validate the existence and relevance of these three frames, their form and content and their potentially conflicting attitudes towards maps.

As we found in the Delfland case that many sensitive issues had to do with neighbouring territories, with related spatial issues, and with higher levels of governance, we looked in a second case for a setup where the existence and overlap of multiple projects would be researchable simultaneously. Also, we had got the impression at the water board Delfland that the spatial planning departments of

municipalities and provinces were more experienced in making policy maps than water boards, who are more technically oriented towards the (daily) management of the Dutch water system, pumping the water trough canals and making sure the spatial territory keeps 'dry feet'. Making vision maps and regional studies or plans seemed more a tradition at municipalities and provinces than at water boards. Therefore, we aimed for a second case in the field of spatial planning. On a regional scale level, this comprises both urban and rural policy issues.

7.1.2 Format: a game

Games have become common modes of training in educational programs, especially in management, organizational and political sciences. The use of games for research purposes is yet less widespread. Games can be serious business. War games are known to be prepared by military top-advisory bodies in the two world wars and for example in 1992 by the American Pentagon, to prepare for a possible war with Iraq (Mayer and Veeneman, 2002). Mayer and Veeneman (p. 20) use the metaphor of a war-game to explain the usefulness of non-military use of simulation games:

> "Business and political systems involve strategic decision-making, competition and conflict, negotiation and diplomacy, and operational planning. Moreover, we would do better to teach our students and train our professionals in a realistic but safe environment before we send them 'into the field'. Like military analysts, researchers can use simulation games to foresee and assess future scenarios, draw lessons from them and communicate strategic recommendations."

For planners and policymakers of complex 'systems' like cities, games make up relatively 'safe' environments for experimenting with large policies and projects. Sometimes in practice an idealized policy proposal is produced 'in the study-room' with a plan that is well-designed in theory, but the practical implications (such as lack of public support or strategic behaviour) of others can be overlooked. By playing a game, the planners and stakeholders can get an idea of the possible strategic alliances that could be formed, the tactic manoeuvres that actors can make to advance their positions, and the trade-offs that could be achievable in negotiations under semi-controlled conditions. As Mayer and Veeneman say (p. 20), in games 'opponents may lie and cheat.' These social dynamics are part of spatial planning in real life, and may be simulated during the process of the game. For instance, the game facilitators may alter the rules of the game or impose an 'event' during the game. By letting the reactions on such interventions free to the choices of the game-participants, unexpected and uncontrolled developments may spin off. By letting the participants in the game experience these dynamics and their effects themselves, a collaborative learning curve can emerge.

7.1.3 The Game on Space Project

The second 'case' in this thesis involves action research and participant observation in a collaborative project by the Netherlands Institute for Spatial Research (RPB, Dutch abbreviation), the faculty Technology, Policy and Management of the TU Delft (TBM, Dutch abbreviation) and the province of Brabant. In this project, a simulation game is developed, played (twice) and evaluated.

The object of study in the game is spatial planning, in particular vision-building and process management by actors and stakeholders in the region of Brabant. (Brabant is a province located in the southern part of the Netherlands, close to the Belgian border). The project is named the Game on Space. The simulated spatial planning issues in the game involve a number of the major challenges that Dutch planners face; accommodating the increasing need for housing, industrial/business areas and infrastructure on one hand, while preserving the landscapes with agricultural, recreational or ecologic value on the other. Pressure on land because of various competing land use practices is one of the main 'problems'. Collaboration among governments and stakeholder groups (public-public or public-private) is currently seen as way to cope with this scarcity of land, combined with participatory methods for the policymaking processes, in the Dutch spatial planning practice called '*development planning*' (in Dutch: ontwikkelingsplanologie) (See section 7.2.1).

Researching the bottlenecks and opportunities of this development oriented style of planning is the main reason why the RPB initiated the assignment for the Game on Space. The objectives of development planning, i.e. innovation, collaboration, efficient use of resources etc, were found to make up a fruitful environment to experiment with ways of map use and map-making; activities that are meant to support these planning processes. Therefore, the project served multiple connected interests, one of them being the research of this thesis. Overall, the combined objectives of the Urban Network Game were:

- To gain an insight into the role of map designers and map visualizations during the development-oriented planning process (research objective: map use, this study);
- To clarify what the popular term 'development planning' means in practice, how innovative concepts and designs come about and to gain an insight into the success and failure factors of development planning (research objective: planning, RPB);
- To practice the making, facilitating, observing and analyzing of a game like this (research objective: simulation games, TU Delft);
- To provide an 'experimentation space' for (new) administrative formats for Brabant City 2030 and generate innovative spatial ideas and projects for Brabant City 2030 (practice, Province of Brabant and the other participants in the game).

The Urban Network Game was played twice, on 14 November and on 10 December 2002 (see Figure 7-1.). The game focused on the development of the *Brabant City urban network* as concrete case. This was a recently established joint venture between the five largest cities, the 'B5', in the province of Brabant and the provincial government (See section 7.2.2.). The two sessions had a similar structure, but the participants had to play with two different long-term scenarios. This made it possible

to evaluate the impact of lateral developments on development planning and on the administrative and spatial development of Brabant City. Around 50 representatives from all relevant administrative, private and social parties took part in each session. During the game, participants developed a large number of spatial designs and projects for Brabant up to the year 2030 and placed those projects on a large zoned map after consulting and negotiating with other parties. The Brabant City joint venture attempted to manage the administrative and spatial development that resulted.

Figure 7-1. Picture of the making (filling) of a large "block map" during the game session on November 14th 2002

7.2 Real-world context of the game

7.2.1 The Dutch spatial planning system

Admittance planning and development planning
Major changes are taking place on an administrative level in the Netherlands. Citizens, businesses and social organizations are becoming pro-active and have more and more expertise at their disposal. In order to improve the process of spatial planning in the Netherlands, numerous advisory bodies and policymakers have advocated a change in spatial policymaking towards 'spatial development' or 'development planning' (Advisory Council on Government Policy, 1998; Ministry of Housing, Spatial Planning and the Environment 2001, 2002).

Development planning is defined as a complementary approach relative to the existing planning tradition. Spatial planning in the Netherlands is generally characterized as *admittance planning*. The higher government bodies create spatial plans and the plans of lower government bodies – such as local municipal governments, provincial governments and water boards – are tested against them. The concept of admittance planning therefore mainly means 'restricted planning hierarchy', and, partly because of this, has become somewhat discredited among spatial planners and public administrators in recent years. Admittance planning is said to be inflexible, passive, with little attention for design and thereby 'locking' landscapes into a status quo situation.

Various planning and administrative advisory reports and policy documents at the end of the 1990s advocated the deployment of development planning (Advisory Council on Government Policy, 1998; ANWB et al., 2001; Healey, 2000; Interprovinciaal Overleg, 2001; Lodewijks et al., 1998; Salet and Faludi, 1999; Teisman, 1997 and 1999; VROM Council, 2001). According to the Ministry of Housing, Spatial Planning and the Environment (VROM), development planning requires:

> "… active intervention by means of investments made by both public and private parties. The State shall then provide policy frameworks for the investments and harmonize them with each other. This provides scope for the initiatives of lower governments, market parties and social organizations and supports them." (Ministry of Housing, Spatial Planning and the Environment, 2002:41)

The concept of development planning does not mean the total surrender of control over spatial development, but calls for the implementation of new or altered planning instruments. The above-mentioned advisory reports and policy documents show that development planning has the following characteristics.

- Governments are looking for *active and broad social coalitions* for concrete development proposals in order to increase the legitimacy and effectiveness of the policy, process arrangements and legislation should provide for this.
- Responsibilities between the scales of governance should be disentangled. On regional scale levels, the plans should influence each other both bottom-up and

top-down in a so-called '*area oriented approach*'.
- Linking spatial planning directly to *spatial investments*. Various spatial investments should be combined in a package or 'project envelope'.
- *Future-oriented*: The central question for development planning is in which direction Dutch society or local communities actually want to go in the coming period. Long term considerations should be treated with high importance preventing them from being overgrown by fast short-term developments.
- *Innovation-oriented*: Development planning implies it is important to search for innovative solutions – for example, create multi-purpose space and combine functions such as recreation, nature and work.

This combination of policy concepts looks like an interesting new direction for Dutch spatial planning practice, but at the same time these are concepts that have yet to be validated and whose implications are not exactly clear. The national government has provided a few new instruments and guidelines for development planning, but mostly, the concept of development planning entails a change in mindset. Defensive thinking that has been dominant must make way for an entrepreneurial way of thinking and a stimulating ('facilitating') way of doing.

However, nobody really knows what the concepts mean in actual practice, how they differ from accepted practices, and to which improvements they would lead as opposed to earlier policy (admittance planning, functional land use planning). Against this background, the game with development planning as subject provided a fruitful context for experimenting with mapmaking in a multi-actor setting.

7.2.2 Brabant City Network

Brabant: urbanized region under high economic, ecologic and recreational pressure
Pressure on land is the case in almost all parts of the Netherlands, but the recent 'spillover' of the Dutch 'Randstad' region towards Brabant has caused a major transition of this area from a laid-back, agricultural region towards a highly dynamic, heavily fragmented area.

The 'old' characteristic landscape of Brabant is that of a green, agricultural area that is above sea level, in contrast to the provinces North and South Holland in the West of the Netherlands. The intensified agriculture exists of arable farming and a 'pig industry', with many large pig-barns scattered across the landscape. Furthermore, creeks and wooded banks dominate the landscape, with scattered small forests and a number of nature reserves. These are complemented with a number of cities and many small-scale and medium-scale villages. The atmosphere of Brabant is that of what is called in Dutch 'bourgondische gezelligheid', meaning something like 'living the rural Burgundian good life'.

In the latest years, the rural area has met a variety of changes that have affected the landscape, such as: the growth of built-up areas; small-scale economic enterprises on former agricultural terrains; expanding recreational services as horse-riding, golf courses, and cycling; expanding catering functions; reconstruction of the intensified pig industry under pressure of the national government; search for areas to store water

and make space for widening rivers. The pressure on space is felt under spatial planners as well as citizens. While the observation is shared that the land gets more 'crowded', ideas how to cope with it are subject of intensive political debate.

Urban networks

The urban network concept, which is adopted as new policy principle for the region Brabant, has emerged as operationalization of the recent development planning approach. Today, people's spatial mobility patterns are on a higher geographical scale level than ever before – that is, not on the level of a city and its immediate surroundings but on the level of urban networks. For work, welfare, recreation, etc., people use amenities such as theatres, stations and hospitals that are available in nearby large cities. Therefore, decisions related to space and infrastructure should also be made on that scale. The Fifth Policy Document describes urban networks in the following way:

> Urban networks consist of a number of compact larger and smaller cities that have good links with each other, separated by non-urbanized areas. Urban networks differ from each other with regard to both size and composition. (Ministry of Housing, Spatial Planning and the Environment, 2002: 60).

The idea of urban networks is that the residents and businesses of a city are enabled to reap the greatest benefit from the metropolitan amenities of a nearby city. In that case, not every city needs to create those amenities itself and every city can realize additional new amenities that would otherwise not be feasible. Individual cities must therefore work together in a larger context when planning, realizing and utilizing amenities. To achieve this, fast and efficient transport links are vital.

Brabant City; cooperation and coordination

The Brabant City urban network involves exactly this kind of joint venture between the province of North Brabant and the five large Brabant municipalities of Breda, Tilburg, Den Bosch, Eindhoven and Helmond (the so-called 'B5'). In 2002, the cities drew up a joint program consisting of nine projects, for which they applied for a subsidy from the national government. The nine projects strengthen the urban network as a whole – for example, through the construction of public transport links – or they strengthen individual cities but not at the expense of other cities – for example, by developing station areas.

However, the real question is what will happen when hard choices and considerations have to be made whereby not all of the cities can be equally successful. For example, in the Brabant City context how is the development location chosen for a mega-project such as a trans-shipment centre or a large theatre? This means that urban networks such as Brabant City will have to work not only on spatial innovation but also on administrative innovation.

Implementation of the Brabant City initiative is therefore more complex and more difficult to control than initially appears. Firstly, there is competition and rivalry between the cities, which are always competing with each other to attract investments and projects. Secondly, within the Brabant City network there are also joint ventures

between one of the large cities and nearby small municipalities. These smaller joint ventures can affect the large Brabant City network.

At the time of the game in 2002, the province had recently launched two visions:

- The Brabant Structure Vision (in Dutch: streekplan) for the whole of the province, which has been open for consultation by local governments and other stakeholders.
- The 'Brabant City Initiative', is a Brabant version of the Delta Metropolis Association initiated by the four largest cities of the Netherlands (Amsterdam, Rotterdam, The Hague, Utrecht). This idea for a platform of stakeholders is incorporated in the game.

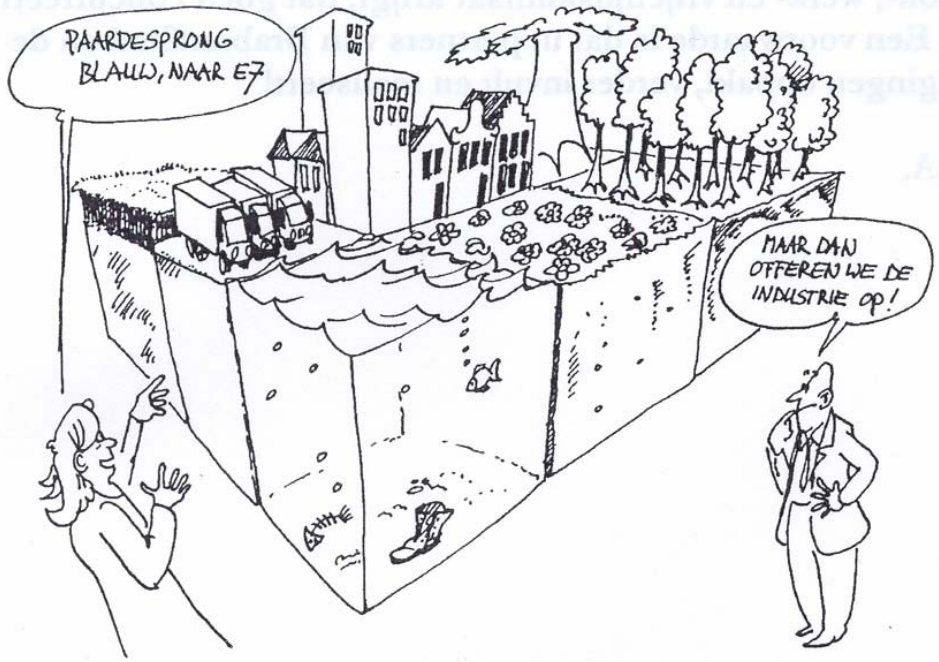


Figure 5-1. Big challenges lie ahead for the urban network BrabantStad. Callout balloons on the cartoon say: "Knight's move: Blue to location E7". "But then we sacrifice the industry!" (source: RPB, 2002, scenario Brabantstad Belevingsruimte, p. 21)

7.3 Project setup

7.3.1 Participants in the project

In the development and playing of the game, we can divide the involved people in roughly three groups: A project group, assistants and participants.

Project group

The project group consisted of a core project-team that developed the game, and a wider project group. The project group consisted of seven people; two of the RPB, four of the TU Delft, faculty TBM and one researcher of the Erasmus University Rotterdam (see Appendix 2). The linking/inclusion of this PhD research as part of the game project came about rather naturally. As the game would be too big a project for one researcher, it would be logically to combine researchers, their various expertise and their related research interests.

Later in the development stage of the game, also the province of Brabant was involved in this project group. This actor would reflect on the game as it was designed, and as a key-player in the game it would take up the most important roles in the game. The three project leaders of each organization, TPM, RPB and the province of Brabant, together made up a kind of steering group that took care of the organizational and financial matters.

Assistants

Both at the RPB and TBM, assistants helped in practical aspects of preparing for the game. This involved work such as sending invitation letters to the participants and arranging the game location and making and printing game documents. One of these activities was the preparation of the map material. The preparation of the (GIS-) map material was our responsibility as it made part of this PhD research. The back-office of the RPB contained a GIS-department which had many geo-databases of Dutch geographic material at its disposal; this was available for the project.

Players of the game

Many players were incorporated in the gaming simulation in order to represent a realistic dynamic process of plan making (See appendix 2). A large number of participants took part on both days, so the two sessions also involved a learning curve by playing the game twice; both by improving the game by the game-developers, and by experience at the participant's side. Because it would be practically not achievable to 'get' all the same people to play the same game twice, and the game-setup would require a lot of people at both game sessions, it was foreseen that part of the participants would be new in the second game sessions; the participants were invited twice, but where asked to send someone in place or to sign up for one of both sessions. Because it was found inappropriate to invite participants to play exactly the same game twice, and also to see what the influence would be from external, autonomous conditions such as population growth or economic conjuncture, the game was played under the circumstances of two different future scenarios.

The following actor roles were represented in the gaming simulation: key-players (regional governmental bodies), local and national governments, private parties, interest groups and game assistants. These roles are explained below. Every role was played by at least two participants. A key-role was reserved for the so-called Brabant City Contact group.

Key-players:

- The Brabant City Contact Group: The Contact Group was formed by several administrators of the province and municipalities and its role was to determine the political direction of Brabant City (referenced to as: *the Contact Group*)
- Brabant City Bureau: The manager/director and motivating force behind the administrative and spatial development of Brabant City (referenced to as: *The Bureau*)
- The five Brabant City municipalities of Breda, Tilburg, Helmond, Eindhoven, Den Bosch (referenced to as: *the B5*)
- The provincial government of North Brabant (referenced to as: *the province*)

National level and local level governments:

- Two ministries, representing: The Ministry of Housing, Spatial Planning and the Environment, the Ministry of Transport, Public Works and Water Management, the Ministry of Economic Affairs and the Ministry of Agriculture, Nature Management and Fisheries (these four ministries were thus united into two ministries in the game)
- 'Other small Brabant municipalities', played by one actor. (Various invited representatives of small municipalities played this actor collaboratively)

Private parties and interest groups:

- Two project developers
- Special interest groups, public (ngo's) and private (amongst others for public transport, farming, mobility, nature conservation).

Game assistants:

- *Design bureaus*: they had the task to work both as private firm in acquiring –unpaid– assignments, but also got a role as facilitating map-makers, experts, creativity stimulators, vision providers, and critical reflective voices. The design bureaus existed of two actors –two firms– each having two persons
- *Administrative panel*: this actor would take in the finalized plans, and would 'put them on the central block map' by a representation in blocks, plastic, rope, and flags. This actor was part of the team who organized the game. They would supervise the compliance with the regulations as they had been prepared or changed during the game session. Spatial projects that had been prepared and finalized by groups of participants would have to be delivered at this bureau to make it official. The administrators were instructed to do a marginal check on the delivered projects by game participants; delivered plans would carry the necessary approvals (by municipalities, by the province, by the ministry), a plausible amount of money and a description that would not be too unrealistic. Then, as symbolic for the official approval of the delivered plan, it would be visualized on the central block map.

All the people who have been playing in the game, except for the actors made up by game assistants, were in reality involved in spatial planning for Brabant. The players

kept the role of their organization in real life as much as possible. The actors, in real-life large organizations, would be represented in the game by two or three (maximum four) participants.

7.3.2 Game design and scenarios

Game objectives
The main assignment for the participants in the game was to create a 'new policy map' of Brabant City 2030 by consulting and negotiating with other participants and taking the provided future scenario into account. The participants were asked therefore to execute the following task:

> Place your own ambitions and your joint ambitions for Brabant 2030 on the central map.

The central map, a 3 x 5-metre plasticized map of the province of Brabant (scale 1:25.000), was laid on a 30-centimetre high platform in the middle of the hall. This was the so-called *block map*. During the gaming simulation, all projects and plans were placed on this map and, where necessary, removed or replaced. This produced an up-to-date map of all projects and plans that had been devised and realized by participants in various parts of the hall.

The assignment for the players in the game was two-folded on purpose; they should try to implement their own ambitions as well as the joint ambition of the group. The platform of the urban network Brabant City was constructed in the game as a platform for collaboration. This platform was institutionalized by a *Brabant City Contact Group* and assisting *Bureau*. This 'joint venture' of the five largest cities of Brabant and the province would attempt to manage the administrative and spatial developments as they were being formulated by the (other) individual actors in the game. The particular assignment for this platform was to establish a *policy vision for the urban network both spatially and procedural*. The Brabant City Contact Group had explicitly been given the far reaching power that they were allowed to change rules of the game, in order to shape the existence of the 'urban network' as an institutional collaborative umbrella-organization.

But as such a platform does not operate in a vacuum. Consequently, a setup was created with multiple actors who are involved in the planning process of Brabant, all with own ambitions and interests. The individual actors would, after consulting and negotiating with other parties, develop a large number of innovative spatial designs and projects for Brabant up to the year 2030 and place those projects on a large zoned map. This would create a dynamic planning process resulting from multiple parallel actor interactions, and as such form a dynamic environment for map-making and map use.

Game procedures

The gaming day started with a brief explanation and instruction. After this, all participants were given the opportunity to prepare for their roles in the gaming simulation. This included developing a concept and strategy for their role and explaining it briefly to the other participants using a slogan.

Every actor had its own table. The initial phase of preparation thus existed of internal deliberations at the various tables between people of one actor-organization who would discuss their role and strategy among each other. In the next round, the 'interactive round', the participants were free to work on the general assignment to create a 'new map' of Brabant City 2030 by consulting and negotiating with other participants.

In the interactive round, the participants would negotiate and form coalitions for projects that could fit with the contextual circumstances, which were provided by a future scenario in each game session. Then, the participants –actors or alliances– would try to obtain financial resources and consent from other players in the form of tokens (money) and signatures for their projects. Complicated spatial and legal procedures were greatly simplified in the gaming simulation. Large(r) projects required the approval of parties such as the provincial government, local government, Ministries and/or the Brabant City Bureau and could only be realized when enough tokens had been collected.

For each project to be realized, the applicants compiled a standard project dossier. An expert panel, consisting of four of the game supervisors and the principal, were responsible for the logistics related to the approval, funding and realization of projects and for evaluating the physical feasibility of each project.

Spatial scenarios

The game would take place in the near future, when new long-term policy would have to be made according to the scenario studies sketched by so-called professor Wonderwoud. These scenarios could be compared to influential scenario documents in real life, such as the Club of Rome reports which warned for the collapse of human societies. The scenarios envisage certain trends and trend-breaks, and served to get people 'out of their daily mode of thinking'.

The deliberative process that would be simulated in the game, takes years in real life. In this time-span, ongoing developments tend to influence the direction of policy processes. These contextual developments were simulated in the game by two long-term environmental scenarios that the Netherlands Institute for Spatial Research had developed beforehand. The game was played twice, each with a contrasting scenario: 1) *Brabant Production Space* and 2) *Brabant Space of Experience.* These scenarios were described in trend reports that were provided to the game participants on beforehand. The scenarios looked ahead to the year 2030 and explored the effects of a number of 'mega-trends' on infrastructure, housing, work, traffic, agriculture, nature, recreation and water. The mega-trends were developments in economic, technological, socio-cultural and other areas that fundamentally change society and physical space in the long term. The scenarios also included prognoses on development trends such as the homes and business parks required for Brabant 2030. They therefore formulated

the challenges facing Brabant City. In Table 7-1, the most important trends of both the Production Space scenario and the Space of Experience scenario are summarized.

Brabant Production Space	Brabant Space of Experience
Major economic growth: significant growth of the knowledge and innovation economy.	Low(er) economic growth: the 'sensible economy' comes into its own.
Regional policy is of little consequence: policy is determined at global and local level.	Regional policy is of major consequence: policy is determined by governments on all scale levels.
Economy takes precedence over the environment: space and the environment are at the service of prosperity.	The environment takes precedence over the economy: space and the environment define the conditions for prosperity.
Nature and agriculture are becoming outmoded; cattle farming makes way for knowledge-intensive agricultural businesses.	A lot of attention for nature and landscape; farmers become green entrepreneurs.
The housing market and the demand for business locations grow significantly.	People want to live in green areas; demand for business locations mainly focused on quality.
Repressive water management: Flooding controlled by technical measures.	Land and water management integrated: Water is the most important landscape element.
Transport by road and air on the increase.	Rail, water and underground transport increase the most.

Table 7-1. Summary and comparison of the Production Space and Space of Experience scenarios

The representatives of the various institutions were expected to find ways to collaborate, which would be robust regardless of the external pressures and circumstances. The game was played in such a way, that the change of scenario had no fundamental effect on the structure of the game. The only significant difference was that in the second game session, with a lower economic growth rate, less money would be available because each actor would get less tokens at each new round.

It was *not* intended to make both game sessions equal and comparable in methodological sense. In other words, the game sessions were not played as a 'classic' scenario exertion. In scenario studies, the impact of difference between driving forces in the scenarios are studied by 'testing' one policy under different scenario circumstances. For such a study, it is critical to keep the 'policy' or in this case, the rules of the game, exactly the same. However, testing a policy against various scenarios was not the primary objective in this case. Instead, it was intended that the first game session would be like a 'general rehearsal'. In the second time, the rules of

the game and start-up conditions could be improved. The lessons learned from the second game would serve as the final results. Learning about development planning (for the RPB) and training in working together and making policy as an 'urban network' (for the participants) were the key objectives in the game. Playing the game twice gave the opportunity to reflect, make adaptations and work through an iteration cycle by playing again for a second time.

Map support secondary
The making of maps has been only supportive to the purpose of the game, that is, to make policy plans. We had learned from the Delfland case that discussions between participants in policymaking meetings do not focus literally on the maps but on the policy issues. Even if people were referring to 'the map', they were really talking about the 'real-world' phenomena in the field that were represented in the map. Therefore, although we added many map-tools as supportive instruments in the game, the making of those maps was not an objective per sé. Instead, the objective for the participants was to achieve their vision and play their strategy successfully. The use of maps is instrumental to this goal, and is part of the daily practice of the game participants.

7.4 Ex ante design of map support

Our objective was to evaluate the use of maps in action, in the setting of a simulation game. This section describes the choices made in setting up the 'experiment'. The focus of the experiment is the group of people and how they act –how they make policy– with the maps and available map tools that we have provided. By designing and deciding on what types of maps to prepare, we have been able to 'steer' the use of the maps in the game. We could use this opportunity to experiment with the map tools and with types of uses that we have found important and abundant in the first case study.

Two main objectives have been formulated for this second case study:

1. To test (explore the generalizability of) the findings of the Delfland case. Verify if the difference between three frames that we have called a 'designer', 'analyst' and 'negotiation' frame is as profound as in the Delfland case and whether these frames again explain the emergence or deepening of conflict and controversy.

2. To see how policymakers, if stimulated by offering tools and support, would use maps as part of their social infrastructure among and in between multiple actors, and if the maps would again (like in the Delfland case) serve as shared model on formulating policy, with an implicit screening process inherently being applied as map-making activities force to make choices.

In the Game on Space, it is our particular objective to set the conditions and stimuli that we had identified for the emergence of the spiral-like process of the Delfland case, which had led to an agreed end result and a cohesive group. In the Delfland case, the WKK map image-document had functioned in the way as described in point 2; it had functioned as multi-actor instrument, otherwise called boundary object, in formulating the water policy in the region of Delfland and in making choices by screening what topics should be on the partial and final integrative map images. The forced making of choices, in what would be important and how to differentiate what spatial landscapes was one of the reasons why the construction of this map raised so much sensitivity and conflict in the Delfland case, but the resulting map was nevertheless valued very positively in the end. The engagement of analysis, design and negotiation frames had led to conflicts, but had also led to a satisfying result and a positive second order effect of actors learning from each other.

In the Game on Space, it is also the aim to achieve an agreed or satisfying 'end-result' in the form of a filled central block map that would visualize the resulting vision as developed collaboratively in the game, and a social learning effect among participants.

7.4.1 Followed method for preparing the map support tools

In the development of the supportive map tools, we followed an approach that stems from our theoretical framework. We prepared the maps ourselves as part of action research. The 'rules' or principles of designing tools and mapping services are summarized below in six steps:

1. Analyze the *institutional context* in which the project (in our case: the game) will take place
2. Identify what potential trade-offs and problems will be part of the discussion among actors, and anticipating on potential *information need.*
3. Identify potential *information supply*; available or possible map-modeling devices, data sources, tools and services
4. Explicate desired *functions* of map-use and map-making activities
5. Formulate foreseen map use procedures and *'design'* the prepared maps and mapping tools
6. *Feedback* if the designed tools fit with actual practice of the participants; are the actors used to work this way?

In step 1 and 2, the nature of the project and the institutional network is being analyzed. Official objectives of the project, the likely motives of the involved actors, the known dilemmas and problems currently being faced can be derived from tracing the project's history and doing interviews with the participants. A preliminary interview round of all the key-players has been part of the project. These interviews were taken pair wise by members of the project-team.

In step two and three, foreseen information need is contrasted with potential information supply. Lists of both are created. The list of potential trade-offs and

problems is created by analyzing the interviews with actors. The list of potential devices, data sources, tools and services is made by own knowledge and experience with availability of spatial data, models and tools in the Netherlands. In step four and five, the actual preparation of maps and map tools is executed. By designing the game procedures and map-support simultaneously, the maps made up an integral part of the game. They cannot really be seen as separate constructions, but are part of the socially constructed infrastructure (rules of play). *Transactions* are imagined between 'information suppliers' and 'information clients'. In this case, the transactions are imagined as handing over map images or drawing and pointing at (parts of) a map during the game. In the project team, there was acknowledgement that maps play a significant role in spatial policymaking and that it would make sense to include map tools in the game. The idea generation and development of the map support options was a responsibility linked to this PhD project. The conceptual design is executed in collaboration with the project team; options and choices were discussed and adapted based on decisions made by the project leader of TBM and the project manager of RPB.

The last step is a check that assumes that actors will continue their normal habit in a new project. We assume that the provision of tools and maps may shape actor's way of working a little, but that grown usual practice will play a mayor role in the actual behaviour of the participants with the offered support tools, services etc. This reflective step was performed by critical self-review and discussing questions in the project team, as well as bilateral discussions with professionals in spatial design and GIS support at the RPB and at the TU Delft.

The steps are elaborated in the next paragraphs.

Context: Conditions for map tools set by client

The project leader of the RPB has formulated a number of conditions and demands for the development of the game. One of them is that no computer tools shall be used during the role-playing game. This has multiple reasons:

Firstly, in the project manager's experience with group processes and future oriented research, computer tools automatically get a lot of attention from the participants and therefore they get a central role in many games. When ICT-tools are used in a game, evaluation research often focuses on the human-computer interface, while it is the human-human interaction in relation to a map (a triangle relationship) that should be central in this game. The map tools support the game, and not the other way around.

Secondly, equipment always brings the risk of not working, error messages, and if this happens, stress over the technology. The project manager did have a constituted fear that this could happen to 'his' game. To prevent such a debacle, he was alert not to become dependent on high-technological tools.

Furthermore, the project leader is worried that the game participants will be overloaded with information during the game, and will experience a 'cognitive overload'. In this game, therefore, all procedures are simplified as much as possible, while keeping focus on the main targets to develop a vision for Brabant in 2030.

Finally, the use of digital tools is not part of the scope of issues that he wants to research in the game. In combination with above reasons, these were enough reasons why using a computer map during the game session was not desirable.

We accepted this limitation of our freedom as we felt that enough space for manoeuvring was provided, and in fact the human resources and financial budget for the game, as well as the whole game setup, would offer us a unique opportunity to observe those interactions that we had research interest in (human-human and human-map). The conditions set by the client are assumed as a given consequence of the institutional setup of the project.

Anticipating on information need: Adopting the Layer Approach from practice

In the same time-period when the concept of development planning was proposed as official governmental policy, the so-called 'layer approach' has been proposed as *mental framework* to structure and assess different types of developments. Dirk Sijmons, national advisor of the landscape, has been the 'founder' of this concept, for which he won a Dutch landscape-architecture price[1] at the time of the game. The layer approach is the name for a framework of analysis, ordering and design of Dutch landscape dynamics on a regional level (de Hoog, Sijmons and Verschuuren, 1998; Sijmons, 2002). These dynamics are separated into three different layers analogous to the division of layers on a map. The label 'layer approach' comes from this *map metaphor* –this example eloquently illustrates the role of a map as serving metaphorically for a way of conceptualizing space–. The three layers stand for respectively:

- The 'green-blue layer': Dynamics in the soil, hydrological and ecologic system. These developments have a long time horizon and slow dynamic of about 50 years (it takes 50 years before planted trees grow into forming a forest).
- The 'network layer': Rail, road and water transport, and ICT-networks. The changes in these networks have a medium time-horizon of ca. 15 years; changes in the infrastructure networks do not come by themselves and they affect other parts of the network.
- The 'occupation layer': Scattered developments in the landscape of housing or business development. These developments can be processed on local scales, and realized within relatively short time-periods of 5 years.

The layer approach makes a difference in that it emphasizes the different time-horizons of some landscapes/groups of land-use functions. It de-emphasizes some functional differences, such as the division between 'business' and 'housing'. Both land-use functions are classified as land-uses of the occupation layer. 'Green-blue' land use functions, such as the Ecological Main Structure or the device 'more space for water', would need priority as they can only be reached on the longer term, while the spatial options for these functions can easily be overgrown by short-term objectives.

[1] The 'Maaskantprijs', awarded to Sijmons in 2002.

The layer approach has quickly been adopted by many civil servants. Its popularity may be explained as a fit with the current mindset about spatial planning. In fact, the layer approach sounds so logical that it seems to have always been between the ears of planners. As the project leader of the Game on Space Igor Mayer, a sociologist, asked surprised during a project meeting: "Hasn't the layer approach been common practice and common knowledge all the time?... How else could spatial planners do their job?!"

Potential information supply;
In the Game on Space, we thought of a number of new computer tools with built-in GIS-functionality that had been developed in the Netherlands. One potential tool comprised the tool 'Environment Explorer' developed by the National Institute for Public Health and the Environment (RIVM),[2] which calculates future land use scenarios based on a similar principle as the instrument WadBOS (see section 3.4.2). But this proposal faced objections of the project leader, who did not agree with computers in the game room.

Another available map instrument called 'The New Map of the Netherlands', an Internet GIS tool-and-related-organization that collects all official spatial plans of different governments[3]. The history of the New Map tool started in 1995, in analogue format, when the Amsterdam's centre for architecture ARCAM presented a map of the region Amsterdam with projected on it all the development plans for this region. They presented a first "New Map" with national coverage in 1997, which contained about 2700 plans for living, working, nature, and infrastructure. This map had a shocking effect as it could be literally 'seen' on the map that many villages would grow near to he borders of each others build-up areas, eating up much of the open 'polder' landscape. The current Internet-GIS tool, published in 2002, is updated continuously and made available online (www.nieuwekaart.nl) and in GIS-format. The system[4] is set up and made accessible in order to increase transparency in spatial planning processes and to support procedures more efficiently and faster (Nieuwe Kaart 2002).

Because no computers were allowed in the game according to the project leader of the RPB, we proposed to use an analogous version of the tool 'the New Map of the Netherlands'. The characteristics of this instrument, the collection and visualization of various spatial plans, could relatively easily be 'simulated' by using a (large) physical map and physical legend items.

Explicating desired functions of map-use and map-making activities
Step 4 of our approach for preparing the maps, explicating its function, was one that we have often seen missed out in practice of map-making for policymaking. In interviews with geographers and spatial designers, the respondents acknowledged that this step often remained implicit. Often their reaction was that they never thought of it explicitly. Rather, they had become used to an automatic mental 'inference' what the maps functions would be in talking to their clients. Sometimes they had envisaged or interpreted the desired maps and their functions wrongly by miscommunication and

[2] See www.rivm.nl/bibliotheek/rapporten/408505004.html
[3] See www.nieuwekaart.nl
[4] an initiative of the Dutch professional unions BNSP (union for spatial planners and urban architects), NVTL (union for landscape architects) and the NIROV (Netherlands Institute for Spatial Planning and Housing).

misunderstanding of the clients' objectives and the particular institutional setting. We envisaged the possible functions of the potential map tools in the game on the basis of:

- the *multi-actor context* (the policy process, determined by the rules of the game) in which the maps would be made and used
- available *tools* and accessible means for maps
- the list with *functions* as checklist, which is based on elicited functions in the first case study and previous map use practices in similar spatial policymaking processes (see the summary of our observation framework in appendix 3)

Designing game procedures and map tools simultaneously

The development of the game procedures and the preparation of the maps were partly a project team effort and partly individual responsibilities. As we were part of the team who designed the game procedures, we could design and discuss choices on both game procedures and map procedures. In the project setup, the usability of the game to also assess the aspect of map use was considered and acknowledged explicitly as a secondary research objective of (one team member in) the project, and integrated/embedded in the game. For instance, the idea to work with a large central map in the room came from the side of designing supportive map-tools, but the idea was elaborated further as part of the overall game procedures.

Asking feedback

The setup of the game procedures and the constellation of maps were being discussed with a 'klankboard group' (feedback group) of the Province of Brabant before the game. Also, a special meeting was conducted with the RPB in the preparation phase to review and comment on each others' research setup and evaluation strategy. In this meeting, with an experienced map designer hired by the RPB, the use of the maps and the evaluation strategy were elaborated.

The map images themselves were not presented to this group on beforehand because of the long process time for preparing the map documents, printing complications and work involved in acquiring the right materials. Feedback about the maps was asked in short interviews and in a survey after the game sessions.

7.4.2 The designed map types in the game

During the design of the game and the map support, several different map types have been formulated and prepared that would be available during the game. Five map types would be implemented:

1. Table maps: map sheets in A1-format on each table to point at and as topographic background for designs
2. Small maps in project forms: map sheets in A3-format that made up the second page in the so-called project forms in the game; the first page would contain the textual description of a formulated spatial project, the second page would show its location
3. Sketches of designers that would be made by designers during the game

4. Wall maps with all currently known policies (policy plans until 2020)
5. A very large Central Block Map

The project forms and the Central Block Map would be part of the vital social infrastructure of the game. This is visualized in the schematic overview of Figure 7-2. This sketch was part of the preparation documents (minutes) in the project-team. Below, each map type will be introduced.

No centralized setup

In the game, all maps would only have a supportive function. The most important map that could be compared to the end-product (WKK map) of Delfland was the central block map. This central map in the middle of the room would have a clear function of collecting projects and represent a synthesis picture of all the separately developed plans. But this map was not an objective in itself for the participants. The game was not to be 'about maps' explicitly, because one lesson we learned from observing regional water (opportunity map) projects and regional spatial planning processes, was that maps were never used as an end in itself by the policymakers. They could be ends in itself for some, especially specialists and experts supporting the practical aspects of making the policy maps, but for the –more experienced– policymaking civil servants involved in planning and spatial development, they were at all times only instrumental.

Instead of having one centralized meeting where 'the' map should be produced, the policymaking process would be decentralized and self-organizing of nature; networked meetings and developments instead of a project-like approach -although the Bureau Brabant City would aim at pulling the directors role towards them. The game was thus played within multiple arenas; with different actors at different times gathering in various parallel meetings and working on multiple projects simultaneously. We would follow the 'life of maps' of a number of specific map documents throughout the development of projects.

Ad 1. Table maps

On each table, a relatively large map (A1-format) was lied down. So that each 'office' would have an overview map at hand, the idea being that maps will be used when the practical 'transaction costs' are low enough: when actors would have to walk across the room before discussing a topic next to a specific map, this effort might quickly be too much to ask. Thus, the maps must be close to the participants. The maps would be large enough so that the people sitting around the table could locate different regions. They would be small enough to fit on the table and to stay within a reasonable printing price. This map was intended to serve as 'locator' to point at by various actors, but also as topographic background for people (professional designers and 'lay people') for their spatial drawings. For the sake of cost reduction, these table maps were printed in black-and-white. A secondary reason for the black-and-white printing was that the images would not be dominant in their appearance; this would add to the aim of simplicity and prevention of cognitive overload.

