A DIALOGICAL MODEL
FOR PARTICIPATORY DESIGN

HOANG-ELL JENG
A DIALOGICAL MODEL
FOR PARTICIPATORY DESIGN
A COMPUTATIONAL APPROACH TO GROUP PLANNING

PROEFSCHRIFT

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獻給我的父母、在臺灣的家人、以及我的妻子

To my parents, my family in Taiwan, and my wife
This study on the development of a method for participatory design started in 1993, as a new departure of my personal interest in participatory design. In 1984, I first experienced participatory design in a community renewal project in Kaohsiung, Taiwan. In Taiwan, participatory design was known as a bottom-up design approach. However, efforts to put the method into practice were very limited because of the lack of social-political context to support the participatory design approach.

In 1990, I participated in a community design project at Mill Creek at Dallas, Texas, the United States. The project was coordinated by Charles Moore and Jim Burns with the cooperation of local organizations. Through this project, I experienced a more complete operation of participatory design.

In the summer of 1992, I was involved in a community design project in Taiwan. The social-political context of Taiwan had changed dramatically over the previous several years. Since the late 1980s, the development of democracy and of the economy in Taiwan have created the conditions more amenable to the application of participatory design approaches. In that project, I worked with a team of professionals and students to carry out a participatory design process. Through this operation, I realized that, although participatory design has improved communication among people with different interests, there are still methodological problems that the professionals have failed to solve. In general, I felt that there was not a satisfactory method to analyze design discussion.

My struggle with the problem of participatory design entered a new phase when I came to the Netherlands in the winter of 1992. In this country, participatory design started as early as the late 1950s. After four decades of development, there have been many practical tools developed to support an integrated design process in different stages of the design process. In time, through discussions and readings I realized that a computer-supported information system to structure design discussion could be of major assist in overcoming current methodological problems. This is how this study started on the development of a method for participatory design through the computational approach.
The *dialogical model* in this study was developed with my thesis advisers Prof. A. Tzonis and Prof. S. J. Doorman who helped me professionally when I needed them most. It has been a privilege to know and to work with two such dedicated individuals. I would like to thank my colleagues in the Design Knowledge Systems Research Group, past and present, Nan Fang, Marc van Leusen, Li Yu, Peter Scrivier, and John Heintz for the discussion and debates we had. My experience on participatory design was broadened, when I participated in the project in the United States. For this, I am indebted to the late Charles Moore, who first led me into the practice of participatory design in Austin, Texas. In Taiwan, where the participatory design project in Hoe-Ju-Wae, (後竹園), was carried out, I want to acknowledge those people who made the project possible. Among them, a special thanks goes to Jui-Mao Huang, (黃瑞茂), who has been one of my best friends and a good colleague for more than fourteen years. I also would like to thank Prof. H.J. Rosemann, Prof. H. Priemus, Prof. D. Schön, Prof. John K.C. Liu, Prof. F.H. van Eemeren and Prof. H. Koppelaar for serving on my committee. Very special thanks are due to Prof. Schön for his most helpful suggestions. I am indebted to Lim Hoo Soei, (林和瑞), Lara Schrijver, John Heintz, and Jane Zaat-Jones especially, who read the manuscript. I would also like to thank H. de Groot for his assistance with the bureaucracy. To my parents, (鄭炳耀, 陳秀花), and my family in Taiwan, I wish to express my appreciation for their warmest support of my study. Finally, to my wife, Chien-Hui Cheng, (城千惠) who was gracious enough to listen to what I had to say about my study from time to time, I wish to express my warmest appreciation.

Hoang-Ell Jeng  
Delft, 1995
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INTRODUCTION

This study is about the need to generate a method for the structuring of design dialogue for participatory design in a face-to-face design discussion. In participatory design, design concepts are generated collectively through discussion in which the interchange of normative and factual descriptions builds a collective design discourse. The goal of this study is to develop a method to support this collective, face-to-face design problem-solving in order to increase the acceptability of design product. In the current practice of participatory design, a common problem is that of the structuring of design dialogue. In general, no effective methods have been developed to systematically analyze and to construct design dialogue into such formal structures that all parties involved in the discussion can understand and use the structured design dialogue as a tool to future improve the cooperative work.

Because of the lack of method applied in understanding design dialogue, participatory designers are normally anxious to guide the group to produce design schemes. To the designer at least, such drawings appear to be better formulated. In this sense, only a small part of the discussion is considered to be useful in terms of direct contribution to the design scheme. Further, important information may be neglected in the process and the result may be unsatisfactory.

Participatory design is part of the overall design process. The formulation of participatory design dialogue is a sub-task that contributes to a broad design task. The main criterion for our method is that, with the method, given massive information produced in the discussion, designers should be able to identify the characteristics of each design statement and specify the relations between them. This can be achieved through the discussion of the theoretical model and the development of technical tools. What the designer needs to abstract from design dialogue are the design requirements, reasons supporting these requirements and the resources of these reasons. In addition, there are different kinds of intention involved in design dialogue. In a dialogue, a statement may express the intention of
obligation, permission or suggestion. It may be a question as to the meaning of design concepts, the process of the discussion, or the legitimacy of the discussion. Furthermore, through the help of current computer technologies, an information system supporting such a dialogue structuring can be implemented.

The development of a tool for supporting participatory design requires a deep examination of the adequacy criteria, viz., validity, effectiveness, efficiency, reliability and robustness. In this study, we develop these criteria based on a case-study of a participatory design project. The product of this study is a method that leads to the actual development of a tool. We then test our method on another project which involves face-to-face design discussion among people with multiple interests. Through the test, we examine the extent to which those criteria are fulfilled, what are the improvements and the limitations of the method, and the potential for the development and extension of the method.

*a new method for participatory design*

The method developed in this study is consist of three modules: a group-reasoning model, a dialogical system of participatory design, and a framework for participation-based design guidelines.

The group-reasoning model formulates the structure of conflict resolution in order to examine how a joint plan can be generated through collective reasoning. We propose a meta-structure of group design reasoning in order to develop common grounds for communication between the different processes of reasoning. The model serves as a conceptual theory on participatory design. It can be applied to the development of particular technology or it can be applied to any cooperative work situation where it is necessary to understand problems of everyday life.

The dialogical system developed in this study is based on the group-reasoning model. The system provides a clear description of how the information should be processed, to which aspects particular attention should be paid, results that can be anticipated, and when and how to control
the process. Most decision support systems (DSS) are solution driven, where the computer calculates a proposal, indicates an equitable agreement, or suggests negotiation strategies, and quantitative components are provided. However, the dialogical system in this study is a system for process support which addresses two dimensions that solution-driven systems do not: enriched communication channels and cooperative work. The dialogical system will improve an integrated design decision-making process by supporting group interaction between users and designers towards a satisfactory agreement, i.e., a set of decisions defined collectively in the early stages of the process. In addition, relevant design precedents can be retrieved and demonstrated in the meeting room to prevent misunderstandings and to provide a basis for further manipulation of the design precedents.

The concentration on the problem of the production of the design guidelines is a rich and structured part of the design process. It facilitates the reconstructing of the implicit reasoning structure in participatory design that takes place through the dialogue generated by the group discussion. In a design discussion, we may collect a set of descriptions of needs and wants, and the arguments for or against these descriptions. How do we analyze them? We might break the descriptions or arguments into several components which describe only the facts, and judge these components to see whether the arguments are acceptable or not. However, in doing the analysis, we do not intend to judge the validity of arguments, but we want to abstract the concept behind the design discussion. By generating the design guidelines, the designer can easily in the design process that succeeds the participatory design achieve a more acceptable design. In addition, the participation-based design guidelines can be applied to many planning and design practices wherever design guidelines are required before the process of the physical design begins.