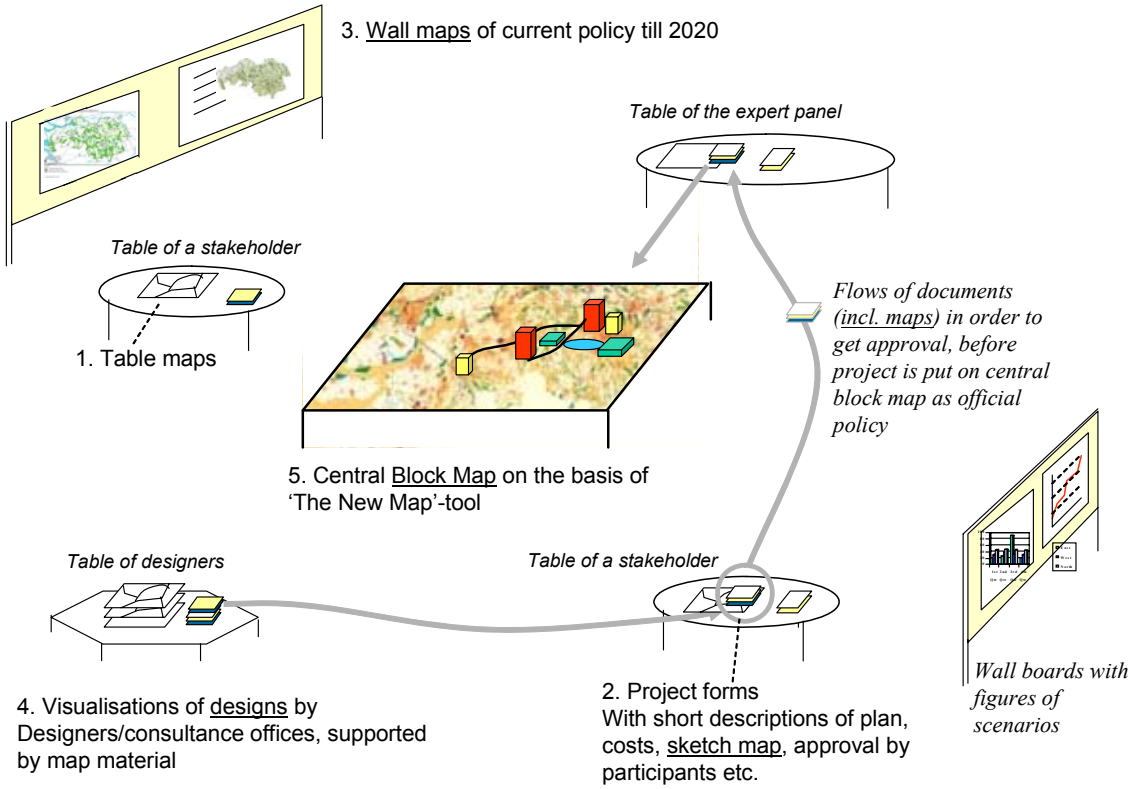


Figure 7-2. Set up of map support in the game (picture made as part of the preparation process, labels translated)

ad 2. Project forms

In the pre-printed project forms, small maps would make up the second page. During the game, projects were being formulated by the participants, and would be discussed, lobbied for, and negotiated. For each project, a form would have to be filled in. On the first page, a title, short project description, initiator and alliance partners, estimation of costs and links to other projects should be filled in. On the second page, a location should be indicated. It was allowed to add designs, graphics etc. to the project documents. Designers could use the second-page-maps as background for their own designs. As it was not known beforehand how many projects would be formulated by the participants, a large stack of forms was prepared. The format was A3-size. The maps were, like the table maps, in black-and-white. The maps were prepared on four scales:

- An overall scale with projection of the whole province
- An enlarged scale with the west of the province (city of Breda)
- An enlarged scale with the south of the province (city of Eindhoven, Helmond)
- An enlarged scale with the north-east of the province (city of Den Bosch, eastern villages)

The project forms would be on the stakeholders' tables, and stored on a general pile, to be distributed based on request/need.

ad 3. Sketches made by designers
During the game, participants could 'hire' professional designers to draw maps, to design visions or to visualize plans. The task of the designers during the game was dual and existed of a supportive role and an independent role. They could help others in formulating and designing their policy plans and visions, and advice about spatial trade-offs. But they could also independently make studies, draw patterns on maps, design their own visions and visualize their own drawings based on what they learned from the processes in which they have participated or observed. Thus, they were also invited to act as 'free' opinion builders, criticasters, and providers of (original) ideas. This way, they could choose their own strategy how best to support the innovative character and quality of the policy projects developed during the game. They were explicitly invited in the second game session to help in getting a grip on the variety of local projects and processes by making visions or proposing general frameworks.

Ad 4. Ex ante preparation of the wall maps
The wall maps were the only policy maps that were prepared on beforehand. The other maps, both the central block map and the project maps, were only topographic base-layers that served to be filled in or drawn upon with policy information during the game itself.

The resources to make the wall maps were limited; time and budget for the preparation of the game were small. The RPB has at its proposal a Geographic Information System with various actual sets of geo-information. The system of the RPB, ArcGIS, is operated by an experienced GIS-operator. We prepared the wall maps together with this GIS-operator. We conceived this preparation as action research; the preparation and choices in the making of these map images, performed by us, is subject of our analysis. Therefore, the process and the choices involved in the making of the wall map images are described in detail in the next subsection.

Ad 5. The Central Block Map: Simulation of the concept 'The New Map of the Netherlands'
At the time of the game development, a new national spatial policy map tool had just had become available in the Netherlands. This tool, called 'The New Map of the Netherlands', is an Internet-GIS based tool that provides an actual overview of all existing official policy plans in the Netherlands, combining the plans of all governmental levels and sectors, for as far as map documents have been made. This tool, in its current Internet and GIS-based fashion (see Figure 7-3), is new at the time of the game in 2002.

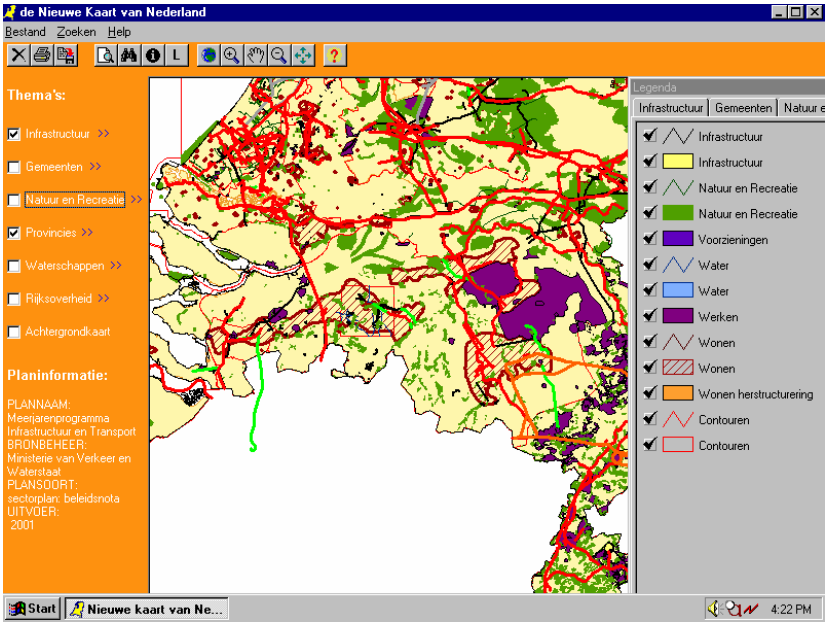


Figure 7-3. Screendump of the internet based GIS-application "The New Map of the Netherlands" (source: www.nieuwekaart.nl, 2002)

The website of the new map suggests the following user possibilities: (www.nieuwekaart.nl, december 2005):

"The New Map is unique for its ability to:
- give an up-to-date overview of spatial development
- be a blotting-pad for design on regional scale
- make plans comparable: one scale, one legend
- democratise the knowledge about spatial planning"

In our idea, this tool could provide a 'mirror' or feed forward information to the participants about how their spatial plans would in collaboration look like. Just as the New Map image of 1995 had a shocking effect, this map tool would have the potency to reframe peoples' ideas about spatial plans on a generalized level, and help in adapting and reshaping policies in order to improve the collection of local projects. This potency is our hypothesis.

While the effect of such a tool in real-life can only be measured on a longer time span, because of the delays in planning processes, in a game these processes are typically speeded up. Thus the longer-term effect and potency of such a tool can be explored. The setup of such a map could also form a logical 'closure' of the social infrastructure in the game; the approved plans had to be collected somewhere, and the visualization of their spatial extent on one central map would make an informative 'scoreboard' for all the participants of ongoing developments. As in the game it had been decided that the real execution phase of projects would not be simulated, the project processes ended exactly at the moment of their official approval. Because of the status of a plan, instead of an executed project, it would be possible and not-costly

to change projects or to replace them by newer ones. All these characteristics of the project formulation process in the game are compliant with the concept of the New Map.

The condition of allowing no computers into the room of the game session was solved by using a 'proxy' for the New Map tool; since all participants would be apparent in the same room, there would be no need to distribute the information digitally or on computer screens; the map information could be presented 'hard copy' as well, on one large central map.

During our research, we had seen 'giant' map at the Faculty of Architecture at the TU Delft. In the course on regional design of the so-called Deltametropolis area, this giant map was used in an exhibition of designs. Small wooden blocks in several sizes were used to visualize different spatial plans and different levels of 'urban density' on the map. In our idea, this map could be used as analogue 'surrogate' for the New Map tool. In fact, the principles of the map would be the same, only carried out with real objects instead of digital legend items.

The project team embraced the idea. The RPB accepted the responsibility in completing all the map sheets of the region Brabant on the large size. We took it as our task to develop a potential legend and to collect items for visualizing the projects on the large map (with, besides blocks in different colours and heights, also plastic sheets for large areas and pieces of rope for representing infrastructures; see Figure 7-4).

Figure 7-4. The block map as central element in the game

To summarize, many pragmatic considerations dominated the choice and selection of supporting map tools (including services like adding landscape designers-at-work). In this case, the costs were to a large extent co-determining the size and appearance (full colour or black-and-white) of the maps. Also the conditions set by the project manager proved decisive in remaining options. In our view, this is similar as the development of policy maps evolves in real-world processes; policy maps are made on ad-hoc basis when an image is considered useful.

7.4.3 Choices in the making of the wall maps

The wall maps were supposed to serve functions that had not been already covered by the maps on the tables or the central block map. During our research we found the wall maps one of the few places where we actually made maps ourselves (with help of an experienced GIS-user at the RPB). And thus we got involved into a type of action research that is different from participant observation of what others do; the inherent, implicit trade-offs and choices in building this map model came onto our own account this time.
The design process is described in this section by approximation. Like the common nature of design processes, many steps are made implicitly and intuitively, and the design process in practice seems a very chaotic nonlinear process with apparently sudden 'creative moments', meanwhile working gradually and partially systematically towards the envisaged end-result. We, that is the GIS-expert/map-maker of the RPB and myself, did the design work while playing with options and reviewing the results.

Function
The function of the wall maps would be to provide overview information about the important existing *policy plans* that have been made for the near future and have a time-horizon relevant for the game (further than 2005, up to 2020). We have thought about making prognoses about future policies under the two game scenarios. But as this is one of the objectives for the participants to formulate themselves, we have not made a forecast other than *collecting the existing policies as they are*. We have given the title to the map images of "Brabant [specific theme] in 2020 with unchanged policy".
The intended use of the map, that is the set of wall map images, is twofold:

- Individual information analysis, namely, viewers can 'read' the whole of spatial policy plans currently released for the future until 2020, and this way they can get a complete and up-to-date overview over currently existing (spatially locatable) policy plans
- Group device serving as artefact in conversations about possible spatial projects and policies, where the map serves as 'microworld' or proxy of the real-world landscape, where discussants can point to areas and locations, while the listeners in the conversation can simultaneously listen to the verbal arguments and check the relation between the planned policies on the map and the proposed ideas of the speaker.

It was not the intention to provide one clear-cut thematic map over one issue. Instead, the map was intended to show a set of overview information over policy plans where one has to look longer than one glance or trace one specific legend item in order to 'read' the map. Furthermore, the wall maps were only one of the support tools for the participants in their work. Project documents, landscape designers, money (tokens) were other means that had a supportive role. In designing the maps, it was the objective to envisage what need of geographic information could appear/be experienced during the game that could be met by means of these wall map images.

Conditions
According to the project leader of the RPB, the wall images, including the maps, had to be big in order to attract attention, and get people take a glance of them. The size would be A0 (1,68 m by 1.36 m). But printing on this large size is costly. Therefore, only a limited amount of maps could be produced. The wall maps would be printed twice and hung on the wall at two places in the room.

Available data
For the making of the map images, a number of geographic datasets were available: The RPB has multiple spatial databases ('warehouses') at its disposal. Amongst others, topographic raster maps called Top25 (the topographic base map produced by the National Mapping Agency at a generalization level of scale 1:25.000). Also, the digital data of the The New Map and the infrastructure roads were on the GIS-server of the RPB, both extensive ArcGIS data warehouses. Next to these national data sources, the Province of Brabant has made available the digital file of the maps in the new Structure Plan. At the RPB, we created the wall maps with the means of ArcGIS software of ESRI. For composing the wall maps and selecting legend items, we had the following data layers at our disposal:

- Legend items of the actual New Map of the Netherlands
- Legend items of the actual Brabant Structure Plan
- Some infrastructure legend items of the Infrastructure policy plans MIT
- Some topographic background layers available at the RPB.

Design process
For the construction of the images, the various legend items of the described data sources were explored. The choices in making the map were primarily based on two questions:

- What legend items make up the *dominant spatial policy concepts* that influence the spatial planning practice now and in the near future? –what legend items (might) influence the way of thinking?
- What legend items make up the important *distinguishing characteristics* of the Brabant landscape *on the scale* of the province and its sub-regions? –what are the 'carrier' patterns of the landscape by which people daily move trough their county, navigate their way, orientate themselves upon when working with maps and base spatial policy decisions upon?

When the map images became very busy with topics, the way of working and deciding was by trial-and-error, with shaping and changing the map, experimenting with different set-ups, and reflecting on all kinds of intermediate map products (see Figure 7-5) The trial-and-error approach consisted of three steps.

Firstly, the current map image was evaluated visually, looking from a wall-map-reader distance (one meter) to the resulting map image on the screen and on printed draft versions.

Secondly, we experimented with the following options through a process of trial-and-error:

- Changing the cartographic layout of the theme by changing colour, texture, filling or line-thickness;
- Shuffling the order of appearance of themes: what theme lies on top, what theme lies 'under' an other and thus sometimes disappears underneath another graphic object;
- Aggregating groups of themes into one more general group, altering the name (legend item) into a more generic class, discussing aloud the needs of information on specific themes and the implications of simplifying themes;
- Exchanging the theme to another map image;
- 'Finishing' the cartographic subtleties of the current mapview constellation (adjusting the above items for the core problem and dealing with its implications for other graphic layers)

Thirdly, we reflected again in order to reconsider the choices made and to think about new ones that could bring further improvement to the total set of images. And finally to make the judgement about qualifying the result as either a temporal solution or as a good end result (and if not, proceeding with the design process). We judged the resulting map image visually on graphic quality (overview, readability, etc., according to principles as described by Tufte, 1990).

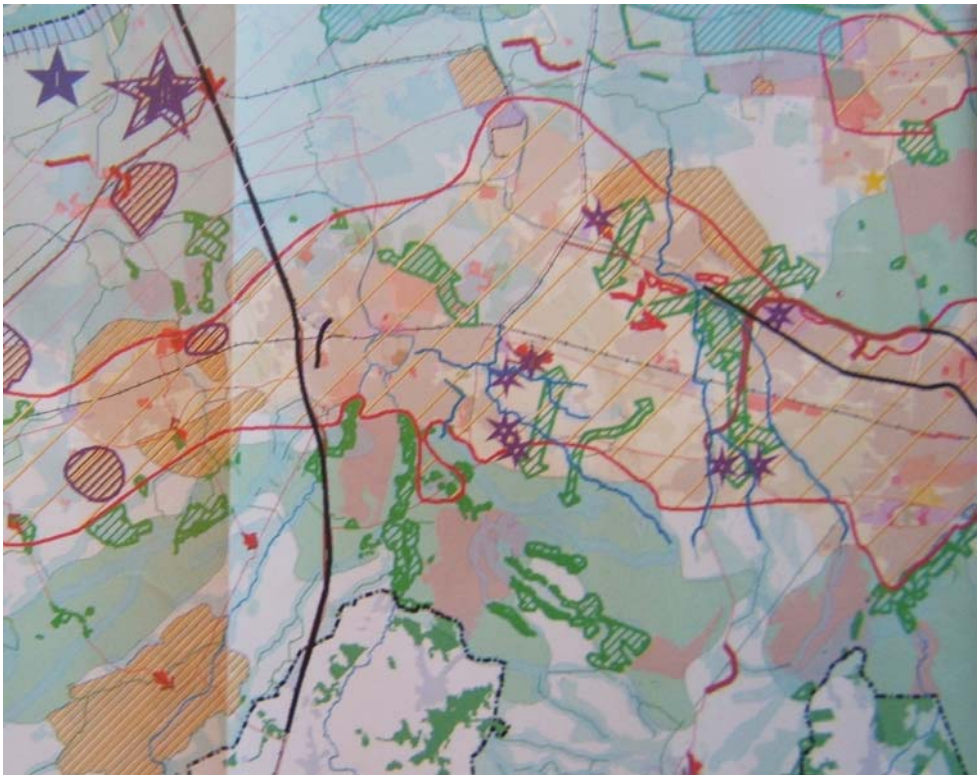


Figure 7-5. Example of a trial-and-error map image with a striped-texture for the urban area and 'red' and 'green' themes combined. This view was dismissed as being unclear and confusing. The long lines of the striped texture did not seem to belong to one homogeneous area-object. See colour figure in Appendix 5.

A green and a red image

After playing with the images, adding and deleting feature classes and especially reducing the overlap between municipal plans and provincial plans in the legend items, it was decided to make two map images. A short experimentation with a single image led to the conclusion that this wall map would be confusing because of overlapping legend items, would be 'shrieking' and above this, the presentation of just one map image would give the impression of a blue-print map that suggests to be 'the framework' in which the game participants should operate; instead of using the map as guide of the future that can be altered. It was decided to make two map images. These images are referred to as the Red Wall Map and the Green Wall Map. The colours red and green stand for a collection of types of policy plans. In Dutch planning discourse, 'red' is associated with build-up environments, mainly urban oriented developments that are visible in the landscape as man-made, stone (concrete) structures as housing, business parks and infrastructures. 'Green' stands for plans associated with green landscapes like agricultural grasslands, nature, but also recreational areas such as sport parks and golf courses. The names red and green have gained importance since the Fifth National Policy Document on Spatial Planning, where 'red contours' and 'green contours' have been introduced as policy instruments (Ministry of Housing, Spatial Planning and the Environment, National Spatial Planning Agency, 2001).

Administrative boundaries

After the choice of the red and green image, and the inclusion of infrastructure, the various administrative boundaries in the Brabant province were focused upon. Projecting the municipal boundaries on the red or green map would trouble the view, so we found. Besides, they did not seem to have much interrelation based on common geographic features (the borders did not seem to follow much of the projected geographic characteristics). Therefore, a third separate map image with these legend items was created. This remained a very quiet or 'empty-looking' map. It was called a 'reserve-map' by us. If costs of printing would exceed budget or place on the wall would not allow space, this map would be neglected.

A reason to keep this additional map, was that institutional boundaries may become an issue when parties in the game change the rules of the game and start re-defining organizations and their territories. In that case, a map with current organizational structures in space might be a welcome representation of the current situation. Furthermore, by hanging this map in the room, participants might even be stimulated to think about such institutional options.

The result is a map that exists of a set of three images, all covering the region of Brabant:

- a red map image
- a green map image
- an image with administrative boundaries.

They, and their legend items, are presented in Figure 7-6 until Figure 7-8. The printing of all the posters, including the maps, was managed by the project manager of the Netherlands Institute for Spatial Research (RPB). There would be in total about eight exhibition boards that would make up the wall information with on each of them three posters on A0-format (each board ca. two by four meters in size).

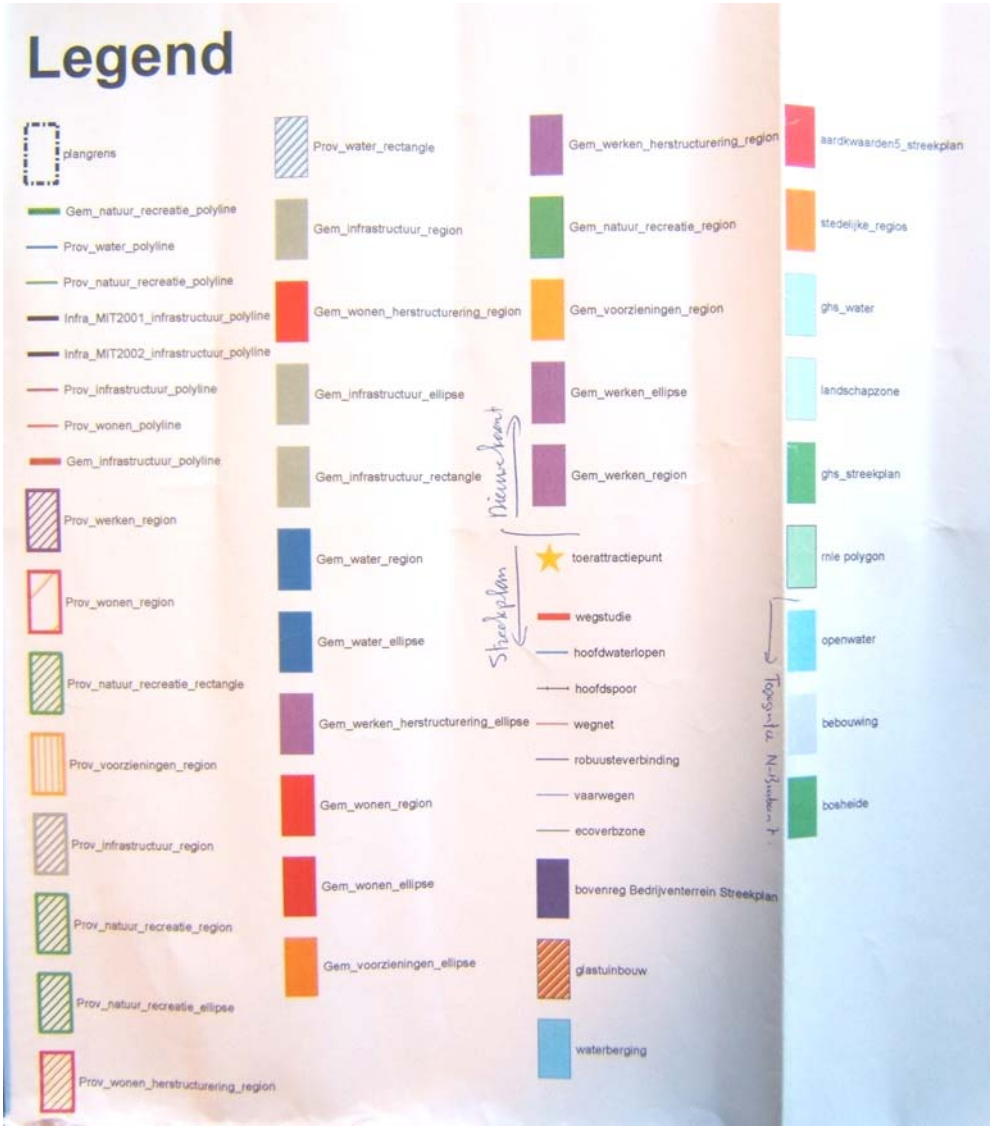


Figure 7-6. Legend items of the Wall Maps, stemming from three different datasets, as the written text in blue marks. See colour figure in Appendix 5.

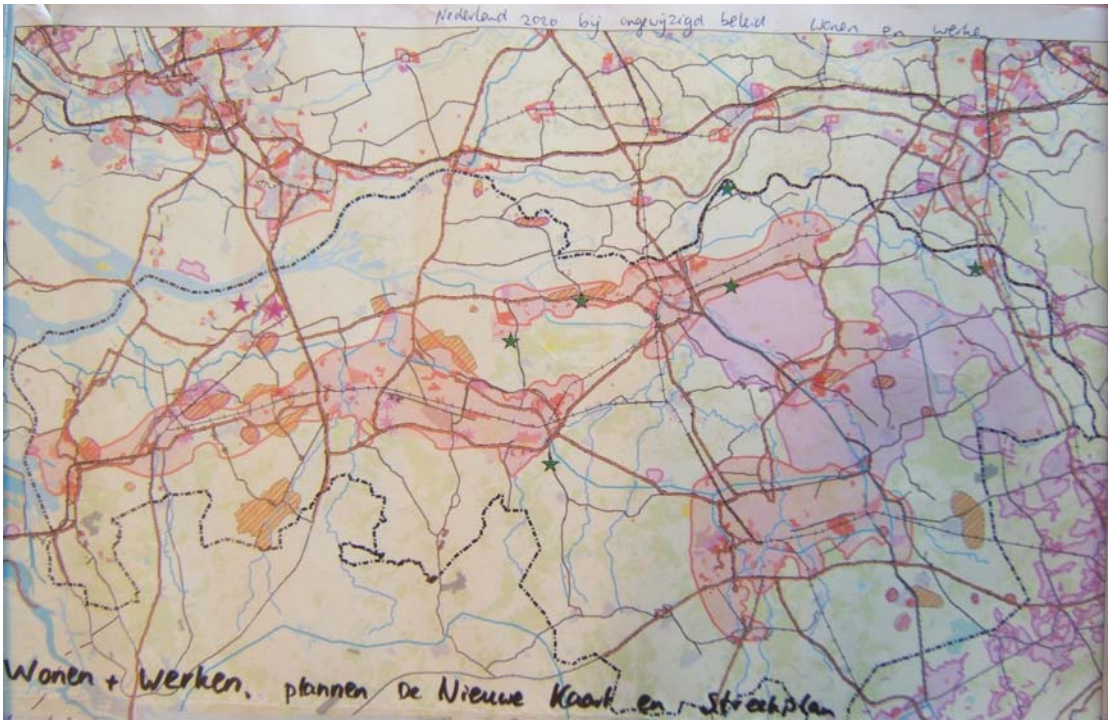


Figure 7-7. Concept version of the Red Wall Map (produced with ArcGIS) See colour figure in Appendix 5.

Figure 7-8. Concept version of the Green Wall Map. See colour figure in Appendix 5.

7.5 Evaluation strategy

In the actions of the two sessions, the use of the above described map types is analyzed in its (game) context. On a general level, it is our main question how the participants will infer at their conclusions and decisions in relation to their use of (map) models. In our study of the use and effect of models, we assume those patterns of use-and-effect to depend both on the "actor" side and the "model" side. In annex 1, we have included the summary framework of our observations. A longer document with questions and explanation was discussed before the two game sessions with the observation assistants. Questions that link the actor-side with the model-side are for example:

- With what arguments do actors refer to maps?
- How are actors visualizing their ideas, analyses, assessments and statements on maps, and if particular choices in this map-use-process are explicated, then what are the reasons for those choices?
- How do actors frame the issues at stake in their dialogues among each other; which stories are told, which problem framings dominate and how do the maps fit with these stories and problem framings? And does the structure of the map affect the discussions supported by this map?

Evaluation data
In order to follow and get a grip on the volatile processes of map use, we gathered a large amount of data. For the evaluation of map use during the game, the following observation data was acquired:

- *Observations*. The progress of both sessions – what was said and done – was recorded by two observers in each session. One of the observers would circulate through the room listening to various groups and following the 'life circle' of particular anecdotes and maps. The other observer would stay close to the group forming the urban network platform, because the collaboration of many groups (the main cities of Brabant and the province) was concentrated in this platform. The observers used an observation framework and a checklist with questions as base for their observations (see Carton, 2002). They also used stickers with numbers to mark particular (map) documents, as help in monitoring the use of these documents during the game and referring to them in notes. This way, the 'life' of some maps was followed, in particular maps drawn by the participants or designers during the game. In the first game session, the observers' approach was merely passive; looking and listening to conversations. In the second session they observed more actively by asking questions to participants why they said or did something in particular moments.

- *Short interviews*. During breaks (lunch breaks and 'dead moments') and after the game, the observers interviewed a few participants that they had been following during the game. These interviews had as subject the evolving decision-making processes and the role of map visualizations. They served as completion of the

observations, to understand the actors' personal perspectives, their explanation for human interactions and use or non-use of maps in the game, and their opinions about both the use of maps and the game in general in relation to their normal practice in the real world.

- *Photographs, sketches, documents and maps*. Photographs and documents made during the gaming simulation – such as concept forms, completed project proposals, (rough) sketches and maps – were used to reconstruct the progress of the game sessions and the intermediate and final results. All map documents were collected and filed after the game. Photographs were made by a professional photographer and one of the observers.

- *Evaluation form.* At the end of the gaming simulation, the participants completed an evaluation form. The question mainly focused on the participants' level of satisfaction and their opinions on the way the gaming simulation was organized, the use of maps and the outcomes for development planning and Brabant City. Participants were asked to return the forms after the end of the gaming simulation, and the response level was approximately 50 percent (see Carton, 2003).

Furthermore, the progress of the gaming simulation and the results were evaluated by *interim evaluations and debriefing about the collaborative process*. During each gaming simulation, interim evaluation moments were inserted to facilitate a plenary discussion about the course and the results. At the end of the gaming simulation, a comprehensive content-related debriefing was held. As support for these briefings and for process reconstruction purpose served three *interim measurements of the administrative process* during each day.

TUD and RPB each had two researchers fully dedicated to observing during the game. The observation reports of the RPB and TUD were exchanged in order to compare and complement interpretations and observations of different researchers. Also on beforehand the observation frameworks of both research groups were compared, but the observations were made independently by different observers. Finally, all project group members who had been involved in the preparation and were present at the game sessions, served as extra information sources to check interpretations of observations. This group existed of both RPB (3 persons), TUD (8 persons) and the Province of Brabant (3 persons).

Observing subconscious actions-with-maps

A similarity with psychological studies is that the actors had been given an assignment in the game that is directed to another task than working with maps; the assignment is to realize individual and group ambitions in developing future-oriented spatial policy. Meanwhile, we would observe how they would act with maps, which, as we have understood in our previous case and interviews, professionals would do for a large extent unconsciously.

Furthermore, the observers were stressed to be aware and sensitive to feedback messages; how has the setup of the experiment (design of the game and the available map support tools) influenced –predetermined, imprisoned– the behaviour of participants by our choices in preparing for the game, and how representative is the game for real-world map-use-in-action?

Expectations

The different map types were prepared in order to be used. It was expected all map types would be used. However, whether the wall maps would be used was doubted on beforehand, because the participants came from the region and we expected that they would know their region well. It would be possible that they could largely do without maps in their conversations.

It was expected that the block map would be used, as this map would change during the game. In order to see a synthesis of all the developed plans, one could take a look on the block map. It was hoped that the participants would use the maps to review and partially adapt or redesign their plans: but, this review or redesign would not be forced. We would leave it to the participants to use or not-use the available maps in the game.

7.6 The game process in retrospect

Two game sessions make up the context in which we have studied the use of maps. In this section, we describe the actors' perspectives on the results of the game. In the next chapter we will analyse the use of the various map types that have taken place in the wider context of the game sessions.

7.6.1 Actor evaluations of the substantive outcomes

Spatial projects

At the end of the first day on 14 November there were 41 projects on the zoned map. Examples of projects that fitted the Production Space scenario include: the development of large and smaller business parks, housing projects, the construction of a large commercial leisure park, the development of public transport intersections and the development of a second national airport. There were a lot fewer projects at the end of the second day – just twelve – but the projects that were realized were larger and more integrated, including water, agriculture and environmental projects, the establishment of a knowledge centre and the development of a large-scale event centre.

Unlike the first day, the projects on the second day were area-oriented and function-oriented combinations of smaller projects. It was striking that in the first gaming simulation just two of the 41 projects could really be seen as *key projects* that could (only) be realized on the level of the urban network, while on the second day five of the twelve projects were *key projects*. The influence of the two scenarios is visible in the type of project that have been formulated in each session: in the second session,

more ‘non-urban’ investments were proposed, like the projects for an extensive green structure, investments in horse-related businesses and investments in waterways.

In general, during the Production Space scenario people preferred to realize their own projects rather than focus on harmonization and cohesion. Because of this, the block map on the first day was mainly a patchwork quilt of many different unrelated projects. After the second gaming session, the participants observed that the map of Brabant Space of Experience met their expectations more than at the end of the first gaming session and that administrative management had made better progress.

The resulting central block map

Figure 7-9 and Figure 7-10 give an impression of the final appearance of the zoned map on both days. The final block map of the first session, with the scenario Production Space, contained more ‘urban’ projects, and on the second day with the Space of Experience scenario the map represented more ‘green’ projects. This was as expected.

Against the expectations of the game developers, the participants were very critical of their group achievements. In the final plenary evaluation at the end of the game, in both sessions, the group concluded that the view of the block map was ‘undesirable’. At the first game session, the collaborative judgement was ‘very undesirable’ and in the second game session it was ‘undesirable, but a little better than achieved in the first game session’.

In the first game session, the collaborative process at the table of the Contactgroup about Brabant City went slower than the bilateral agreements between private parties and municipalities. The Central Block Map thereby resembled a coincidental picture of what the sum of individual visions would look like in spatial terms once projected on a map. The performance or added value of the Contactgroup was considered very limited.

In the second game session, the central block map resembled a picture “less undesirable” than the first game session, in the words of the participants themselves. The Contactgroup had played a more meaningful role and managed to ‘get ahead’ of the local developments, which contributed to a Central Block Map with sharper distinctions between a network of ‘green’ zones and coordinated, concentrated urban zones.

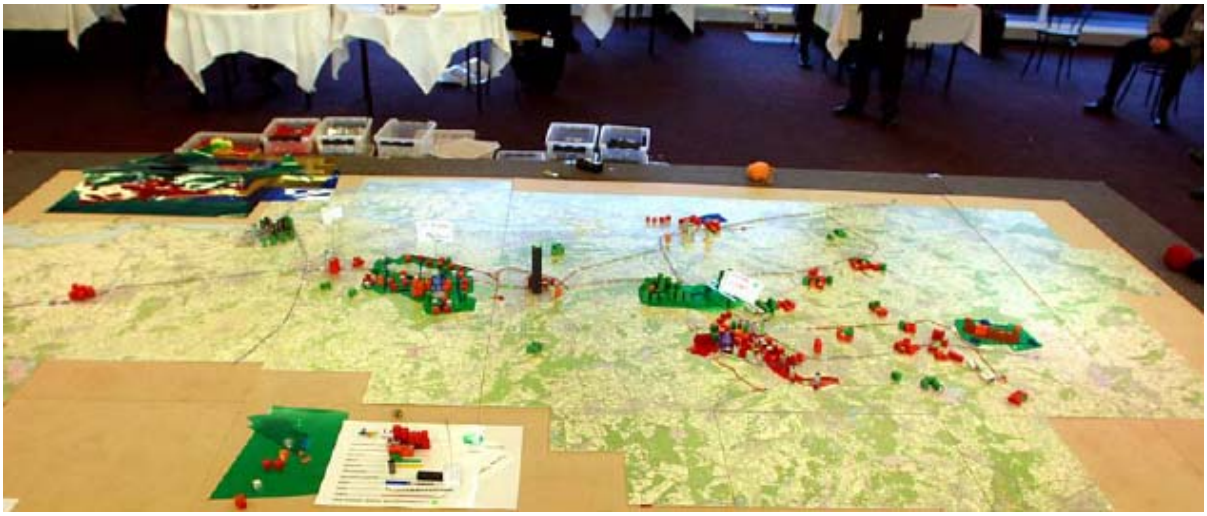


Figure 7-9.Map at the end of the first day: Production Space. See colour figure in Appendix 5.

Figure 7-10. Map at the end of the second day: Space of Experience. See colour figure in Appendix 5.

An explanation for the relatively low appreciation of the process and outcome in the final group discussion was that both scenarios have faced the region of Brabant with developments that it has not asked for, but cannot escape from. Population growth and economic activities coming as spill-over from the Randstad to Brabant may be welcomed in the centre of Eindhoven, or in individual municipalities, but not with reference to the rural landscape of the region as a whole. In that respect, the game and the scenarios helped the participants in learning about the capacity of deliberative spatial planning efforts in the situated setting of Brabant. The figurative 'space' where the participatory platform of the Brabant City Network could have meaning was made more explicit. A participant put the feeling of disappointment expressed in the group in perspective, looking at the resulting Block map at the end of the second session:

> "Our responsibility lies in the task of accommodating these waves of population and economic growth, rather than fighting them or letting ourselves be surprised and overruled by them. Instead of comparing the result with the current situation, of which it seems that we would most favourably wish to keep and protect it as much as possible, we should compare it with a situation where no coordination would have taken place. Given these considerations, the result on the block map today may look rather quite acceptable."

This interpretation was not objected to by others, and, 'reading' from the nodding faces and positive remarks, acknowledged by a majority of the group. We concluded from this that the game, and the resulting block map, had been confronting (with respect to expectations about future scenarios). In our view, the Central Block Map had helped in explicating realistic 'pictures' of the future land use planning in Brabant.

7.6.2 Actor evaluation of the process

The game sessions have been structured into three stages; a beginning, a period at the middle of the game session and the last developments at the end. At each of these moments a short survey was held about the actors' perceptions of the process, in terms of decisiveness, innovation, control/guidance, future orientation, coherence, openness, cooperation and support. For the purpose of understanding the context in which the maps have been used, this section describes the evaluation of the overall process as it was valued by the participants themselves.

A realistic multi-actor process: much interaction, little result

The first and universally shared reaction after the end of both simulation days was that the gaming simulation was a very realistic simulation of daily practice. The chairperson of the Brabant City Bureau:

> "In just one day, I experienced what I have been going through in reality for the past two years with my work for Brabant City. This has certainly opened my eyes."

Many participants cited the high speed at which the projects came about *without their involvement* as an important factor for the uncomfortable situation in which they found themselves. While they were trying to develop a good spatial concept, they felt they were being continually overtaken by the progressive processes of others. One participant aptly compared the gaming simulation to a pressure cooker, with the effect greatly magnified.

The designers – who could be hired to design projects – felt the least satisfied with their role in the gaming simulation. If given the choice, they would have preferred to design their beautiful, innovative and integral spatial concept 'on the drawing board'. However, in practice just as in reality, they were reduced to 'image reproduction' of the ideas of others.

The Brabant City administrators and process managers were very inward-looking. During the interim evaluation on 14 November, the project developer remarked:

> "I didn't even know that the gaming simulation was really about them."

The competitiveness between the Brabant City cities and the occasional insularity that cropped up led to hold-ups and an element of sluggishness in the decision-making process. The main debating point was the distribution of financial costs and benefits among the municipalities. Complicated constructions were devised to regulate funding (money tokens) and distribute the projects over spatial territories, but particularly to ensure that none of the parties paid too much or received too little. In the meantime, the administrators were not available for other tasks and were therefore inaccessible to other parties. In this regard, another project developer remarked:

> "Our projects, our management is different to that in their world (the administrators). When we want to talk to them they have no time, even though our projects tie in with their network city."

One unexpected outcome was that due to the flourishing economic situation in the Production Space scenario, there were more than enough financial resources to go round. As a result, the private parties and individual municipalities were able to largely realize their own ambitions in spite of Brabant City. Some small municipalities and project developers in particular used the opportunity and displayed great resolve and decisiveness in realizing innovative projects. The representatives of the State were ignored increasingly often due to their lack of initiative and their failure to manage Brabant City. The Brabant City Bureau was excluded more and more from the gaming simulation until it was virtually ignored during the final stages of the first day and no longer played any kind of significant role.

The aim of coherence was given up at the end. Figure 7-11 clearly shows this reaction on the lunch evaluation characterized as "Let thousands flowers flourish"; while a change of attitude towards decisiveness had helped in realizing many small individual projects, there was little mutual coherence or synergy in the end result. The participants valued the overall result as very undesirable.

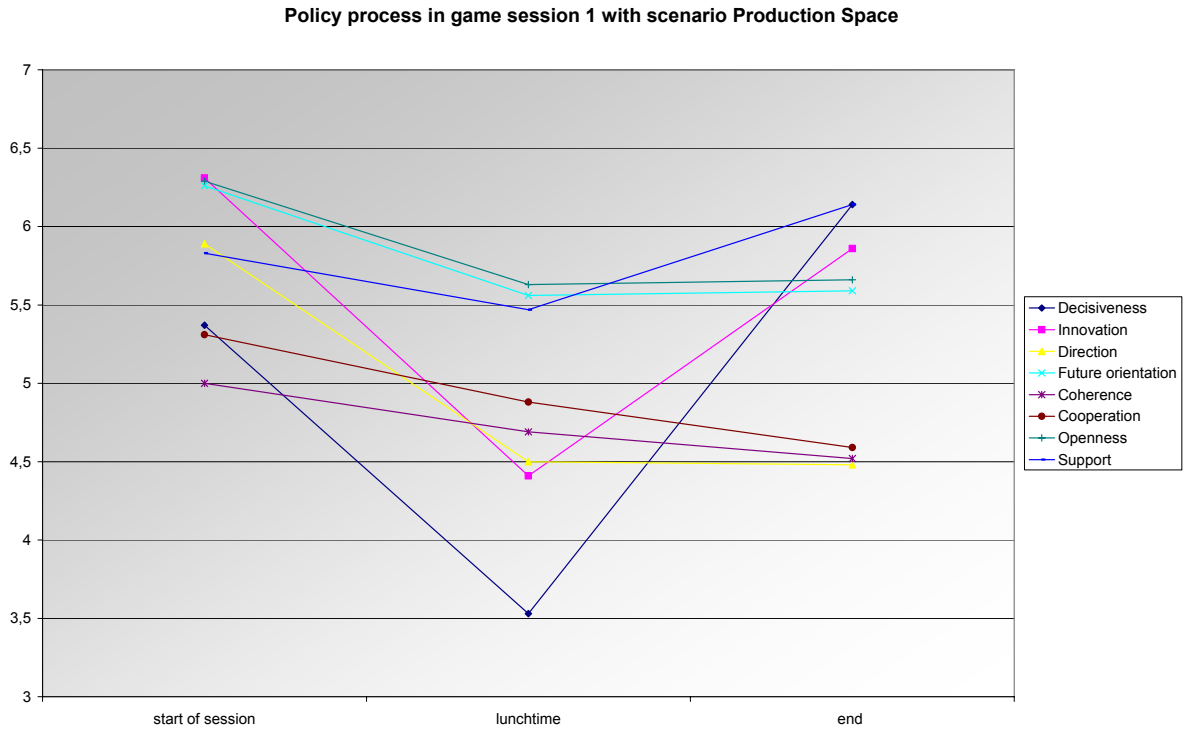


Figure 7-11. Intermediate surveys about the process. (Actors were requested to give a grade (1-10) on the 8 indicators for characterizing the process). This survey represents the first game session, scenario Production Space. The graphic shows a 'dip' of decisiveness and innovation in the middle of the process. At the end of the session, coherence, cooperation and control/guidance have sunk further while decisiveness and innovation have returned.

Consequently, one of the recommendations of the participants at the end of the day was that, in reality, Brabant City should only focus on a very limited number of special projects. The participants seemed to embrace unanimously the *principle of subsidiarity*: *organize locally what can be done locally*. They also denounced any attempts to reach a broad and sweeping consensus, a leftover from the Dutch administrative tradition called 'polder model'.

Adjustments in the second game

In the time available between the two simulation days, the team, RPB and the contact persons of the provincial government evaluated the administrative impasse to which development planning can lead. Together, they devised a number of new strategies so that more administrative innovation could be realized on the second day. Brabant City Bureau would place less emphasis on financial resources, pay more attention to process management rather than content, contribute more to the collective development of concepts by stimulating joint designs and managing a regional development fund, be more visible, and more emphatically focus on external parties such as project developers and small municipalities. On 10 December, this new strategy worked initially, but then the same pattern as before gradually appeared. Again, one of the participants remarked:

> "They're still so busy talking with each other that all I can see in the gaming simulation is their backs. But that's the kind of inward-looking administrative attitude that you also come across in reality."

Brabant City was caught in a vicious circle: no willingness to invest without concrete projects – no projects without concept – no concept without willingness to invest. The mutual trust between parties turned out to have a decisive influence on the choices they made when realizing projects and on their attitude during administrative negotiations. For example, the small municipalities chose to sell land to project developers rather than to the large municipalities, which they regarded as a threat. The large municipalities had to play a double role. They were regularly faced with the choice of going along with all kinds of local initiatives that developed at a fast pace in their local environment or sticking to the sluggish procedures in the Brabant City urban network.

During the second day, this vicious circle was broken by persuasive and decisive behaviour of the member of the Provincial Executive. He proposed in an intermediate evaluation to bring the gaming simulation a step further by accepting the existing 'vision map' that was available as shared perspective, and also to agree (for the sake of progress in the game) that everybody would invest according to the current plan in the Contactgroup, which was the object of long discussions. This was agreed upon and the vision map made by the Bureau was taken as general spatial structure in which project proposals should fit.

An hour later four large projects for Brabant City were agreed upon and put on the central map. A spontaneous applause characterized the atmosphere. In the end evaluation, it was remarked that although the process and resulting outcome still had not been as desirable as hoped, the process of collaboration was better at the end than in the first game session (see Figure 7-12).

In the group evaluation at the end of the game a collection of lessons learned was written on paper. When people discussed what *development planning* is, a tension remained to what extend it is perceived as meaningful or not (to phrase Wildavsky (1979), 'if planning is everything, perhaps it is nothing').

In a last closing speech, the game facilitator reminded the participants that all the rules of the game had been in the hands of the group as a whole, and had been open for change. The powerless feeling of some participants might be a sign of a planning practice that had become imprisoned by a traditional way of doing. The game facilitator ended the group evaluation with a final word about playing games as means for empowerment and social learning.

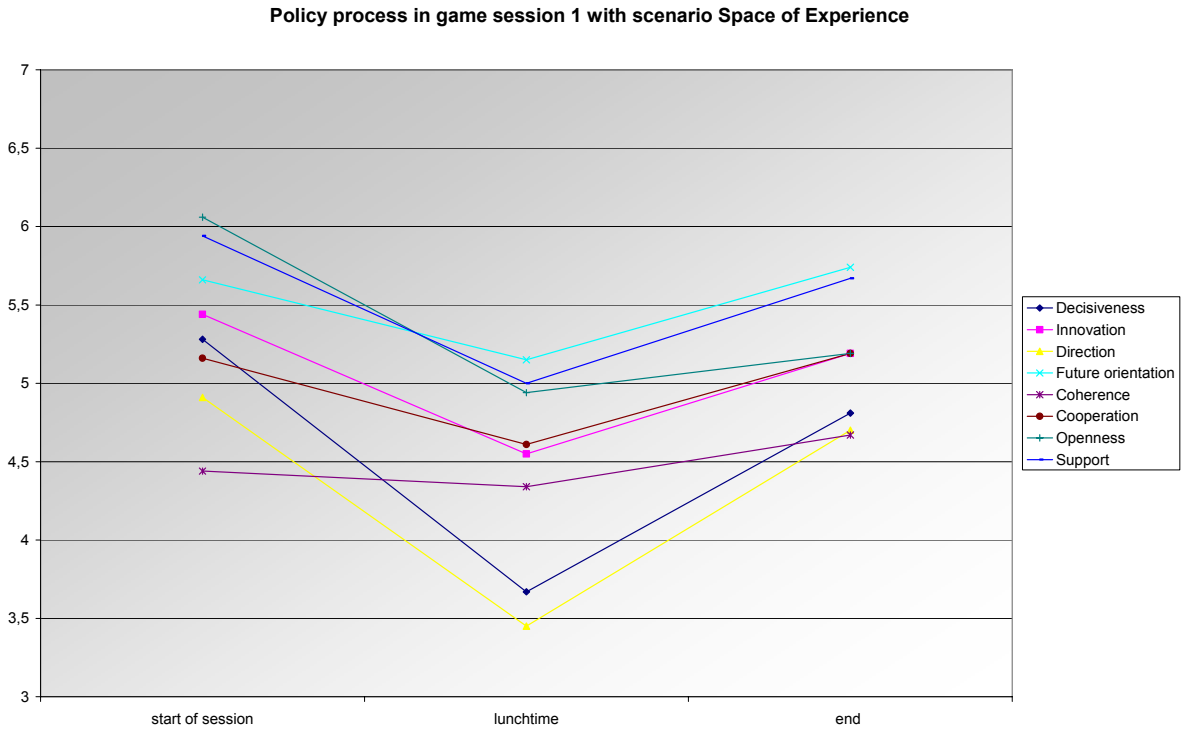


Figure 7-12. Intermediate survey at second game session, with scenario Space of Experience (grades on scale 1-10). Opposite to the first game session (Figure 7-11), all aspects including direction, coherence and cooperation are on the raise at the end of the game.

8 Fear for blue prints: Analysis of map use in the Brabant Game

".....All I see are their backs. I can't come in between to talk with them."

–Verbal statement of participant in evaluation discussion about the game, November 11th 2002.

8.1 Introduction

This chapter focuses on the various maps that have been used in the project Game on Space, during two days of playing the game in Brabant. The use of the maps is evaluated as it was practiced 'in action' during the two game sessions. Three different 'map uses' have been elicited for in depth evaluation: the use of the central block map, the making and use of a vision sketch of the Brabant region and the use of the wall maps. In the conclusions section, the emergence of conflicts and the mechanisms how actors coped with this is discussed.

8.2 Use of the central block map

8.2.1 Central block map: used for checking and claiming, not for redesign

Figure 8-1. shows people working on and pointing at the central block map. The block map was 'used' in all rounds of the game after the initiation phase. It was inevitable that the map would be used, as the block map had a central place in the game; figuratively because the map was the place where all collected plans came together and literally because of the map's central place at the centre of the room. The size and location of the block map, lying horizontally and covering about 15 square meters, gave an impression of a 'bird-eye view' over the province. People who entered the room at the start of the game "bumped" into the map. After the initial speeches, the

explanation of the game and the small theatre-performance to bring the participants 'in the mindset' of the scenario (Production Space on day one and Space of Experience on day two) the game session began. In the initiation phase of the game, the map played no role. In the initial discussions around the tables among the members of each actor organization individually, when a map was used at all, it was the map lying on the table (to point at locations and regions) or sketches of supporting designers.

After the internal deliberation, the actors were assigned to 'go ahead' and realize their plans. This initiated much traffic; people walking around the room, and various meetings taking place. Meanwhile, the block map was just lying there, unchanged. On a few occasions, there were persons deliberating bilaterally 'in the coulisse' who pointed at the map to explain to the other 'what and where' of their ideas. This happened on both days in the same manner.

Figure 8-1. People working around the central block map

In the second half of the morning, the first plans arose on the block map. Once this started, more projects followed. On the second day this happened somewhat earlier than on the first day, probably as an effect of the measures taken by the game-organizers, after their experience of the first day. On the first game-day, the actors took a long time deliberating and reaching agreement about nine projects that were already formulated in the real world; these were the nine 'key-projects' of the provincial program for the City-Network. It took most of the morning before these projects were 'placed on the map'. In order to bring the game towards more innovative plan-making instead of spending time on formal approval of existing plans,

on the second day these nine key-projects were already placed on the map beforehand, as if they had been approved already.

On the second day, the facilitator encouraged the people "not to wait with pushing through 'almost finished projects' and to deliver them as soon as possible at the administrative panel, to put the plans on the map". He explained that the hesitant behavior not to finalize plans at the start of the game on the first day, had been a frustrating factor in the game's dynamics and was limiting the time for 'real innovation'.

After the first projects appeared on the map as a result of the deliberations during the game (see Figure 8-1), many people turned their head to take a look at the map. In the first minutes after the first blocks and spots appeared, the map became a real 'magnet of attention'. People took notice what projects were appearing on the map. As more and more projects arose on the map, people kept taking short looks at the map to keep up with developments. In a meeting of the Contactgroup, one of the city representatives mentioned with a smile, when he had looked again and again over his shoulder to the central block map:

> "Sorry, I have to keep looking over my shoulder because the developments in my region are going so fast."

Although the game facilitator had mentioned that projects could be taken off the map, and replaced by new plans, this did not happen. In the game, the projects placed on the block map appeared as representing a "claim" for that project on the particular location. The claim that would be first on the map was seemingly perceived as legitimate. As the first projects appeared on the map, people got nervous and hurried to bring their own projects towards a closure.

For example, there was a project called 'Culture palace", being planned by the Contactgroup as one of the key-projects. This project was cancelled before it was finalized (and thus before it was on the central block map) because another project with a similar idea, 'Van den Ende Theater', was earlier on the central block map by the partnership of the cities Breda and Tilburg. The Contactgroup felt somewhat betrayed by the cities Breda and Tilburg, as they had participated in deliberations on the Culture palace, but suddenly came with their own competing theatre. This anecdote is one example of the 'claiming' function of the central block map (on the first day's game session). The Van den Ende Theater was first on the central map, and the Contactgroup did not attempt to get it off the map.

Another instance in the second game session where a participant felt as 'being framed' when looking at the central block map, was around the city Eindhoven (on the second day). While the city representatives of Eindhoven were in discussions with the Contactgroup about their larger area, the small municipalities had formulated a large green corridor (part of the Ecologic Main Structure) just in between Eindhoven and Helmond and precisely at the municipal border of Eindhoven's official territory. This while the city Eindhoven had plans to 'grow' towards Helmond. The representatives of Eindhoven complained about this "strategic manoeuvre" of which they had not been given any notice. They went to the chairman of the Contactgroup

Brabant City, the person with the 'highest' formal power in the game, with the request to take this particular piece of the Ecological Main Structure off the map. But the chairman just responded that if all signatures on the project file were correct, and the procedure had been legal, then nothing could stand in the way of the small municipalities. They had just been politically smart, and had used their own territory and jurisdiction. The representatives of Eindhoven remained angry, which gave some people in the game secret amusement. Figure 8-2. shows the part of the central block map that shows the green corridor between Eindhoven and Helmond, established by the small municipalities and their alliance.

Figure 8-2. The established green corridor between the cities Eindhoven and Helmond, disputed by the representatives of Eindhoven.

We identified two instances where blocks and other legend items were added and composed into a more and more complex whole on the central block map (but not radically changed or replaced). One was the planning of the large connected "Ecological Main Structure" in the second game session (represented by the large green spot in Figure 8-2. and in Figure 7-11), another was the project called "Breburg". This was an area-oriented project of the cities Breda and Tilburg.

Project Breburg started with the collaboration between the two cities and the approval of the national ministries to close the military airport between Breda and Tilburg. At this location, a recreational area was envisaged. The plan was extended and extended while it was being formulated. During these discussions, a designer assisted in visualizing the ideas on a map that was part of the project form. When the designer asked a critical question, he was being silenced by one of the city representatives:

> "Shut up. You are just the map-maker. You must draw what we tell you."

More and more ideas were being added to the project. Over two map images, several options were being 'exchanged'. According to the observer, a type of quick 'wheeling and dealing' occurred among multiple actors, and over multiple (project) sketches: "If you agree with this housing area over here, then we will agree with your nature reserve over there". The maps used got busier and busier as these extensions were being visualized. The game assistant who helped in presenting this project on the central block map made use of the various colours to symbolize the 'mixed' type of land uses that were combined in the project. Figure 8-3. shows a number of maps in

succeeding phases of the project Breburg, with sketches and a photograph of the project as it was finally represented on the central block map.

At the end of both game sessions, all projects that had spatial implications have been visualized on the central block map. For the representation, partially a pre-defined legend is used, and partially new combinations and new interpretations of coloured blocks are introduced.

Figure 8-3. More and more detailing to plan and concretize the major area oriented project "Breburg". At the photograph at the upper left, the stakeholders and designer are discussing plans with each other. At the upper right and lower left the plan is visualized. These maps are part of the project file. At the lower right, the project is visualized on the central block map. See colour figure in Appendix 5.

8.2.2 Analysis: Confrontation with the spatial scenario for Brabant

The collectively constructed block map brings an undesirable view
The most remarkable outcome for us as researchers was, that on both days the final view of the block map was classified by the group as *undesirable* (see Section 7.6.2.). There was no doubt in the group in both game sessions that the representation of the outcomes on the final block map was disappointing. To us as researchers, it was not evident that those representations (see Figure 7-10 and 7-11) were to be considered as 'undesirable', but to the group of participants, this was a clear conclusion that was acknowledged by all –no counterstatement has been voiced.

A difference between the block maps' outlook at the end of both game sessions was also noted, and explained as a result of the two collaboration processes (as discussed in Section 7.6.1). The second block map was qualified 'not as bad' than the first, with more coherence and larger, more innovative projects.

Immediately after the second game session had ended, we interviewed a city-planner of Den Bosch on this issue of the map being conceived as undesirable and asked for his explanation. In the various discussions, in our view he had expressed to be an experienced planner and used to working with vision maps and policy maps such as the block map. He gave three reasons why, in his view, the resulting block map was disappointing in the eyes of the participants:

Firstly, the fact that the block maps on both days represented huge amounts of changes to the current landscape was threatening for most of the participants. In his view, the traditional way of living and the small-scale character of the landscape, with many villages and a traditional old-fashioned architecture, is what most people would like to see maintained, and this is not represented in the two end-images of the central block map. The planners of Brabant are people from the region itself who keep hold of their usual, traditional way of doing, and their existing values. They are confronted in the game with the implications from prognoses about land use claims in the future, which turn out undesirable.

Secondly, the city-planner commented the map itself. Another reason why the developments might look extra undesirable on the block map, according to the city-planner, is the fact that all new developments are represented in 3D –all blocks have a height– while the current topography is represented only as flat. Thereby, the new developments rise above the current situation. If the block map would have been completely in three dimensions, also the existing landscape, then the new developments could have been a little less profound and more embedded in their local environments.

Thirdly, the legend, through the use of colours on the block map was somewhat manipulative according to the city planner. The coloured blocks –red, orange, silver, green– were very bright of colour, thereby giving the map a relatively 'nice' outlook, while the high black blocks (representing high-density, thus literally high-rise buildings) were very confronting –look for instance at the representation of the project Breburg in Figure 8-3..

To conclude, the reason why the block map represented an undesirable future state of the region in the eyes of the participants could be traced back to the experienced identity of the Brabant landscape, the traditional culture in planning practice, the lack of support for current and expected prognoses (about developments in housing, business, etc), and the cartographic features of the central block map itself (3D, colours used).

The identity and culture aspects and the aversion to new spatial developments are in contrast to the assignment in the game to give shape to large development projects and much innovation and change. While the planners 'obeyed' the assignments of the game to (try to) initiate and coordinate changes and to work within the constraints and opportunities of the two given scenarios, in fact they accommodated the implications of those scenarios as well as possible while actually disliking the scenarios altogether. Furthermore, by the 'eliciting' effect of the three dimensional blocks on the map, the large changes of the landscape were exaggerated in relation to the current situation, which strengthened the impression of an undesired result.

Functionality of the block map

The block map did fulfil the function of the logical closure of decisions in the game, with placing projects on the map. The map served as kind of 'scoreboard' as planned. Many participants looked at the block map frequently, and multiple participants used the block map for bilateral deliberation. Especially when multiple plans had arisen at the block map, people started to use the block map as device in their deliberations. This is logical as the block map was the only map with an up-to-date view of developments.

The block map also did provide a 'mirror' to the participants of their actions as a collective. The function that was foreseen but not fulfilled, was the function of a device that could stimulate (possibly trough a shock effect) redesign; adaptation and reshaping of plans. Even though people were reminded by the game facilitator that they could without any 'penalty' or damage take plans off the map again, this was not taken action upon. The only attempt by the city representatives of Eindhoven failed.

This was not what we as researchers/game developers had expected. Apparently, the status of the block map was another than the status of the design sketches as produced by the designers, in the perspective of the participants. While the design sketches and vision maps could easily be changed or dismissed, the block map could not.

A reason for this can be found in the process of construction of the block map: only projects that were decided upon with enough financial resources to implement (represented by tokens) and explicit support of the necessary parties (represented by signatures on the project files) were accepted by the panel who administrated the finalized projects and put them on the block map. A representation on the central block map was thus considered an acknowledgement that the decision-making process had been legitimate and closed. It was not in the nature of the participants to take up a finalized decision for reconsideration. Possibly this corresponds with the process characteristic of the decision-making process in the Contactgroup; each project was established through a process of long, slow deliberation, but once decided upon, it would not be reversed.

Another explanation could be that the game sessions were too short; if an extra round would have been played after the last evaluation, participants might have altered plans. However, this argument is not grounded in empirical clues that changes were up hand. On the contrary, the plea of the participant that the picture of the block map might be the best possible in the light of the scenario, with little space for manoeuvring, indicates that changes would not be up hand.

We conclude from the empirical observations that the central block map fulfilled one function well, but did not work fully as expected by us game designers. We have structured the various identified functions of the map according to our framework of analysis[1].

Perspective # B1 (held by whole group of participants and game designers): The block map functioned as 'mirror', as an overview of actual spatial developments, and as 'scoreboard' that signalled new realized plans and conflicts between potential projects. In this perspective, the block map functioned 'as planned'.

Perspective # B2 (held by game developers): The potential of the map to give clues for re-design and replacing projects was not effectuated, although it was tried once. With respect to this functionality, the map was 'non-effective'.

Perspective # B3 (participant who stated last comments during evaluation): As described in Section 7.6.1., according to this participant the outlook of the block map after two game sessions is confronting and carries a message, namely a call to lower expectations. This way, the map might help in giving the planners a (more) a realistic mindset. We (as game developers) classify this as an 'emergent function'; we had not expected the confronting nature of the final block map images because the game participants had got all opportunity to make changes during the game sessions.

Perspective # B4 (in the eyes of the planner of Den Bosch): The block map's outlook with a flat map and 3-D blocks may have contributed to the feeling of disappointment of the participants. The map emphasized the far-reaching changes in the landscape, which were placed in the third dimension (3D) on a flat topographic background. Also the use of particular colours worked manipulatively for the perception of the maps' audience. This could have given a distorted view of the spatial developments that were planned during the game. In this respect, the map may have had different effects than intended, and as it gave a feeling of dissatisfaction, this outcome of contributing to a feeling of disappointment may be classified as 'dys-functional'.

The four perspectives each emphasize a different functionality of the central block map (see Figure 8-4.). In our observations, these different map evaluations seemed among each other not incompatible and conflicts between them did not emerge. (The conflicting projects Ecological Main Structure and Culture Palace were settled in democratic procedures, and that decision was accepted or at least not contested by anyone.) Therefore, we do not report here an in-depth frame analysis.

Instead, we reflected on the different identified functionalities. In reflecting on the

[1] As the evaluation of the Block Map function does not refer to particular conflicts, we found it not necessary to identify particular different time-perspectives. Instead, the various (expected) functions of the block map are entangled.

processes during the game and the reactions shortly after the game, in discussions with both participants, game designers and observers, we conclude that the central block map fulfilled the function of a 'scoreboard of agreed decisions', and that this functionality could not be combined with a function of a re-design device in the game in the way of working by the participants. Namely, if the block map would have been used as starting point for redesigning plans, then the map might have lost its status as scoreboard, as 'visualizer' of agreed plans. In this alternative map use scenario, the *authority of approved plans would have become uncertain.* It could then have become a new discussion who could decide upon what would be put on and off the central block map.

Reflecting on this finding, it was probably a reasonable choice of the participants not to reconsider plans that are on the block map, and thus not to put the authoritative status of this map in question. Instead, the paper sketches of designers were used for the purpose of designing and redesigning, and indeed, those sketches were often changed or replaced. The functionality of design and decision approval were thus separated between the designer's sketches and the central block map. The central block map was symbolic for the 'closure' of decisions.

Relating the functions of the map to the set of frames of the Delfland case, e.g. the analysis, design and negotiation frame, we conclude that:

- The map was not used from a *design* frame of reference; the potential function of the map to support 'redesign' of plans (perspective B2) was evaluated as 'non-effective'.
- Perspective B1 reflects an *analysis* frame of reference. The map keeps score, and functions as an objective 'mirror' from reality.
- Perspective B3 reflects a *negotiation* frame. Because the outlook of the final map images at the end of both sessions resulted to be judged as undesirable, the map worked out as being confronting rather than appealing. According to perspective B3, the map's message is to lower expectations about the potential of planning efforts. We classify this as a reaction from a negotiation frame.
- Perspective B4 is somewhat blurred in our interpretation. It could be classified to either *analysis or design*, being critical about the accuracy of the representation and aware of the psychological influence of the colours of the blocks on the map.

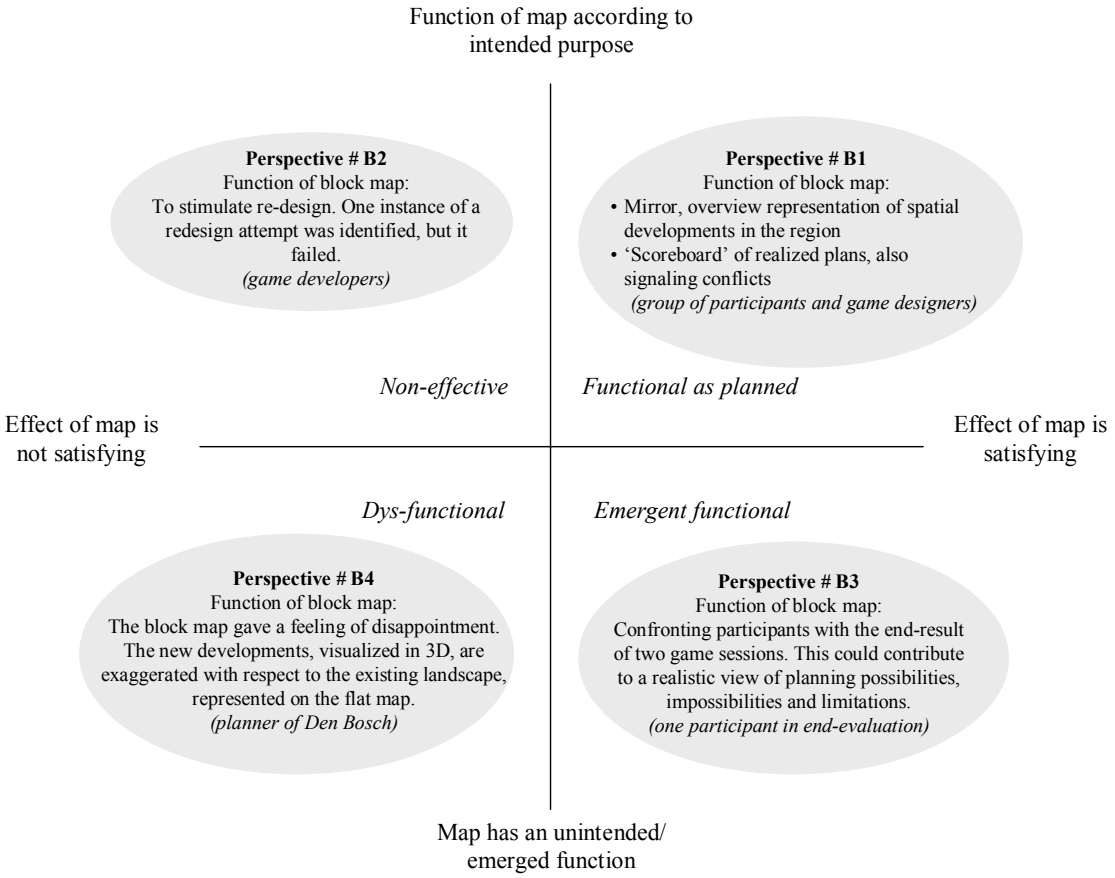


Figure 8-4. Overview of different perspectives on the central block map, each emphasizing a different functionality.

8.3 The wall maps: evaluation of their use

8.3.1 Analysis ex post: Wall maps used, administrative borders ignored

Context

The wall maps had been prepared before the game, as described in section 7.4.3. In the room where the game sessions were held, two boards were dedicated to map images; on each board a set of the same *three wall map images*. (Additionally, other boards were dedicated to the visualization of the scenario, with pictures, short texts, trends, graphics and photo's). Everybody was free to walk around and have a look at the boards with the set of three wall map images and the other boards. The set of wall map images existed of a 'red map image', a 'green map image' and a 'map image with administrative boundaries' (see section 7.4.3.)

Interactions

In both game sessions, especially at the start of the game it was busy around the 'Red Wall Map'. But also in later phases, small groups occasionally went towards this wall map and proceeded their discussions around the Red Wall Map. The participants used this map especially by pointing at areas, infrastructures and locations. The Green Wall Map was used to a lesser degree. One of the designers went to this map several times to trace parts of the map as background for his designs, such as the shape of the creek valleys and the contour of build-up areas (see Figure 8-5).

The small municipalities used the Green Wall Map in their discussion of developing an "Ecologic Main Structure" through the province in the second game session (together with several other participants).

The map image with the administrative boundaries was not used at all during the game. None of the participants found the location of administrative boundaries a topic for discussion; it was not an issue.

The Brabant City group, both Bureau and Contactgroup, did not use the Wall Maps in their discussions. One of the reasons for this could be that their tables were located relatively far away from the Wall Maps. In a few occasions, the Bureau and Contactgroup used the A1-map laid down on their table, in order to locate areas or visualizing their argument with arm-signs over the map.

Figure 8-5 One of the designers working at the Green Wall Map. He copies the boundaries of the existing built-up areas in the region of Breda and Tilburg, as a basis for the area-wide project of "Breburg" during the first game session. Look at how he 'stylizes' the contour lines of grey spots into simpler, abstract shapes on the calc paper.

Quick explorations by one project developer near the Red Wall Map

The only person who immediately began to explore and analyze the wall maps at the beginning of the game (first session) was a project developer[2] (see Figure 8-6). A reason for this, given by this participant, was that in his vision space is going to become a scarce resource in Brabant, especially in the area between Den Bosch and Eindhoven. In his perception the directors/political representatives of Brabant City have not yet become aware of this. He also explained that in the other parts of Brabant, 'metropolitan' developments are absent, and therefore a pinching lack of space will not play a dominant role in the other areas.

Standing besides the Red Wall Map, he invited the minister of Economic Affairs (played by a participant), the representatives of the city Eindhoven and of the public forest management organization 'Staatsbosbeheer' what they thought of his ideas. This way, he found out their opinions and tried to gain support. While pointing at the Red Wall Map, the project developer explained: His main idea was to "give up" one of the green areas in the province, at the centre between the large cities Den Bosch and Eindhoven; and to create a new metropolis "over there" with a lot of business parks, creating work for the inhabitants of the region. "The return on investments of this project could be used to strengthen the other green areas which currently already have a higher ecologic value than the rural area around Boxtel."

Instead of any positive reactions, the project developer noticed he got only negative or opposing reactions. All discussants mentioned the plans at government sides for a so-called "Green Forest" on the particular location around the village Boxtel. A person of city Eindhoven literally said: "This is not achievable."

In a short interview with our observers, the project developer explained that he had come to the conclusion that the Green Forest concept is a "sacred house" (Dutch expression for a topic that cannot be negotiated) of the government parties. Therefore, space for development could best be searched on a different location. As the project developer saw Eindhoven as the unofficial 'capital of the South', the development should be close to that city. The location of the airport at the west-side of Eindhoven, in a furthermore relatively spacious rural area, would make up a good combination with a future-oriented, high-tech business area here. So, the project developer "shifted his plans southward" to avoid loosing time on discussing options for the Green Forest location.

The project developer was very pro-active in inviting other participants and asking them their opinions about his proposals. The early investigation of the political achievability and the flexible adaptation of his plans were, amongst others, ingredients for a smooth realization of his projects in later phases. We saw in later phases of the game that the authority of this project developer increased as other participants copied his behaviour, listened when he was talking and asked him for advice. In the second game session, this participant was considered an important player and partner already at the start of the game. When we asked him if he had a specific reason to use the Red Wall Map to have informal discussions, he answered:

[2] In real life, the person works for the Chamber of Commerce (in Dutch: Kamer van Koophandel).

> "This map hangs on the wall, that is the most important reason. It makes it easy and comfortable to stand beside it and point at some location. Standing up makes fluid and mobile conversations possible, while talking to various participants who come by. Besides, the map hangs very close to our table."

Figure 8-6. Two participants (project developers in the game) discussing policies with the red wall map

Map

The *Red Map image* was used more often in discussions than the Green Map image. On this map, the urban concentrations are most easily recognizable. The large red contours with the Three Urban Zones and the infrastructure makes it easy to orientate on this map.

On our question to the project developer if he found the (red) map image suitable for his use:

> "Well, all the items that I need are on it. Thus the map is well suitable."

The *Green image* was used as well, but less frequently than the Red Map. In the first game session it was used only by individuals who investigated the map or the designers who used it as background. In the second game session, the Green image was used by the Small Municipalities in discussions over the Ecological Main Structure. No comments about the map itself were observed during this conversation. As far as the conversation has been recorded, it dealt about strategy, spatial choices, and landscape characteristics of the appointed areas (e.g. the creek valleys).

When asking other participants about the wall maps during the breaks, they gave answers similar to that of the project developer: the needed information is on the map, thus the map is useful, and other aspects are about the large size and wall-hanging character, which is found easier to work with than the horizontal maps on the table.

Functionality

Two functions of the map had been envisaged:

1. Individual information analysis, that is, 'reading' the map so that the participants get an up-to-date overview over currently existing policy plans (namely the policies described in the Brabant Structure Plan, the New Map and the most recent Infrastructure policy plan MIT);
2. As artefact in group conversations over new potential projects and policies where the wall map serves as spatial representation on which ideas, problems, and opinions about locations and spatial relations can be pointed out.

In the two game sessions the wall map images were used for these purposes, except for the image with administrative boundaries. We consider this Red and Green map images (R) to have functioned 'as planned' (perspective # R1) .

A function that had not been planned was the use of the Green map image (G) by designers for copying spatial patterns as basis for their designs and sketches. The designers showed to be creative in what they used for means of drawing their designs. Also a sketch of the Netherlands presented on one of the scenario billboards was used as background on one of the national sketches of a designer (perspective # G2).

The map image with administrative boundaries was not used at all. Overall, spatial territorial borders did not seem an issue in the discussions, which explains why the wall map was not used. Conversely, hanging a map on the wall with administrative boundaries did not 'make' the participants rethink their spatial territories (perspective A3). (See Figure 8-7).

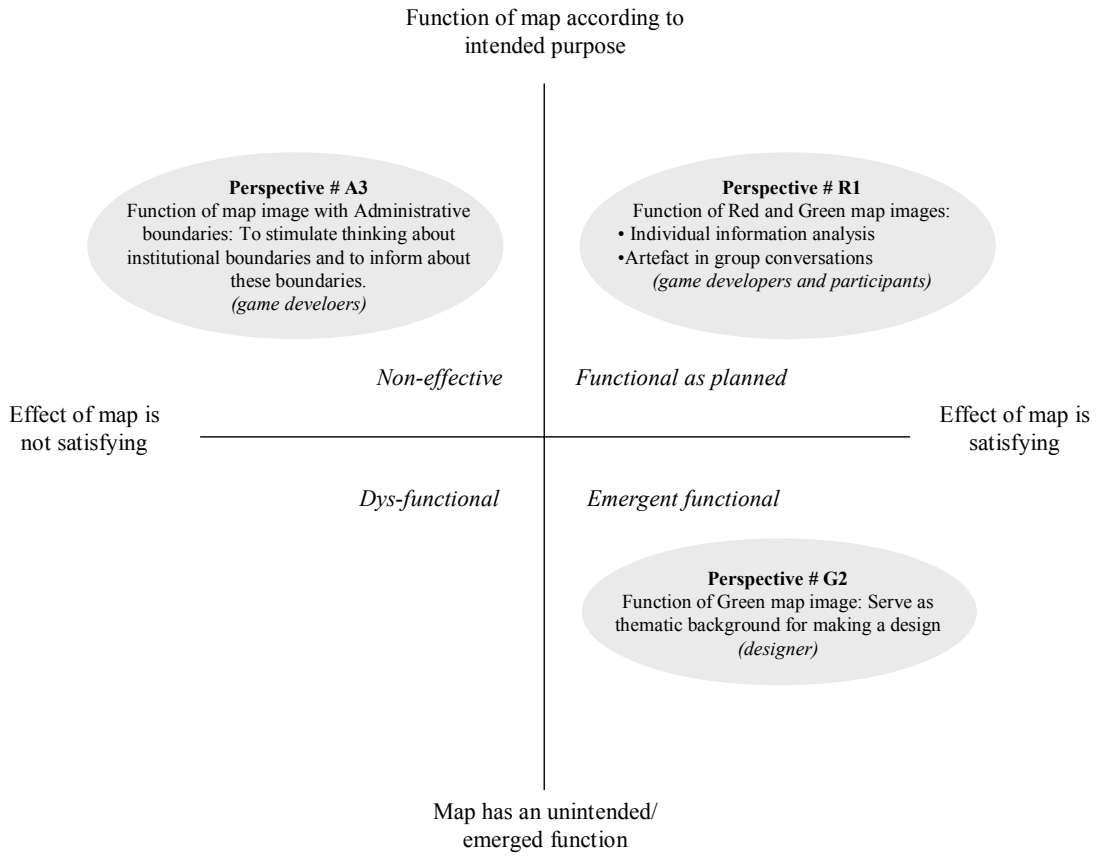


Figure 8-7. Overview of different perspectives on the various images of the Wall Map. The Wall Map contains a set of three images: a 'red', a 'green' image and an image with administrative boundaries.

Interpretation: compensating for information imbalance

In our interpretation, the maps fulfilled a role of compensating for an information inequity. Some participants studied the maps to become informed about current policies. Others did not need to because they were already well-informed. For example, the local governments showed to be well up-to-date about the spatial policies in their area, the maps did not show anything new to them.

The participants who did 'study' or 'read' the map images during the game were mostly people that did not work for local governments, such as the project developer and the man representing the national forest maintenance organization (Staatsbosbeheer). Also the designers investigated the maps. The anecdote of the project developer who 'discovered' that the area of the Green Forest was already designated in the minds of the government representatives, shows an example of how the map fulfilled its function as artefact for getting informed / 'up to date' about policies and plans in the region, and to compensate for information imbalance among participants.

Furthermore, the ideas and expectations between project developer and government representatives were being exchanged while pointing at the map. The project developer understood that his plans for urbanization were not achievable at the

location around Boxtel and he relocated his plans, according to answers of the government representatives on his questions. In this way, the map served a function as artefact or 'common reference' for explicating and exchanging tacit knowledge, ideas and opinions.

Frames

The difference between frames that we elicit from the use of the wall maps were those of the makers (ourselves as action researchers and supporting observers) and the users. The users were very *pragmatic* in their considerations for using the wall maps. They were satisfied with the information provided. "All information needed is present" was an important criterion for evaluating the functionality of the map, and how exactly this information was visualized was no point of discussion. The size and hanging position of the map were explicated as factors that added to the maps suitability for deliberations. In our interpretation, these pragmatic factors were more important in this case than cartographic criteria whether the image could have looked better.

The wall maps proved useful in bridging the backlog of information of the private parties in the game, as opposed to the well-informed city-governments. This had been an implicit aim with the wall maps (see section 7.4.3). We interpret this function of compensating for information imbalance or inequity as a sharpening of our own frame on the need or potential function for the wall maps in the specific context of the Game on Space.

To conclude, the maps were functional for spreading/collecting up-to-date information and for deliberating about new ideas and plans. Whether these functions are perceived from an analysis, design or negotiation frame of reference depends on how the actors interpreted these functions of the wall maps and how they incorporated the use of the wall maps in their strategies. As the wall maps did not lead to conflict, we did not make an in-depth analysis to distinguish between actor-perspectives and actor frames (the project developer did not proceed his plans when he learned his plans could become controversial, rather he adapted his plan). But if diagnosing the frame of reference of the users despite of absence of 'counter voices', we would conclude the following:

The dominant frame of reference, we feel, was that of *analysis*. Most participants, with the project developer as example, used the information on the wall maps and the verbal information of other participants (while they pointed at the map) to think about their strategy in the rest of the game. Deals were not closed while having these conversations, therefore we consider the classification of 'analysis' more appropriate than 'negotiation'.

8.4 Vision maps: spatial sketches used as common goal

The vision building process, as it was practiced during the game, was part of the initial discussions at the start of the game. At the Bureau, a particular sketch, referred to as the vision map, played an important role in formulating a common vision for the region of Brabant. In the subsection beneath, the processes of sketching a map of Brabant and the surrounding deliberations are described in detail as they have been recorded and observed in the *second* game session.

8.4.1 Description of the vision building process

Initiating vision development
The Bureau started with the self-reflection that they should not be 'wanting' to steer or control everything, but to be selective in what projects and type of problems would need the attention on the scale level of Brabant City. And they should have an substantive idea where the spatial planning should be directed towards; they should have a *vision*, as it was called in the game. The people in the Bureau played in both game sessions, and thus learned from their experience built up in two sessions. From the first game session, they had learned that commitment of the B5 governments might fade as the city representatives would notice that it would be more effective to develop and get their plans finalized outside the Brabant City arenas. The Bureaus civil servants had drawn lessons from the first game, and agreed with each other on the following strategy:

> "Begin with a broad vision for 'Brabant City', then listen to others. Select projects where Brabant City can offer added value. Have a vision where to go."

In the second game session, a designer was invited to facilitate the discussion and support by making maps during the preparation phase of the Bureau in making this initial vision. The four members of the Bureau and the designer went standing around the Bureau's table. The designer (in daily life working for the RPB) laid down his analysis of the region. He started talking while laying a white sheet of (semi transparent calc) paper over the A3 map on the table. We observed that the designer got 'the floor' to speak. There were no explicit conditions for the designer in the form of a concrete question (substantive) or time (process) given. But it was clear that a substantive vision for the region would be prepared. The substantive vision visualized on this vision map is described in the next subsection. The strategy for the Bureau, in order to achieve the above described aspirations and vision, is set up according to two lines:

1. Get the Contactgroup Brabant City on this line
2. 'Shop' for ideas, plans and support with the smaller parties in the game. This could be executed by the designers who would be hired in the game by other parties. A hired designer typified his task according this last role: "*so I will be spy-designing…?!*"

Turn in the Contactgroup: vision parked
The vision was presented to the B5 cities and the board of the province in the Contactgroup. The Contactgroup was chaired by a new chairman (in daily life working for the province). This person was not present during the first game session. The chair listened to the vision of the Bureau, but did not grasp or agree why they started with a substantive vision. He expressed his *fear* that the Brabant City initiative would impose a *blue print* plan onto others. He stated that the vision should be parked, and that first an inventory should be made how much money was available at all parties to contribute to Brabant City, so that the financial scope would be improved. This proposal was not criticized by others. Thus, the vision map was set aside, and the Bureau refocused its efforts.