The fundamental assumption of developing our method are that participatory design is important and necessary and that current problem of participatory design is about the method of participatory design. Many other issues can derived from the phenomenon of participatory design, such as social-political or gender issues. However, they are beyond the scope of this
study.

applications of the method

Participants in the participatory design establish, exchange and modify their beliefs throughout the exercise of the design discussion. The computer-based systems proposed in this study will make the change and modification faster and more explicit. They also will help to educate the participants in discovering their own beliefs and in understanding others’ beliefs. The dialogical system will adjust easily to individuals as well as to the group in the participatory design process, and it can be further extended from focusing on problems of face-to-face discussion to targeting problems of remote location communication. The technique of structuring design guidelines developed in this study may be applied to the design and planning practices when a set of design prescriptive are to be generated through group decision making.

This study makes a practical contribution to architectural and urban design process in which participation occurs in the early stages. In the short term, designers can apply our dialogue model directly to practice as support systems, in order to understand the structure of design concepts. In the long term, the method developed can be employed in the development of computer-supported system for designing.

outline of this study

The first chapter deals with the general formulation of the problem, and the methodological premises, research methods, and theoretical models used in the study.

Chapter 2 is on the case study. We use a narrative approach to examine a real case of participatory design. This chapter includes a narrative of the project, including the setting of the participatory design workshop and the method applied to the project. We then concentrate particularly on the participatory design dialogue in the case, in order to
generate adequate criteria for developing a mode for such a dialogue. A complete report of this project is enclosed in Appendix A.

In Chapter 3, we review historical parameters of the development of the participatory design method to generate criteria for the evaluation and development of the method presented in this study. The examination of criticism of the design and planning approaches of the 1960s is intended to improve our understanding of the problems the movement wished to solve. A critical review based on the case study is presented in this chapter.

From Chapters 4 to 6 comprise the development of the method for participatory design. The method is consist of three modules: group-reasoning model, a dialogical system of participatory design, and a framework of participation-based design guidelines.

Chapter 4, the first module of the method, addresses cognitive aspects of group planning and reasoning. To develop the group-reasoning model, we review definitions of a group, conflict resolution and reconstruction methods applied after employing the group-reasoning model. The definition of a group includes the organization, the orientation, the tool and the product, and mental operations of the group in participatory design situations. We then examine aspects of conflict resolution from a social-psychological viewpoint to an engineering approach of mean-end analysis. To reconstruct a meta-structure of the individual’s design reasoning, we then examine methods applied in argumentation theory and architectural discourse analysis in order to develop our group-reasoning model.

In Chapter 5, the second module of the method, we proceed to develop a computer-supported dialogical system of participatory design. This development draws knowledge from Group Decision Support Systems (GDSS). The dialogical system is employed to improve domain problems of participatory design. In this chapter, a structure of a distributed information-processing system (DIPS) is constructed. The dialogical system developed in this chapter models the input, the output, the mechanism and the belief systems supporting the operation of information processing, and the relation between this system and other information systems. It also proposes the concept of distributing the tasks of one single facilitator into
several sub-tasks and supporting these sub-tasks with other facilitators or computer technology. Here we see the intelligence involved, including human agents and computers, as an entity of a distributed system, which is called the FACILITATOR.

Chapter 6, the third module of the method, closes the development of the method with a practical application, viz., a framework for participation-based design guidelines (PBDG). It reviews the state of the art of design guidelines and examines the problems of current methods, through which it proposes a rigorous analytical framework to generate a collective set of design guidelines based on participatory design dialogue. In the second half of this chapter, we develop the details of this analytical framework and demonstrate how a set of participatory design dialogues is captured and reconstructed into a collective set of design guidelines.

In Chapter 7, a design project employing participatory design processes in Amstelveen, the Netherlands, is selected as a test case for examining the method developed in this study. In this test case, we examine how the model can be applied to the group discussion, and we demonstrate how a design dialogue can be systematically reconstructed into a set of design discourse. Further information on this project is included in Appendix B.

Finally, Chapter 8 summaries the major ideas, contributions and limitations of the present work. In concluding the discussion of the method, we propose how such a dialogical modelling can be applied directly as a support system for group planning. The chapter closes with a discussion of the application and potential extension of the study.

At the start of each chapter, there will be a line of eight squares showing the eight chapters of the study. At the end of each chapter, one of the squares will indicate the subject matter of the following chapter. Let us now start with the first chapter.
Introduction

methodology
A Dialogical Model for Participatory Design
CHAPTER 1

A COMPUTATIONAL APPROACH TO GROUP PLANNING

In this first chapter, we start by defining our approach to the problem addressed by this study. We outline the problem of participatory design in a broad sense in order to examine the relation between the problems defined in the study and the problematic. We then describe our interdisciplinary approach to the problems, which comprises three parts: the basic assumptions of the study, the theoretical framework for developing our participatory design method, the allied case-study method employed to develop adequacy criteria for our new method, and the basic concepts of the method.

1.1 Toward a model of dialogue

The sequence of statements, interpretations, and interrogations that comprise a dialogue between two or more parties can be regarded as a collective representation of thinking. Dialogue in participatory design is the representation of an interactive process of group thinking. Participatory design dialogue is a continuous process of learning, modifying, connecting, retrieving, and generating design concepts through verbal interactions. In
such dialogue, information is prepared in the mind and formulated in a way that can be explicitly delivered to others. The model of participatory design dialogue which this study develops is proposed as a tool to understand how people design collectively through the interaction of dialogue. In a design discussion, natural language is the most common means of expressing and transmitting design concepts. In participatory design, participants design by exchanging information and generating knowledge, modifying their belief systems, connecting concepts, and retrieving cases through dialogue interaction.

There are systems of design concepts in the mind which can be captured through the analysis of the individual design concepts of which they are comprised. Every design concept, once generated, can be verbally represented. Some are important, some are irrelevant, and some are not directly relevant but may seem important to discuss for certain reasons. Participants may focus on information concerning their particular interests, whereas the facilitator, who is probably a professional designer, is normally engaged in keeping the design group together, resolving conflicts and collecting information for the design work he/she has to do after the discussion. Thus, each individual collects a different set of information for the design. In some cases, drawings are also generated as the result of the workshop, but much information provided by the participants is missing or remembered only in fragments by the facilitator.

In many cases, the design can be the description of an action. When drawings of a design are given to a builder, they are a collective set of instructions to be executed. When the client agrees with the design made by his architect, an authority-based decision can be given. In participatory design the participants construct a set of commands collectively. It is not easy for a group to give a set of commands which all group members can agree upon. However, individuals are not interested in all details. They pay attention mainly to what they care most. Further, they are more concern of the result rather than the process of participatory design.

There are many ways in which participatory design can be carried out. Collecting the opinions of users through survey, and integrating these
opinions into the design; users participating in a self-help process also involves participation. In this study, we define the term "participatory design" in a broad sense, but we focus on one particular activity with participatory design: the small group discussion in a meeting room. In a participatory design, the designer may generate the design independently, or he/she may design together with the user. Our boundary is based on whether the user, the non-designer, has a direct role in determining the end product. Further, as Sanoff (1988: 39) has said that the participation process is not a separate exercise from the design process; participatory design is part of the overall design process. In this study, the objective underlying the investigation of the problem is the development of a useful method for supporting design.

1.2 Why participatory design?

Participatory design has been important in the past and has become increasingly so in present practice. User participation in the early stages of design can prevent problems from occurring after the design has been fully developed or implemented. The opinions of the users have to be taken into consideration as part of the architectural programme in order to create a comprehensive design. Participatory design movement has gone through three phases: the ideology of design quality and social justice, the professional’s design task, and the integration of design. Types of participatory design vary according to the setting of the problem and the social context.

1.2.1 A new approach to design processes

Since the mid-1960s, there has been an important movement toward the participation of the public in the determination of their built environment. Most influential ideas or methods of participatory design were originally
generated in the 1960s, such as the "ladder leading to citizen control" (Arnstein 1969), "self-help" (Turner 1967, 1968), "advocacy" (Davidoff 1965), "open and indeterminate architecture" (Habraken 1972a, 1972b), and "learning from Las Vegas" (Venturi & Brown 1968). These ideas and methods were in common in terms of their "bottom-up" approaches. Tzonis and Lafaiure (1975: 9) create a framework for, up to 1975, these separate approaches called "movement of populist architecture."

By the 1970s, the purposes of participatory design have been more modestly defined to include information exchange, resolving conflicts, and supplementing planning and design (Sanoff 1994: 110). These methods have been practised throughout the 1970s and 1980s in all over the world. For example, North America (see Moore 1984, Comerio 1984, King et al. 1989, Sanoff 1988), Mexico (see Alexander et al. 1985), Western Europe (see Knevitt 1975, Priemus 1984, Beheshti 1986), Scandinavia (see McCamant & Durrett 1988, Gustavsen 1992), Australia (see Sanoff 1994), New Zealand (see Kernohan et al. 1992), Japan (see CEPD 1991), Taiwan (see CEPD 1991). Many "self-help" projects have been conducted in India and South America (see Fathy 1973, Lewin 1981, Hall 1988, Hamdi 1991). However, because self-help projects involve a less design discussion, and the participants of the projects have less direct influence on the design process, in this study we emphasize on the type of participatory design which is termed as "community design" by Comerio (1984)\(^1\).

In the practice of architecture and urban design, the aim of user participation methods is to introduce those needs and aspirations of the users which professionals fail to predict into the decision making process on their built environment. To reach this goal, many pragmatic techniques based on specific contexts have been used extensively in the past three decades. Participatory design has infiltrated into the mainstream professional practice

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\(^1\) "Community design is based on a recognition that professional technical knowledge is often inadequate in the resolution of societal problems, and it represents the addition of a moral and political content to professional practice. In particular, it grew from the belief that all citizens had a right to be represented in decisions about the environment, and that planning would benefit from the maximum public input." (Comerio 1984: 227-228).
of designers and planners. Participation is engaged in many places of the world and has become part and parcel of professional practice. "The designer's job is no longer to produce finished and unalterable solutions, but to extract solutions from a continuous confrontation with those who will use his/her work." (Sanoff 1988: 29). In the following section, we move to examine current views of participatory design in order to understand the attitude toward and the need of participatory design in contemporary society.

1.2.2 Current views of design participation

Aside from the traditional urban design and planning practice, the participatory design approach is being explored in new areas such as: product development, long-term system maintenance and redesign, and siting in the developing world. Here are some examples showing the need for participatory design in contemporary societies in three different scales:

1) global problem: conflicts on the siting of LULUs — locally unwanted land uses (Popper 1987) — followed by the notion of NIMBY — not in my backyard — in many industrialized countries (Heiman 1990, Dear 1992, Lake 1993), and, gradually, people are also aware of this problem in many developing countries;

2) regional problem: population growth and economic booms resulting in large-scale resettlements, and conflicts as to the preservation of historical buildings in urban renewal areas (Chin 1988), and

3) problem of organizations: the participation of workers in respect to their work environment to improve the quality of the work product (Gustavsen 1992, Schuler & Namioka 1993).

These different types of needs require the employment of better methods in the joint decision making process at its various levels. "The design of complex artifacts has increasingly become a cooperative process, with the
detection and resolution of conflicts between design agents playing a central role. Effective tools for supporting conflict management, however, are still lacking." (Klein 1993: 259).

To date, researchers and practitioners in multiple domains, such as management, computer science, planning, engineering and industrial design, have been actively involved with developing the theoretical models and artifacts for cooperative decision-making, or negotiation of the group. From recently published papers (Lake 1993; Schuler & Namioka 1993; Klein 1993; Jennings et al. 1992; Eden 1990, 1992), we observe a great interest in the application of participation-based methodology. Such methods can help to solve problems concerning the group act in participatory design. Let us now examine problems of current practice that are defined in our study.

1.2.3 Problems of participatory design

In our study, we have defined problems of participatory design with four interrelated categories which are derived from our case study (Chapter 2) and the review of the methods of participatory design (Chapter 3). These problems are: the user-as-designer myth, ill-structured information flow, the result-oriented process, and the paradigm of the two categorized groups. The next question one may ask is: How do we solve the problem? The way "problems" of participatory design are defined determines the method applied to solve the problem, and limits knowledge drawn from other disciplines. We will rethink the participatory design process through fundamentals of the discussion of individuals, viz. the reasoning of design. "Reason is the mechanical manipulation of abstract symbols which are meaningless in themselves, but can be given meaning by virtue of their capacity to refer to things either in the actual world or in possible states of the world." (Lakoff 1987: 7).

These problems are adequacy criteria developed based on our case study (see Chapter 3) and the review of methods of participatory design (see Chapter 2). Let us now examine our approach in developing a method for
participatory design.

1.3 An interdisciplinary approach

Theories applied in current methods of participatory design are either those of developing methods for practical application, or ambitiously those that combine social-political rhetoric that draws out to a discourse rather than conformation to a method. Some participatory designers, setting their target as a responsive design, tend to focus on well-structured design problems aimed at the direct improvement of the built environment. Some others, with interests in the relations between space, power and society, are examining participatory design issues from social-political perspectives, aiming at a long-term improvement of the society.

This study examines a deeper level of the participatory design process—the cognitive aspects of group design discussion. It is an interdisciplinary approach that employs recently developed theories in cognitive science, social psychology, artificial intelligence, information systems management and design methodology. The basic characteristic of this study is that it addresses aspects of knowledge acquisition associated with design, the generation of design alternatives and design evaluation, and considers reasoning as taking place dialogically through discussion between multiple agents. The work concentrates on cognitive aspects of communication and multi-person distributed problem-solving processes as they relate to design.

The most important invention of the model is that we propose not to rush into design decision-making, but to draw the mental operations of the participants to focus on problem solving/defining and to lead participants to think about questions such as, "What are the grounds and reasons for this claim?" "What do we mean by our design norms, i.e., comfort, privacy, or economic norms?" "What is the "picture" of the problem/solution?" "What is the relation between goal A and goal B, action A and action B, or, fact A and fact B?" Our study proposes to draw the design discussion into the
stage where the exchanging, defining, and generating of design concepts among multiple agents are major tasks, which is moving away from simply making decisions of choice among presupposed solutions\(^2\). That also means that the method will rule out weighting and rating, because they will occur in a following phase. Thus our study goes further toward improving a specific design problem, the structure of design guidelines that are generated through a group discussion.