Intermediate evaluation: Reanimation of the vision
During the evaluation before the lunch, it was generally agreed among the participants that they had fallen in the same trap as in the first game session. Lack of a substantive direction or vision was stated as a problem. In the intermediate plenary group evaluation, a participant speaks of the lack of a 'direction' and the lack of an 'assessment framework' to assess proposals on their potential to be taken up by the Contactgroup as a Brabant City project. In his argument, a vision should serve as directive guide and as framework for assessment. This way, everybody will get acquainted with the common ambitions for the Brabant region and the selection of key projects will be more transparent. As a reaction, a spokesman of the Bureau argued that they had prepared a rough vision at the Bureau, but that this initiative was killed in the Contactgroup meeting.

At this moment, the chair of the Contactgroup interfered, bringing in a new proposal. He proposed a 'package deal' of decisions, to get out of the impasse that had brought the process to a halt. He diagnosed that the process of getting consensus over financial funds took too long in the Contactgroup, and that the other participants felt the need of a shared vision. He argued that would be better for the game to be able to carry on as if there were agreement about vision and finances. Among this package deal is the proposal to accept the Bureaus vision for the sake of progress in the game (even though he himself had never heard what the vision substantially was about).

The package deal was accepted. The vision made by the Bureau was accepted as the shared vision of Brabant City, regardless the objections people might have against this vision.
Directly after lunch, all participants gathered around the central block map to listen to the explanation of the Bureau's vision. The calc paper map of Figure 8-9 was sought, and held up against a flip-over. The civil servant of the Bureau explained that it was left to the cities in this vision to differentiate between cities and give their own space and surroundings a specific "theme".

As a reaction, the spatial planner of Den Bosch asked if he was allowed to present his map plenary, as it would be a more concrete crystallization of the designer's ideas and closer to the experience of the municipalities. He presented his vision map, which seems similar visually, but the accompanying explanations and stories are more detailed. (See the next section). A representative of the city Eindhoven had critic on

this second vision. He found these stories too much focussed on 'green' and the visions too limited. In his opinion, talking about visions was not useful:

> "Also I can bring in a vision. We can spend the whole afternoon working on visions."

The game facilitator ended this discussion. The vision of the Bureau was accepted as general direction and assessment framework, which would be used by the participants as guiding principle. The second vision (and presentation of the city planner) is assumed as a possible concretization and furthermore as overlapping general idea.

The facilitator calls upon the participants to proceed with the game and to go over to the next stage, formulating and developing projects and policies that:

(a) Fit in this vision, and
(b) Belong on the scale of Brabant City.

Figure 8-8 shows a meeting of the Contactgroup in the afternoon.

Figure 8-8. Brabant City in session in the afternoon. The vision map of the city-planner hangs on the flip-over.

Conversation about visions and designs in the aftermath of the game

In the aftermath of the game a small-group conversation made clear that the supporting designers felt frustrated about the way the making and use of visions was organized. According to them, the game should be more structured and the process set-up towards more collaborative design. Then the work of the involved expert designers could have played a bigger role and a collective vision map could have been more ambitious and of better spatial quality. The process could have led to more far-fetching ideas, so was being argued. Then they could have made a high quality vision

map. While one professional designer had amused himself better than others, all the –young– professional designers with the role of facilitating other stakeholders during the game shared this opinion.

We held a short interview/conversation with the supporting designers in the aftermath of the game, which was also attended by two city planners of Brabant. The opinion of the designers about how the game should be organized differently was not shared by the city planners of Brabant who attended this conversation. One of the stakeholders (in real life spatial planner at Den Bosch) replied:

> "When I was a young designer, I also wanted to make innovative spatial plans and design far-fetched changes in the landscape. When growing older, I learned to be more realistic about the scope of influence of a city planner."

This conversation in the aftermath of the game resembled the same type of tension inherent in practice with designs and vision maps. Some saw professional designers as key-players in spatial planning processes, others perceived designers as one of the many –more or less peripheral– stakeholders with a subordinated role.

8.4.2 Analysis: Power to the people, call for a vision

Context

The game process evolved in multiple 'rounds', with changed contextual circumstances. At lunchtime, the conditions had changed. The Contactgroup made a U-turn and accepted the vision map as basis for further development. The vision map got a new status as part of a 'package deal' to come out of the deadlock situation in the overall policy process.

Interaction

The drawing pen was in the hands of the designer in this first round of the game, at the Bureau while making the vision. Here, there was a clear client-advisor role, where the advisor –in this case the designer– facilitated the discussion and the others thought along with him. The substantive choices in making the map will be explained underneath.

Map

There is a clear choice of scale: the Brabant province as a whole. Technically, the vision map is produced by drawing on a white paper, overlaid over a topographic map on the table. Colours are used as legend items: green for agricultural (stripes, dots) and for nature (intense green filling), blue colours for creeks and rivers, red and black for infrastructure and settlements. For each legend element, that is each colour, the existing situation is drawn at first. Then the related problems, dilemmas and ambitions are discussed and choices upon map-related trade-offs are made. In order to explain

the substantive aspect of the visual sketches that is presented in Figure 8-9, the additional verbal story needs to be taken into account. This verbal explanation is added underneath, through the recording of the substantive discussions while the map was produced/ presented by its maker.

The making of the Bureau's vision map

On the map, the designer drew the rivers Meuse and Rhine (thick blue lines), and the creeks in the south (short blue lines) on the bottom of the map. The designer started explaining that he saw strong *carriers* of the landscape in the North, with the river landscape between Meuse and Rhine, and the South, where creek valleys characterize the landscape. He explained that here, the landscape of creek valleys had been formed since the retreat of the last glacial period. In the middle of the map, the agricultural development of the sand and peaty soil, together with the occupation of the region, settlements had grown through history towards the fragmented landscape of today (see Figure 8-9). The designer further argued that in his observation, the rural landscape was very fragmented. He slowly drew small red, black and green dots on the white paper overlaid over the A3-map on the table, explaining them as 'pieces of urbanization, agriculture, and nature'. The civil servants working at the Bureau agreed.

Figure 8-9. Vision map of the Bureau Brabant City. Some of the initially drawn dots are still visible. See colour figure in Appendix 5.

The designer posed a general observation: "*I see a tension between spread and concentration*". Furthermore, he pointed at the ambition to create a network city: "Public transport is only profitable if one concentrates." The chairman of the Bureau

summarized the shared feeling among the group members: "*The starting point should be 'city'*." What the common problem was, was easily agreed upon, and remained for large parts implicit. Clearly, the "pressure" of spill-over effects of the activities in the Randstad, both demographic and economic, was seen as important driving forces behind the –perceived– problem. More people and economic developments were expected to occupy the landscape (representing housing areas and business parks and extra infrastructures, together associated with 'red'). The problem that was agreed upon was the fragmentation of green-blue and red developments in the landscape.

An important question had now become: Where to channel the 'spillover' of the Randstad in economic and demographic movements towards Brabant? The laid down pattern of *river landscape* in the North and *creek valleys* in the South were seen as valuable green-blue landscapes that should be conserved and improved. The river landscape had as value its 'openness' and this excluded this area as option for planning developments like villages and extensions of settlements. The creek valleys had as special value that they reached as 'fingers' from the south into the urban fabric of Brabant, and thus served as 'backyard' for the urban population, to recreate, and to enjoy 'nature'. Through their meandering shape, a lot of people living in urban areas would feel close to areas of natural beauty.

It was clear for the group that these creek valleys were an important 'green' asset of the region and that should be invested in their green-blue quantity and quality. The valleys should not be occupied by settlements, or narrowed.

These explanations, recorded here on paper, were told by the designer while looking at his map, thinking aloud and explaining his thoughts. The conclusion that he drew was that, expecting that economic activities and housing developments would be on the increase, the concentration of these activities should be in the middle area on the map. The cities could grow within their urban 'spheres' that were laid out in the current structure plan of the province, with red contours (zones) around the urban areas. This plan was acknowledged by the other members of the Bureau.

Then a question was asked by the designer about how to designate the non-urban areas. The existing idea for a Green Forest in between the three urban areas was mentioned, and this area was coloured green on the vision map. The recreational and natural landscape qualities of this area should be enhanced so was decided. Also the creek valleys were coloured green; also here there should be invested in quality of the green landscape. At the west and east of the main three urban zones, agriculture should remain a main carrier of the rural landscape.

A final point was the Urban Network strategy related to the B5 cities. The participants of the Bureau agreed that the plan-making for the cities should comprise their surrounding rural countryside (called "the backyard of the cities") and not stop at their territorial border. As general 'motto', the term spatial *differentiation* (between the cities and between the designated areas or zones) was expressed as the Bureaus' objective in the game.

Second vision map presented by planner of Den Bosch

The maps of the Bureau and the city-planner of Den Bosch have much in common on a conceptual level (see Figure 8-9 and Figure 8-10). In the two presentations, the visual sketches seem rather similar, with as most remarkable difference the presence

of *infrastructure* in the Bureaus vision, which structures the space, while this legend item is absent in the vision of the city-planner from Den Bosch. This made this second vision look 'greener' than the Bureau's version.

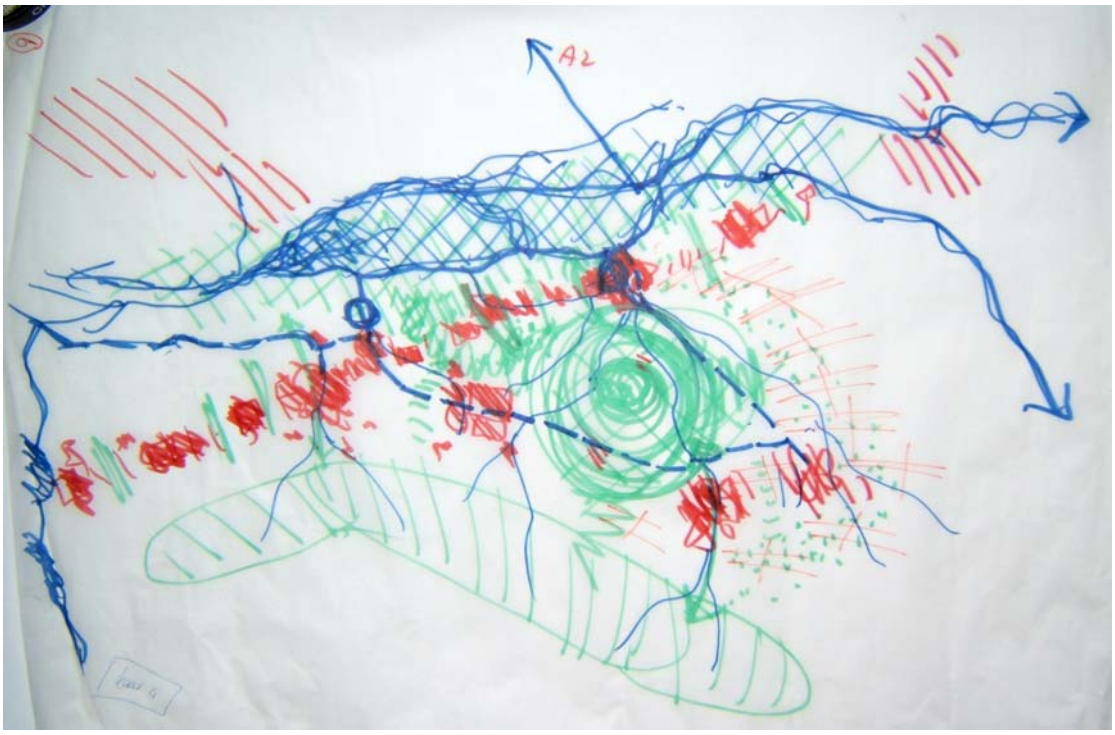


Figure 8-10. Vision map of the urban planner of Den Bosch. See colour figure in Appendix 5.

Functionality

Dynamic environment and changing function of the map

The function of the vision map did not change considerably over time, although the contextual environment did. The act of vision-building, as it was practiced by the designer and the four participants of the Bureau, was remarkably quick and smooth. During this map-making, the thoughts of the small group of participants were allocated and brought together in a process that I would call '*deliberative design*', *eliciting patterns in the landscape while formulating (new) objectives*. Because there were no big differences between the thoughts of the participants, and no situation of different interests, there were no discussions that would be termed emerging conflict at this stage.

The thinking of all group participants contributed to the decisions made, while the designer drew the map image. The making of the map served as *proxy* for analyzing the essential characteristics of the 'real' landscape. By visualizing landscape patterns, the essential spatial characteristics of and developments in the region were explored and in deliberation assessed on its nature and desirability (for instance: fragmentation desirable or not?), and accordingly related problems and dilemmas were formulated. We consider this activity of map-making as an act of visual *problem framing*. The making of the vision map forced to make choices; spread or concentrate

developments; mingle or separate 'red' and 'green'. The designer asked these questions to the civil servants of the Bureau.

Once produced, the function of the vision map altered. Then the map served to persuade others of the overall spatial direction, and to let this *coherent picture guide choices* in formulating and supporting projects. This fits with the expressed need before lunchtime as lacking an '*assessment framework*' for approving, and disapproving project proposals on the level of Brabant City and as guidance in the formulation of new proposals. When an alternative vision map was proposed by the city planner of Den Bosch, the process could have turned into a *comparison and competition* between the two visions, but this discussion was broken off by the game facilitator. Next, the vision map functioned according agreement, as assessment framework and guiding principle.

Perspectives of multiple actors at various moments in time

There were different perspectives on the functionality of the vision map, at various moments in the process.

The first perspective is that of the Bureau together with the two designers at the start of the game. For them, the map served the purpose of making choices and as a visual '*storyboard*' in the collaborative design of a vision (perspective # V1).

When the people of the Bureau present their vision map in the the Contactgroup meeting at 10:15 hours, the map had got a different function. Now, the Contactgroup had to be persuaded of the produced vision, and next the vision should be used as general framework by the rest of the game participants (perspective # V2).

The third perspective is that of the Contactgroup led by its chairman. The chairman even refused to discuss the map. The vision was considered a potential controversial map and the Contactgroup feared a top-down blue-print planning approach (perspective # V3). The Bureau thought otherwise, but accepted the Contactgroup's decisions.

The fourth perspective comes at lunchtime, at the plenary reflection on the policymaking process, when the other parties 'accused' Brabant City of having no overall framework. The vision got a new 'life' when the rest of the game participants (other than the Bureau and Contactgroup) hear that there was a vision produced, but that it had not been used. Then the proposal of the chairman of the Contactgroup to a package deal was embraced by all participants (perspective # V4). Accordingly, the vision map, and its 'sister map' of the city planner from Den Bosch, were then used as guiding framework for further policymaking.

These different perspectives towards the same map document are summarized in Table 8-1 and in Figure 8-11. Table 8-1 also includes the evaluation of the functionality.

	#	V1	V2	V3	V4
ACTOR-TIME PERSPECTIVE	*Actor*	*Bureau*	*Bureau*	*Contactgroup*	*All other game participants (all actors in plenary other than the Bureau and Contactgroup)*
	Time-period	Morning, 10:00 hours	10:15 hours	10:15 hours	12:00 hours
INTENTION	*Objective of the actor(s) with the map*	Explicate vision: Characterize the region, clarify desired situation, make choices.	Persuade the Contactgroup, discuss and decide on future ambitions	Fear for top-down approach and blue-print planning, fearing lack of support and neglect of bottom-up initiatives.	Solve the felt lack of direction and a common assessment framework by accepting one rough global vision
OUTCOME	*Action/Effect*	Internally at Bureau, among civil servants and designer: many choices made.	In contact group, map-making overruled by Contactgroup chair. No support for vision map.	Plan of Bureau terminated by chair.	A process decision was made (to accept a package deal). The map presentation was paid plenary attention to; this gave new direction for action.
EVA-LUATION	*Functionality*	**Functional as planned**	**Non-effective**	**Dys-functional**	**Emergent functional**

Table 8-1. Different actor perspectives on the functionality of the vision map during the game

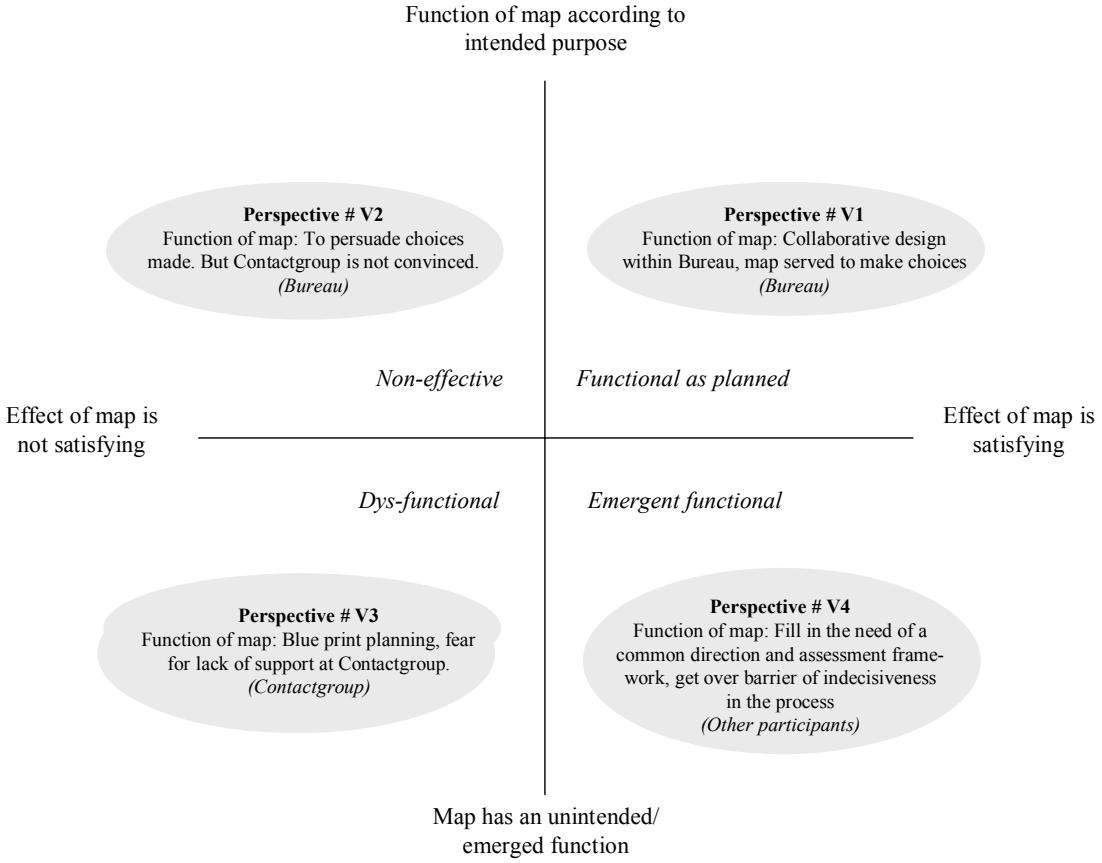


Figure 8-11. Different actor-time perspectives on the functionality of the map.

Frames

In the process, there is a clear conflict between the perspectives V2 and V3. This conflict is settled by the hierarchical organization, where the (supporting) Bureau has to act according to policy and strategy decisions taken by Contactgroup. But later on, the perspective V2 gets new support by the 'other' stakeholders outside the Contactgroup, in the plenary evaluation. Then the Contactgroup gets convinced about the merits of using the vision map.

Elaborating on the above analysis, the difference between frames can be appointed as explanatory factor for understanding the conflicting point of view in perspective V2 and V3. For clarifying this conflict, the frames that have been formulated in the Delfland case can be distinguished, especially the *design frame* and *negotiation frame*. In the view of the design frame, a map is necessary as common goal, as symbol for consensus about substantive policy. In the view of the negotiation frame, the map is only instrumental in a process towards collaboration, where the substantive policy should 'emerge' bottom-up. While the Bureau sees the fragmented nature of the physical landscape of Brabant as a main problem, the Contactgroup has its focus on the 'soft' or managerial aspects of how the five cities could and should work together as a connected whole. We have set these conflicting characteristics of the two underlying frames of reference next to each other in Table 8-2.

The conversation in the aftermath of the game, between the professional designers and city planners of Brabant (see section 8.4.1, last paragraph), also reflect different, and in a way even opposing perspectives. In our interpretation, this difference between attitudes also falls in our earlier defined categories of a "design frame" respectively a "negotiation frame". In the perspective of the design frame, the process must be subordinate to make a best vision possible, while the vision must be subordinate to the policymaking process in the perspective of the negotiation frame.

Two conflicting interpretations of the policy process

	DESIGN (D) frame	NEGOTIATION (N) frame
View on policy process	• Process subordinate to making a best possible vision	• Vision subordinate to the policymaking process
Main urge in game	• Create new ideas, solve problems in the physical landscape, formulate new ambitions	• Choose, decide, align up existing ambitions among local representatives for managing the region
Focus	• Creation, presentation of vision, persuasion of 'others' in the game about this policy alternative	• Interaction, arranging collaboration and trade-offs among actors, get consensus about interdependent policy process
Main function of map	• Vision as goal, symbolized by map	• Vision as means, no map necessary

Table 8-2. Two different interpretations of the policy process with the vision map perceived either as a goal or as a means. The design frame underlies perspective #2, held by the Bureau, while the negotiation frame underlies perspective #3, held by the Contactgroup.

The vision map as it emerged visualized the substantive frame of the creators on the spatial problems of Brabant. When the vision map of Den Bosch is presented next to the vision of the Bureau, a critical voice argues to get back to work: "We can spend the whole afternoon working on visions". In our view, this critical remark typified the tension between people for whom the discussion about a common vision is a relief, and those who have the feeling that as long as no decisions are taken, deals about tokens (finances) are reached or project files are finalized, no 'real work' is being done. We explain this as a clash between the design frame and negotiation frame, but in this example one could also speak of vision oriented people and action oriented people.

Recognizing the analysis, design and negotiation frame

We argue that we have seen all three frames, analysis, design and negotiation frame, being visible in the discussions over the vision map. Although the analysis frame has been less profound than the other two frames, we consider one of the arguments for 'needing a vision' to be an explication of the analysis frame. This is the call for one common vision for the purpose of providing 'direction', for the sake of having an assessment framework, and in order to make the selection process of key-projects more transparent. In our view, this argument is a call for rationalization of the process: calling for structure and for a clear procedure and criteria for selecting key-projects. Therefore, we consider it an argument that is built upon an analysis frame.

By engaging in a debate, the three frames are intertwined with one another as deliberations proceed. To us, this is plausible because of the different argumentations why the vision maps are or are not necessary: in the discussions is spoken of the map as assessment framework by some, while the same map is seen as necessary explication of an innovative and coherent plan by others, and again others just allow the map presentation and discussion for the sake of progress, such as the chairman of Brabant City. All in all, the various perspectives on the vision maps were at some points conflicting, and these conflicts remained while the decisions were settled by decisions based on hierarchical or pragmatic arguments. Table 8-3 structures the three frames and their accompanied perspectives on the functions of the vision maps.

Division of the functions of the vision maps over three frames

ANALYSIS frame	DESIGN frame	NEGOTIATION frame
• Clarify the desired state of the region, which serves as collective 'direction' (objective) for the participants	• Serve as device to articulate patterns in the landscape, generate new insights by drawing	• Assist in moving latent arguments towards an explicated policy agenda, with the map as storyboard
• Serve as (visual representation of) the objective and assessment framework	• Express ideas and options; show innovative idea (vision) as result of art and crafts work	• Persuade actors with an argument or story, presented graphically.
• Reassure transparency about the assessment of projects	• Reassure coherent concepts about the landscape, visualize alternatives	• Reassure the communication of strategically relevant arguments, ideas and decisions.

Table 8-3. Function of the vision map(s) as discussed in the game, divided in the categories of an analysis, design and negotiation frame.

8.5 Overall use of maps: Findings and discussion

8.5.1 Functions of the maps in the game

Overall impression: role of maps taken for granted
Overall, the maps that were used during the game were taken for logical and obvious instruments. Some participants complained that the small topographic background sheets, provided to point out the location of a project proposal, were in black and white print instead of full-colour. Two others complained that the maps attached in the project files were too small in scale, and asked for a project file with a larger scale map (which were available). But most of the participants did not think of this as an issue that mattered during the game. They used the maps that happened to be immediately available on their table or let a designer draw a new one in real-time (see Figure 8-12.). Otherwise, they would just describe, discuss and negotiate about the project proposals in words. This does not mean that maps were not used; many maps and sketches of maps were used, as can be seen in Figure 8-12.

Figure 8-12. Parties at work with maps: drawing and deliberating over plans and base maps

The spatial locations of many projects were not found to be critical. Instead, the costs were believed to be a bottleneck (while in the first game session, there even was a large amount of superfluous money circulating in the policymaking arena which had not been spent during the day). Nevertheless, the actors had a cautious attitude in

spending money and they feared competition of others on the aspect of costs, not on the issue of space. All in all, the participants' attention was focused on money (tokens in the game) rather than on space, which was visible by the vast attention that the many notes on budget divisions got from participants in the Contactgroup (see Figure 8-13.).

The central block map was an exception. People often took a glance at this map to *monitor* the overall 'vision-in-development' and the developments relevant for their own region and projects. One participant associated the block map with a 'magnet'.

Most policymakers that we have spoken and observed in action considered it inevitable to spend some time on making maps in order to get the plan on paper and to iterate towards better versions of the plan. They considered map-making as part of 'sunk costs' involved in spatial planning.

The actors did not spend time on discussing the making of the maps itself. When the term map was used, most often the content of a map was referred to, that is, the substance of the plan, and not the particular image. This happened for instance in references to the map of 'Breburg' and references to the (mapping of) 'the creek valleys'. The map artefact was thus in these discussions representing the actual territory, and the translation of this territory into a map was so evident and undisputed that it was not explicated. The people used the maps as visual communication channel –with pointing at locations– in meetings with other participants. They rather were discussing where to go (the plan) rather than 'how to drive the car' (how to map). For this purpose, the maps were 'functional as planned'.

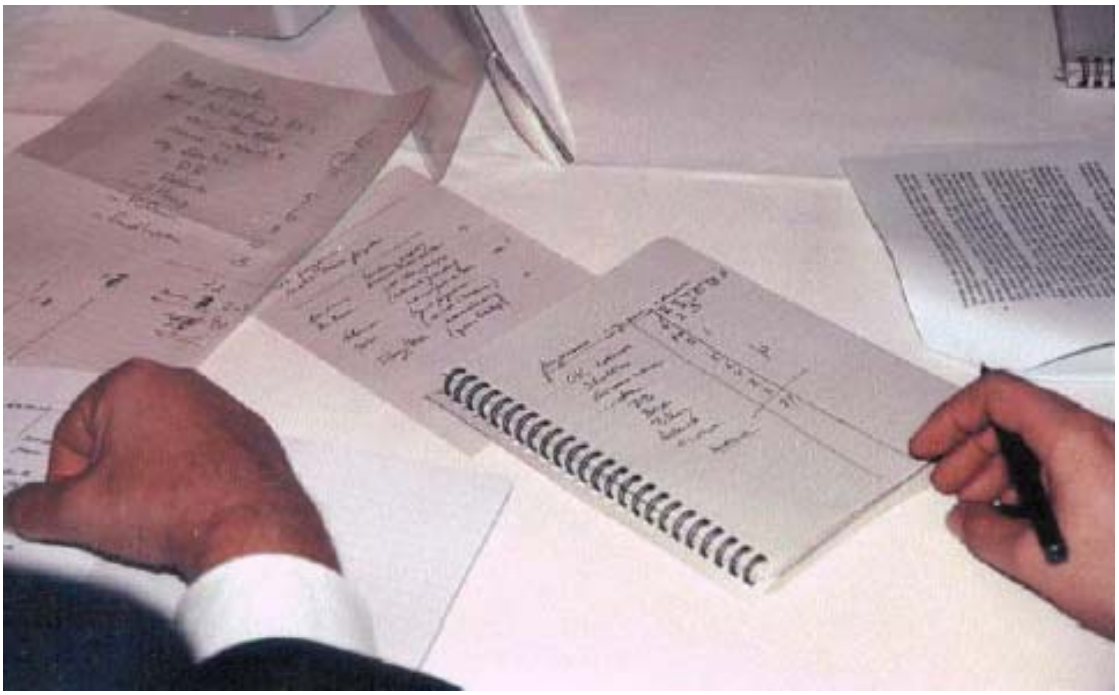


Figure 8-13. Many lists of budget divisions on the deliberation table of Brabant City.

Pragmatic considerations in map use

The game showed that a lot of considerations in map use for spatial planning were made from a pragmatic point of view. This was especially visible in the case of the wall maps. In the preparation of the wall maps the costs of printing were an important consideration, while in the use of the wall map the stated considerations were the presence of the relevant information, and the hanging position and size of the map, handy for a group to stand around. The appreciation of the wall map characterized the relatively arbitrary attitude against the visual appearance of the maps. Also, the implicit 'translation' of real-world plans into map visions –and vice versa– indicated the relative taken-for-granted-attitude towards maps by the actors involved.

Instrument of the Block Map: Representation of the recent "New Map" ICT-tool in practice

The monitoring function of the ICT-tool "The New Map" was inherited in the game. As described, at times the map had been a 'magnet of attention'. Like the New Map tool has the function of comparing and signalling conflicts between plans, the block map did the same during the game. The conflicts over the Culture Palace versus the Van den Ende Theatre and the Ecological Main Structure near the border of Eindhoven city, were signalled by the corresponding features on the block map.

The claims of the New Map tool to democratize the knowledge about spatial planning and to give an up-to-date overview of spatial development (see section 7.4.2.) are confirmed by the use of the block map in the game. The claim that the New Map is useful as blotting-pad for design on a regional scale remained a question. The block map was useful as up-to-date device for deliberations among spatial planning actors. If the block map would have been materialized in a computer-version, it would have been possible to make prints of updated versions, and using those for instance as background layer for new drawings by designers. However, this was not signalled as a missed opportunity by anyone during or after the game.

Non-functional, dys-functional and emergent functional maps

The survey held after both game sessions points out that the participants are satisfied about the supporting maps in the game. This is presented in Table 8-4. The assumption that the participants, for a large part existing of spatial planners, would be acquainted with working with maps in their professional life is confirmed in the survey.

1. Statement: The maps (block map, black-and-white maps on tables, wall maps, etc) were a good support of the game		
	First game session (N= 27)	*Second game session (N= 18)*
Mean [1 = disagree, 5 = agree]	3.41	3.11
St. dev.	0.89	0.96
2. Question: To what extend do you use geographic maps in daily life?		
	First game session (N= 27)	*Second game session (N= 18)*
Mean [1 = not at all, 5 = a lot]	3.78	3.83
St. dev.	1.19	0.92

Table 8-4. Selection of the survey with questions about the use of maps

Most functions of maps were fulfilled in the game as planned. Underneath, we have summed the specifics for each map type:

The central block map:

- Functioned *as planned*. The map got a lot of attention in monitoring the development of projects (perspective B1);
- The block map does not fulfil its potential function as device for redesigning plans. On this aspect, the map is '*non-effective*'. Rather, the participants attribute an authoritative status to the block map as the formal 'scoreboard' of decisions taken (perspective B2);
- The shape of the map, with new projects visualized in the third dimension on a flat map and the use of bright and black colours, created a distorted map view that may through exaggeration have worked manipulatively in increasing the feeling of dissatisfaction with the end-result, and thus work *dys-functionally* (perspective B4);
- In clearly visualizing the spatial impacts of proposed projects and policies, by confronting the participants with the implications of their planning work, evoking a feeling of disappointment, the map may adjust their expectations to a realistic level. We classify this as an *emergent* functionality (perspective B3).

The wall maps:

- The wall maps fulfilled the specific function of *compensating for information imbalance* between the private parties and government actors. The Red and Green wall maps were useful for information analysis about spatial policy and deliberations among actors, *as planned* (perspective R1);
- Also for the designers who helped in formulating new plans, this map offered a good informative starting point and base layer for making their sketches, and

therefore a designer picked the Green map image as base layer for his designs; an emergent functionality of this map (perspective G2);
- The wall map image with administrative boundaries has not been used in both game sessions. The making of this map was thus '*non-effective*' (perspective A3);

The vision map:
- In the observation and interpretation of the observers, the making and use of spatial sketches was practiced during the game *as planned*: professional designers were invited by actors to support with making maps, and they produced maps on the basis of drawing their sketches by means of overlaying over base maps on the tables (perspective V1);
- The strategy of the Bureau, to persuade the Contactgroup to accept the map as common vision, did not work. The map was parked, thus non-effective (perspective V2);
- The vision map may, in the eyes of the chairman of Contactgroup Brabant City, be regarded as example of '*blue print planning*' by the other participants in the game and may rise protest, and as such do more harm than good; he considered the vision map as '*potentially dys-functional*' and therefore he put the map aside (perspective V3);
- The vision map of the Bureau got a 'second life' halfway the second game session, when the policy process got stuck and many participants called for a vision to give directions for new projects and to serve as a common assessment framework. This function fitted with the initial objectives of the Bureau, but they had not expected that their map would play a role after the Contactgroup had put it aside. In the perspective of the participants other than the Bureau and Contactgroup, who had not been informed that a vision map existed, the map was '*emergent functional*'; for the group of participants it seemed handy that this map 'was suddenly available' (perspective V4).

Even though we as researchers prepared the use of maps in the game purposefully and consciously, aware of potential pitfalls in how maps can be used differently than planned, we found in the game instances of non-effective maps and examples were maps worked (potentially) dys- functionally. We also found a verification of our assumption that the context of policymaking is so dynamic and capricious, that the functionality of a map cannot be totally estimated beforehand; with the policy process entering new rounds, new 'lifes' of a map become possible or impossible, such as was the case with the Bureaus vision map.

Our overall objective with the ex-ante design of map-support was not to prepare map use that would be hundred percent 'functional as planned', without any surprises or inefficiency, but instead, to prepare the supportive function of maps suitable for the participants in playing the game and 'good enough' as supporting means for this purpose (satisfycing). That is, the presence/absence of maps should not be regarded as a bottleneck during the game. (And thus for example, in the first game we were nervous about having prepared enough basis-layers for drawing map sketches in the project documents).

Furthermore, we wanted to provide enabling conditions for a particular behaviour; that participants would rethink their current practice and their territorial organization. We made a number of choices with this function in mind, namely the choice for emphasizing the re-design possibility of replacing projects on the central block map, and by adding the 'wall map with administrative boundaries'. But the influence of this 'manipulation' could not be observed during the game.

On the whole, we conclude that the functions of the maps have been in balance; many maps functioned as planned; with two non-effective examples, and two examples of emergent functionality.

8.5.2 Conflicts, frames and map use

Emerging conflict over maps, as described in this chapter, are observed at five occasions:

1. At the central block map when the Van de Ende theatre planned by the cities Breda and Tilburg was earlier 'on the map' than the Culture Palace, which was envisaged by the Contactgroup;
2. At the central block map about the establishment of a green corridor –part of the Ecological Main structure– near the border of Eindhoven;
3. At the start near the wall map, between project developer and government representatives about the location around Boxtel (urbanize this area or plan a 'Green Forest');
4. About the vision maps; whether the vision map(s) should play a role and how it should look like;
5. About the use and making of maps in general, with respect to the structure of the game, which evoked frustration at the side of the professional designers.

Furthermore, a pool of conflicts has been observed that slowed the process down and evolved into a deadlock situation before lunchtime. But these conflicts concentrated around financial issues, not around maps.

Ad 1. Conflict about whose theatre should be on the central block map
This conflict concentrates around the question whether the city governments of Breda and Tilburg should give priority to the collective idea for a Culture Palace in the Contactgroup that formed Brabant City, or if it could act 'disloyal' by unilaterally providing a license for construction to the private firm Van de Ende to build a theatre in between Breda and Tilburg. The placing of the Van de Ende Theatre on the block map thwarted the plan for a Culture Palace, as the Contactgroup estimated that two theatres for this region would be too much. We conceive this as a clash between the individual interest of the cities Breda and Tilburg the collective interests of the urban network Brabant City. The alliance of Breda and Tilburg acted strategically by placing its plans first on the map.

Ad 2. Conflict about the Ecological Map Structure on the central block map
This conflict concentrates around the green corridor in the east of Eindhoven. It also centres around the question which actor has decisive power over this territory. The particular area is in administrative terms territory of the small municipalities, while the area is so close to the city of Eindhoven that the city-government of Eindhoven is of the opinion that it has a say in the matter.

The block map in this case signalled to the representatives of Eindhoven about the existence of the plan. The conflict unfolds as a typical geopolitical power-conflict on a regional scale. In our interpretation, the explanation of the conflict as a geopolitical clash of powers offers the simplest explanation for the emergence of this conflict. In the frame held by the Eindhoven representatives, the scope of their city-governance reaches beyond their administrative boundaries. This does not match with the official governmental reality, as the chairman of the Contactgroup makes clear.

Ad 3. Potential conflict near the wall map
In the discussions, the ideas of the project developer to 'give up' the green area around Boxtel conflicted with existing ideas at the side of government actors. The project developer did not proceed with his ideas, but instead adapted his proposal.

The map served here to mediate between opinions, and to find common ground. The conflict can be explained from an *information imbalance* about current policy plans. The emergence of the potential conflict is avoided by an adaptation of plans.

Ad4. Conflict over the vision map(s)
The Bureau had a different idea about the use of the vision map than the Contactgroup at the beginning of the second game session, but they accepted the decision of the Contactgroup as part of the division of responsibilities and formal hierarchy between the Bureau and Contactgroup.

Ad 5. Implicit conflict about the use of maps and the structure of the game in general
In the discussion between the professional designers and other participants about the making and use of designs, the conflict went deeper than about the map itself. For example, this became visible when a designer expressed his frustration about the statement of one actor that he should shut up, as he was 'just the picture drawer'.

The frustration of the designers in the game and the arguments between the professional designers and the city-planner of Den Bosch in the interview/discussion at the end of the game, about the role of spatial designs and the place of design in the organization of the game, represented a fundamental discussion about the function of design in policymaking practice. At this point, the –young– designers and older city-planner expressed two opposing views, which we have recognized as an expression of our formulated 'design frame' versus 'negotiation frame'.

Clarifications for the emerging conflicts
Recapitalizing these findings, two conflicts can be clarified without a reference to frame difference, and the one most stubborn conflict in our view 'needs' the concept of multiple frames as source for explanation:

- The emerging conflicts about the theatre and the planning of the Ecological Main Structure (conflict 1 and 2) could be explained as a *geopolitical power-clash* between competing territorial interests. In the case of the theatre, it was a conflict between individual and collective interests. In the case of the Ecological Main Structure, it was a clash between the interests (and range of power) of a large city versus the autonomy of surrounding small municipalities. These decisions were settled by the implicit *norms* that were acknowledged by all actors:
  - The theatre conflict was settled by whose plan was first on the map.
  - The Ecological Main Structure conflict was settled by a judgement of the political representative of the province.

- The emerging –but avoided– conflict about the spatial policy around Boxtel, about the choice between urbanization or a forest (conflict 3), could be explained as an *effect of information imbalance* between private parties and government actors. As soon as this information imbalance was corrected, the problem was *solved*.

- The conflict about the vision map (conflict 4) was settled in the hierarchical constellation between the Contactgroup and the Bureau, where the Contactgroup is responsible for policy decisions and the Bureau is only an administrative office for preparing such policy decisions. The bureau's civil servants respect the power of the Contactgroup as their employer/ governmental body. However, substantially the Bureau and Contactgroup do not agree on the strategy in the Game. We can explain this as a clash between two different frames of reference. The frames of reference can be classified as a *design frame* (Bureau) versus a *negotiation frame* (Contactgroup).
  The distinction between the frames of reference may have their roots in the learning curve that the bureaus' civil servants have made through by having played the first ánd the second game. This while the chairman of the Contactgroup in the conflict had only been present at the second case study.

- The fifth conflict was about the frustration of the supporting designers against the other view of participating spatial planners of Brabant that the game was realistic and designed well. This conflict can be best explained as a conflict between frames. On this topic, no consensus was achieved. We classify the conflict as a conflict between a *design frame* (supporting designers in the game) and a *negotiation frame* (voiced by other participants involved in the interview after the game).

In our interpretation, the framework of analysis of this thesis, with various actor-perspectives that differ over time and of alliance, and the framework with different underlying frames regarding context and map, has shown to be applicable. While the emerging 'small conflicts' can be explained with the 'simple' explanations of strategic interests respectively information inequity, the most stubborn conflict cannot. The

persistent conflicts can be explained as a frame conflict. This is in line with the framing theory as described by, for instance, Schön and Rein (1994).

Frames of reference regarding map use

In the analysis of the various maps, we have assessed whether the perspectives on map use could be classified according to the findings of the Delfland case. In this section, we have concluded that the frames of the Delfland case are suitable for explaining the emerging conflicts that could not be explained as a matter of information imbalance or clash of interests. In the previous sections, where the life of the three map types are described and analyzed, we have traced the various perspectives on the maps on their underlying frame of reference. These classifications of the various perspectives are enumerated in Table 8-5.

	Perspective and its view on the function of the map	Valuation	Vocabulary	*Frame*
	Block Map (B)			
1.	# B1. 'Map use as assessment framework and for keeping score'	Functional as planned	Mirror, assessment, scoreboard	*Analysis*
2.	# B2. 'Map use for potentially supporting 'redesign' of plans'	Non-effective	Re-design'	*Design*
3.	# B3. 'Map use for reflection and for adjusting expectations'	Emergent functional	Lowering expectations, limitations of planning	*Negotiation*
4.	# B4. 'Map use influences peoples' perspective by its colours and 3D-setup'	Dys-functional	Colours, map's visual appearance	*Analysis or design*
	Wall Map (images R, G and A)			
5.	# R1. 'Map use for information analysis and as artefact in group conversations'	Functional as planned	'All themes that I need are on the map'	*Analysis*
6.	# G2. 'Map use as thematic background for new designs'	Emergent functional	- (designer used the map while being silent)	*Analysis/design*
7.	# A3. 'Map use for rethinking and perhaps changing institutional boundaries'	Non-effective	- (no use of the map)	*Analysis/negotiation*
	Vision Map (V)			
8.	# V1. 'Map use for collaborative design within Bureau'	Functional as planned	'fragmented pattern', 'I see a tension between spread and concentration', 'differentiation'	*Design*
9.	# V2. 'Map use for persuading Contactgroup of choices made'	Non-effective	'the main ideas are…'	*Design*
10.	# V3. 'Fear for map use as blue print planning'	Dys-functional	'blue print', 'will not be supported', 'will evoke objections'	*Negotiation*
11.	# V4. 'Map use for filling an acute need for direction, to overcome indecisiveness'	Emergent functional	'need an assessment framework', 'direction'	*Negotiation/analysis*

Table 8-5. Overview of perspectives with their associated archetypical frames

8.5.3 Frames represented in the maps

Choices and concepts expressed by maps
The deliberations in the making and the acceptance of the vision map illustrate how the actor perspectives about Brabant, relying *on* particular frames of reference, constitute a particular frame *in* the map image. The two vision maps made during the game represent what people prioritize as the essence of spatial planning in Brabant. On the two vision maps, shown in Figure 8-9 and Figure 8-10, the concept of the Green Forest is represented by green lines (in the map of the small municipality, a large circle gives extra accent). In Figure 8-10, the colours red and green symbolize the tension between urban –'red'– and rural – 'green'– ambitions. While Figure 8-10 puts more emphasis on the *urban* fabric through the region (and at neighbouring regions, with red stripes demarcating the Randstad and the KAN area), Figure 8-9 shows the *road infrastructures* as important feature. Both maps show the rivers area and creek valleys as important cultural/natural heritage. The maps are for a large part compatible and the Bureau's map is accepted as 'framework' in which new projects should fit. In our interpretation, the maps have done a good job in selecting, emphasizing and conceptualizing what is considered as critical characteristic of the Brabant landscape on the scale of Brabant City. The vision maps are examples of conceptual maps that 'catch' the mental frames of the majority of the group, and thereby create a shared feeling of understanding.

Frames and map types
Several types of maps have been present in the game. In the previous sections respectively the wall maps, the vision maps and the block map have been described in detail. When looking to the visual appearance of these three map types, and regarding the way they are used in the process, we note a remarkable resemblance between the three frames analysis, design, and negotiation, and the function and utterance of these three map types:

1. The *wall maps* can be linked to the analysis frame through its function of correcting for the information imbalance between game participants. In preparing these map images, we have used our knowledge of cartography, the possibilities of GIS and the scope of available data to make an accurate map, with 'objective' validity as the presented policies are all formally approved in practice.
2. The *central block map* can be linked to the negotiation frame through its function as the formal 'scoreboard' of decisions taken, with the corresponding political authority.
3. The *vision sketches* can be linked to the design frame, with their primary function to give direction to and create new ideas for projects and policies. These maps are also produced by professional designers.

Looking at the resulting maps, the appearance of the maps also fits with the three frames, while the final outlook of the vision maps and block map has not been in our own hands (in contrast to the wall maps, which we have produced ourselves). The

appearance of a map appears to be correlated with the type of frame from which perspective the map is made; analysis, design or negotiation (see Table 8-6).

Appearance of the map images

Map type:	**Wall maps**	**Vision maps**	**Block map**
Characteristics:	• Specific, superfluous information	• Abstract, metaphoric information	• Dedicated, selective information
	• Clearly defined categories and sub-classes	• Conspicuous names with ambiguous interpretations	• Few legend items –only those decided upon
	• Sharp boundaries	• Sketchy boundaries	• Boundaries on the map as far as they have been decided upon
Resemblance to frame:	*Analysis frame*	*Design frame*	*Negotiation frame*

Table 8-6. Visual appearance of the three map types in the game and the associated frames

This observation fits with the assumption that maps being produced from a particular frame of reference, also inherit (conceptual) characteristics inherent to that frame of reference. When considering the maps tangible explications of particular frames, the observed correlation between frame of reference of a map-maker, map function and map utterance makes sense. The map is designed according to the frame of reference in the mind of the maker, and the maker anticipates on the intended function of the map by giving his/her map a graphic outlook that is suitable for its purpose. Furthermore, the inherent values of a frame of reference also 'dictates' quality standards for the maker how he or she should visualize his/her map.

8.5.4 Mechanisms in coping with emergent conflict

In the Delfland case we have identified a number of mechanisms how actors dealt with emerging conflict. In this second case, we recognize a number of these mechanisms:

1. Let politics/ rules of the game decide (conflict no.1 and 2)

The emerging conflicts that we explained as a geopolitical power-clash, about the theatre and the Ecological Main Structure, were settled by the

acknowledgement of the existing norms about the 'rules of the game' and the power hierarchy between actors. We have formulated as the mechanism to use the institutional context for settling the conflict: *"Handing over the arguments involved in a conflict to decision-makers (possibly accompanied by maps) and let politics decide"*.

2. Shift the scope of the map or mapped issue (conflict no. 3)

The emerging –but avoided– conflict that we explained as an effect of information imbalance between private parties and government actors, about the spatial policy around Boxtel, urbanization or a forest, was solved by changing the geographic location of the urbanization plans by the project developer. We recognize this mechanism as *"changing the scope of the map or the scope of the mapped policy issue"*. In this case, the project developer shifted his focus southwards.

3. Change the function and status of a map (conflict no. 4)

The third conflict, whether the vision map(s) should play a role and how this vision map should look like, is recognized as a frame conflict. In the early phase, the dispute is settled by the institutional context, that prescribed a hierarchical relation between the decision-making authority of the Contactgroup and the supporting (administrative) role of the Bureau. In the later stage of the game, when the policymaking process was diagnosed as a deadlock, the new circumstances, mobilized through the public call for a vision, brought a change in the function and status of the map. While this may not have happened purposefully or consciously, the group as a whole thus applied the mechanism "*changing the function and status of a map*" and thereby influencing the problem framing process during the game.

The conflict no. 5 was not settled or coped with. The conflict was ignored and left to be. The frustration of the designers remained.

(Note: The mechanisms "Changing the cartographic layout of maps" and "Change the classification system around a policy issue", additional mechanisms identified in the Delfland case, are not noticed in the game.)

8.5.5 Reference to our framework of analysis

We conclude from this analysis that the framework of analysis was applicable in this simulation game. Also, the identified frames from the Delfland case could be verified as being present in this other case as well. Three of the five mechanisms that were identified in the case of Delfland, could be identified also.

Through executing the design of map support and producing the wall maps ourselves in this game, we experienced a number of the choices that map-makers face when their map is prepared for practice, but not yet disclosed to others. In this preparation, questions about the possible functions and uses of the map, remained

open questions until the game started. The 'risk' that maps would be used for different purposes than foreseen, or would not be used and thus remain 'non-effective', put us as map-maker for a difficult task where multiple options of *possible map use* in practice were taken into account, and we had to *think through* the related uncertainties involved. Because the project concerned a game and not a real-life policymaking process, we got much freedom to experiment within the restrictions of the overall project.

We have 'experimented' with the deliberative manipulation of the participants' frame of mind by adding a wall map with administrative boundaries and by opting for a central block map in the middle of the room –and at the centre of the game. As result from two game sessions, we conclude that the wall map image with administrative boundaries was not used at all, and that the block map was not used for re-design purposes. The block map turned out to be confronting at the end of both game sessions, although the participants had all been responsible for the end result. This was not a satisfying result for the actors that hoped to stimulate development planning and gain support for the Brabant City Urban Network initiative with the Game on Space. In the eyes of at least one of the participants, the resulting block maps after both sessions could be interpreted as functional for lowering the expectation of the participants about the possibilities for spatial planning developments in the region.

The framework of analysis is able to explain the functioning of the maps in their environment. We have assumed that it is not possible to 'predict' the policymaking process over various rounds and accordingly the function of a map may also change. This has become visible in the two 'lives' of the vision map.

Furthermore, we could use the three frames for explaining the emerging conflicts over maps. In addition we found two emerging conflicts that could be clarified by the 'simpler' explanations of clashing interests (geopolitical) and an information balance.

Part IV:

Conclusions

9 CONCLUSIONS, RECOMMENDATIONS AND REFLECTIONS

"I call our world Flatland, not because we call it so, but to make its nature clearer to you, my happy readers, who are privileged to live in Space."

–E. Abbott (1838-1926) in 'Flatland. A romance of many dimensions' (1884, p. 1)

9.1 Introduction

The theoretical ideas that underlie our choices in defining our object of study stem from the research program Multi Actor Systems, of which this PhD-research is part. Previous research in this research program by Enserink and Monnikhof (2000), Thissen and Twaalfhoven (2001), van de Riet (2003) and Monnikhof (2006) has shown the importance of how the models and information that are used in policymaking settings where multiple parties are involved, are communicated and presented. This thesis builds further on this line of research and focuses on how specific models, maps, are used in multi-actor settings.

The map image serves as a language among participants in a policy process, alongside other channels and means of communication. Because map images are tangible, visual artefacts, they form a type of information that can be 'followed' while the map takes on its own life in the policy process.

With the shifting emphasis in policymaking towards more participative approaches, professionals who work with maps see themselves increasingly supporting group discussions with their information and expertise rather than working in isolation for one client in a bilateral decision-maker versus policy advisor setting. In this context, we have focused on *social interactions* with maps between *multiple actors* who are in the process of policymaking[1].

Today, many maps circulate in policy processes. In the introductory chapter, we discussed a repetitive pattern with respect to the functionality of maps. Maps often

[1] This is instead of focusing on how one actor works with his or her map or the technical dimension of constructing a map.

evoke discussion, and in multiple cases this can result in conflict and controversy, while in other cases maps contribute to participant satisfaction and breakthroughs in policy processes.

The problem statement that drives this thesis was formulated as follows: the underlying factors and mechanisms of how maps become the main focus of conflict in some situations –while not in others– are not well understood, although the power of maps has been acknowledged in the literature. In many occurrences of map conflicts, the 'simple' explanation of conflicting interest does not suffice.

From this problem statement the following main question was formulated.

> *"How can we explain the functionality of maps in multi-actor policymaking settings, and elucidate occurrences of emerging conflict?"*

In chapter one, we have divided this main question into three research questions.

1 **For what functions are maps used in the practice of multi-actor policymaking?**
2 **How do maps function in this multi-actor setting, and what factors and mechanisms contribute to the emergence of conflicts around maps in policymaking?**
3 **How can the activity of map use be guided/improved, can we draw lessons?**

We have distinguished 'use' from 'function', with map *use* referring to how actors act with maps either in making or using the maps. With *functions* of maps we refer to the intentions of actors using a map (and their evaluation of a map's *functionality* in hindsight). We aimed at clarifying different functions of maps for the purpose of making policy, and at explaining the observation that maps often become a source of conflict and controversy in policymaking.

Background and follow up questions
Chapter two and three were dedicated to outlining the basic assumptions made during this study. These chapters were centred on the following background questions.

- How are maps used in policymaking?
- What is a map?
- What makes maps so powerful?
- What may we consider 'good policymaking' and how does 'good map use' (including 'good map making') relate to it?

On the basis of a literature study of policy analysis and cartographical literature (amongst others), we clarified our position by defining our view of the nature of maps, and how we perceive map use as a special type of modelling. From this, we collected and structured ten characteristics of maps that add to their powerful nature (see section 3.5).

The follow-up question follows naturally from the knowledge acquired in the main part of this research: How can the practice of map use (including map making) in a multi-actor setting be guided/ improved; can we draw lessons? In this research, focus has been on a *descriptive* rather than a normative or prescriptive approach. We have chosen to focus on evaluations (judgments) about the functionality of maps made by the various actors involved, and comparing and contrasting these different perspectives. In taking this approach, we have deliberately not aimed at giving a single 'objective' judgment of the functionality of the maps or their contribution to the quality of policymaking. Instead, we have aimed at *clarifying the contexts* in which maps are made and used, and tried to clarify the different *perspectives of actors about map use*, with the objective to *identify and explain emerging conflicts* among these actors with respect to the use of maps.

Because of this approach, directions for map making and map use only follow indirectly from the analysis. We will elaborate on this last question in the recommendation part of this chapter.

9.2 The framework of analysis

As the research had an exploratory nature, we had to develop our own framework of analysis. We consider this framework one of the 'results' of the study.

9.2.1 Policy processes structured in rounds and maps regarded as models

The interpretation of something as intangible as a policy process is not trivial. Various frameworks of analysis can be chosen that structure a policy process regarding different assumptions and focusing on different aspects. In this research we have used the rounds model formulated by Teisman (1995) because it emphasizes the dynamic and multi-actor character of policymaking. According to the rounds model, a policymaking setting may be relatively structured, goal-oriented and predictable in one round, but capricious, chaotic and unpredictable over various rounds. A new policy round starts with major changes in the configuration of the policy process (by introduction of new people, external events, formulation of new goals, discovery of new problems, etc.)

In our analysis we assumed that maps can serve different purposes on different occasions and simultaneously. In the case studies, multiple maps were used, and sometimes a map was used over longer periods of time. As a consequence, in the period of time between the assignment to make the map and the presentation of the result, the actors' perspectives on a map and its role can change (for instance because the project leader changed in the Delfland case, or because of a new meeting of the representatives of Brabant City in the Game on Space). The actor perspectives on maps were therefore formulated as actor-time perspectives; perspectives on maps of a certain actor, at a particular moment in time.

The conceptualisation of the participative policymaking process according to the rounds model (Teisman, 1992) formed the basis of our analysis. We have

distinguished a 'policymaking environment' and a 'knowlegde environment' and consider maps to be as objects that function across the boundary between these environments (See section 4.5). The structure of this framework is visualized in Figure 9-1.

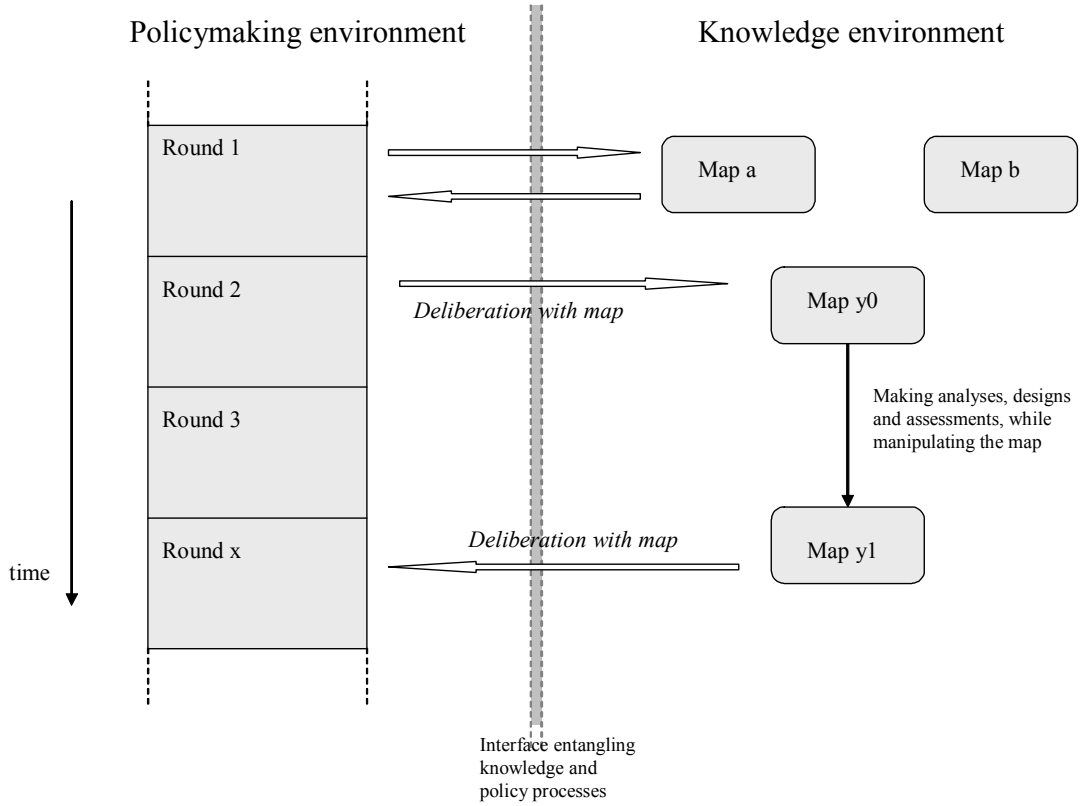


Figure 9-1. The conceptual perspective on map use in the wider context of policymaking and knowledge creation. The policymaking process is conceptualized according to the rounds model of Teisman (1992). Our focus is on the multi-actor deliberations with maps in both environments and across the boundary.

9.2.2 Direct and strategic effects: emergent functional and dysfunctional maps

We developed a two-step strategy to assess empirically the effect of map use. In a first step, we distinguished the various purposes mentioned for using a map (the potential functionalities). During the literature study and the case of Delfland, we collected a number of *functions* of maps, both form theory and empirical findings. This list of functions served as input for preparing and observing the Game on Space. We found the list of functions could be unlimited if one disassembled functions and clustered them into numerous variations, and the list would become short if one translated all functions into the basic actions that people actually do with maps (e.g. 'look at it' or 'talk about it'). We therefore did not aim to present a list of '*the*' functions of maps as a result of our study.
The scope of functions that we identified and analyzed in the first case study was used as a starting point for observations in the second case. This list is not inclusive; the

research in both cases was open, e.g. observations were dedicated to identify new map functions in the second game, in parallel with recognizing map functions 'from the list'.

Identified map functions for supporting policymaking:

1. analyze problem, clarify spatial issues
2. synthesize results of spatial analysis
3. design; visualize spatial patterns
4. coordinate information; organizing and distributing function
5. agendize; alerting function
6. (re-) frame problem
7. stimulate creativity
8. express spatial claims. also: polarize
9. persuade, make argument
10. clarify spatial conflicts
11. mediate between spatial trade-offs
12. drive to make/consolidate choices

In a second step, we distinguished four categories of how the effect of map use was perceived in different perspectives by the multiple actors involved –both map maker(s) and users.

- *Functional as planned:* function of map according to intended purpose with satisfying effect
- *Emergent functional:* map has unintended/unanticipated function with satisfying effect
- *Non-effective:* function of map according to intended purpose but effect is not satisfying
- *Dysfunctional:* map has unintended/unanticipated function and its effect is dissatisfying

Functional and dysfunctional map use in the cases

Map use functional as planned.

Most maps served their purpose as planned by their creators. This is the case, for instance, in the clock-wise/anti-clockwise maps in the perspective of the map maker in Delfland, and the Red and Green Wall maps in the Game on Space.

Map use emergent functional.

In both cases, there were examples of maps that, after being created, got a 'second life' by serving new ideas, and fulfilling a new function. In the Delfland case, the making of the Water Opportunity Map forced the people of the water board to make consistent choices throughout multiple internal departments. This functionality was not explicitly stated at the start of the project, but perceived as an emergent, extra benefit later on.

An example in the Game on Space was the vision map of the Bureau Brabant City that was put aside in early rounds of the game, but was later used as guide and

assessment framework to get out of the impasse in which the policymaking process had evolved. In the perspective of the map makers, in this second instance the map served its purpose as the map maker had originally planned, but for the Contactgroup and the other participants in the game the map was useful *by surprise*.

Map use non-effective.
In the Delfland case, the municipalities found the spatial planning maps non-effective or even dysfunctional, as they represented only rudimentary and a selective selection of ideas about future developments, and the water board would only risk facing angry faces at various municipalities using this map. However, the water board thought it was a useful map as it provided information for the water board about possible future developments in the area. Showing this map to municipalities served to signal that the water board was aware of the plans and wanted to be involved in their realization.

An example of a non-effective map in the Game on Space was, for instance, the map with administrative boundaries. This map was not used by participants in the game.

Map use dysfunctional.
The thematic water shortage/water surplus map images in the Delfland-case, called 'Water Wish Map', was an example of a map that was called dysfunctional at a particular moment, as it got stuck in a controversy between project members. When finally choices were made, the map was considered to be useful for its clarity and because it had brought the differences of opinion to the surface, which could otherwise have remained an implicit point of disagreement. Furthermore, the clockwise/anti-clockwise maps were dysfunctional in the perspective of the hydrologist, as they gave a false impression according to him: but these images were *functional* in explaining the conceptual differences between two interpretations of sustainability, in the perspective of the map maker.

In the Game on Space, the vision map of the Bureau was parked by the Contactgroup of Brabant City as the Contactgroup envisaged a dissatisfying effect of the use of the maps, which they perceived as undesirable blue-print planning.

The central block map at the end of both game sessions was disappointing in the perspective of the group of participants, while we as game designers had not expected this effect beforehand. This can be interpreted in two ways; the map was confronting for the participants visualizing the spatial implications of their work, and in that sense the block map was functional: but if the objective was to motivate the participants to adopt the idea of creating a Brabant city, which was an objective of the province of Brabant, then the disappointment with the final block map can be considered an undesirable side-effect.

Furthermore, the designers in the game found the setup of the game was not well suited for map making, while the other participants were satisfied with the supporting role of the designers as 'picture drawers'.

We found that maps that were not functional or dysfunctional in the eyes of one participant were often functional in the eyes of others, for a different purpose. The different intentions of various actors using the same map image make the map a tug-

of-war object. The roles of the maps were blurred, we therefore, in this study, speak of functionality to whom and when rather than to speak of *the* functionality of a map.

9.3 Findings: Explaining the emergence of conflicts around maps

9.3.1 The conflicting nature of maps

The factors that were observed to contribute to the emergence of conflict around maps were:

- the presence of multiple actors with fundamentally *different frames* of reference about both the policymaking process as a whole and the (functionality of a) map in particular.
- the *capricious and strategic* character of the multi-actor deliberations, through which the functionality of a map could change, but not to everyone's consent.
- the *power of maps*, which can clarify and explicate (policy) choices visually and thereby force people to make choices while map making.
- the function of the map as political instrument while simultaneously the early stages of policymaking leave much room for choices and interpretations of uncertainties concerning the deliberated policy issues at hand (climate change, population growth, etc.). These choices in options can be made visible using a map, and then the maps' *forcing of choices making* in spatial dilemmas can lead to a confrontation between the different frames of reference.

The reason why people attribute much power to maps have been structured in six points in our literature study (chapter 3): their *artefact* character, with the fixation and explication of mental worldviews; the essence of a *scale*-model in which a larger landscape is represented; the *visual* nature of maps, which can inhibit a high density of information; the map as product of *artistic* creation with own beauty; the assumed *authority* of maps; and the *political* character of policy maps, which often signals that interventions can be expected.

Although the small sample of six maps and two cases does not provide any statistical proof, the empirical observations showed how the *fixation* of discussions onto maps at times resulted in a deeper polarization of opinions. The characteristic of maps to fixate worldviews made differences of opinion explicit. As an external artefact, the map became literally a 'playing field' where conflicts between actors were settled by 'pushing and pulling' items on the map. This was especially true for the Water Wish Map (the water surplus/shortage map images, Figure 6-8) in the case of Delfland.

In the cases the use of maps *forced actors to make choices.* In the two case-studies, various choices came on the agenda or were discussed. Among them were the scale of the map, the ways to conceptualize issues into legend items, the order of the legend items on the maps, visualization of the cartographic layout of a map, certain

boundaries on the map, and the power division over who is the author of the map. (The last being vividly represented in a remark made during the Game on Space "Shut up. You are just the map maker. You must draw what we tell you to.") In the Delfland case, many discussions were centred on the setup and selection of the *legend items* of the maps, thereby deciding on the classification system used to structure the policy issues.

Accordingly, when maps were produced, the *spatial implications and incompatibilities between choices and options became visible.* While these incompatibilities are not clear as long as plans remain implicit, they are clarified and fixed once they have been made explicit on paper. The maps thus sharpen the spatial dilemmas. When clarified on a map, ideas go beyond the stage of being a dream in the heads of some people, particularly when such a map is circulating in a process where the actors seriously work towards a policy decision.

Three fundamentally different frames involved in map use

We found the theory of frame reflection and frame analysis, as discussed in chapter 4, useful for explaining the emerging conflicts that we observed in the case studies. In our interpretation, the actors in the cases had different individual intentions during the process, held different frames (worldviews) and used different strategies to achieve their objectives. All this influenced how they used maps and how they perceived the functionality of maps in policy deliberations.

In policy analysis theory, multiple studies have grouped and labelled mayor classes of frames. We discussed a number of them in the construction of our conceptual framework, in section 4.3. From the two cases discussed in this thesis, we distinguished three different, archetypical mental frames of reference used in map use that, according to us, were dominantly apparent in the various conflicts centred around the maps.

The first, the *analytic frame,* reasons from the 'rational' perspective or: to measure is to know. It is characterized by large amounts of data that need to be collected, organized, monitored, and mapped, before decisions can be made: but what data to collect is assumed to be prescribed by a given, fixed problem formulation. The maps are used as an interactive model, but the structure of the map must be logical; each spot on the map should be properly defined and clearly bounded. The essence of the overall policy (preparation) process is seen primarily as a process of analysis, research and assessment. Many GIS-experts that we interviewed seemed to support this view.

In theory, we found resemblances to Stone's (1988) analytic rationality and to the scientific method referred to in Mayer et.al. (2004).

The *design frame* is associated with creativity and intuition. The frame is related to the craft of urban design and landscape architecture. Maps are considered to be tools for professionals who use maps to consolidate and express their thoughts. They design their ideas by drawing maps. Maps are used to present and express all kinds of ideas, variants of ideas and possibilities. The author designs a structure in space, which did not exist before nor had it been articulated before. Observations of landscapes (direct and indirect through photo's, stories etc), experience with other examples and

common sense are the main sources in the search for patterns. The map is used as a visual language and the essence of the overall policy process is seen primarily as a process for creating and presenting options and alternatives. On the map are coherent, abstract and preferably beautiful concepts with eloquent names and metaphoric meanings, like the famous 'Green Heart' concept of the Netherlands.

In theory, we found overlap with study books about creativeness in design and the value of drawing for design by Ching (1990) and De Jong and Van der Voordt (2002).

The *negotiation frame* is based on political reasoning. Maps are political devices used in discourses on decision-making; they communicate ideas, perceptions or claims, and advocate opinions and concerns. Maps are also used as instruments to communicate and consolidate decisions and agreements on space. As such, a map reflects a political agenda. Likewise the political 'game' to get issues on or off the political agenda, it is part of a strategic game to get legend items on or off the map. The presentation of a map is considered to be similar to showing ones cards in a card game, and thus whether to show or hide legend items on the map is subject to conscious choice rather than coincidence. The information presented consists of symbols or metaphors that help us make sense of the world, according to a particular political claim.

In theory, we found this frame best represented by literature on decision-making and policy analysis, such as Stone's (1988) description of political reason, or the logic involved in policy analysis as explained by Wildavsky (1979), De Bruijn et.al. (2002) and Mayer et.al. (2004). Maps that deliberatively 'stretch reality' for rhetoric purposes are denoted as 'propaganda maps' by Monmonier (1993), but who decides what is propaganda, and what is 'legitimate' rhetoric remains a grey area made up by subjective opinions, which can change over time.

9.3.2 Overview over the three elicited frames

While we announced the analysis of frames in our conceptual framework (chapter 4), we did not select these frames ex-ante, although we expected to identify a distinction between scientifically oriented map use (based on an analytic rationality) and politically oriented map use (based on a negotiation rationality). The related frames, which we have called the analysis frame and the negotiation frame, have their roots in the theory of Stone (1988) about the contrast between analytical rational and political reason. On the basis of the Delfland case we have added a third frame. This frame, named the design frame is implicitly present in Stone's theory as she considers policymaking to be a struggle over ideas.

The resulting set of three frames were elicited on the basis of the Delfland case. The Game on Space was used to verify if conflicts over maps can indeed be explained in terms of the same frame conflicts. We found the three frames that we named analysis, design and negotiation most relevant for explaining the observed conflicts and controversies over maps that appeared during the case studies.

An overview of the archetypical frames and the concurrent roles of the map is presented in table 9-1. In each frame, the map is used as an instrument within a different rationale, which is reflected in a different view on what role the map plays

(or should play), and the different characteristics of resulting policy map images. The table can be read in the vertical and in the horizontal direction.

In the *vertical direction*, the dominant line of reasoning of one particular frame can be followed by reading from (C) through (M) to (E). It starts with a view of the policy process and its context (C), from that follows the dominant practice or 'habit' in the use and shaping of the map (M), and at the bottom follow the perceived and expected general functions of the map (E). Each frame comprises a different dominant urge that is felt. In the intention to do something about this urge, particular limitations are perceived more strongly than others. The range of functions of the maps that we looked for encompassed modelling and communicating functions.

In *horizontal direction*, the differences between the frames (A), (D) and (N) are potential sources of conflict. For instance:

- for persuading others with a map, one could make use of an attractive, abstract map that was produced by someone with a dominant design frame: but this may face objections from the side of the analysis frame stating that the map lacks validity.
- in contrast, the presentation of a map produced from an analytic point of view may face objections from the side of the negotiation frame, as the data may not be relevant or strategically sensitive.
- someone with a negotiation frame may claim that certain legend items must be removed from a policy map, because of strategic considerations (giving away 'pocket money' that could serve for making trade-offs in negotiations): but this may meet with objections from both the design and analysis frame. In the perspective of the design frame, the legend item may belong to the conceptualization as a whole. In the eyes of the analysis frame it would be analytically poor logic, misleading or invalid, and seen as an opportunistic act that manipulates objective research for the sake of political illegitimate gains.

To summarize, the rows of Table 9-1 offer an overview of the conflicting elements between frames, while the columns of the table point to further implications of these differences for how maps are made and used.

The characteristics of the various frames are generalizations, and they are retrieved from aggregating the observations in the case studies. The differences of opinion towards the various maps that we have observed, are grouped in these three generic archetypes. As said before, many other and more detailed frames could be elicited from those discussions: but these three frames offer us enough variety to be able to explain the conflicts that occurred in the cases.

Table 9-1 Overview of different frames on map use in policymaking

frames:	**Analysis (A)**	**Design (D)**	**Negotiation (N)**
	"Map use as science"	*"Map use as art"*	*"Map use as politics"*
Context (C)			
Archetypical group or actor	Expert, skilled in research fields like geography, GIS, cartography, economy etc.	Expert, skilled in artistic fields like urban architecture, landscape design, etc.	Stakeholder, experienced in decision-making, acting on behalf of dependency/stakes.
Focus on policy analytic phase	Emphasis on research and assessment	Emphasis on creation and presentation of options	Emphasis on deliberation, trade-offs, problem framing.
Limitations, perceived boundaries	Given scope and available data	Given conditions and objectives (fixed objectives may also hinder new ideas)	Given institutional constellation and timeframe
Map Use and appearance of map (M)			
Values in coding of information	Objective and valid information	Broad, holistic information	Comprehensible information
Values in mapping	Map valid according to model and cartographic heuristics	Visual impression of artistic quality, coherent design	Map sufficient and opportune for the occasion
Habits in act of thinking	Use of technology; preferring rigid, unambiguous definitions and specified information	Use of examples, associations, 'back talk'[2] and imagination to create innovative ideas	Strengthen arguments, map use according to pragmatic and strategic considerations
Overall image	Specific, superfluous information	Abstract, metaphoric information	Dedicated, selective information
Legend items	Clearly defined categories and sub-classes	Conspicuous names with ambiguous interpretations	Few legend items –only those (to be) decided upon
Boundaries	Sharp boundaries	Sketchy boundaries	Boundaries on or off the map according to negotiation strategy
Effects (E)			
Dominant functionalities of maps	…Clarify spatial (socio/ physical) facts and mechanisms	…Visualize and articulate imaginative spatial planning concepts	… Agendize problems, create a sense of urgency
	…Synthesize analytic results, providing accurate model information (detailed, precise and reliable) about spatial distributions	…(Stimulate creativity in order to) identify, elicit patterns in the landscape and imposing (new) structure in space	…Persuade, by mediation or advocacy; using the map as argument
Maps are seen as a…	… Research model	… Design language	… Decision agenda

[2] The designed map 'talks back from paper' to the creator. Schön describes back talk using the example of designing an urban plan. A halfway designed plan has limited the degrees of freedom but it also thereby offers new insights into possibilities and problems (Schön, 1983).

9.3.3 Clarifying emerging conflict around maps

In chapters 6 and 8, where the use of maps in two cases are analyzed and interpreted, we made thick descriptions of the stories of how maps were used in their context; what happened, who intervened, what opposing perspectives were present, and how the discussions and maps resulted in new actions and new maps. The stories follow the 'life of the maps' and in doing so, they explicate the overlapping and iterative steps in map making and map use in the various contextual settings. In this section, we interpret these stories.

How the frames clashed and let maps become a source of conflict in the cases
In both case studies, we could explain the observed stubborn conflicts over maps, which could not be explained by a 'simple' explanation of clashing interests or information imbalance, by tracing these discussions back to a clash of the underlying three frames.

In our view, the conflicts around maps were not only about the visualization aspects, the cartographic 'lies of the maps' in the words of Monmonier (1991). Usually the arguments (and conflicts) went deeper. The conflicts were also not a matter of competing interests, such as NIMBY behaviour.

In the cases, multiple types of conflicts got intertwined in a complex constellation of issues and conflicts and meanwhile, as the standpoints in debates polarized, people who found they were sharing overlapping frames of reference, aligned and formed coalitions. In our view, these empirical observations fit with the theory of advocacy coalitions (Sabatier and Jenkins-Smith, 1993 and 1999), which explains policymaking as a process where temporary coalitions compete for dominance in the decision-making process. In our empirical research, each of the three distinguished frames was at times dominant in both cases. In this view, when the frames clashed, the maps served as a *playing field.* In this interpretation of map use, the nature of maps is redefined as representations of power, first set out in the literature by Harley (1988, 1989).

How the policy processes went on and produced 'final' policy maps in the cases
Despite the various conflicts, neither cases study ended in a deadlock situation. The case of Delfland showed how the three frames at times conflicted, how these conflicts were settled and how the intermediate map results built on previous maps (see chapter 6). In the Delfland case, we saw how the negotiation frame dominated and determined the role and appearance of the map at the end of the project, while the information that was used came from earlier phases, using map information constructed under the influence of the analysis and design frame.

In the Game on Space (see chapter 8), the negotiation frame dominated the process of placing projects on the central Block Map, which gradually built up a representation of the group result: but the process also needed input in the form of a shared vision, which was presented using two vision sketches. These sketches were made from a design point of view. Small analyses of spatial structures and inventories

of actor-support for project proposals were made at the wall maps, and these conversations were about analysis rather than negotiation.

In our view, we needed all three types of frames rather than one to explain the ongoing policymaking process in both cases. In both cases a resulting policy map emerged (a final Water Opportunity Map and Block Map image). How these policy maps were constructed in incremental steps, and in the environment of capricious and chaotic multi-actor deliberations, is analyzed in chapter 6 and 8. The group of participants in both cases built further on information provided by others, while they (re-) framed the pre-eminence and meaning of a map. The processes of map making and map use were incremental, participative and partly unconscious; and the legitimacy of legend items or maps as a whole grew while the items/maps settled themselves into the language that used in the cases.

9.3.4 Generalizing: Conflicting rationalities embedded in the three frames

Inherent conflicts between analysis and design frame

In our interpretation of the different rationalities involved, the analysis versus the design rationality conflict in the way policy options are defined and dealt with. While analysis is focused mainly on the exclusion and selection of possibilities by gaining *evidence*, design rationality is focused on the scope of *possibilities* and the room for engineering or manipulation. What serves a policy better, depends on where one believes the critical problem aspect is located and how this problem aspect could best be overcome, prevented, mitigated, compensated or accepted. For the analysis frame, possibilities are subordinate to finding the truth through evidence, while for the design frame, finding evidence is instrumental to creating options and enabling new possibilities.

Inherent conflicts between analysis and negotiation frame

The analysis versus the negotiation rationality differ in the way they support reasoning. While the first rationality is, generally speaking, based on the idea of one dominant truth that is out there, and that can and should be discovered; the second, negotiation rationality is based on the concept of subjective experiences and preferences and the existence of multiple worldviews (multiple truths) as a starting point for deliberation. For analytical rationality, finding the best –that is, the most valid and accurate – truth is a natural value and obligation in policymaking. For negotiation rationality, finding truth is only instrumental to finding satisfycing agreements, where the values and interests of affected stakeholders are involved in the considerations, with a positive 'net profit' of all gains and losses (e.g. where actor's interests are harmed in a limited manner and the group interests of the local community, region, nation or world, are protected or improved by the proposed policy.) Conflicts can thus appear when, from a negotiation rationality point of view, finding truth is subordinate to other considerations in the policy process (such as political manoeuvres, trust in government, power play, loss of face, historical rights, tolerance, compassion, etc), while finding/discovering the truth is the ultimate goal in the analytical frame and thus policymaking should be subordinate to analysis.

Inherent conflicts between the negotiation and design frame
The negotiation versus design rationality conflict in the way preferences or norms are valued between the conceptual ideas involved in decision-making and the process of policy-making and policy implementation. While in design rationality one strives for 'beauty', coherence and perfection in the conceptual structure of a plan, in negotiation rationality this is subordinate to practical use and procedural feasibility. Imperfect but pragmatic compromises may be preferable from the perspective of negotiation rationality, but this is not satisfactory from a pure design rationality perspective. While the design artefact (a policy, a spatial plan, a map design) is the object of creation in the design frame and the process of making this artefact is subordinate to the product that will come out, in the negotiation frame the process gets prioritized over the particular outcome; the people involved in the process may be met again, and it is important in the negotiation frame to consider actor-relations over time and over the horizon of an individual policy project.

The above explanation of conflicts between the three archetypical frames are archetypical generalizations. While all professional participants in a policymaking process will probably state they aim for 'wise' policy decisions, we aimed to clarify the point that how to achieve this aim can be interpreted very differently. In our view, the three frames offer a generalized explanation for the conflicts that appeared over maps in the case studies. We found, on the basis of both cases, that the limited number and simplicity of the three frames was sufficient for explaining the observed conflicts over maps.

The resulting set of identified frames is case-sensitive: they relate to the conflicts that appeared between the participants that were present in our case studies. We are confident that other observers would have witnessed the same conflicts in these cases and would have elicited similar frames, though possibly giving these frames different names: but if we had observed different case studies or if different people had participated in the two studied cases, then different conflicts around the maps might have appeared.

9.3.5 Mechanisms involved in framing process with maps

Using the theoretical framework of analysis, we observed, in practice, how people dealt with emerging conflicts and how they acted using maps to influence the framing of policy. In this theoretical framework (see chapter 4), a frame is considered to comprise of, amongst others:

- a lens with own *visibility*/manifestation of a frame in symbols, names, language, metaphors, images, etc.
- a *focus*, with inherent main objective and 'horizon' of what is being considered relevant
- an underlying *rationality*, with inherent set of values and logic

Focusing on these aspects, the following five basic mechanisms that people employed to influence the framing of policy, and to overcome emerging conflicts were identified.

1. *Change the cartographic layout of maps.*

   A mechanism oriented at the visibility (manifestation) of a frame. This mechanism does not change the problem framing, but serves to hide or smooth over the conflictive issue, thus literally placing problems out of sight. We consider this a symbolic strategy to cope with map conflicts. This mechanism was observed in the Delfland case.

2. *Change the scope of the map, by changing its scale or the region presented, thereby also altering the horizon or system boundary of the policy issue under study.*

   A mechanism oriented at the focus of a frame that is embedded in a map, using this mechanism, the frame is shifted. (For instance, by including a wider territory, new options can come into sight; or by making a small-scale map with only little detail, attention is focused on the main choices rather than the details of a policy issue, which can be deliberated in a later stage). This mechanism was observed in both cases.

3. *Change the classification system around a policy issue, by a redefinition of legend items and alternative clustering of themes on a map.*

   A mechanism oriented at the rationality underlying a frame of reference. This mechanism basically implies a need to make new maps, and look with different eyes at the issues-to-be-mapped. With help of a new map, a new agenda for deliberation can be formulated, involving a fresh look at the policy issues and involved dilemmas, trade offs, solutions and problems. This mechanism was observed in the Delfland case in making the Water Wish Map, where a re-clustering of legend items led to the final Water Opportunity Map image.

4. *Change the function and status of the map in the policy process.*

   A mechanism oriented at the process of framing. With this mechanism, the map image is not changed: but by altering the maps' role in the policymaking process, the acceptance of the map can be increased. This mechanism was observed in both cases. In the Delfland case, the status of the circulation map sketches and the suitability map were kept low, as the maps and method for making them were criticised. In the Game on Space, the vision map was given a higher status to help the actors come out of a deadlock situation with a package deal, where the vision map got the status of an assessment framework.