### 1.3.1 Basic assumptions

Participatory design operates within an open information system such that information from the "outer" can influence the "inner" information system. The process of a full-fledged participatory design includes several phases of mental operation\(^3\) and several stages of design tasks\(^4\). It would be difficult to study participatory design without a clear delineation of the scope of our study. To do so, we have set two strategies in circumscribing the scope of this study:

1) to scale down to focus on the design reasoning of a small group engaged in design discussion.

2) to place emphasis on the early stages of participatory design,

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\(^2\) A distinction between decision-making and problem-solving is made by Olsen (1982: 6), "Whereas problem-solving involves a number of phases and idea action, decision-making involves primarily one idea action or mental operation — that of evaluation."

\(^3\) According to Guilford (1967), five basic mental operations that the organism performed in the information processing includes: cognition, memory, divergent production of ideas, convergent production of ideas, and evaluation.

\(^4\) Burns (1979) defines the process of participatory design as four stages: awareness of the problem, perception of possible resources for solving the problem, decision-making through cooperative work and implementation.
problem defining and problem-locating\(^5\), where generating collective normative statements and providing factual descriptions are more important than making final, specific design decisions.

Moreover, in order to further define the constraints of this study, here are several basic assumptions:

1) Participants in the participatory design dialogue are equally involved in the process and are willing to generate design solutions cooperatively and rationally. For the definition of a rational process, we refer to the process of consistently applying "rules" to processing information in means-ends reasoning, and to applying "meta-rules" that control these rules, either explicitly or implicitly.

2) Acceptability is more important than optimization in participatory design. In participatory design, each participant has his/her independent view of what is most preferable to him/her. Given this fact, what is important in the participatory design process is to have each individual accept the result of the discussion as been the best the group could achieve. An ideal participatory design process can be regarded as a means leading to the production of optimal design solutions which, if implemented, should fulfill the needs and wants of the participants. In reality, design solutions are not optimal to every participant and rarely do all participants feel satisfied\(^6\).

3) Design discussion is based on the qualitative description of needs and wants that leads to a compromise, rather than quantitative data that leads to an a priori design solution.

4) Every design concept, after it has been generated in the mind, can be verbally represented to a satisfactory degree, through which verbal representation and analysis systems of design concepts can be reconstructed.

\(^5\) Problem defining is to know what distinguishes an observed condition from a desired condition. Locating a problem is to find where in the complex causal networks the trouble really lies. They are the most intractable problems. (Rittel and Webber 1974: 33).

\(^6\) People may accept the real world but may not satisfied with it when comparing it with an ideal world.
5) In the conceptual design phase, the priority and importance of design concepts can be explicitly explained by the expression of reasons, instead of applying rating or weighting.

6) We may be not able to understand correctly how people think collectively in participatory design, but we may be able to construct a model approximately to a satisfactory degree that can help to describe and explain the group-reasoning process. Moreover, for engineering purposes, the model can help to control the process.

7) Conflicts may arise from inconsistencies between the intended uses of objects. The objects by themselves do not uniquely determine these intentions, rather, they are "part of it". Therefore, there are cases in which people, once they recognize the true nature of the conflict, may resolve it by changing those intentions, e.g., by changing the interpretation of the pragmatic value of those objects.

8) Each individual in the group has his/her own "design logic." Design logic is the logic of design reasoning, the generation of design solutions and the justification of design statements.

1.3.2 Theoretical framework

As Argyris and Schön (1974: 5) have pointed out "theories are vehicles for explanation, prediction, or control," in this study, we need theories that help in understanding the problem, that predict the possible solution, and control the development of the method. The theoretical framework of this study is based on theories drawn from the following five categories: 1) dialogue and cognitive structures, 2) argumentation theory, 3) theory of group decision-making, 4) computational theory, and 5) distributed artificial intelligence.

dialogue and cognitive structures

"Dialogue" here refers to the verbal interaction sequences performed among language users in participatory design. In order to be able to adequately ac-
complish the respective actions which constitute a dialogue, these language users must "go through" a number of highly complex cognitive processes (Van Dijk 1984: 1). These language users are constantly planning, monitoring, executing, storing, retrieving and understanding information from internal memory and external sources. In this study, the term cognitive structure is used to describe the model of information processing in the mind.

The cognitive structure of dialogue has been studied mainly in cognitive science and philosophy (e.g., Barth & Krabbe 1982, Dascal 1985, Winograd & Flores 1986, Cohen et al. 1990, Wold 1992). The dialogue and the relation between dialogues and cognitive structures are called "dialogical logic" (Lorenzen 1961, Barth 1985), "dialectical logic" (Rescher 1977), "logical dialogue-games" (Walton 1984), "logical model of dialogue" (Runcan 1984), "argumentative dialogue" (Van Eemeren & Grootendorst 1984), "dialogue game" (Mann 1988, Carlson 1983). In general, what those researchers intend to do is to formulate rules applied in dialect in order to discover which norms should control moves and counter moves in a dispute. It is the attempt to "exhibit epistemological processes as a work in a setting of socially conditioned interactions" (Rescher 1977: xii).

In developing a dialogical model of participatory design, we can easily think of using models of formal debate as the prototype. This cannot be achieved without further examination because there are similarities and also differences between current models of dialogue and the model of participatory design dialogue. Current studies of dialogical logic are focused on two people's formal dialectics, the dialectics between the Proponent and the Opponent (e.g., Lorenzen 1961, Rescher 1977). One main assumption in formal debate is that both parties, the Proponent and the Opponent, have prepared sufficient information beforehand and are both aiming to prove they are right and the other is wrong.

However, the basic assumption of participatory design dialogue is that all parties involved are willing to achieve consensus through the dialogue. Furthermore, participants not only express opinions and counter-opinions but they also learn from each other and generate knowledge
through the dialogue interaction.

In formal disputation, the models of such "superstructures", or "basic superframes" (Minsky 1975: 109), explain how two people with different beliefs or who use different "logics" can debate through a dialectical process. As Research (1977: 1) has said, "Perhaps the clearest, and surely historically the most prominent, instance of dialectical process is formal disputation. Formal disputation is a method for conducting controversial discussions, with one contender defending a thesis in the face of objects and counter-arguments made by an adversary." They act and react with language that is based on the interaction between outside information and the cognitive structures of the Proponent and the Opponent.

However, in participatory design dialogue, people use informal logic for their discussion. The rules bonding them are looser than that of a formal debate. There is no absolute role of Proponent and Opponent, and the roles of Proponent and Opponent shift constantly, depending on the issue or time.

In the above community of dialogical logicians, the term dialogue generally refers to the verbal exchange between two agents where each attempts to defeat the other. But, in the community of participatory designers, it refers to the communication between two groups, the group of the user and the group of the non-user (e.g., builders, designers, clients, etc.)

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7 There are more than one logic. Twentieth-century logicians have proposed several types of logic such as, propositional logic, intentional logic, deontic logic, conditional logic, modal logic, etc. See the review on modern logic in Beth (1970); and the introduction on modal logic in Chellas (1980) and the discussion on informal logic in Fogelin (1978).