5. *Handle over the arguments involved in a conflict to decision-makers in charge and let politics decide, possibly using maps.*

   A mechanism oriented at the institutional context. With this mechanism, maps may serve the function of clarifying the different frames that are 'competing' for dominance; the actor-coalitions that advocate a particular view may use the maps to strengthen their arguments towards decision-makers. This mechanism appeared in both cases.

Whether these mechanisms were chosen deliberatively as options for dealing with map conflicts –consciously or unconsciously– or not, was not part of structural research. The five mechanisms show that there are several ways to deal with a conflict surrounding maps. The way out can be sought in changing the map, either its visual appearance (changing graphic variables, for instance replacing spots by indicative point symbols) or the structure and content of the legend (changing clusters of legend items, for instance grouping items according to policy priority): but the settlement of a dispute can also be sought in the contextual policymaking setting, and not per se in the map. The map can be used to formulate a new framing of the problem, or to present all information to decision-makers who may then, on a basis of political representativeness, decide. The maps can be used deliberately to make a conflicting situation clearly visible, which may polarize the political debate but also makes the involved trade-offs transparent for all participants.

The map symbolically becomes the territory

The use of maps in the Game on Space evoked less conflict than in the Delfland case, but still a number of conflicts were seen. We asked ourselves whether these conflicts were essentially about the map or about the represented policy issue. Our answer and point of view in this question is, that a map, representing real-world issues (a map being defined as a spatial model) cannot be separated from the real-world landscape that it symbolizes. As an artefact that represents real-world territory, the map 'becomes' the territory in symbolic sense in the deliberations between the actors. This is functional for the ease of communication among actors. The line between territory and map evaporates until the difference between model and real-world territory becomes relevant (for instance, because the map might not be valid). In the Delfland case, this difference was repeatedly pointed out by the hydrologist. We thus argue that the map, and the real-world issues that are represented on maps, are symbolically intertwined through the use of a map as a *language*, and cannot be separated in an analysis of map use. Although the map is not the territory, in the multi-actor discussions it is metaphorically used as such.

9.3.6 Propositions

Generalizing, we argued that the archetypical frames, with the elaborated differences between their inherent rationalities, and the identified mechanisms can be generalized beyond the scope of the two case studies. Arguments for this statement are:

- the generic nature of the involved frame differences and mechanisms
- the representative character of the planning practice in the game according to the participants
- the corroboration of the empirical observations through interviews with map makers and planners in the Netherlands from outside the two reported case studies

This leads to the following propositions about map making and map use in the context of Dutch policymaking.

The distinction of the three generalized frames analysis, design and negotiation explains many controversies over maps in the Netherlands that cannot be explained by 'simpler' explanations such as conflicting interests (with strategic behaviour in spatial issues often referred to as Not In My Back Yard (NIMBY) behaviour or information imbalance (with the conflict being solved as soon as information is shared).

Actors can cope with map conflicts using several mechanisms, either through actions with the map or actions in the process/context of the policymaking setting. In map conflicts that are identified as frame conflicts, when the choice is made to cope with the conflict by altering the map, actions can focus on altering the visibility, focus or rationality of a frame.

The collection of emerging conflicts and their explanations fits with the theory of Schön and Rein (1994) on frames, framing and stubborn conflicts. These authors also acknowledge that explanations for conflicts at the level of frames are fruitful alternatives when simpler explanations such as the geopolitical power-clash or the information imbalance do not suffice, and consensus is not within reach.

9.4 Recommendation: awareness about frames

Where theorists like Harley (1988) and Pickels (1995) have stated that maps are socially constructed, we saw in the cases that people who are aware of the influence of cartography and framing of issues on maps, actually benefited from this consciousness in their acting as participant in the wider project. We recommend that participants involved in map use for policymaking, whether they make, use or are confronted with maps (for instance as a process facilitator), should be aware of the conceptual power of maps, and their inference. We do not recommend professionals to switch roles or combine different professional functions in policymaking: but for process managers, policy analysts, map makers and other professionals, we hope our framework of analysis and our findings may offer clues for coping with conflicts around maps.

One way actors' consciousness about map conflicts could be enhanced is to keep the three archetypical *frames* of this thesis, the analysis, design and negotiation frame, in mind when working with maps in a multi-actor setting. Table 9-1 could be used to explicate the functions of a map in the eyes of the participants. The presented frames can help in judging the policy environment in which a map circulates, or to identify the underlying assumptions held by the actors involved.

The formulated *mechanisms* can serve to help actors be sensitive to the strategies of (other) actors, and to consider consciously their own purposes and strategies when using a map. In case of sensing emerging conflict over maps, structuring the problem of the map using our framework of mechanisms and frames involved in map use, is one of our recommendations for map makers and map users.

On the side of policymaking, we noted that both case studies centred on what were called complex problems, dealing with urbanization, rural land use and resources management. One of the reasons the maps in the cases evoked objections was the confronting message they contained. Although the maps could be said to oversimplify the problem or not be accurate, the discussions around the visualized regional concepts (such as the anti-clockwise water circulation in Delfland or the 'Green Forest' and 'creek valleys' in the Game on Space) clarified what the main spatial dilemmas were and what the alternative approaches were as proposed by the various actors. In our perspective, *the function of maps in forcing choices, simplifying concepts and confronting actors* is important for dealing effectively with the complex problems on a regional scale, especially in the deliberative polder culture of the Netherlands.

More extensive lessons were learned that were only indirectly based on the two cases exposed in this thesis. These are presented in a separate appendix and serve for map makers and map users in practice (See appendix 4).

9.5 Reflections

9.5.1 Reflection on the applied method

Discourse analysis

In this research, we did not use discourse analysis with the intention to clarify and support actual policy discourse, rather the context of the policy discourse was used to explain the functions of the map and the rise of controversies when using maps. We studied the arguments on the map by looking at:

- the topics visualized (the titles, legend and legend items)
- the scale and borders chosen for the map; the cartographic variables employed by the map maker for the layout (colours, line thickness, textures, symbols, etc., according to the semiology of graphics as described by bertin, 1967)
- the techniques for constructing the map (gis-data, overlay techniques, drawing)

We combined these observations with arguments taken from the spoken and written deliberations. While the arguments presented in maps are not expressed aloud, maps

are silent witnesses of the ongoing framing process. The shifting of names, the re-classification of legend items and priorities, and the choices made in cartographic layout on the (temporal) maps are representative of the ongoing conceptualization and negotiation process among participants in a policy process. We encourage discourse analysts not to neglect maps as data source, but encourage a critical approach to maps as they incorporate many underlying assumptions. For map makers we recommend the concept (way of thinking) of discourse analysis, as it helps to listen critically to and interpret the various perspectives involved in a multi-actor setting.

9.5.2 Reflection on findings: Why these three frames?

In our opinion, it is remarkable that the conflicts could be explained from only three different frames. We made a further refinement of the negotiation frame, because we found in the cases different attitudes on behalf of actors on how negotiations should be carried out (for instance, advocating own interests or seeking consensus) (De Boo and Carton, 2003; Carton, 2005) but this refinement was not necessary to explain the discussions that particularly focused on the map images.

It is an interesting question why these frames that have come to the surface in our analysis. One of the reasons was sought in the organizational division of roles and expertises in the Dutch spatial planning processes. It may be the case that professionals are hired on the basis of reputation for just one type of craftwork repeatedly, which is either focused on research and assessment, or on creation and presentation of alternatives, or to facilitate interaction and arrange trade-offs. Thereby, the professional advisors may act habitual and run a project on the automatic pilot.

Another reason could involve the educational training of professionals. Although we have not dedicated our research to this aspect, this factor seems to be important. All the map makers that we encountered and judged as having a predominant design frame, had followed a creative study in urban architecture or landscape design, except two, who both had a background in ecology. Most people that we judged as having a predominant negotiation frame had at least five years of experience in the bureaucracy of policy preparation or in higher management. People working with Geographic Information Systems we mostly judged as having primarily an analysis frame, and a large distance from the negotiation frame.

Finally, another reason for finding these three frames can be looked for in different educational programs, where each educational program has its own dominant research paradigm at its basis. The analysis frame obviously reflects the classic paradigm of the scientific method[3]. The design frame seems similar to the research paradigm of creative schools of thought as described in De Jong and Weggeman (2002), with emphasis on skill-development, free observation, learning from examples and wild

3 as formulated by, amongst others, Popper (1959).

experimentation. The negotiation frame reflects the research paradigm stating that knowledge is produced in social interaction, and that all knowledge is negotiated[4].

However, regardless of where the particular analysis, design and negotiation frame originated, the conclusion remains that the observed conflicts in the case studies could be explained as a conflict between the limited number of three frames.

Relating the resulting set of frames to theory

The resulting set of frames, elicited in this thesis from empirical observations, can be traced back to theory following (Stone, 1988) about perspectives on policy analysis by Mayer, Van Daalen and Bots (2004). The latter present a conceptual 'hexagon' with six perspectives on policy analysis. Two cornerstones of the hexagon model, which the authors call types of activities, are named analysis and design, which have a similar meaning as the frames that are elicited in this thesis. In the remaining four cornerstones, Mayer et. al. distinguish between various process goals such as democratizing the process, advocating ones' position, or mediating between interests; types of activities that appear in this thesis as the focus of the negotiation frame.

Another similar theory that could be used to verify our findings structures policy analysis in three types of discourses (White, 1994): analytic discourse, critical discourse, and persuasive discourse. Comparing this to our thesis, the analytic discourse resembles our analysis frame. While White's persuasive discourse seems to overlap with our negotiation and design frame, we did not conceptually separate any frame similar to Whites' critical discourse.

9.5.3 Reflection on the contribution of the study to the field of policy analysis

The 'Use' aspect: a parallel between policy analysis and map use

Shulock (1999) asked herself what she called 'The paradox of policy analysis': If it is not used why do we produce so much of it? We see a parallel between Shulock's argument and our study on the usage of map models. According to Shulock, policy analysis activities take place to shape ideas, to work them out, to process thoughts. Not to replace decision-making, nor to give the decision-makers the answers on what to decide: but rather to enrich the policy debates and policy process with new and adapted ideas, and presenting a (not 'the' but 'a') view on its possible and probable consequences, pro and con. In other words, according to Shulock, policy analysis output *is* being used, although it may be used in different forms than anticipated or hoped for by the particular policy analysts.

In our view this also applies to the use of maps. In this thesis, we aimed to gain insight into the use of maps as policy analysis instrument, by analyzing *how* they are actually used. In our personal observations of the making of Water Opportunity Map Delfland, we saw the audience of municipality representatives and planners as not being so much interested in the outcomes of the resulting maps, rather they were interested in the underlying assumptions and the methodology used for supporting the proposed claims for space. Instead of adopting the given frames of the map makers,

[4] in line with Kuhn's social theory of science, ref.

the group of map users together constructed a new shared frame of reference by questioning assumptions and choices of maps, and by posing new options (Carton and Van Norel, 2002).

9.5.4 Reflection on the contribution of the study to the field of map making/GIS

GIS-technology only used in preparations, not during multi-actor deliberations
Both in the Delfland case and the Game on Space, participants were satisfied with using tangible map images in their deliberations, and did not shift to or ask for live GIS or interactive GIS-presentations during the multi-actor deliberations.

In the Game on Space, the advanced options to 'play interactively with geographic information in GIS' was only used for preparing the wall maps. The use of computers was 'vetoed' by the program manager as it would distract the actors, added risk-factors to the operational complexity of the game itself and furthermore it was not considered necessary for the main objectives of the game.

In the Delfland case, it was found that a suitable way of working was to use prints of map images from the GIS that were distributed for the meetings, and that changes and adaptations were processed in between meetings in the GIS-room of Delfland or by the consultants. (The only operational detail in this respect was one remark that the images could not easily –without extra work– be emailed around, attached to the meeting notes).

To conclude, we did not find it a critical miss that only the print-outs of computer tools were actually used in multi-actor deliberations for our research, although technologically a lot of live map support is possible today through the use of GIS, Google Earth or other advanced computer tools. As we focused on the conceptual level of what was discussed with the map, and how this was discussed, we did not expect that computer tools would have prevented any of the observed emerging problems. Moreover, as we identified many conflicts as frame conflicts, we expect that the conflict would have persisted –perhaps to the surprise of people with a predominant analysis frame of reference, who may have high expectations of computer models as problem solvers (see the explanation of the analysis frame).

New types of maps in practice
Focusing on the interaction process in policymaking, we explored two cases that were considered as innovative in terms of their participative approach. The maps that were made and used in these cases show two relatively innovative map types that are gaining importance in the Western planning tradition.

- The *'New Map'* that was simulated in the Brabant game by a block map, is in reality a digital product that will be managed, updated and extended using financial support provided by the Dutch government for the next 5 years. This 'new map' tool is available in the Netherlands through the Internet (www.nieuwekaart.nl) and serves as an institutionalized living document. Although developed to assist policy administrators, the tool seems to be used mostly by researchers (verbal statement, Alexandra Tisma, RPB, 2004).

- *Suitability maps* are appearing in increasing numbers, with various topics. They serve to explicate the lines of argumentation of specialized advisors to decision-makers and people from other disciplines. Examples of suitability maps are found in the fields of urban planning, water management, geotechnical analysis, and also in fields like public safety and insurance policies. A related map type that seems to be gaining importance is the *risk map*. The map tells a story to provide insight and transparency in the models of the specialists and to communicate risks and potentials.

In our opinion, while the nineties were characterized by large GIS-projects with an emphasis on extended spatial analysis, in the current period attention has shifted to the communicative effectiveness of maps. Suitability map/risk map instruments, and tools like the new map, are being implemented in a web-enabled manner to allow a wider public to access the maps, and especially when the general public gets access, it becomes more important to explain the methods and datasets used, and to tell the story of why the map was made the way it is.

In our view, the current developments in mapping are driven by enabling technologies like Google Maps, Google Earth and Open Source GIS, but we expect the next wave of innovation in the field of geo-information to be on the side of social practice (e.g. governments and public exploiting on a larger scale the options enabled by these technologies and information systems) rather than on the technological side.

9.6 Directions for further research

Typical frames involved in map use and their origination
This study dealt with two case studies in depth, with a life of the map analysis of six maps in two different environments. The frames that were elicited in the first case study were verified in the second case, also in that case, the frames could explain the emerging conflict. However, the generalization (validity of these frames in a larger set of cases) of this finding has not been tested. This question could be the starting point of follow up research.

The elicited frames may be useful for explaining other conflicts and controversies found in Dutch spatial planning practice. We expect that the frames are representative for the cultural practice that is dominant in Dutch spatial planning. However, more cases are necessary for validating this assumption.

Conscious versus unconscious framing with maps in a group setting
In our view, the theory of frames and framing matured in the last few years, but new questions keep arising. In this thesis, we have aimed at formulating an explicit description of the meaning of frames and framing, which is open for debate. We have tried to explicate how maps influence the problem framing process in a project and vice versa: but we have not elaborated on the question whether this happened consciously and deliberative or not. Research in the fields of participative

policymaking may focus on this subject: but the fields of cartography and design could also shift their focus to the multi-actor setting of their practices.

A possible pitfall, in our view, lies in the inherent embedding of frames in their context and in the minds of the frame carrying actors. Theoretic research into frames per se, without roots in practice, may loose sight of the fact that frames are context-sensitive psychological constructs, named and labelled by the symbols that researchers give them. We recommend further empirical study into the use of symbology in multi-actor policymaking, in the form of metaphors, concepts and models, including graphics such as maps.

GIS and PGIS

We expect that the wider spread of technologies like Google Maps, Google Earth and other virtual maps and globes among the mass public will stimulate the creation of many new applications, and open up sources of information that until now have mostly been in the hands of governments and used by experts in GIS rooms. For instance, In the Netherlands, the city of Nijmegen has recently announced that it will publish its licensed constructions on Google Maps.

While the development of Spatial Data Structures (SDI) may be enabling new applications that can support policymaking, we warn against placing too much focus on (slow) deliberations for standardization and for putting too much effort in increasing the level of detail of spatial data without a clear concrete purpose. Policymakers and collaborative policymaking does not always need, or can work with, this level of detail. The cases in this research have illustrated how each policy issue is addressed with the formulation of new, unique concepts such as the clockwise/anti clockwise water circulation options in the Delfland case or the Green Forest in the Game on Space. These concepts were quite abstract and were formulated on an intermediate scale level, not on the level of the smallest map unit.

We also warn against the consideration of new GIS applications or the knowledge spread under the label of PGIS as a panacea for policymaking. It would be naïve, in our opinion, to expect that map conflicts can be prevented in policymaking. We argue for a more conscious approach of the conflictive nature of maps in policymaking, where a further bridging of the field of GIS with theories of the social sciences may be fruitful.

Integration of manual vision-sketching with GIS-supported analysis in map making

This study comprised both hand-drawn maps and GIS-maps. The usefulness of pen and paper drawing at the start of a participative process, for the sake of vision building, has been mentioned in this chapter. Both cases contain an example of such vision sketches. Within the field of GIS, it seems the tendency is to digitize all information and do all work processes using GIS. In an interview with Douwe Schenk of the Dutch Ministry of Housing, Spatial Planning and the Environment (2004), Schenk recognized this trend and acknowledged that the added value of manual drawing had been somewhat ‘forgotten’. He mentioned a recent vision project of three ministries, where his department found it surprisingly useful to go back to pen-and-paper tools. The relation between manual and computer tools (map drawing and GIS use) could be further investigated and possibly improved.

Evaluation of the role of specific new map types in policymaking
When this study was conducted, Water Opportunity Maps were a relatively new phenomenon in the Netherlands. At the time of defending this thesis, in 2007, a new European guideline on water prescribes the making of flood risk maps for all regions with a certain vulnerability to floods. Are these information products, these oversights laid down over spatial maps, really useful? For whom? Do the maps bring new information, a structured view on the scope and urgency of the latent problem? Do they serve to increase awareness? Do they serve to improve collaboration? Or do they just standardise and administrate what is already known? In chapter 1, a list is given of map types that nowadays circulate in policy processes. We recommend a critical analysis of the origin, use and effects of these policy maps, especially when more and more of these products are being produced.

International component
The work of this study was focused on discussions in meeting rooms of regional governments. We only studied the use of maps in two regions of the Netherlands. The cultural differences involved in cross-boundary corporation, while working with maps, has proved difficult in the European Spatial Development Perspective (ESDP) process, as described in chapter 1. An elaborated analysis of emerging conflict around maps in cross boundary and international settings could be relevant in the light of further globalization of technology, trade, environmental trends and policymaking.

"Even though we navigate daily through a perceptual world of three spatial dimensions and reason occasionally about higher dimensional areas with mathematical ease, the world portrayed on our information-displays is caught up in the two-dimensionality of the endless flatlands of paper and video screen. All communication between the readers of an image and the makers of an image must now take place on a two-dimensional surface. Escaping this flatland is the essential task of envisioning information –for all the interesting worlds (physical, biological, imaginary, human) that we seek to understand are inevitably and happily multivariate in nature. Not flatlands."

– E. Tufte in 'Envisioning Information' (1990, p12).

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Appendix 1: Participants in the Delfland case study

In this appendix, the names of people involved in the WOM project Delfland are enumerated who were present in (part of) the meetings that have been observed.

Participants of the WOM project:

Water board Delfland:

Mrs. K. Baele
Mr. J. Baltissen
Mr. P. Beukema
Mr. A. Boele
Mr. J. van Dansik
Mr. H. Drenkelford
Mr. P. Florijn
Mr. J. Grootjans
Mrs. M. Hilders
Mr. H. Hoogenboom
Mr. W.J. van Liere
Mr. H. Meijerink
Mrs. J. Rahman
Mrs. T. Ruijgh-van der Ploeg
Mrs. A. Spaandeman
Mrs. K. Vetten
Mrs. A. Wijnants

Municipalities involved in pilot Oostland:

Berkel en Rodenrijs	Mrs. B. de Bruijn
	Mr. W.J. van Empel
Delft	Mr. S. Clarisse
	Mrs. A. van de Sande
	Mr. R. Van der Werf
Leidschendam	Mr. A.P. van Eijk
Pijnacker and Nootdorp	Mr. B. van Waes
	Mr. P. Bell
	Mrs. Van de Meulder
	Mr. R. Broekhuijzen
	Mr. M. Beke
Zoetermeer	Mrs. W. Sprokholt

Regional governments:

Province of South-Holland	Mrs. D. Valk
	Mr. Halbersma
Urban district Haaglanden	Mr. A. Lammers
('Stadsgewest Haaglanden')	Mrs. M. Weirauch

Environmental interest group:

Zuid-Hollandse Milieufederatie	Mrs. T. Beukema

Consultants LWT and BNG (the acronyms LWT and BNG stand for an engineering firm respectively a firm of landscape architects in the Netherlands):

Mr. R. Iedema
Mr. W. Keijsers
Mr. J. Lubbersen
Mr. B. Smolders
Mr. M. Witberg

Appendix 2: Participants in the Game on Space

In this appendix, the names of people are enumerated who were part of the project team, supporting assistant or participant in (one of the two) game sessions of the Game on Space.

Project team members:

Project members	Name	Affiliation	Expertise	Main responsibilities
Project leader TPM	*Igor Mayer*	TU Delft TBM, section Public Management.	Games, policy analysis	Project leader, game facilitator
Project manager RPB	*Ed Dammers*	RPB	Scenarios, future studies	Client, co-leader
Senior Researcher	*Martin de Jong*	TU Delft TBM, section Public Management.	Public management, spatial planning	Preparing work, game logistics
Junior Researcher	*Linda Carton*	TU Delft TBM, section Policy Analysis.	GIS and maps, spatial planning	Preparing work, game setup, map use, tools and observation
Junior Researcher	*Martijn Leijten*	TU Delft TBM, section Public Management.	Spatial planning	Preparing work, screening substantive issues in Brabants planning discourse
Researcher	*Richard Scalzo*	Erasmus University EUR (working with TBM on games)	Games	Assistant and advisor during game
Junior Researcher	*Femke Verwest*	RPB	Public management	Assistant and observer

Table A2-1. Constellation of the project group

Supporting assistants before or during the game:

GIS-expert	Mr. J. van der Schuit (RPB)
Designer	Mr. A. van Hoorn (RPB)
Designer	Mrs. M. van Leeuwen (RPB)
Designer	Mr. F. Stroeken (Royal Haskoning)
Assistant	Mrs. M. Galle (RPB)
Assistant	Mrs. R. van der Ham (RPB)
Assistant	Mr. M. Piek (RPB)
Assistant	Mr. J. van Kempen (TU Delft)
Storyteller	Mr. K. Roseboom (IMI, explained scenario trends before start of the game)

Observers:

TU Delft	Mrs. L. Carton
TU Delft	Mrs. S. Karstens
TU Delft	Mrs. M. Klompenhouwer
RPB	Mrs. F. Ferwest
RPB	Mrs. C. Nauta (Royal Haskoning)

Participants first Game session, November 14th 2002

Municipalities:

Bergen op Zoom	mr. P. Dingenouts
Boxtel	mr. P. van den Crommenacker
Breda	mr. A.W. Hartman
Breda	mr. A. Michielse
Eindhoven	mr. F. Hund
Eindhoven	ir. M. Bredschneyder
Helmond	mr. P. Kloet
Tilburg	mrs. P. van Baal
Tilburg	mr. R. van Eijkeren
Uden	mr. S. Molkenboer

Regional governments:

Province Noord-Brabant	mr. P. van Gaalen
Province Noord-Brabant	mr. B. Doedens
Province Noord-Brabant	mr. T. Godefroij
Province Noord-Brabant	mrs. M. Oom
Province Noord-Brabant	drs. M. Post
Province Noord-Brabant	mr. P. van Ree
Province Noord-Brabant	ir. F. van der Steen
Province Noord-Brabant	mrs. I. Wouters
Urban district Eindhoven ('Samenwerkingsverband Regio Eindhoven')	mr. M. van der Velden

National government:

Ministry of Housing, Spatial Planning and the Environment	mr. J. Bloemberg
Ministry Economic Affairs	mr. H. van der Beek
Ministry Economic Affairs	mr. W.J.C. Schaaf
Ministry of Agriculture, Nature and Food quality	mrs. I. van Hoorn
Ministry of Agriculture, Nature and Food quality	ir. G.A.J. Vis
Public Works and Water Management (‘Rijkswaterstaat’)	ir. H.P. Nugteren

Non-governmental associations and private parties:

BBA	mr. W. de Jong
Bureau voor Emancipatiezaken	mrs. E. Vermaat
Rover West-Brabant	mr. E. Filius
Staatsbosbeheer	mr. A. van Haperen
Stichting Brabants Bureau voor Toerisme (Recron)	mr. W. Harmsen
Sociaal-Economisch Overlegorgaan Brabant	mr. A. Verhoeven
Slokker Vastgoed/Neprom	mrs. H.J.E.M. Pijnenburg
Heijmans IBC	mr. R. Breddels

Participants second Game session, December 12th 2002

Municipalities:

Boxtel	mr. P. van den Crommenacker
Boxtel	mrs. B. van der Padt
Breda	mr. A Greven
Breda	ir. A.H.J. Hurk
Eindhoven	ir. M. Bredschneyder
Eindhoven	mr. F. Hund
Helmond	mr. P. Kloet
‘s Hertogenbosch	mr. K. van Aalst
's Hertogenbosch	mr. H. Oerle
Uden	mr. S. Molkenboer

Regional governments:

Province Noord-Brabant	mr. P. van Gaalen
Province Noord-Brabant	mr. R. Gielis
Province Noord-Brabant	mr. C. van der Meijden
Province Noord-Brabant	mr. M.H.G.Mentink
Province Noord-Brabant	mr. M. Post
Province Noord-Brabant	mr. M.P. Reinders
Province Noord-Brabant	mr. S.J.N. de Wit
Province Noord-Brabant	mrs. I. Wouters
Urban district Eindhoven ('Samenwerkingsverband Regio Eindhoven')	mr. M. van der Velden

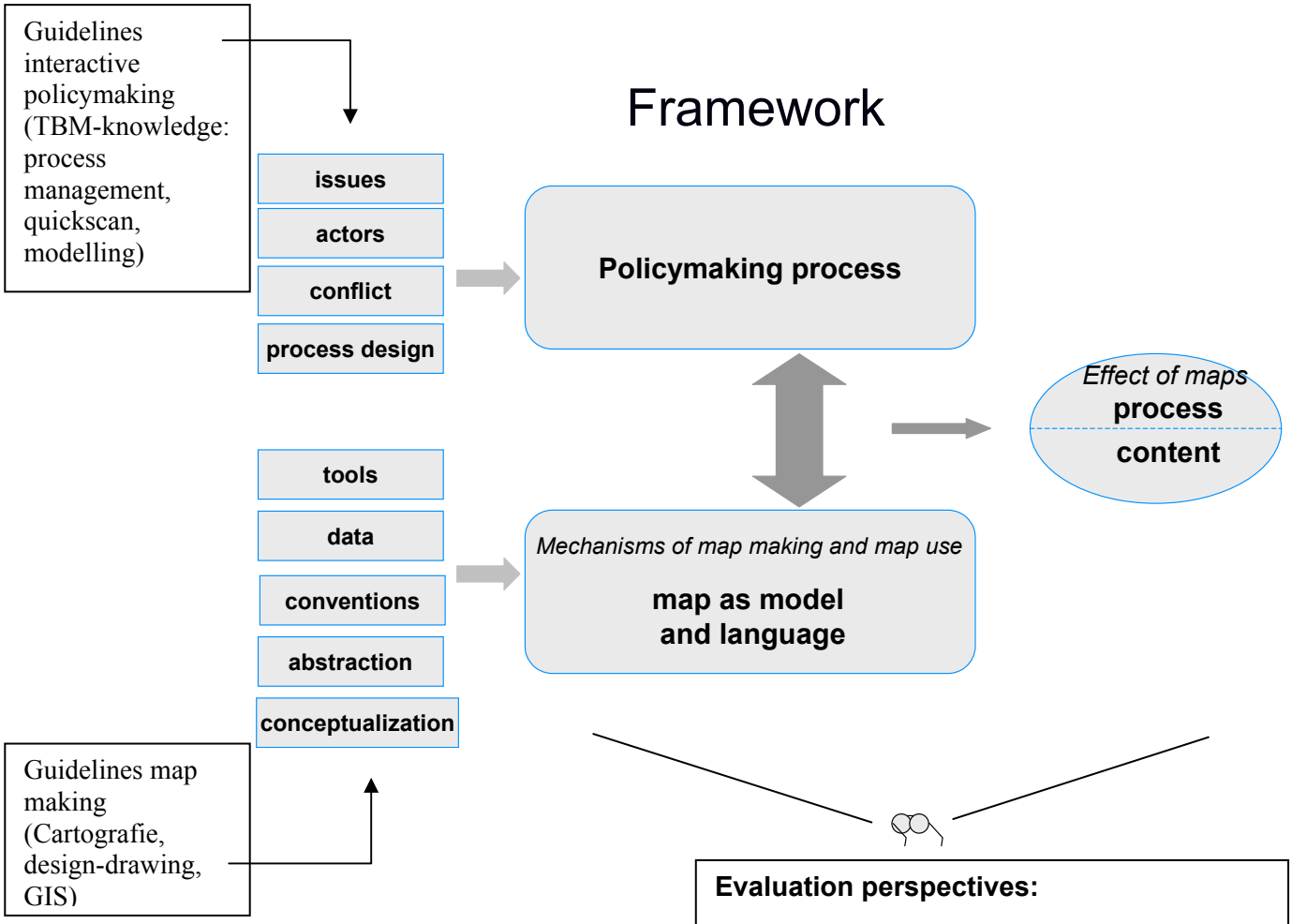
National government:

Ministry of Housing, Spatial Planning and the Environment	mr. J. Bloemberg
Ministry Economic Affairs	mr. T. de Jong
Ministry Economic Affairs	mr. H.P Krolis
Ministry of Agriculture, Nature and Food quality	mr. B. Clabbers
Public Works and Water Management (‘Rijkswaterstaat’)	mr. P.J.J.W. Huijs

Non-governmental associations and private parties:

ANWB	mrs. M. Dwarshuis
Staatsbosbeheer	mr. J. Hendriks
Brabantse Milieufederatie	mr. P. Klaassen
NVOB Gewest Noord-Brabant	mr. M.M.A.M. Knoops
Lokale Agenda 21	mr. O. Kwak
Sociaal-economisch overlegorgaan Brabant	mr. A. Verhoeven
Slokker Vastgoed/Neprom	mrs. H.J.E.M. Pijnenburg
NS Reizigers Zuid	mr. M. Essers
NS Reizigers Zuid	mrs. M. van Daalen
Katholieke Bond voor Ouderen	mr. H. Dirkx
POG Brabants Centrum voor Gehandicaptenbeleid	mr. J. Geurts

Appendix 3: One-page summary of observation scheme



Functions of maps:

1. Analyze problem
2. Synthesize results of spatial analysis
3. Design; visualize spatial patterns
4. Coordinate information
5. Agendize
6. (Re-) frame problem
7. Stimulate creativity
8. Express spatial claims. Also: polarize
9. Persuade, make argument
10. Clarify spatial conflicts
11. Mediate between spatial trade-offs
12. Consolidate choices

Appendix 4: Recommendations for map users

In the beginning we had the ambition to develop a method. But as the research progressed, this made less and less sense. Contextual circumstances require a method that is adapted on a case-by-case basis. Furthermore, awareness grew that a method makes sense either to produce a map at one instance in time (by a single map maker in a multi-actor setting), or to formulate a method for supporting participatory processes in general regardless of the model-type used.

Still, this would not help the practitioner that aims to learn and aquire experience. Therefore, we summarize here a simplified step-approach that we would follow in a situation where asked for assistance as a map-maker. The approach exist of a process-part (targeted at the participative nature of the process) and a substantive part (targeted to cope with the policy issues by building a map model). Next, we explicate our personal perspective on "good policymaking" that forms the basis of our approach of map support in policymaking.

Guidelines for a map-maker in a multi-actor policymaking setting

1. Process part:
In this study, much attention has been given to the contextual setting of the map. In our view, the context of the project (time-period, problem, participants, etc.) has a large influence of what services are actually valuable and realistic, also in terms of map-making. The recommendation thus starts to first orientate on the contextual setting, instead of the substantive or technical map-issues. This is what our strategy would look like, and what we would recommend to others:

- Depending on what the *concerns* of participants and the *tensions* in the policy process are, explicate a set of problems and questions and collect opinions on the needed and desired set of information and set of participants. Have explicit attention for what stakeholders and information is missing.
- Depending on the *nature* of the explicated problems, dilemmas and questions, as well as the requested information by the various actors, make a screening to elicit the most urgent and most important issues as well as the relevant actors that are influenced by these issues or may be influenced by changes in the situation. Explicate a call for particular actors to become involved and particular models to be developed (define the appropriate type of model in communication with expert practitioners on the subject)
- Accordingly, make explicit for yourself how the *responsibilities* in the group of participants are divided, elicit the (formal) statement of what drives the collaboration (what unites the group of participants), and make an inventory of the *risks* involved in the policymaking process –whatever these risks are, from economic to aspects of reputation damage. These risks can offer indications of future pitfalls in the map-making and map use process. Also, the analysis of risks explicates the potency for 'controversial maps'.
- Discuss with the organizers and participants the expectations from the map-maker, your own responsibilities, and the *'rules of engagement'* during the map-making process. (Who may decide and advice on what, what is expected by whom –for instance the delivery of data, and who owns the results.)

- Get explict (negotiated) agreement on the process. In order to encourage 'ethical' behaviour of the participants, it is possible to provide the *'code of ethics of PGIS-practice'* as information for participants (amongst others www.iapad.org)

2. Substantive part:

In many policy processes, the information that is requested is expected in a relative short period of time (days, weeks, months). For instance, information requested by participants on one meeting, is preferably available at the next meeting. As policy processes have a capricious character and can change from round to round, it makes no sense to 'walk before the crowd'. As said before, working too fast to results could lead to unexpected objections as other participants' may feel neglected. Therefore, we advise to make the map that is requested for the current moment, in the current phase of the policy process. (When larger time-frames for building models come in the picture, the policy process gets the character of a research process. In our opinion, a research process has different dynamics than a policy process).

A generalized mapping-method in a multi-actor setting for one map-maker on one instance in time, would look like this (derived from own analysis and based on Keijsrs and Witberg, 2003):

- Depending on what the concerns of participants and the tensions in the policy process are, decide who are the participants to *listen* to in requests for map information, and who make up the target actor-network of your work
- Depending on the nature of the defined problems and questions, as well as the requested information by the various actors, think of what type of map would be appropriate at the current stage of the policy process. On this basis, define the *purpose* of the current map-to-be-made and think through the effects of this map, both desired and undesired and both immediate and indirect effects (for instance a shocked audience, a concern agendized, a new solution in the picture, a conflict sharpened, etc.). The division in functional and possible *dysfunctional* effects may be helpful.
- Formulate the *message* (statement) or the *question* that drives the mapping exercise, and think through what *legend items* are necessary to compose the message/ to analyze the question. Reflect if a map is really the best type of model. Discuss the legend items explicitly with the group of participants.
- Choose between tools, techniques and *data* sources. Construct the map –by composing existing data into a map by means of geodetic, geographic, cartographic and information-design techniques, for instance with help of GIS software, possibly completed by own drawing.
- Experiment with alternative scales, boundaries, graphic variables and multiple images, and show intermediate results to close affiliations. Here tools such as GIS are handy to *'play'* with the information in order to get to know its *meaning*, its *uncertainties* and its *limitations*, without having to spend all attention on repetitive aspects of automated mapping procedures (such as projection of coordinates, showing topographic base data, copying designs from one map image to another, etc). Reflect whether the information of the map corresponds with the expected message, or that the resulting map in fact points at *new information* about underestimated or neglected (counter-intuitive) problem aspects.
- Meanwhile think through how the resulting map and the concerns and tensions present in the contextual setting (see process part) relate to each other. Discuss

with the participants the various *levels of framin*g involved in map-making (see next subsection). Clarify and possibly adapt the (explicit) *role(s) or status* of the map.

- In case you notice *emerging conflict*, try to interpret what the underlying frames of participants 'look like'. The three frames of this study may be usefull as starting point for recognizing the different assumptions and attitudes of participants. Make these (fundamental or ideological) frame differences point of deliberation and try to find common ground with adaptations either to the map or to the conditions and assumptions for making and using the map (see next subsection).

In our view, no response from an audience on a presented map is also a response. The map is either OK, not relevant, or undisputable. Both map-makers and 'audience' can use maps for asking critical questions.

Personal perspective on evaluating "good policymaking"
A general definition of policy analysis describes the field as the production of knowledge that can be used by policy makers. We adopt a discourse-based interpretation of policy analyisis; the viewpoint that knowledge and policy processes should be intertwined in order to achieve good decision-making, and that policy analysis theory should provide the methods, tools, guidelines and insights to achieve this (Van Eeten and Ten Heuvelhof, 1998; Thissen and Twaalfhoven, 2001; Edelenbos, Monnikhof and van de Riet, 2003). To give a short statement of our normative view on policymaking, in our view, "good policymaking" exists of:

- A *dedicated effort to expand timely knowledge* on the issues and solutions for making a thoroughly assessed decision. The knowledge is aimed to provide the best/most mature considerations available at the time before a policy decision is taken, and should ensure a level of transparency in trade-offs and choices, and insights in scenarios about implementation, effects, and affected. This comprehends a dedication to the analysis of the problem, to the exploration of alternative possibilities and to the awareness about –and inclusion of– additional issues, aspects, alternatives, stakeholders and relevant representatives. Specifically, we mean with a dedicated effort:
    - Interaction (engagement) with the issues and actors involved, including the explicit communication of trade-offs about the division of gains and losses over involved actors and affected stakeholders[1]. In this view, *communication and observation/ measurement* are both key-elements in *learning* about the policy issues at stake.
    - Dedication towards an alleviation of the severest problems, while considering not creating bigger or irreversible problems as a side effect of the potential policy process and outcome. This implies the mobilization of *creativity* to find innovative options and simultaneously a *conscious assessment* of all possible implications.

- *Commitment to democratic principles and respect for universal values of humanity.* This criterion involves the conduct of the people who make the

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[1] Nowadays, the term 'sustainability' has introduced/formalized an important representative or a 'virtual actor' in policy debates, namely the interests of the unborn future generations. This concept urges to take long term consequences of actions into account.

> policy towards the actors involved and the stakeholders affected, and is ethics-oriented. On a universal level, an example of a guide for 'good conduct' is the universal declaration about human rights. On a local scale, examples of such codes are described under labels like 'good governance' or the guidelines about participative policymaking approaches. These codes proclaim a dedication towards values such as openness, trust, transparency etc., they stimulate a reflection on moral principles and cultural habits and values, and they explicate how particular ethical values can be ensured as strong as possible.

We assume that expertise, given that it would be intertwined in the policy process in a certain way, can enable good policymaking in multi-actor settings. Hajer et. al. (2005) call this the 'stimulating hypothesis' (as opposed to a 'limiting hypothesis' or 'technocracy hypothesis' that assumes that experts hinder participation in policymaking). We assume that by improving the communication between what we distinguish as the knowledge domain (preparing knowledge by experts, civil servants and stakeholders) and the policy domain (where political power is structured and channelled so that it leads to decision-making over policy), the potential increases for 'good policymaking'.

The connection with our study of map use lies in the essential inherent function of maps, which we perceive as 'communication': communication between landscape and map-maker, between map-maker and map user, and between map user and landscape.

For an elaborated discussion about theories on the quality of policymaking we refer to Mayer (1997), Thissen and Twaalfhoven (2001), Van de Riet (2003) and Monnikhof (2006) who discuss various theoretical frameworks.

A general recommendation: Modelling for policymaking in a multi-actor setting

Awareness of multi-actor dynamics: Thinking in terms of simultaneous levels of framing

In our frameworks of analysis, we have not started with a structuring of policy processes in the 'classic' stages of problem formulation, criteria formulation, model building, assessment and recommendations to decision-makers that is familiar in fields of technical model-building. In order to explain the changing roles and status of a map, we found the so-called 'rounds model' more useful. The rounds model emphasizes the chaotic nature of policy processes and its dependency on contextual circumstances.

In our own thought process of structuring maps, rounds and effects of maps, we have found it useful not to think about modelling in terms of succeeding stages, but instead, to regard all 'levels' in (map-)modelling as simultaneous elements with parallel, contemporary products, or 'boundary objects'. Boundary objects are *points of reference* for conversations. People from different backgrounds can agree they are talking about a certain boundary object, but simultaneously attach a different meaning to it.