8 In this study, we use informal logic in contrast to formal logic. As is said by Fogelin (1978), traditionally, logic has been considered the most general science which deals with arguments. The task of logic is then concerned with discovering the fundamental principles for distinguishing good arguments from bad ones. A different way of viewing argument is to treat it as a particular use of language. Arguments are things that we do in everyday life in informal situations. (Fogelin 1987: v).
who are also involved in the design decision-making process\(^9\). (See Section 3.3.4). To these agents, resolving possible conflicts and achieving acceptable solutions is more important than winning over the others in the design discussion. We can elaborate this difference by applying terms used in Game Theory\(^{10}\): participatory design is a \textit{win-win} game instead of a \textit{zero-sum} game. However, in this study, we do not focus on the communication between the user and the non-user. We are interested in the participants with different interests who are involved in the design discussion. Our method has been developed to support directly the human facilitator who "facilitates" the design discussion. (See Section 5.2.1).

One main similarity between participatory design dialogue among a group and formal debate between two people is that, although people may have different beliefs in processing their information, there is a superstructure that can capture these diverse individual cognitive structures. To develop a full-fledged model of such a superstructure between two people is not a simple thing (Van Dijk 1984: 8), not to mention a model of "multilogue" (Mann 1988: 528). Therefore, departing from the state of the art of the dialogical logic, we then try to model and experimentally test only some manageable parts of the model of participatory design dialogue - dialogues related to design arguments and design reasoning.

\footnote{\textsuperscript{9} Kernohan et al. (1989) have defined a distinction between users and providers of facilities. "The user of a facility are the individuals or groups with a presumed right to use that facility," while providers are "individuals or groups with a close connection to a building or other facility, but without a presumptive right of use to that facility." (Kernohan et al. 1989: 7-9).}

\footnote{\textsuperscript{10} Game Theory is concerned with an optimal strategy for each player, assuming each player is motivated by self-interest. In the later development of \textit{N}-person cooperative game, the concept of 'optimal strategy', has lost its salience. Particularly, when solutions are offered as 'rational' final outcomes of the game, game theory becomes a theory of conflict resolution rather than a theory of optimal decision making to satisfy self-interest. (Rapoport 1974: 6).}
argumentation theory and the process of design thinking

There are certain relations between design acts and design thinking. Individuals have their own rules, implicit or explicit, based on their beliefs. Therefore, one person’s rules for his/her design thinking may be different from another’s. Von Wright’s *Norm and Action* (1963) and Rescher’s *Logic of Commands* (1966) help to further define the distinction between the description and prescription of design thinking, and the relation between one design concept and another.

Design dialogue does not proceed haphazardly. In participatory design, people argue, reason about, agree and/or disagree with others while using their own rules of design thinking. These design arguments can be identified, reconstructed and tabulated. By analyzing those explicit design dialogues generated collectively in the group discussion, the interaction of the cognitive structures, in relation to design thinking, can be understood.

Argumentation theory is a rigorous method to systematically analyze the representation of arguments - monologue and dialogue. Toulmin (1958) in his analysis of the structure of argument defines several basic components in an argument, e.g., data, claim, warrant, backing, etc. People assert statements in the participatory design, and they justify their statements by asserting more statements. This process is called *reasoning* by Toulmin et al. (1979).

In our study, we use the two terms, argumentation and reasoning, interchangeably because most of the time they refer to the same activities. However, our model is not a model of argumentation which focuses on analyzing arguments, but is a model of reasoning which analyzes both arguments and design thinking on which design arguments are based.

In making a plan for a design programme, people generate and justify their statements. They tend to use their descriptions as commands. Based on the studies of such normative actions by Von Wright (1963) and Rescher (1966), Tzonis et al. (1975) in their study of the Conceptual System (*systèmes conceptuels*) have developed a method targeting the constraints of design argumentation. Design argumentation refers to two processes: the
process of generating a plan from a program and the process of justifying a plan in relation to a program (Tzonis et al. 1978: 6).

In the analysis of design thinking, Tzonis (1992) further proposes a framework for the representation of architectural knowledge which includes performance, operation, morphology and context. This later development further defines concepts expressed in normative statements into performance, operation and morphology. We call this system of design concepts the POM system. In our study, we further examine the notion of context to see what the meaning of context is in group planning, and how the descriptions of context influence the process and the result.

The analysis of design arguments in relation to thinking is essential in developing systems to capture reasons beyond the explicit design dialogues. This study expands these theories of individual normative reasoning into a group normative reasoning model that sees participatory design as a group conflict management with the users as the human agents in the cooperative design reasoning.

**decision theory for group conflict resolution**

The method developed in our study does not resolve conflict, but it is a method to enable humans to understand the conflict in a participatory design situation. The understanding of conflict does not, in itself, resolve conflict. As Coombs and Avrunin (1988: 209) have said about their development of the structure of conflict (see Section 4.2.1), "The role played by this structure of conflict in the varied and immense task of resolving conflicts may be placed in perspective by an analogy. A theory such as this about the logical structure of conflict is to the resolution of conflict as anatomy is to curing disease. Anatomy does not, in itself, cure anything, but it is basic, necessary information, and the practicing physician is the better for knowing it."

The study of group conflict resolution requires knowledge derived from various domains (e.g., social psychology, management and artificial intelligence) including the study of group behaviour in resolving conflict as
can be found in studies of concepts such as "game" (Rapoport 1960), "collective action" (Olson 1965), "decision making" (Janis & Mann 1977), "groupthink" (Janis 1982), "intention" (Bratman 1990), "structure of conflict" (Coombs & Avrunin 1988). We will examine the theories of decision-making\textsuperscript{11}. (For further discussion on decision theory, see Chapter 4). According to Phillips (1990: 144-145), such theories of group design decision provide:

1) a language that participants can share,
2) a "grammar" for manipulating meaning in ways that are not easy to realize with words alone, and
3) a structure to thinking.

Methods developed for group problem solving, such as: group planning (Olsen 1982), group decision making (Guzzo 1982), group negotiation (Gulliver 1979), decision theory (Janis & Mann 1977, French 1986), are the basis of the design support system in this study. According to DeSanctis and Gallupe (1987: 593-594), three approaches in developing methods to support the group are:

1) technical features aimed at removing common communication barriers,
2) decision modelling and group decision techniques aimed at reducing uncertainty and "noise" that occur, and
3) approaches characterized by machine-induced group communication patterns which can include expert advice in the selecting and arranging of rules to be applied during a meeting.

\textsuperscript{11} Decision Theory was developed considerably in the late 1970s and the 1980s. See the review in Munier (1988).
computational theories of group planning

The proposed research draws from recent advances in design computational methodology, e.g., work in cognitive science and social psychology which focus on problems of group interaction (Vaina & Hintikka 1984) and Artificial Intelligence (Bond & Gasser 1988), or the development of automation-based creative design (Tzonis & White 1994). As is seen in these work, much knowledge can be drawn from such computational approaches.

The dialogical model is built on the basis of computational design theory, that is to specify, in explicit terms, the design problem that the device deals with. It considers multiple points of view, the information that may be available, the beliefs of the participants involved in the process about the problem, as well as the beliefs about the beliefs of the others about the problems, the agreements and disagreements, and the information required to solve such a problem, etc. The aim of this study is to develop a computational theory the representations of which can serve to describe, explain and improve design practice.