While a classical stages model structures a modelling process in succeeding steps such as in Figure A4-1, we would restructure this schematic representation of a modelling process into 'levels of framing', with the four cornerstones as boundary objects. In this view, all four end-results of the steps are now perceived as

simultaneous boundary objects-in-the-making: a problem formulation, a classification system, a model, and a formulation of proposed policy actions. The framing process than happens between these separate and semi-manufactured objects, in order to achieve one consistent whole. The problem formulation and model are both subject of 'tug-of-war' deliberations. It remains a free choice of the participants to either adapt the model to the problem formulation, or vice versa. The modelling process can be 'grasped' as a simultaneous manipulation of several boundary objects (several classification systems, models and problem formulations) that in order to create common ground and find consensus on a shared problem framing statement.

In the sciences on organizations, several literatures about coping with uncertainty and ambiguity and managing change use the vocabulary of framing and mapping while in a capricious and dynamic situation (Pondy, Boland and Thomas, 1988; Huff, 1990; Normann, 2001) The authors advice to keep a map (metaphorically) to make decisions, while simultaneously keeping a flexible approach with regards to the problem; the assessment of the relation between problems and map can lead to a need for 'reframing'.

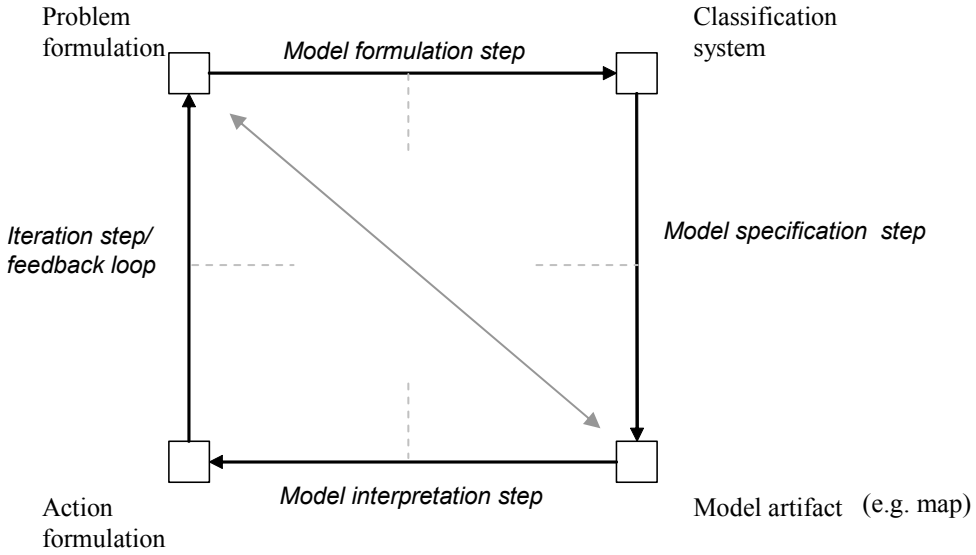

Figure A4-1. This interpretation is based on formal methods for model-building and on the perspective on policy analysis as presented by Dunn (see Chapter 2, Figure 2-2).

Part with colour figures

Appendix 5: Colour figures

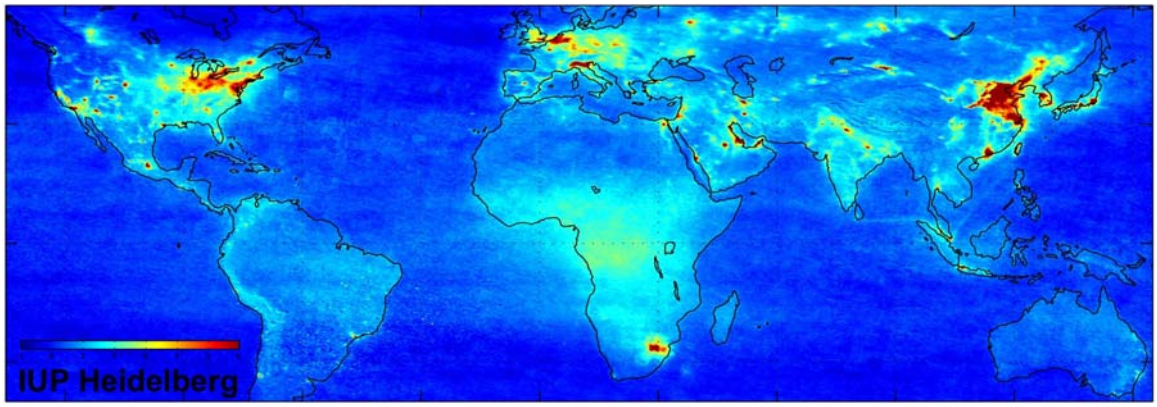

Figure 1-2. The NO2 map of ESA in 2004. Global air pollution map produced in October 2004, based on measurements by ESA's satellite Envisat. Source: image produced by S. Beirle, U. Platt and T. Wagner of the University of Heidelberg's Institute for Environmental Physics -Press release by ESA on October 11th, 2004.

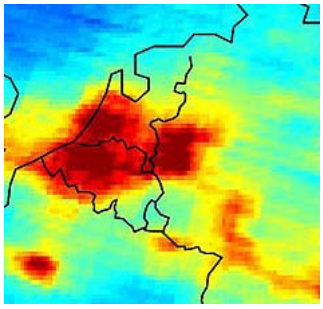

Figure 1-3. Detail of Figure 1-2 with O2 levels over Belgium, Germany and the Netherlands (Source: ESA).

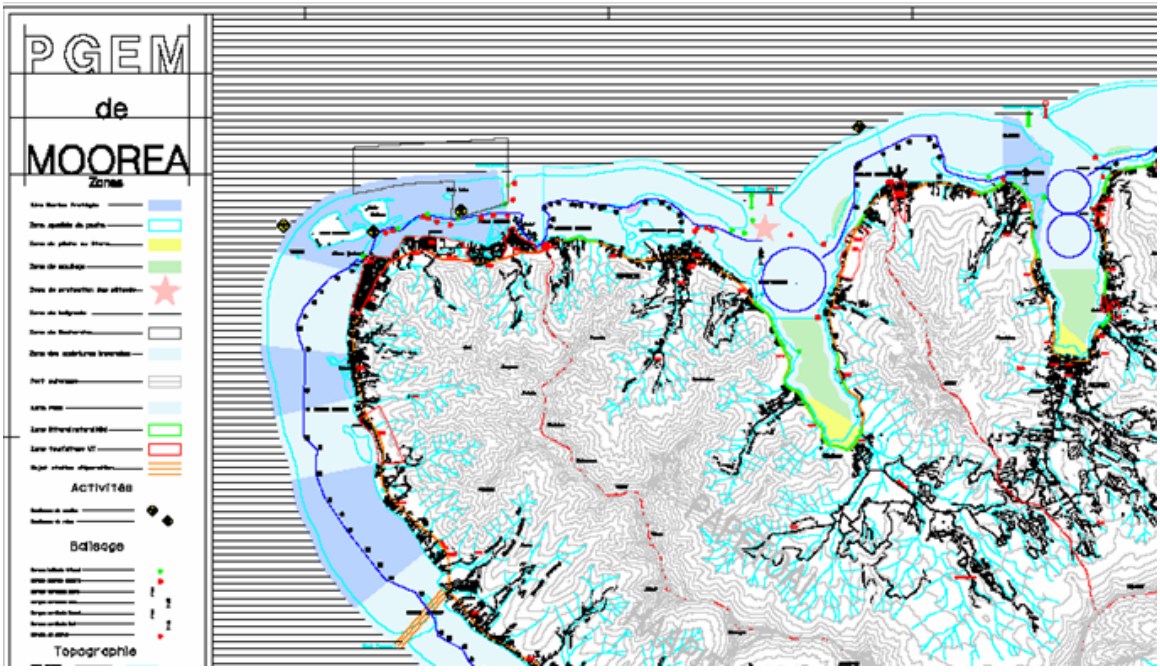

Figure 1-7. Fragment of the new PGEM map after deliberation between stakeholders and government. (Source: Stonich, 2002; http://moorea.berkeley.edu/maps/index.html)

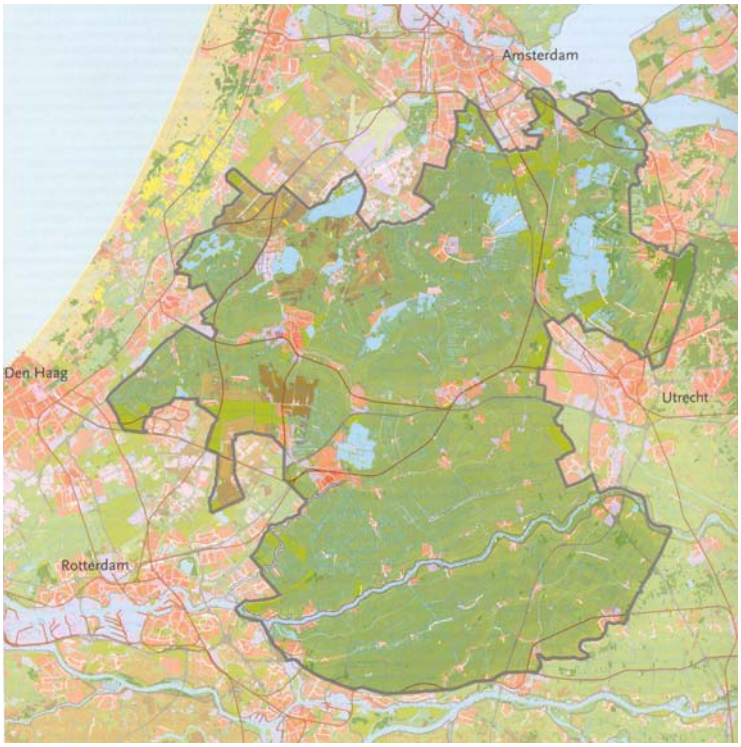

Figure 1-8 (a) Map of the Green Heart. (Source: National Policy Document on Spatial Planning, Part 3, 2002)

Figure 1-8 (b) Map of the Deltametropolis. (Source: National Policy Document on Spatial Planning, Part 3, 2002)

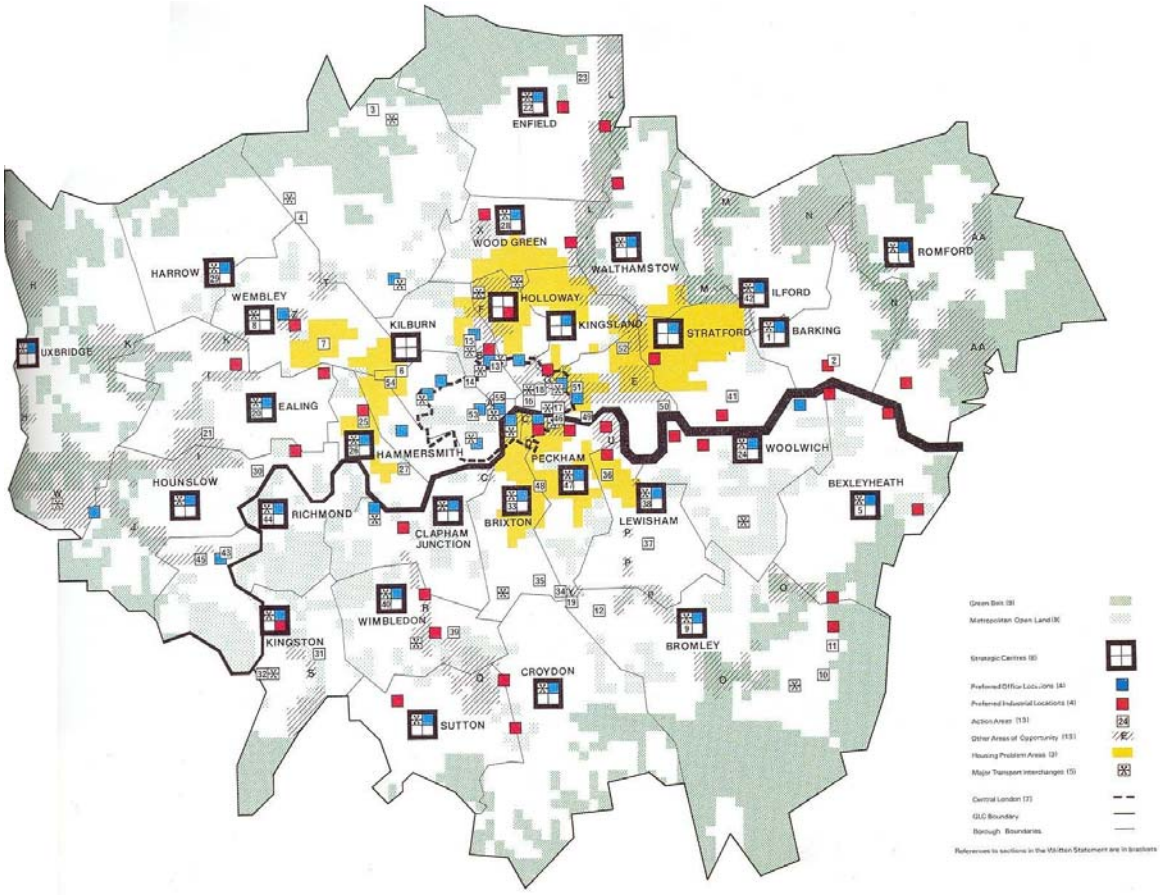

Figure 3-3. Key Diagram of the Greater London Development Plan, 1976. Policy map that presents, amongst others, areas with a 'housing problem'(in yellow), so-called strategic centres (in four-block squares) and the green belt around greater London (in grey) , laid out in a cubical raster. (Source: Greater London Council, reprinted from Gowling and Penny, 1988).

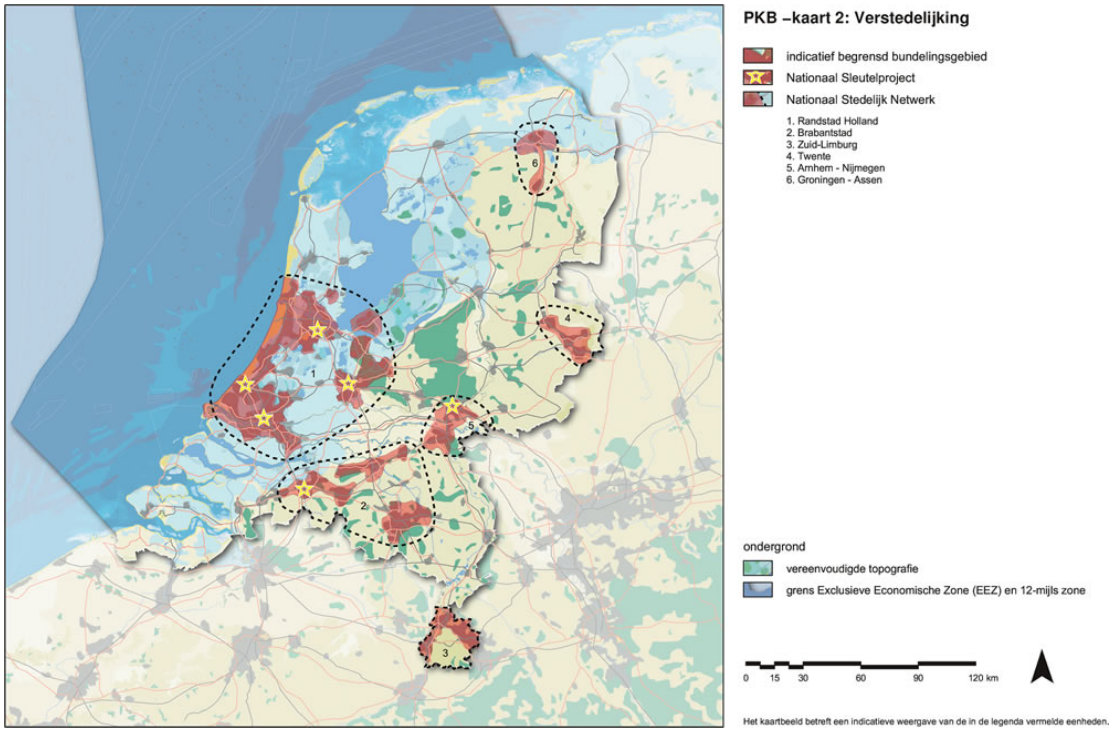

Figure 3-4. Policy map of urbanization in the Netherlands, part of the National Policy Document on Spatial Planning 'Nota Ruimte' (2004). (Source: VROM).

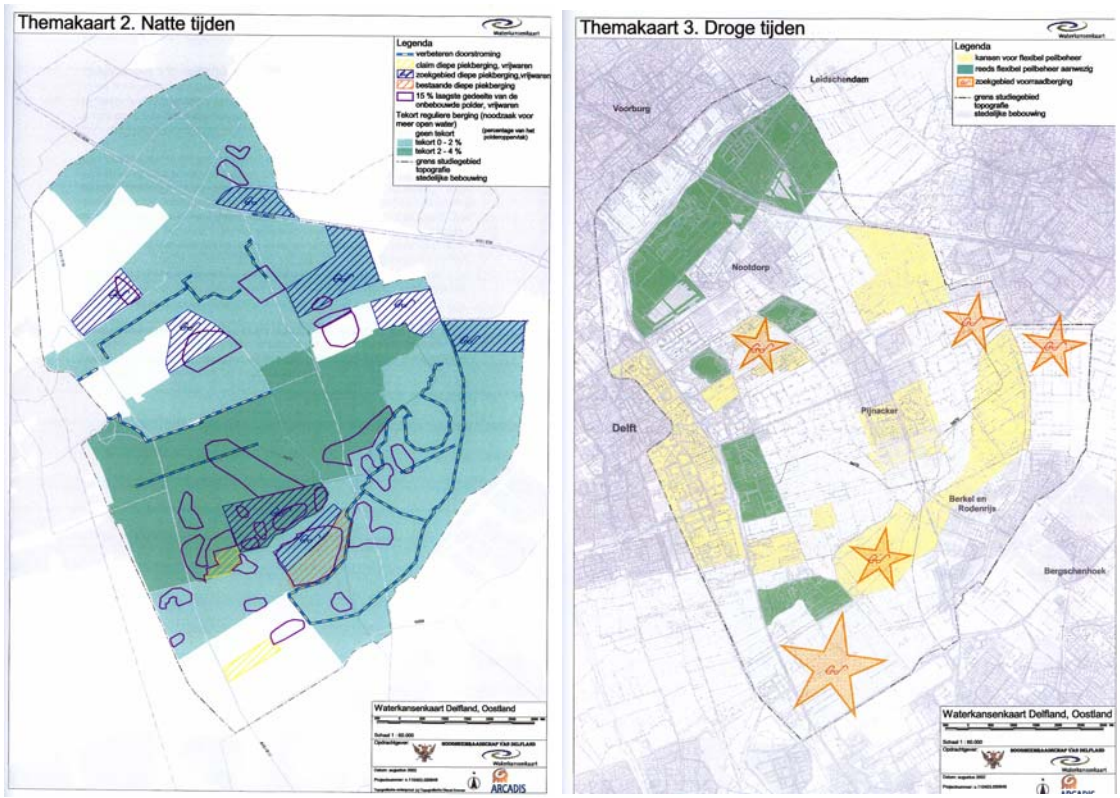

Figure 6-8. GIS-overlays of various policy measures in the area Oostland. Left: water surplus situation. Right: water shortage situation. Some search locations overlap.

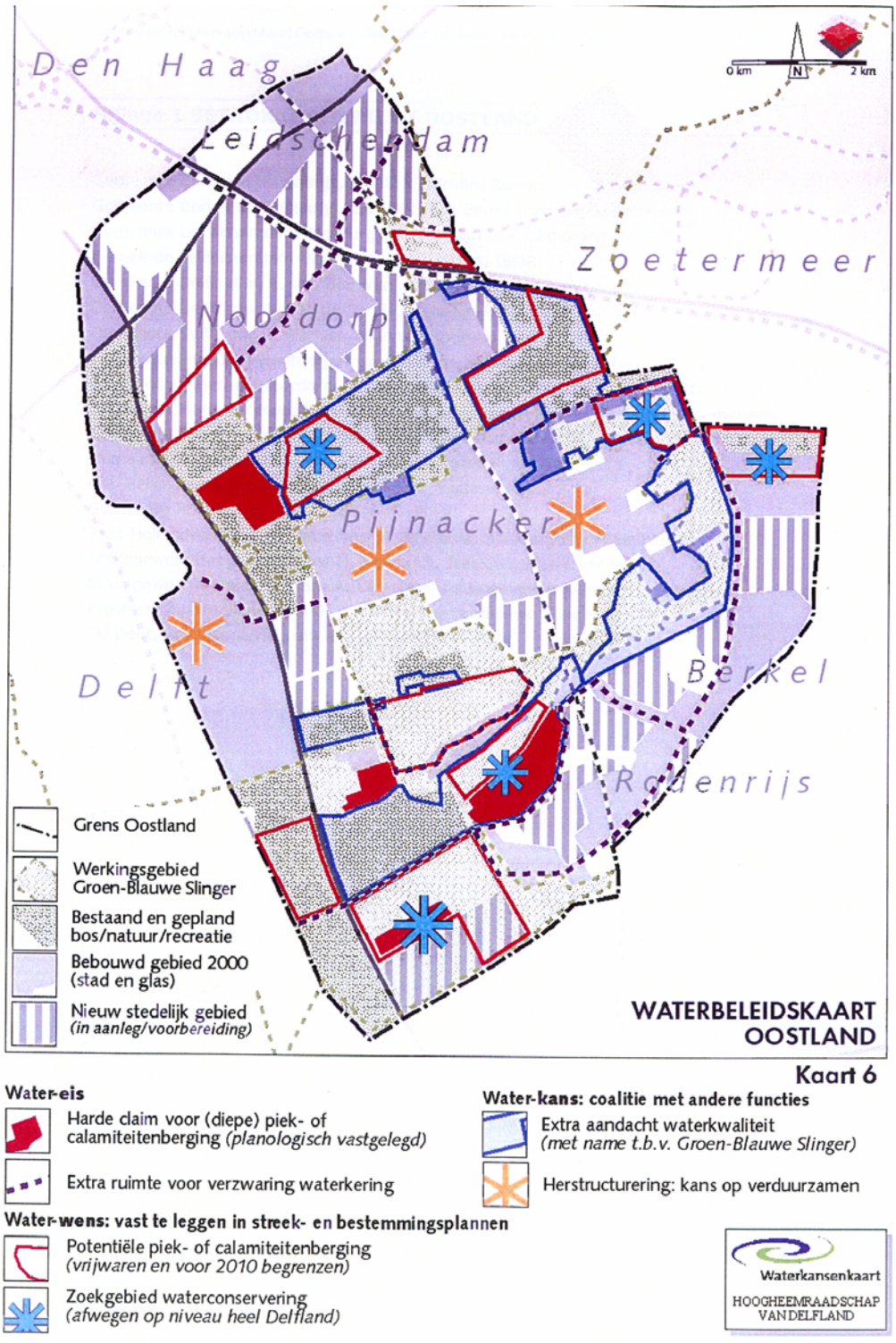

Figure 6-10. Resulting Water Opportunity Map of Oostland.

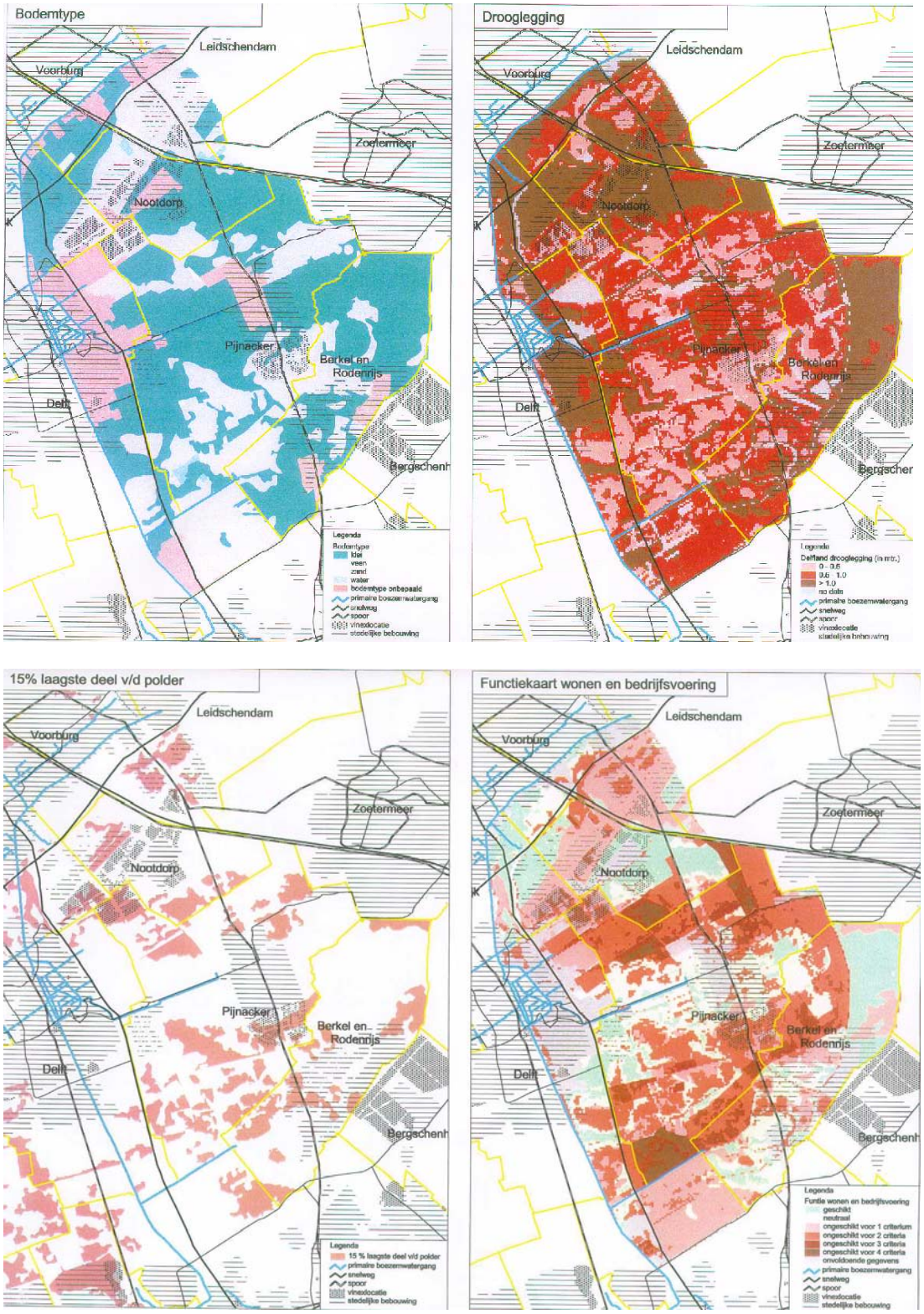

Figure 6-12. Concept suitability map as prepared by LWT (lower right map), and three 'base maps' that make up criteria for suitability; respectively on 'soil type' (upper left) 'level of reclamation' (upper right) and '15% lowest area of a polder' (lower left). There are 4 criteria for suitability; the base map showing nature areas is left out from this picture. The darker the red colour in the concept suitability map, the more unsuitable the area; relative to 1 till 4 criteria.

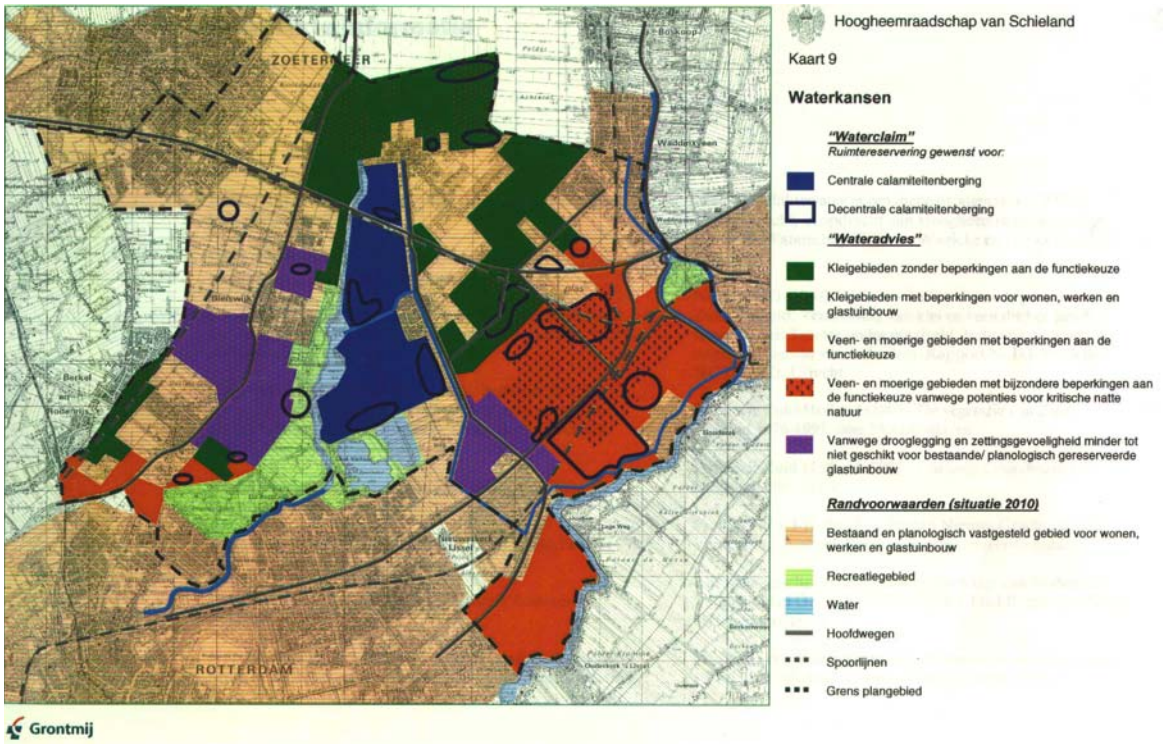

Figure 6-13. Map of neighboring water board Schieland, with claims for water storage areas combined with advice on suitability of lands for (urban) development (the green orange and purple legend items). Notice how the legend items are formulated in long sentences; in these formulations, the arguments for suitability are incorporated.

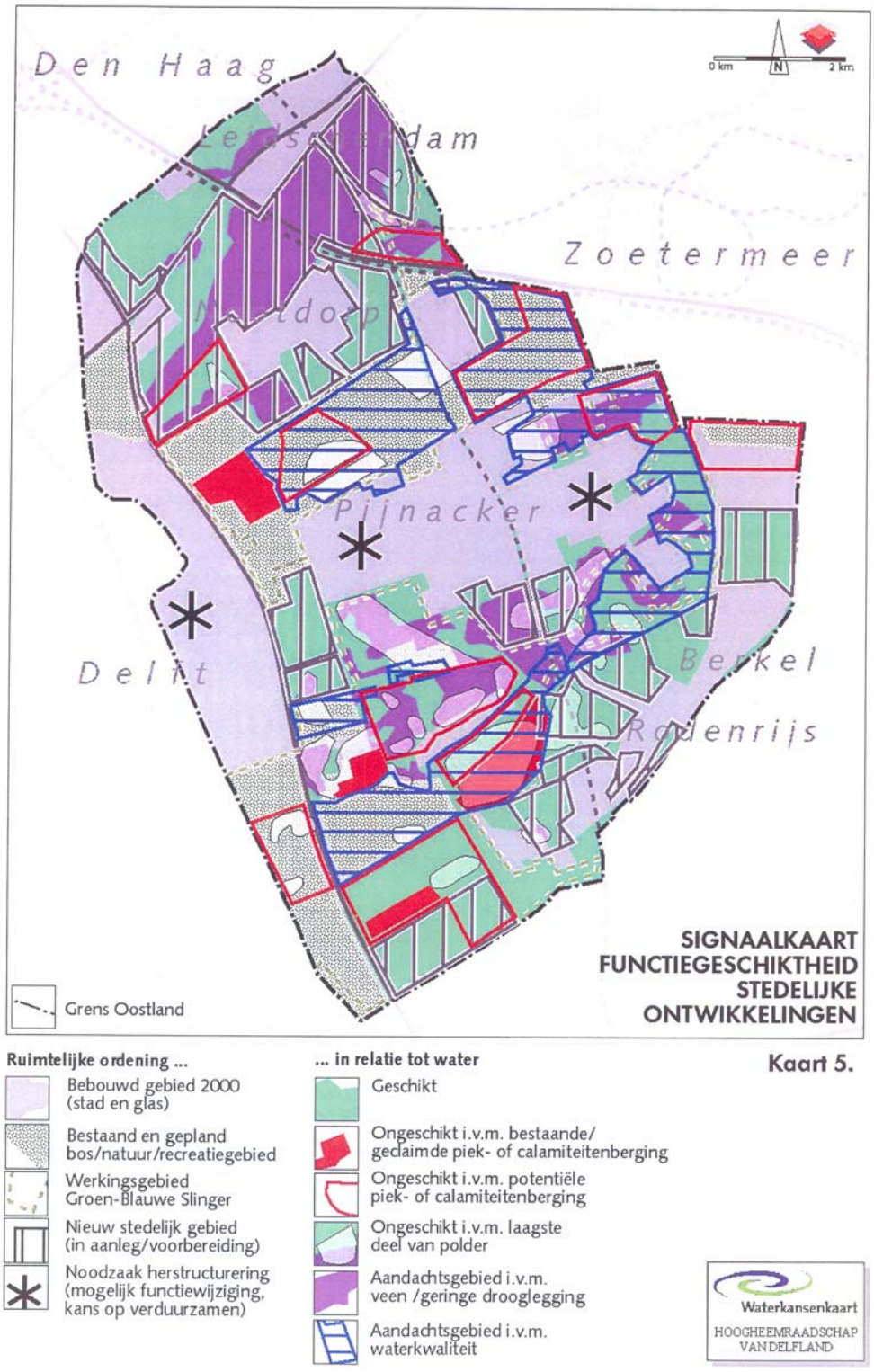

Figure 6-14. Final suitability map of consultant BNG, with explanatory legend items

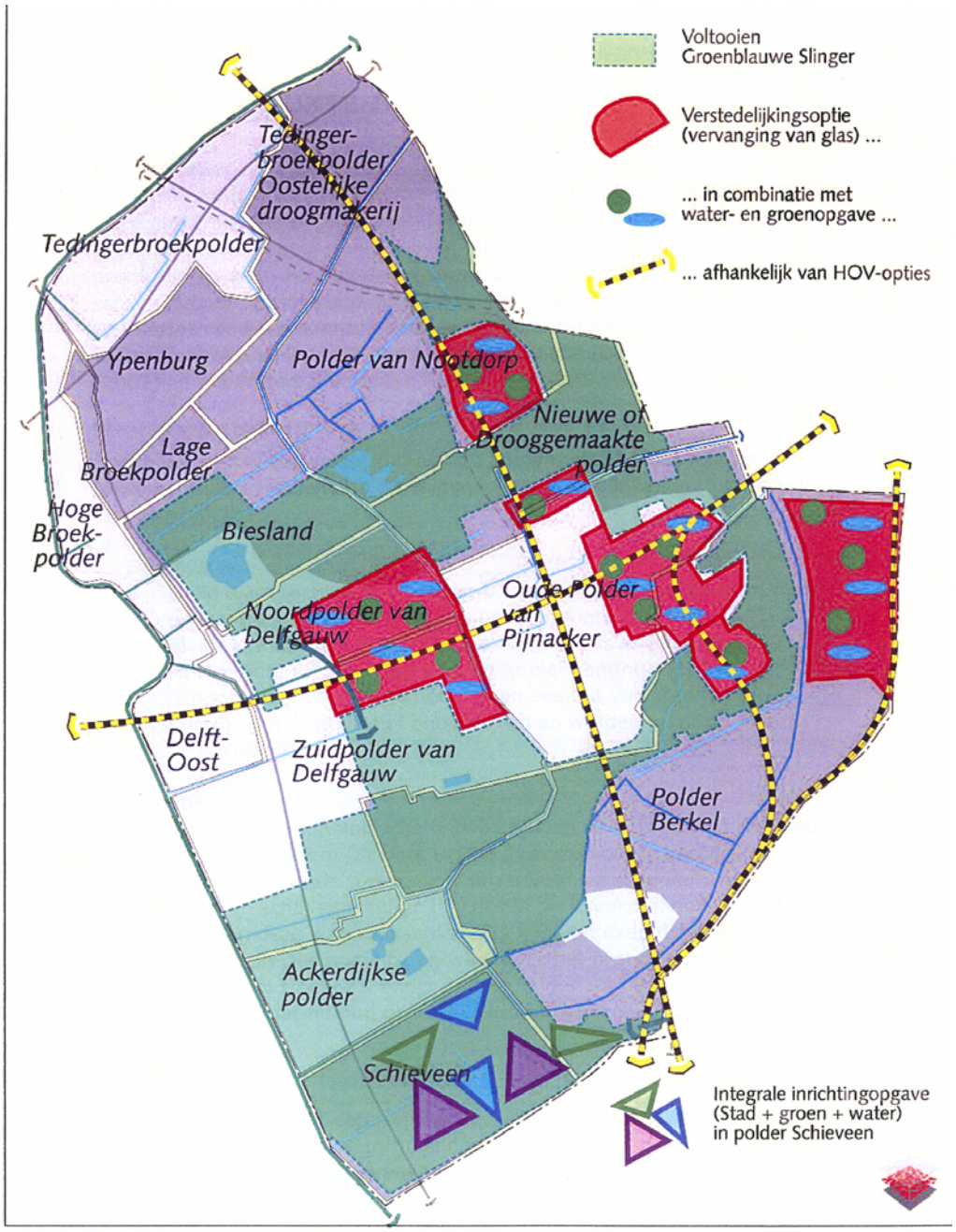

Figure 6-15. Map of Future Spatial Developments, final version.

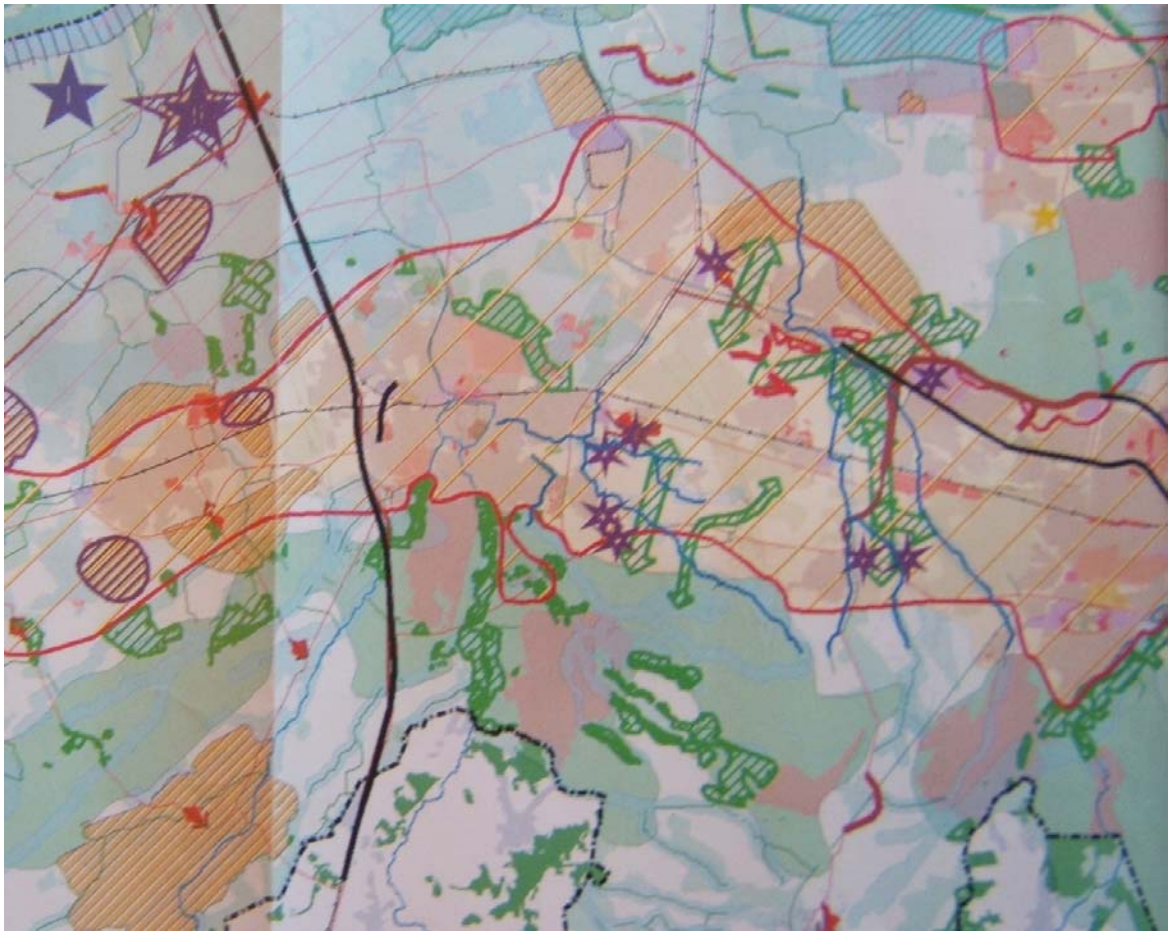

Figure 7-5. Example of a trial-and-error map image with a striped-texture for the urban area and 'red' and 'green' themes combined. This view was dismissed as being unclear and confusing. The long lines of the striped texture did not seem to belong to one homogeneous area-object.

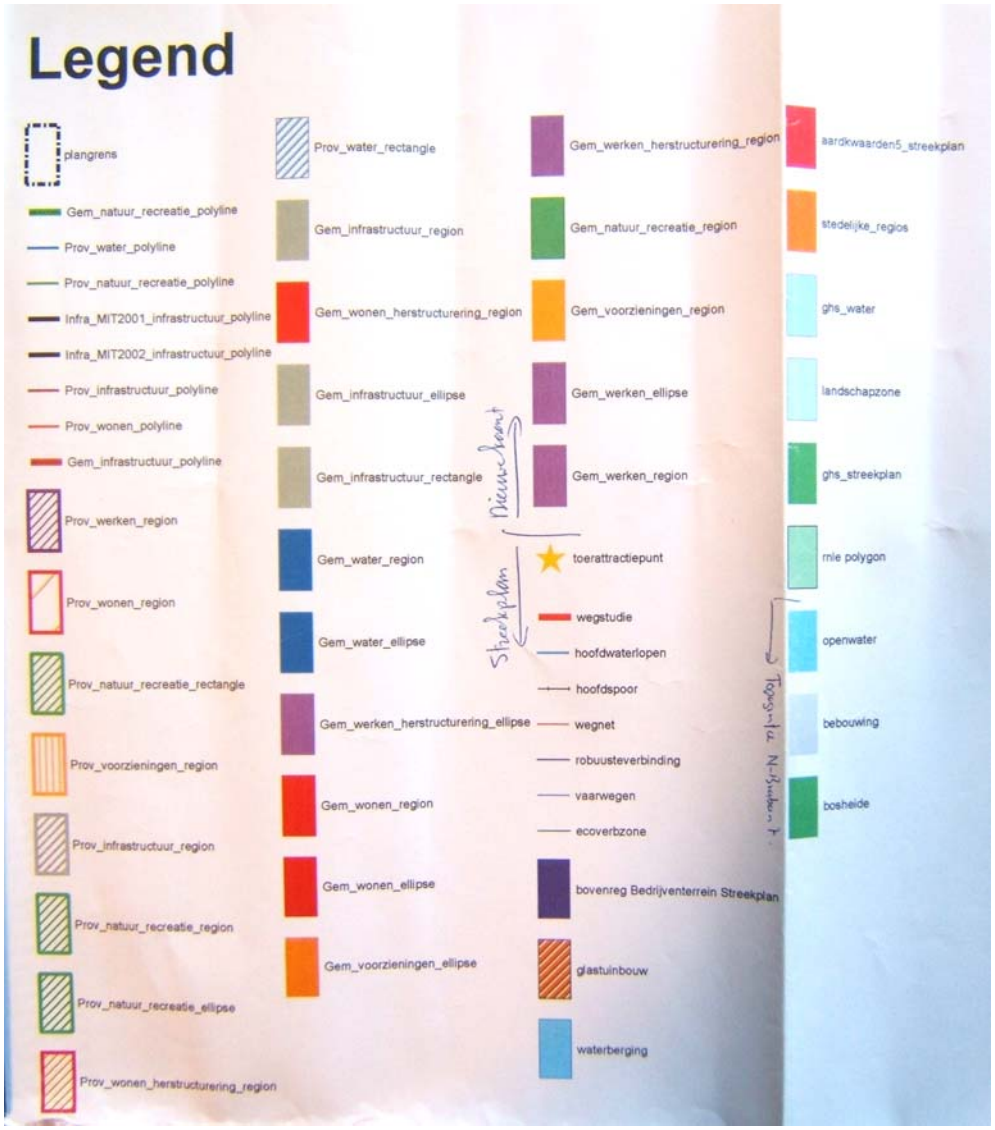

Figure 7-6. Legend items of the Wall Maps, stemming from three different datasets, as the written text in blue marks.

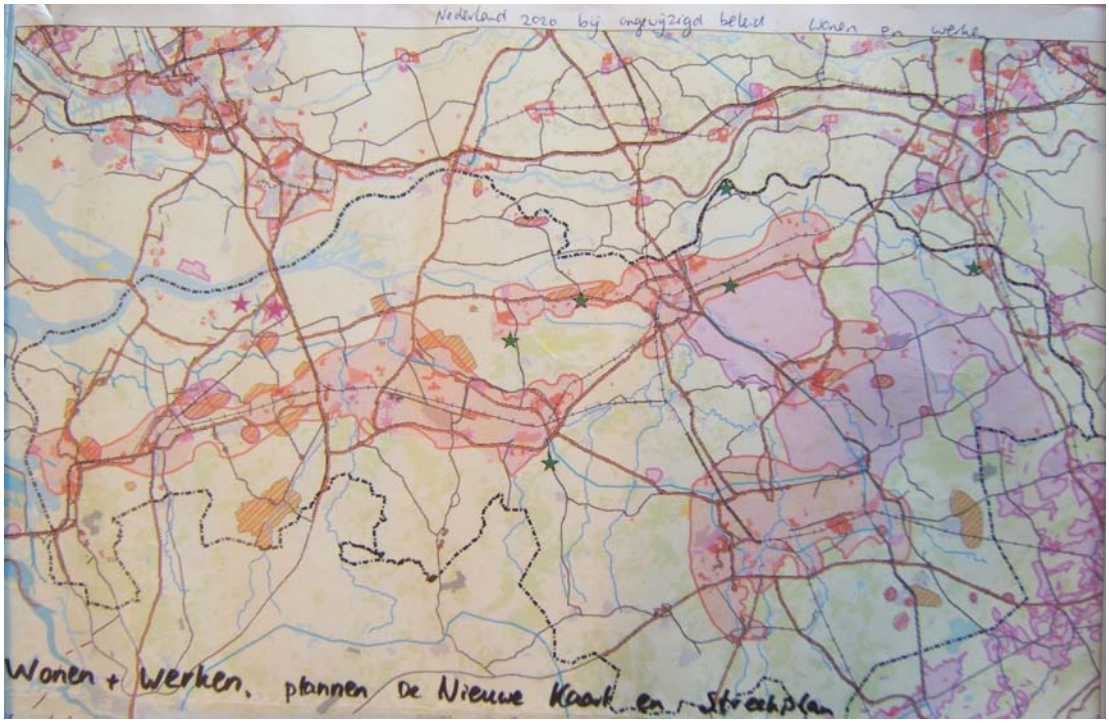

Figure 7-7. Concept version of the Red Wall Map (produced with ArcGIS)

Figure 7-8. Concept version of the Green Wall Map (produced with ArcGIS)

Figure 7-9.Map at the end of the first day: Production Space

Figure 7-10. Map at the end of the second day: Space of Experience

Figure 8-3. More and more detailing to plan and concretize the major area oriented project "Breburg". At the photograph at the upper left, the stakeholders and designer are discussing plans with each other. At the upper right and lower left the plan is visualized. These maps are part of the project file. At the lower right, the project is visualized on the central block map.

Figure 8-9. Vision map of the Bureau Brabant City. Some of the initially drawn dots are still visible.

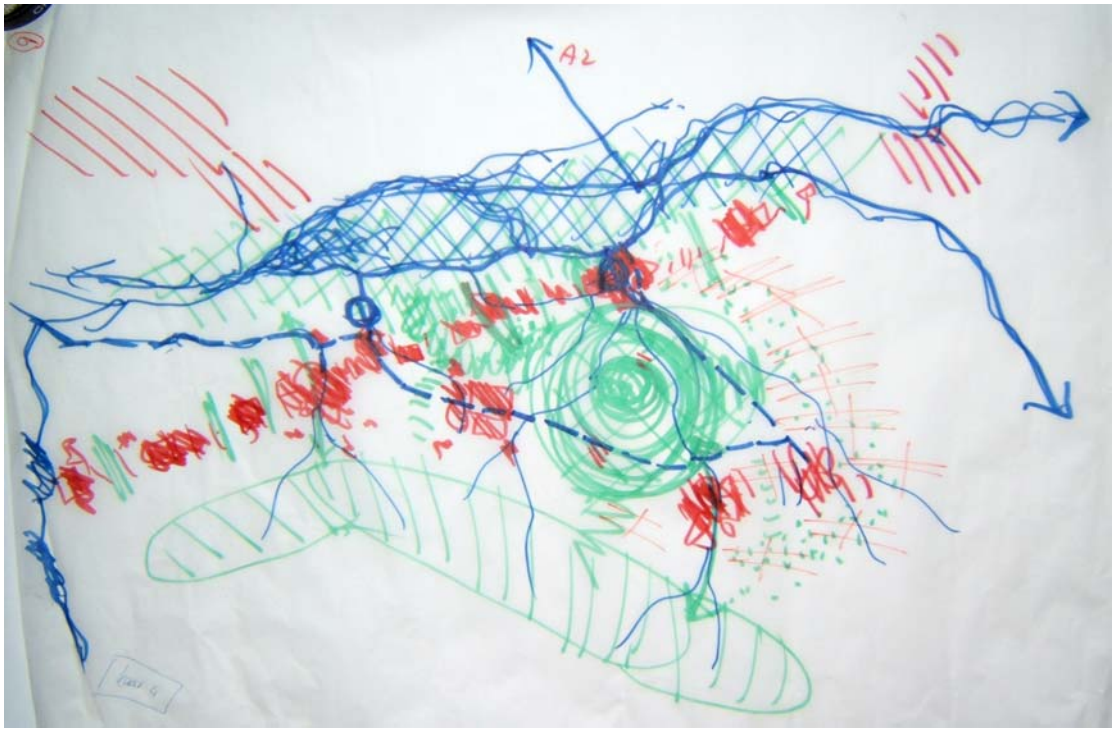

Figure 8-10. Vision map of the urban planner of Den Bosch

NEDERLANDSE SAMENVATTING

Kaarten maken en kaartgebruik in een multi-actor context:

Ruimtelijke visualisaties en 'frame conflicten' in regionale beleidsvorming in Nederland

Een veelheid aan kaarten circuleert tegenwoordig tussen experts, ambtenaren, besluitvormers en belanghebbenden in beleidsprocessen over ruimtelijke beleidskwesties. Vroeger was het maken en gebruiken van kaartbeelden een zeer specialistisch expertisegebied, uitgevoerd in kaartenkamers van overheden. Tegenwoordig, gestimuleerd door de beschikbaarheid van geavanceerde data-sets en gebruiksgemak van geografische informatie systemen (GIS) en andere visualisatietechnieken, is het verkrijgen en gebruiken van geografische kaarten snel en gemakkelijk. Als consequentie hiervan lijkt de functie van het maken en gebruiken van kaarten te veranderen. Kaarten worden niet langer gemaakt als 'blauwdruk' als een beleidsplan eenmaal is besloten. In plaats daarvan circuleren er vele kaartbeelden gedurende de vroege fasen van probleemformulering. Deze veranderende praktijk van het maken en gebruiken van kaarten, in dit proefschrift gezamenlijk aangeduid met de term kaartgebruik, heeft consequenties voor de manier waarop kaarten worden gepercipieerd en hoe ze functioneren in het beleidsvormingsproces.

Logischerwijs worden kaarten beschouwd als behulpzame instrumenten in hedendaagse beleidsvorming, op beleidsterreinen zoals ruimtelijke ordening, milieubeleid, infrastructuur-planning, en andere ruimtelijk gerelateerde sectoren. Kaarten, en hun digitale versie ingebed in toepassingen zoals GIS, worden in het algemeen gezien als instrumenten die het besluitvormingsproces ondersteunen. Maar in veel voorbeelden van kaartgebruik onder meerdere actoren, worden de kaarten omgeven door veel discussie en vaak lijken ze een bron voor conflicten te zijn.

Dit onderzoek richt zich op het begrijpen hoe en waarom conflicten rond kaarten ontstaan in beleidsvorming en hoe dit zich verhoudt tot de reputatie van kaarten als ondersteunend instrument. Het onderwerp van studie was het maken en gebruiken van kaarten in een omgeving met meerdere actoren, waarin de kaarten een 'eigen leven' gaan leiden. Een achterliggende doelstelling van het onderzoek was om een bijdrage te leveren aan de huidige wetenschappelijke kennis over 'informatiegebruik in multi-actor beleidsvorming,' in het kader van het onderzoeksprogramma "Multi-actor systemen: analyse, ontwerp en management." De hoofdvraag van dit proefschrift luidt als volgt:

> *"Hoe kunnen we de functionaliteit van kaarten in een multi-actor beleidsvormingscontext begrijpen, en het ontstaan van conflicten verklaren?"*

We hebben deze hoofdvraag opgesplitst in drie onderzoeksvragen:

1 **Voor welke functies worden kaarten gebruikt in de praktijk van multi-actor beleidsvorming?**
2 **Hoe functioneren kaarten in een dergelijke multi-actor setting, en welke factoren en mechanismen dragen bij aan het ontstaan van conflicten rond kaarten in beleidsvorming?**
3 **Hoe kan de activiteit kaartgebruik (incl. het maken van kaarten) worden geleid/verbeterd, kunnen we lessen trekken?**

Twee hoofdgebieden van theorievorming zijn onderzocht in een literatuurstudie. Op het gebied van beleidsanalyse (hoofdstuk 2) worden de ontwikkeling van het 'discourse paradigma' en de aandacht voor 'participatieve beleidsvorming' benadrukt, omdat deze stromingen in de beleidsanalyse het multi-actor karakter van beleidsvorming benadrukken.
Op het gebied van kaarten maken en kaartgebruik (hoofdstuk 3) worden de ontwikkelingen in de kartografie en de geografische informatie systemen uitgelicht. Er wordt aandacht besteed aan de recente ontwikkelingen die worden aangeduid als 'participatieve geografische informatie systemen' (PGIS) aangezien de ideeën in deze stroming aansluiten bij het onderwerp van onderzoek in dit proefschrift; namelijk het gebruik van kaartgerelateerde modellen (kaartbeelden, fysieke schaalmodellen/maquettes of GIS) in een multi-actor omgeving.

Mensen dichten aanzienlijke invloed aan kaarten toe. De redenen hiervoor zijn geordend in zes punten: het artefact karakter, waarbij kaarten het mentale wereldbeeld van de kaartenmaker(s) fixeert en expliciet maakt; de essentie van de kaart als schaalmodel, waarin een groter landschap wordt gerepresenteerd; het visuele karakter van kaarten, die daarmee een hoge dichtheid aan informatie kunnen weergeven; de kaart als product van artistieke creatie met een inherente schoonheid; de autoriteit die mensen toedichten aan kaarten; het politieke karakter van beleidskaarten, die vaak een signaal vormen dat er in de praktijk interventies verwacht kunnen worden.

Op basis van deze twee theoretische stromingen, beleidsanalyse enerzijds en kartografie/ mapping/ GIS anderzijds, is een raamwerk geformuleerd dat ons helpt om in de praktijk het kaartgebruik te interpreteren en te evalueren. Uit de literatuur is het concept 'framing' geselecteerd als een verklarende theorie die het ontstaan van conflicten rond kaarten in beleidsvorming kan verhelderen. Dit concept past bij het paradigma van discours analyse en bij het proces van betekenisgeving in het maken van kaarten. Een frame kan het best worden opgevat als een denkbeeldige *lens* waardoor de werkelijkheid wordt beschouwd door een actor. De term 'frame' staat hier voor zowel een werkwoord (eng: to frame) als een zelfstandig naamwoord (eng: a frame). Het werkwoord 'to frame' is niet goed te vertalen naar het Nederlands, maar kan het best worden opgevat als een actie waarbij iemand een beleidskwestie inkadert, in een bepaald perspectief plaatst en daarmee een specifieke –selectieve– probleemformulering creëert. In het ruimtelijk beleid wordt bijvoorbeeld gebruik gemaakt van metaforen, zoals *Groene Hart*, om betekenis te geven aan landschappen, waarbij de metaforen sturend zijn voor de perceptie van een beleidsprobleem, en daarmee dus 'framend' werken. Het concept is theoretisch uitgewerkt, waarbij een aantal sleutelelementen van *frames* en *framing* worden onderscheiden, waaronder verschillende typen van rationaliteit. Twee generieke frames zijn geïdentificeerd op basis van theorie. Met name Stone (1988) geeft twee frames over beleidsanalyse en

het gebruik van kennis/informatie in beleidsvorming: één met een wetenschappelijk-analytisch uitgangspunt, en een andere die zij 'politieke redenering' noemt.

In de evaluatie van kaartgebruik in de praktijk hebben we de door betrokkenen *ervaren functionaliteit* van kaartbeelden centraal gezet. We hebben de mogelijke actor-perspectieven op de functionaliteit van kaarten verdeeld in vier brede categorieën: 'functioneel zoals gepland, 'emergent functioneel', 'niet-effectief' en 'disfunctioneel'. Met deze classificaties streefden we ernaar om onderscheid te maken tussen verwachte en onvoorziene functies van kaarten en tussen bevredigende en onbevredigende effecten, *zoals gezien vanuit het gezichtspunt van de verschillende actoren rond dezelfde kaart*. Het was verwacht dat de verschillende actoren de kaart voor verschillende doelen zouden gebruiken, dat de doelen van een kaart door de tijd zouden wijzigen, en dat dit zou resulteren in verschillende meningen over de functionaliteit van dezelfde kaart. In plaats van het evalueren van kaartgebruik vanuit één objectief gezichtspunt is de functionaliteit van kaarten dus geanalyseerd door een reconstructie van de actor-perspectieven. De verschillen en contrasten tussen de verschillende perspectieven over de functionaliteit van een kaart zijn uitgelicht en geanalyseerd met behulp van deze multi-actor aanpak.

Case studies

Case één was de Waterkansenkaart van het waterschap Delfland. Het hoofddoel van het project was om een structurele dialoog met ruimtelijk ordenaars op gang te brengen omtrent de ruimtelijke aspecten van het waterbeheer. Daaraan gekoppeld was een belangrijk inhoudelijk doel van het project het creëren van meer ruimte voor water op de middellange termijn. Met een toelichting op de projectopzet, de methoden en een reconstructie van het procesverloop in het proefschrift wordt de context geschetst waarin de verschillende –tijdelijke– kaartdocumenten werden gemaakt en gebruikt (hoofdstuk 5). Drie kaarten die in het proces circuleerden zijn vervolgens uitgelicht en diepgaand geanalyseerd (hoofdstuk 6):

1. De watercirculatie schetsen 'linksom' en 'rechtsom'
2. De waterwensenkaart
3. De functiegeschiktheidskaart

Vooral bij het maken van de waterwensenkaart ontstonden hardnekkige conflicten, maar er ontstond ook conflict rond de functiegeschiktheidskaart. De experts van het waterschap hadden verschillende conflicterende perspectieven op beleidskwesties die zichtbaar werden toen het maken van een kaart hen dwong om expliciete keuzes te maken. Het op een kaart aangeven van potentiële watervoorraadbergingen, een maatregel om in de toekomst met situaties van aanhoudende droogte om te kunnen gaan, werd zwaar bediscussieerd.
Op grond van deze casus zijn drie frames over kaartgebruik geïdentificeerd die in conflict kwamen gedurende het beleidsproces. Deze drie frames zijn 'analyseframe', 'ontwerpframe' en 'onderhandelingsframe' genoemd.

In de tweede casus is gebruik gemaakt van een simulatiespel om kaartgebruik te analyseren in een semi-gecontroleerde en versnelde omgeving. Het spel was georganiseerd in samenwerking met het Ruimtelijk Plan Bureau (RPB). Het hoofddoel van het RPB was om met het spel de mogelijkheden en belemmeringen voor ontwikkelingsplanologie te onderzoeken. Het spel is twee keer gespeeld in de regio Brabant, een zuidelijke provincie in Nederland (hoofdstuk 7).

In deze casus werden de bevindingen en lessen uit de eerste casus gebruikt als input voor de analyse. Het ontwerp van kaartondersteuning was vervlochten met het ontwerp van het spel. Als onderdeel van dit simulatiespel werd het concept van het Nederlandse op Internet-gebaseerde instrument 'De Nieuwe Kaart' geadopteerd, in een analoge versie, als één van de in het spel gebruikte kaarten. Drie typen van kaartondersteuning werden geboden in het spel:

1. Een centrale blokjeskaart als onderdeel van de planning procedure
2. Kaarten op de tafels en thematische wandkaarten aan de muur
3. Materiaal voor het tekenen van kaarten voor de deelnemers aan het spel, alsmede professionele ontwerpers die de deelnemers konden helpen met het visualiseren van visies voor (delen van) de regio en schetsen voor projectvoorstellen

De wandkaarten werden geprepareerd door ons, om te testen of de kaartbeelden functioneerden zoals gepland, en of de kaarten door de deelnemers aan het spel werden geëvalueerd als bevredigend voor hun doel. Het gebruik van de centrale blokjeskaart, de wandkaarten en het maken van een visieschets met behulp van een ontwerper zijn vervolgens geanalyseerd en geëvalueerd (hoofdstuk 8). Dezelfde frames als in de Delfland casus konden worden geïdentificeerd en vergelijkbare mechanismen in het kaartgebruik konden worden waargenomen in het simulatiespel.

Opmerkelijk in het spel was dat de ondersteunende ontwerpers, die de belanghebbenden in het spel hielpen met het maken van kaarten, niet tevreden waren met de opzet van het spel en hun rol, terwijl de belanghebbenden het spel en de rol van de ontwerpers in het spel erg realistisch vonden. In onze analyse hebben we dit verschil van mening geïnterpreteerd als een botsing tussen het 'ontwerpframe' en het 'onderhandelingsframe'.

Resultaten

De kaarten dienden verschillende functies in de ogen van de verscheidene actoren op verschillende momenten in de tijd, en zoals verwacht, conflicten verrezen rond de kaarten in beide cases. In beide case studies was sprake van een resulterende beleidskaart die op incrementele wijze ontstond, terwijl de kaarten werden veranderd in verschillende 'ronden' in het beleidsvormingsproces. In deze ronden bouwden de actoren verder op informatie die door anderen was verschaft, terwijl ze een bepaalde (selectieve) framing bestendigden van de verschijningsvorm en betekenis van een kaart. Het proces van kaarten maken en kaartgebruik kon in beide cases worden beschreven als incrementeel, participatief en gedeeltelijk onbewust. De legitimiteit van de legenda-items of de kaart-in-haar-geheel groeide terwijl de gebruikte legenda-items en kaarten zich innestelden in de taal die werd gehanteerd.

De factoren die volgens de observaties bijdragen aan het ontstaan van conflict rond kaarten waren:

- De aanwezigheid van meerdere actoren met fundamentele verschillen in mentale referentiekaders (frames) over zowel het beleidsvormingsproces als geheel, als de functie van een kaart in het bijzonder;
- Het grillige en strategische karakter van de multi-actor processen, waardoor de functie en functionaliteit van een kaart kon wijzigen;

- De ‘macht’ van de kaart zelf, dat wil zeggen de inherente eigenschappen van kaarten zoals hun visuele aard, toegedichte autoriteit etc., als een artefact dat dwingt tot het verhelderen en expliciet maken van ruimtelijke (beleid-) keuzes;
- De functie van de kaart als politiek instrument in een context waarin onzekerheden rond de besproken beleidskwesties een grote rol speelden (klimaatverandering, bevolkings-groei, etc.)

De bevindingen van de case studies ondersteunen de theorie over ‘framing’ zoals geformuleerd in het conceptuele raamwerk. De theorie van framing kon de ontstane conflicten die in de cases werden geobserveerd verklaren. De kaarten functioneerden als ‘speelveld’ waar de verschillende actorenframes elkaar ontmoetten, gedeeld werden, en soms met elkaar concurreerden. Het identificeren van verschuivingen of nieuwe ‘ronden’ in het beleidsproces was bruikbaar om te verklaren waarom kaarten veranderd, genegeerd of juist bevestigd werden. De vraag ‘wat in kaart te brengen en hoe dit op kaart weer te geven’ beschouwen we als de kern van het concept framing, gezien vanuit het perspectief van kaartenmakers. In het beleidsproces staat deze vraag in dienst van de te formuleren (te framen) probleemstelling en beleidsdoelstellingen.

We hadden genoeg aan drie frames om de conflicten rond kaarten in het voortgaande beleidsvormingsproces te verklaren. Een overzicht van de drie frames is gepresenteerd in Tabel 1. Elk van de drie frames heeft unieke dominante waarden en inherente logica, die we de onderliggende rationaliteit van de frames noemen. Met behulp van de drie frames hebben we getracht om de verschillende gezichtspunten van de actoren –beleidsmakers, belanghebbenden en experts– te verhelderen die in onze ogen voortvloeien uit de drie verschillende typen van rationaliteit.

Deze rationaliteiten hebben ofwel:

- Een wetenschappelijke achtergrond waarbij de kaart wordt beschouwd als onderzoeksmodel (analyseframe);
- Een houding als creatieve kunstenaar of innovator waarbij de kaart wordt beschouwd als taal om iemands’ ideeën te uiten (ontwerpframe);
- Een politieke of onderhandelingshouding met bijbehorende aannames en waarden waarbij de kaart wordt beschouwd als een strategische agenda voor het nemen van beslissingen (onderhandelingsframe).

De essentie of de bron van conflicten tussen de frames is, in onze ogen, de rationaliteit die gevolgd wordt in het vinden van een oplossing voor een beleidsprobleem of van waaruit de norm wordt gesteld waaraan een oplossing zou moeten voldoen. Generaliserend vanuit de empirische observaties, zijn de volgende bronnen voor emergente conflicten tussen de frames benoemd:

Inherente conflicten tussen het analyseframe en ontwerpframe

In onze interpretatie conflicteren het analyseframe en ontwerpframe in hun wijze waarop ze beleidsopties definiëren en ermee omgaan. Terwijl het analyseframe zich met name richt op het selecteren en uitsluiten van mogelijkheden door vergaring van bewijs, richt het ontwerpframe zich op het scala aan mogelijkheden en de ruimte of 'vrijheidsgraden voor engineering'. Voor het analyseframe zijn mogelijkheden ondergeschikt aan het vinden van de waarheid door bewijs, terwijl voor het ontwerpframe het vinden van bewijs instrumenteel is voor het creëren van opties en het openen en benutten van nieuwe mogelijkheden.

Inherente conflicten tussen het analyseframe en onderhandelingsframe

De analytische rationaliteit is gebaseerd op het idee van één dominante waarheid, een op zichzelf staande werkelijkheid die ontdekt kan en moet worden (door het testen van hypothesen), terwijl de onderhandelingsrationaliteit gebaseerd is op het concept van de subjectieve waarnemingen en voorkeuren en op het bestaan van meerdere wereldbeelden (meerdere waarheden) als startpunt voor overleg. Voor de onderhandelingsrationaliteit is het vinden van de waarheid instrumenteel voor het vinden van bevredigende overeenstemming, waarbij waarden en belangen van de betreffende actoren betrokken worden in de overwegingen. Conflicten kunnen dus ontstaan wanneer uit een onderhandelingsperspectief, waarheidsvinding ondergeschikt is aan andere overwegingen in het beleidsproces (zoals vertrouwen, machtspolitiek, reputatie, etc.) terwijl volgens het analyseframe, in beleidsvorming het vinden/ontdekken van de waarheid een doel op zich zou moeten zijn.

Inherente conflicten tussen het onderhandelingsframe en ontwerpframe

Terwijl ontwerprationaliteit streeft naar schoonheid, coherentie en perfectie van de conceptuele structuur van een plan, zijn deze aspecten gezien vanuit het onderhandelingsframe ondergeschikt aan praktisch nut, bruikbaarheid en procedurele haalbaarheid. Imperfecte maar pragmatische compromissen kunnen de voorkeur genieten in het perspectief van de onderhandelingsrationaliteit, maar dit is niet bevredigend in een pure ontwerprationaliteit. Het ontwerpartefact (een beleidsplan, een ruimtelijk ontwerp, een kaartontwerp) is het object van creatie in het ontwerpframe en het proces om dit artefact te maken is ondergeschikt aan het product, terwijl in het onderhandelingsframe het proces voorrang krijgt boven een bepaalde uitkomst; belangrijke overwegingen in het onderhandelingsframe zijn de relaties tussen actoren op termijn en de belangen, die vaak individuele projecten overstijgen.

Table 1. Overzicht van de drie frames ten aanzien van kaartgebruik in beleidsvorming

frames:	**Analyse (A)**	**Ontwerp (D)**	**Onderhandeling (N)**
	Kaartgebruik als wetenschap	*Kaartgebruik als kunst*	*Kaartgebruik als politiek*
Context (C)			
Archetypische groep of actor	Experts, vaardig in onderzoeksgebieden als geografie, GIS, kartografie, economie etc.	Experts, vaardig in creatieve vakgebieden zoals stedebouw, landschapsontwerp, etc.	Belanghebbende, ervaren in besluitvorming, acteert op basis van belangen/ afhankelijkheden.
Focus van het frame	Nadruk op onderzoek en assessment	Nadruk op het creëren en presenteren van opties	Nadruk op overleg, uitruil, probleemformulering
Kaartgebruik en verschijningsvorm van de kaart (M)			
Waarden, criteria	Objectieve en valide informatie	Brede, holistische informatie	Begrijpelijke informatie
	Kaart valide ten aanzien van heuristiek (vuistregels) uit het modelleren en de kartografie	Visuele impressie van artistieke kwaliteit, een samenhangend ontwerp	Kaart goed genoeg en goed getimed (opportuun) voor de gelegenheid
Aangewende gewoonte in de gedachtegang	Gebruik van technologie, eenduidige definities en gespecificeerde informatie	Gebruik van voorbeelden, associaties en verbeelding	Versimpelen van argumenten in (het maken van de kaarten en in) de boodschap van de kaarten
Informatie op kaartbeeld	Specifiek, overvloedig	Abstract, metaforisch	Toegesneden, selectief
Legenda items	Duidelijk afgebakende categorieën en subklassen	Opvallende namen met ambigue interpretaties	Weinig legenda items – alleen diegene waarover besloten zal worden
Grenzen	Scherpe grenzen	Schetsmatige grenzen	Grenzen wel of juist niet op op de kaart[1]
Effecten (E)			
Dominante functionaliteit van kaarten	…*Verhelderen* van ruimtelijke mechanismen (sociaal/ fysisch)	…*Visualiseren* en articuleren van ruimtelijke planconcepten	… *Agenderen* van problemen en het overtuigen van actoren over ruimtelijke besluiten
	…*Synthetiseren* van analyse resultaten, het verschaffen van nauwkeurige informatie (gedetailleerd, precies en betrouwbaar)	…*Identificeren* aanbrengen van patronen in het landschap; het wijzigen van ruimtelijke verdelingen en het toevoegen van constructen	…*Bewegen* en structureren van (latente) impliciete meningen richting een agenda voor overleg en beleidsovereenkomst
De kaart wordt gezien als een...	*onderzoeksmodel*	*ontwerptaal*	*politieke agenda/ besluitenlijst*

[1] Of de grenzen juist op de kaart moeten of met opzet worden weggelaten, hangt mede af van de onderhandelingsstrategie (bijvoorbeeld een advocatieve, mediërende of strategische insteek).

Naast de beschrijvende aanpak die was gekozen in het onderzoek, hadden we als doel om lessen te formuleren voor toekomstig kaartgebruik. In de conclusies zijn vijf mechanismen geformuleerd die gevonden zijn in de case studies. Deze mechanismen representeren de manieren waarop de actoren in de cases in de praktijk omgingen met de kaartconflicten die ontstonden. De mechanismen zijn gebaseerd op de formulering van ons theoretische raamwerk, waarbij de 'framing theorie' wordt verondersteld te bestaan uit, ondermeer, de volgende elementen:

- Zichtbaarheid/manifestatie van een frame in de gebruikte symbolen, namen, taal, metaforen, beelden;
- Focus van een frame, met daaraan inherent doel en 'horizon' over wat relevant wordt geacht;
- Onderliggende rationaliteit met daaraan inherente set van waarden en logica;
- Een proces tussen actoren waarbij de frames worden gecommuniceerd door (beeld-) taal.

De volgende vijf basis mechanismen werden geïdentificeerd die mensen gebruikten om de probleemformulering te beïnvloeden, en om opkomende conflicten op te lossen of uit de weg te ruimen:

1. *Verander de kartografische lay-out van de kaart.*

   Een mechanisme gericht op de **zichtbaarheid** (manifestatie) van een frame. Dit mechanisme verandert niets aan de probleemformulering, maar dient om het conflicterende onderwerp te verbergen of voor het oog glad te strijken, en dus letterlijk om het probleem uit het zicht te plaatsen (met andere woorden; beeld-retorische wijzigingen). We beschouwen dit als een symbolische strategie om met kaartconflicten om te gaan.

2. *Verander de reikwijdte van de kaart, door het veranderen van de schaal of de regio die weergegeven wordt op de kaart, waardoor ook de 'horizon' of systeemgrens van een beleidskwestie wijzigt.*

   Een mechanisme gericht op de **focus** van in de kaart ingebed frame. Het frame wordt verschoven met dit mechanisme. (Bijvoorbeeld, door een breder gebied mee te nemen in de beleidsvorming kunnen nieuwe opties in zicht komen. Of, door een kleinschalige kaart te maken met weinig detail, kan de aandacht gericht gefocust worden op de hoofdkeuzes in plaats van op de details van een beleidsvraagstuk, die in een later stadium besproken kunnen worden).

3. *Verander het classificatiesysteem rond een beleidsvraagstuk, door het her-definiëren van legenda items en door een alternatieve groepering van thema's op een kaart.*

   Een mechanisme gericht op de **rationaliteit** van een onderliggend referentiekader. Dit mechanisme vereist dat nieuwe kaarten worden gemaakt, en dat de kaartenmakers en beleidsmakers (de betrokken actoren) met andere ogen kijken

naar de onderwerpen die in kaart gebracht dienen te worden. Met behulp van een nieuwe kaart kan een nieuwe agenda voor overleg worden geformuleerd, waarin het beleidsvraagstuk vanuit een ander perspectief kan worden bezien van waaruit de problemen, oplossingen, dilemma's en uitruilmogelijkheden anders ingedeeld en verwoord worden.

4. *Verander de functie en status van de kaart in het beleidsvormingsproces.*

   Een mechanisme gericht op het **proces** van framing. Met dit mechanisme wordt niet de kaart aangepast, maar de rol van de kaart in het beleidsvormingsproces. Hierdoor kan de kaart acceptabeler worden voor de betrokken actoren.

5. *Overdragen van de argumenten van een conflict aan de leidende besluitvormers en de politiek laten beslissen (mogelijk met behulp van kaarten)*

   Een mechanisme gericht op de **institutionele context**. Met dit mechanisme kunnen kaarten dienst doen om de verschillende frames, die concurreren om dominantie, te verhelderen. De actor-coalities die een bepaalde mening verdedigen of willen uitdragen kunnen daarbij kaarten gebruiken om hun argumenten kracht bij te zetten bij de besluitvormers.

De vraag of deze opties in de bestudeerde cases opzettelijk waren gekozen of niet –bewust of onbewust–,was geen onderdeel van dit onderzoek. De kaarten kunnen ook opzettelijk ingezet worden om een conflictsituatie duidelijk zichtbaar te maken, waardoor het debat gepolariseerd kan raken, maar waarbij ook de betrokken uitruilmogelijkheden transparant worden voor alle deelnemers. Verder kan het polariseren van meningen –achteraf– als welkom worden ervaren door de deelnemers, en voor dergelijke doeleinden (die meestal niet expliciet naar voren worden gebracht door deelnemers omdat het deel uitmaakt van hun strategische agenda) kan een kaart een handig hulpmiddel zijn.

Concluderend stellen we dat een bewustzijn van frame conflicten helpt bij het herkennen, diagnosticeren, omzeilen (of soms opzettelijk opzoeken) van conflict in een beleids-vormingsproces. Wanneer er conflicten rond een kaart rijzen zijn er een aantal mechanismen die de kaartenmakers of kaartgebruikers kunnen aanwenden (zie de hiervoor genoemde mechanismen). Verder kan het denken en spreken over beoogde en onbedoelde functies van kaartgebruik helpen om de frames van betrokken actoren te doorgronden, en om te helpen bewuste keuzes te maken bij het opstellen en vormgeven van een kaart (zie Tabel 1).

Generaliserend

In het proefschrift wordt betoogd dat de mechanismen en de archetypische frames, met de verschillen tussen hun inherente rationaliteiten, veralgemeniseerd kunnen worden buiten de reikwijdte van de twee case studies. Argumenten voor deze stellingname zijn:

- Het generieke karakter van de betreffende frameverschillen en mechanismen;
- Het representatieve gehalte van de planningspraktijk in het spel volgens de deelnemers;
- De bevestiging van de empirische observaties in interviews met kaartenmakers en ruimtelijke planners in Nederland buiten de twee gerapporteerde case studies.

Dit leidt tot de volgende stellingen over het maken en gebruiken van kaarten in de context van Nederlandse beleidsvorming:

- *Het onderscheid tussen de drie gegeneraliseerde frames analyse, ontwerp en onderhandeling, verklaart veel controversen rond kaarten in Nederland die niet kunnen worden verklaard door 'simpelere' verklaringen zoals conflicterende belangen of een informatie onbalans.*

- *Actoren gaan met kaartconflicten om door het gebruik van verschillende mechanismen, ofwel handelend door de kaart te wijzigen, ofwel door acties te nemen in het proces/de context van de beleidsvormingsomgeving. Wanneer men ervoor kiest om met het conflict om te gaan door de kaart aan te passen –in kaartconflicten die geïdentificeerd zijn als frame conflicten– kan men de zichtbaarheid/verschijningsvorm, de focus of de rationaliteit van een frame wijzigen.*

Tenslotte stellen we dat het geïdentificeerde onderscheid tussen de drie frames, inclusief de corresponderende spanningen tussen typen van rationaliteit, onderdeel uitmaakt van de culturele praktijk van ruimtelijke beleidsvorming en kaartgebruik in Nederland, en dat het moeilijk is deze praktijk te wijzigen.

CURRICULUM VITAE

Linda Carton (1974) works at the section Policy Analysis at the Delft University of Technology, faculty Technology, Policy and Management. She graduated in Geodesy at the same university. As part of the study, she did work at the Water Resources Centre of the University of San Carlos in Cebu, Philippines. Her masters' thesis was on the topic of developing spatial intelligence, on the basis of a collection of digital information sources of a Dutch Telecom company (KPN), to improve the localization of disturbances in the telephone cable net. After her study she started working for Intergraph, an international firm, on advising, designing and implementing geographic information services and systems (GIS).

Interested in learning more about social science, she took up a PhD research at the policy analysis section in 2000. In her study, she was fascinated by questions regarding how people frame problems and make strategic planning decisions while in interaction with their natural, human-made and social environment. Since 2005 she continued working at the policy analysis section as post-doc researcher. She has taught about policy analysis, e.g. multi-actor approaches and systems analysis/integrated assessment methods, and Geographic Information Science. Other work includes projects for water authorities and facilitating in group decision-making processes, e.g. on budgeting or sustainability issues.

In September 2007 Linda will continue teaching and researching at the Radboud University Nijmegen, School of Management, as assistant professor at the Spatial Planning section.

In daily life, she lives together with her partner and son. She enjoys walking, horseback riding, travelling, reading, and doing some voluntary work (on sustainable development, animal welfare or politics).

ABSTRACT

About: Map making and map use in a multi-actor context

In this book, Carton explores the question why maps create both conflict and discussion in policymaking. Bridging the disciplines of participative policy analysis and cartography/mapping/geographic information systems (GIS), she explores two case studies in-depth, regarding regional spatial planning processes in the Netherlands.

One case consists of a project at a water board in the low-lying western part of the country, where climate change adaptation requires citizens to adapt and "make more space for water". A second case consists of a simulation game that is held in cooperation with the Netherlands Institute for Spatial Research. The Game on Space is about developing an urban network in the province of Brabant. Brabant is a southern region in the country with a beautiful scenery but also a high pressure on land due to urban dynamics.

The book builds further on theories about participative policymaking and concepts like Participatory GIS. Using the theory on "frames" and "framing", based on the ideas of Donald Schön and Martin Rein on frame reflection and the work of George Lakoff on the use of metaphor, Carton develops and applies a new framework of analysis, with the perspectives of multiple actors as the specific focus. The evaluation of the functionality of maps is analyzed from these various actor perspectives, rather than from one objective point of view.

Conclusions are drawn about the emergence of tensions and dilemmas among actors during the making and use of maps. Three archetypical frames are identified that were observed in the case studies and confirmed by interviewees. These three generalized frames, called analysis, design and negotiation, explain many controversies over maps in the Netherlands that cannot be explained by simpler explanations such as conflicting interests or information imbalance. Furthermore, five strategies were identified detailing how actors coped with map conflicts. On the basis of these findings, Carton gives a number of recommendations for map makers and map users in policymaking.

The thesis offers an interesting insider-view on the process of spatial planning in the Netherlands, and an in-depth analysis of the life of maps in a policymaking environment. Because the book is organized with separate sections for the project descriptions and the analyses of different maps, it is possible to read selective parts. "Map making and map use in a multi-actor context" is recommended for people working and researching in the fields of map-making, spatial planning and water management.