Within this programme we need to define further how far a computational theory goes in relation to a computer-based simulation of the process of design participation, or a computer application in design practice. For that we will use the structuring of the problem according to Marr (1982). For him there are three levels of an information-processing device: the abstract computational theory, the representation and algorithm, and the hardware implementation. The first level is "the abstract computational theory ..., in which the performance of the device is characterized as a mapping from one kind of information to another, the abstract properties of this mapping are defined precisely, and its appropriateness and adequacy for the task at hand are demonstrated." The second level is "the choice of representation for the input and output and the algorithm to be used to transform one into the other." And the third level, hardware implementation, is "the detail of how the algorithm and representation are realized physically — the detailed computer architecture." (Marr 1982: 24-25). This study focuses on developing a computational theory. It does not involve
computer algorithm or hardware implementation.

distributed artificial intelligence

Information processing of participatory design resembles structurally concurrent design decision-making. To facilitate such information processing, many methods have been developed recently in the domain of management, engineering and computer science. Having demonstrated that we need to develop a computational theory, it is clear that what we are doing is a problem dealing with multi-agent problem-solving. Up to now, such multi-agent problem-solving has been applied in a small area called concurrent engineering. There is currently no carried out dialogical interaction among human beings — the agents in the participatory design process. We have to see what are available tools inside cognitive science that can be applied to dialogical decision making, a decision making that can be seen as a multi-agent information processing which is an artificial intelligence approach.

"Artificial intelligence research is fundamentally concerned with the intelligent behaviour of machines. In attempting to create machines with some degree of intelligent behaviour, artificial intelligence researchers model, theorize about, predict, and emulate the activities of people." (Gasser 1991: 107-108).

In other words, the development of artificial intelligence also helps us to better understand human behaviour and can provide inspiration in resolving the problem of human behaviour. As Klein (1993: 260-261) has pointed out "work relevant to support of group conflict management comes from artificial intelligence and related fields as well as social science," and, "To find work on systems that directly the support conflict resolution, we need to turn to artificial intelligence and related fields such as planning and design."

In particular, a sub-field of artificial intelligence, Distributed Artificial Intelligence (DAI), in many ways resembles participatory design. "Some statements of fundamental artificial intelligence problems have recognized that multiple actors with different viewpoints are an important
part of AI." (Chaib-Draa et al. 1992: 59). DAI deals with interactions of intelligent agents and has been applied to the machine-based design agent in the cooperative design process. It is "a revival of interest in approaches to analyzing and developing intelligent 'communities' which comprise collections of interacting, coordinated knowledge-based processes." (Gasser 1991: 108). "DAI attempts to construct intelligent agents that make decisions that allow them to achieve their goals in a world populated by other intelligent agents with their own goals." (Chaib-Draa et al. 1992: 35).

Other works related to developing machines for multi-agent concurrent design in DAI are: "joint intention" (Lochbaum et al. 1990, Searle 1990, Jennings 1993), "teamwork" (Cohen and Levesque 1991), "groupware" (Johansen 1988), "open information systems" (Hewitt 1991).

1.3.3 Case-study approach

This study will use the case study method as a heuristic device. Given the complexity of the problem of participatory design, we decide to go directly to an empirical case, and to concentrate on the holistic nature of the case. In doing the case study, we are aware of that content of the participatory design project plays a very important role in defining the nature of participatory design in each case. However, for the heuristic reason of our study, we assume that the content is irrelevant. In other words, we focus on identifying the fundamental attributes of the structure of design discussion. Further, since it is the structure of the dialogue rather than the content we are concern, we came to the conclusion that content aspects can be cut out from the analysis of the specific case.

Let us now examine the method of case study applied here. We will look at the definitions of the case-study method and the case selection.

*definition of the case-study method*

The definitions of *cases* and *case-study* vary according to the domain in
which the study is conducted. A case can be a fiction, a making up of a story, when it is used as an object for learning and teaching purposes (Easton 1982). What is a case study? A case study can be a simple description about a particular design project, or it can be a deep investigation on the same project. On the one hand, researchers classify methods used in case-based research into case-study methods and non-case-study methods, viz. qualitative and quantitative methods. Based on this distinction, case study is regarded as a qualitative method. It is an in-depth, multi-faceted examination, and is a holistic standpoint of one single social phenomena. Quantitative methods, including surveys and experiments, the collecting of data from a large number of samples, or the testing of particular theories about causal relations between different phenomena, do not constitute case study (Glaser and Strauss 1976, Easton 1982, Byman 1988, Orum et al. 1991). Quantitative methods are also criticized as having lost their complexity and their narrative order of social phenomenon (see, for example, Abbott 1992). That is, such a study method has lost the sense of relative representativeness.

On the other hand, other researchers argue that the distinction as to the type of case-study should not based on one case versus many cases. A study with a large number of cases must also be seen as case-study research, and that some research when conducting comparison between cases is also considered to be using case-study methods. In other words, the difference between comparative research and single-case research is limited (Holt & Turner 1970, Ragin 1987, White 1992). More inclusive terms such as case-oriented work (Ragin 1987) and qualitative comparative analysis (Ragin 1987, Drass and Ragin 1989, White 1992) are thus established to indicate this type of research. Conclusions to this argument, however, have not been reached. Some other researchers even disagree about having the quantitative-qualitative distinction (Platt 1992). The classic quantitative-qualitative distinction has oversimplified the case-study methods by dividing them into two absolute partitions. It misleads in relation to the concept of case-study methods. People generally think that only individual case studies can be narrative and that only population case studies can be analytic

Methods used in case-based research depend on the ways researchers define the cases. Ragin & Becker (1992) categorize case-based research into four basic approaches which are based on how the researchers view their cases. He organized these four approaches around two dichotomies in how cases are envisioned: whether they are conceived as empirical units or theoretical constructs, and whether they are considered as example of general phenomena or as specific phenomena. These four definitions of cases are:

1. Cases are empirically real and bounded, but specific.
2. Cases are empirically real and bounded, but general and conventionalized.
3. Cases are specific theoretical constructs which coalesce in the course of the research.
4. Cases are general theoretical constructs, but these constructions are the products of collective scholarly work and interaction\textsuperscript{12}.

Ragin's framework provides a conceptual map for linking different approaches to the question of cases. It covers the qualitative-quantitative distinction but proposes to treat cases in a less bounded way. This framework help specify the case-study method used in our study. The selected case for the case study in this work concerns a single social phenomenon, and the investigation of the instance is rich in detail for the development of preliminary criteria of a model.

\textit{the selection of the case}

The case selected for our case study is about a park design through the participation of the local neighbourhood in Hoe-Ju-Wae, San Chun City,

\textsuperscript{12} For the entire discussion of this issue, see to Ragin & Becker (1992: 8-11).
Taiwan. This case is selected because it fulfils the four typical process of a participatory design project as is defined by Burns (see Footnote 3), and this author has personally participated in the operation of that project.

Once a case is selected, it is thus necessary to identify the characteristics of this case and the criteria of the selection. Questions here are how can the criteria be generated? What is the knowledge of this comparison? The representativeness and typicality of the selected case in a single case research is normally what the investigators are anxious to declare rather than to prove (Bahr & Caplow 1991). The uncertainty as to the typicality of a single case is that it can easily be challenged by stating another case with inconsistency (Blalock & Blalock 1968)\textsuperscript{13}. Lynds (1929) and Stein (1960) in their studies on communities claimed that there are no representative cases; there are no typical cases but only that the case selected has many features in common with a wide group of cases\textsuperscript{14}.

In our case study, an actual case of participatory design is required. The methods of documenting participatory design cases vary according to the purposes of the respective cases. In order to avoid selecting an insufficiently documented case, and to be able to control the data collecting process, the case in which this author has participated in Taiwan is thus selected. The case is about a park designed through the participation of local neighbourhood in Hoe-Ju-Wae, San Chun City, Taipei, Taiwan. The principal interest of the case is in the participatory design process. We have no direct interest in San Chun City or in the Hoe-Ju-Wae area, nor do we intend to tell another touching story about participatory design after three decades of the development of the participatory design movement. For the purpose of our study — developing a model for practical purposes — the knowledge generated from the case study is be more important than the case itself.

\textsuperscript{13} The weakness of the case-study method using only one case is the lack of assurance that the case selected is really typical (Blalock & Blalock 1968: 240).

\textsuperscript{14} "A typical city, strictly speaking, does not exist, but the city studied was selected as having many features common to a wide group of communities" (Lynd and Lynd, 1929).
1.4 Concluding remarks

Up to now, we have outlined the methodology of this study. It might appear unusual that the project we have selected for the case study was carried out in Taiwan, since the methods of participatory design, as we will review later, were mainly developed in the United States, and the project we have chosen for testing the method developed in this study is a project carried out in the Netherlands. This certainly has to do with the experience of this author and the constraints of this study. However, this arrangement gives us a position where we can examine participatory design more objectively. Further, the process for this study is very clear. This author has learned the methods of participatory design in the United States, has applied the methods to that particular project in Taiwan, and is carrying out research on participatory designing the Netherlands. In other words, two constraints of this arrangement are 1) the methods of participatory design applied to the project in Taiwan were developed in the United States and 2) this study is carried out in the Netherlands. Therefore, by using the resources in the Netherlands, we 1) analyze the project as a case study, 2) review the background of the participatory design methods which were applied to the project, 3) develop our method for participatory design, and 4) test the method developed in this study to a project in the Netherlands.

Participatory design can be seen as a complex social phenomenon. In this study, we have scaled down our focus to a particular problem of participatory design, viz., the problem of structuring design dialogue. To solve this problem, we will apply an interdisciplinary approach which draws upon knowledge of 1) dialogue and cognitive structure, 2) argumentation theory, 3) group decision making, 4) computational theory, and 5) distributed artificial intelligence. This approach helps us to examine the problem from a new perspective, which differs greatly from traditional participatory design approaches.
Summary

This chapter has given an outline of our computational approach to group planning. In this chapter, we have pointed out the background of participatory design approaches, given current views of participatory design in contemporary society, and addressed the problems associated with this study in relation to the problematics. In order to solve the stated problem, we have proposed the application of an interdisciplinary approach by using knowledge from cognitive science, social psychology, artificial intelligence, information systems management and design methodology. We have also highlighted the case-study method applied here. The questions to be answered next are, "What does participatory design look like?" and "What do we want to learn from a case-study?" In the following chapter, we present our case-study, which is used as the basis for the development of adequacy criteria which is again employed for the development of a participatory design method.
CHAPTER 2

A CASE STUDY

What does a participatory design project look like? In this chapter, we start our investigation by trying to answer this question. We examine a real participatory design project through which we will develop methodological problems of participatory design, adequacy criteria of a participatory design method, and some basic concepts for developing the method. This case study includes the structure and processes of the method which has been applied to the project, the process and the products of the project. In the first part of this chapter, we limit our analysis, and we limit unnecessary associations which might result in misinterpretation. We simply describe events which were observed or recorded by the designers. Major analysis is presented in the second part of the chapter.

2.1 Introduction

This case study is a preliminary observation of participatory design based on the investigation of a design project carried out in a natural setting situation through participatory design methods. As mentioned in Chapter 1, this case study serves as a heuristic devise. We have defined the problems of participatory design methods together with the review of the development
of participatory design methods in Chapter 3. Further, we use the findings in chapters two and three as the departure point for the development of the new method.

In this section, we look at the method of the case study, the preliminary observations of the project, and methods applied to the workshop. To obviate isolation from the overall event, we set our corresponding observations in boxed figures. These observations are used as references in later discussion in this study. They serve as background to the participatory design process. In making the observation, we also concentrated on how information was processed during the group discussion; how design dialogue was generated and the result of the design workshop.

2.1.1 The development of adequacy criteria for a participatory design method

This project involved complex factors. As discussed in Section 1.4.3, such an event can be understood and described differently, the differences are based on different perspectives in order to serve different purposes. For example, an event can be examined in respect to social-political aspects (e.g., in relation to the local society and to the politics of the nation), social-cultural (e.g., to study the conflict between two of the groups of residents: new migrants and old migrants), economic (e.g., to understand the development, or decline, of the economy of that region), environmental (e.g., to learn how this issue is understood within the context of the project), etc. In this study, our purpose is aimed at improving current participatory design methods. With this intention, we focus mainly on the design method and the social-cognitive aspects of the project.

The resources of this case study are based on 1) the observation of the author during the carrying out of the project and 2) a report by the Graduate Institute of Building and Planning, of National Taiwan University (see Appendix A). The working languages of the project were Taiwanese and Mandarin Chinese. Dialogue quoted in this case study has been
translated into English by the author.

2.1.2 Preliminary observations of the project

In this section, we first examine the setting of the project, including the plan of the municipality, the situation of the site, the intervention of the professionals, the organization of the design team, and the method applied to the participatory design process.

the plan of the municipality

The project is a public park located inside a neighbourhood, Hoe-ju-ware, San Chung City, Taipei, Taiwan. The park was planned some years ago but the actual construction did not start until the summer of 1992. According to the plan proposed by the municipality, the park has been designed under a theme, "Chiang Kai-Shek Memorial Park." There would be a statue of Chien Kai-Shek located in the centre of the park, paved wandering the whole park, and concrete fence surrounding the park with few entries.

site

The site is located inside a residential block. The size of the planned park is about 6,300 m². Existing buildings on the site were Chinese courtyard-type houses belonging to early settlers of this region. All buildings on the site had been demolished except for an old farmhouse which was built after World War II. Residents of the site had moved. The site was used by people in the neighbourhood for their daily activities.

professional intervention

In the summer of 1992, there was a social programme funded by central government intended to organized some students from National Taiwan
University to carry out community services in the Hoe-Ju-Wae neighbourhood. The programme was cancelled because of budget cut. Those students then were aware of a project of the municipality of San Chun City and decided to carry out a participatory design approach themselves. This idea was supported by urban designers who worked in the University. Together, the students and the professionals organized and conducted a participatory design process with the citizens from the neighbourhood. The design team, through the local network, contacted the mayor of San Chun City and convinced him to postpone the construction of the park for one month, so that the design team could proceed with a participatory design project in order to generate a new plan for the park. The new scheme was accepted by the municipality and the project was awarded by an international panel.

organization

The design team established a centre on the campus of the National Taiwan University and met extensively during the period of the participatory design. They also establish a base on the planned site of the park to gather information, exhibit the process, and communicate with the residents.

the beginning and the end of the observation

It is important to note that this participatory design process was only part of the overall project. The project did not come to an end after the participatory design workshop. The later construction process also required participation of the neighbourhood, and a long term organization to maintain the park has been set up. However, our observations focus on the period of the participatory design workshop.

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1 This is an award project of the international competition entitled "What is Socially Responsible?" The competition was organized by the Pratt Institute, the Polytechnic University, N.Y. and Architects/Designers/Planners for Social Responsibility in the winter of 1992. The project and other 24 projects were selected from a total of 245 entries.
2.1.3 Methods applied to the workshop

To the design team, the methods of participatory design applied to this project were based on the assumptions that users ought to participate in the design process in determining their own built environment. During the operation, voting on controversial disagreements was ruled out for fear that it would have led to conflict. The team anticipated that the participants would self-adjust their ideas throughout the participatory design process.

resources of the method

The design team developed their own method for this participatory design project. The method developed was based on 1) techniques introduced in Co-Design (King et al. 1989), 2) the author's experience of the Take Part process\(^2\) and 3) experience from other participatory design projects in Taiwan.

the task

The task of the project was to generate a new scheme through the participatory design process and then propose the new theme as an alternative to the original scheme. According to the agreement with the municipality, the design team had to submit a new scheme so that the contractor can start the construction.

operation

week one

project given

\(^2\) The technique is adapted from the "Take Part" process invented by Halprin and Burns (1974). This method uses techniques developed in Halprin (1970). In the winter of 1990, The author participated, as a participatory designer, in workshops conducted by Charles Moore and Jim Burns in Dallas, Texas, the United States.
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interview
site analysis
introductory activities
the study of social context

week two
establishment of an on-site campaign
environment cleaning, (targeting people ages 6-12)

week three
children’s workshop under the theme, "draw the new park", (age 6-10)
sports on the site, (ages 10-16)
a picnic: for all ages

week four
a talent show, (age around 60 or above)

week six
site experiencing, section 1
collective diary, section 2

week seven
group design, section 3
development of the design generated from the workshop

week eight
exhibition and development of design
arrangement of a long-term organization for the park

week nine
end of observation


2.2 Design workshop

The design workshop was the core of this participatory design process. The participatory designers had paid intensive efforts to the workshop. The workshop had three sections: site experiencing, the collective dairy, and the
group design.

2.2.1 Section 1: site experiencing

The design team set up questions and anticipated the reactions of the participants. The purpose of these three workshops was to guide the participants to discover and to clarify problems/needs of the site; to build up trust between the participants and the students through one-on-one question-answer contact; to reduce the tension on the project by this activities. The summary of the operation is:

1. the design team identified seven "stations" inside and on the edge of the site,
2. one student at each station was assigned a specific question,
3. each participant started their tour to go through these seven stations from different points in a different sequence, and
4. each student at the stations gave the arriving participants the assigned question and recorded the answer(s).

The seven stops for the question/action:

1. tell us your opinion, in general
2. the image of the entrance
3. tell a story related to this place
4. play a game of chess
5. count the number of automobiles that enter the community
6. imagine the site if there was a wall around it
7. take a picture of the surroundings

Station 1:
Situation: Inside the base there were always people from the neighbourhood sitting nearby casually on chairs they had brought
and they would join other people's discussion at any time.  
Question: Station 1 was a general discussion station and people were asked "What do you want the park to be like?"

**station 2:**

Situation: The station was at the entrance to the rectangle where the potential entrance to the park from the outside will be.  
Question: If this was the entrance to the park, what would you want it to be like?

**station 3:**

Situation: Station three was set inside a Chinese courtyard-house in the neighbourhood.  
Question: The participants were asked to tell a story related to the areas and then the student recorded the story.

**station 4:**

Situation: The team set two stools in front of the wall of a local temple in the site; there was a two-meter-wide lane with speeding motorbikes passing close to the stools.  
Action: The assigned student invited the participants to sit down for a cross-circle check. After the check, the student asked "Where do your children (or, you or your younger brother/sisters) play after school?"

**station 5:**

The day for the site experiencing was a Sunday. There were not many cars. Participants' responses to the question was about the problem of parking. They said that "outsiders" were parking their cars on the site and in the lanes.
2. A Case Study

A man: "It is very hot in the summer, many people, as you have seen, stay in the park during a hot day. Besides, we old men go to the toilet more frequently. My son's wife does not like me to stay at home all day. She thinks I waste electricity on air conditioner and waste water on using the toilet. I prefer to stay in the park and use the public toilet."
Other participants: (laughter).

Figure 2-1

station 6:
Situation: On a corner of the site.
Question: The student asked the participant "If the wall was built, what would you like the wall to be?" and sketched the scene described by the participant.

station 7:
Situation: On the west edge of the community, there was a two-lane road. Across the road was an open market where housewives of the community buy their daily supplies.
Action: The assigned student asked the participants to take a photo of the surroundings.

One participant pointed out that it was possible to see a mountain on one side of the road on a clear day.

Figure 2-2

2.2.2 Section 2: the collective diary

The second section of the workshop is about developing a collective diary.
Two main assumptions for this section were:

1) the participants could express their needs and could understand
others' needs through this workshop, and
2) that this process could clarify what the participants claimed were
important to them.

After the site experiencing, eighteen participants were brought to a class-
room at a local kindergarten. Some participants who did not join the site
experiencing also attended this workshop.

The operations of this workshop were:

1) The conductor of the workshop drew a line across the blackboard,
and marked off the hours of the day and night.

2) The participants were urged to write down on the blackboard or
to call out activities that would go on in the new park.

3) The conductor reviewed the diary and specified the activities and
the actual needs (i.e., size, place, implementations) of spaces required for
the activities specified by with the group.

A woman, aged about 35, was not very happy about this workshop. She
said that there were too many opinions from those old men. We en-
couraged her to bring more housewives to the following workshop on the
following Sunday. She did.

Figure 2-3

In this workshop, two major issues were about the existing farmhouse in the
park and whether a public toilet would be necessary. We will present them
later in this chapter. Other goals and needs, and doubts, emerged from the
diary:

1) A path designed path as a Healthy Walking Path\(^3\). Aged people

\(^3\) "Healthy Walking Path" is a concrete road with pebbles half buried. It is believed
that walking on this kind of road with bare feet, through the massage by the pebbles toward
the feet, is healthy to the body.
and women would like to have it at this park.
2) A place for children to play baseball and basketball.
3) As the park was very hot in the summer, most parents of new families do not let their children play at the park thought some children do play in it.
4) Space for playing badminton at the park.
5) Baseball was dangerous.
6) The relation between the location of activities and the shady place in the park.
7) The relations between activities area and the shade areas according to the time.

There was a slide-presentation at the end of this workshop, introducing cases about participatory design in Taiwan, the United States, and Japan.

A man said, "We need the space for funerals. Every family can have people die some day. If the park is blocked by the fence and the lanes around the park are packed with cars, then we have no space for the funerals."

Figure 2-4

2.2.3 Section 3: group design

The third section for the workshop is a group design. In group design, participants were divided into four groups. The reason of this dividing the participants into four groups was based on the consideration of collecting opinions from all age groups, both genders, and both types of dwellers — old and new residents of that areas. According to pervious observation:

1. There was a gap between two different type of dwellers.
2. Old residents in the discussion dominated the others in terms of
expressing opinions.

3. Adults who participated in pervious workshops were mainly women of the new residents group and old men from the old residents group.

The original plan of the park proposed by the contractor was explained and criticized at the beginning of this workshop. Participants were encourage to express their opinions freely. The workshop conductors stated several rules explicitly to the participants in the opening:

A man entered the room before the beginning of the workshop but left immediately. He answered to an inquiring student, "He (referring to another man already in the room) is the person I dislike most. I don’t want to be seen by him”.

Figure 2-5

1. Listen to and respect to other’s opinions.
2. There is to be holistic consideration from different view points.
3. The park is not only for us but is also for our grand sons.
4. Try not to criticise other’s opinions but let them speak out first.

In this workshop, each group had two students directing the design process by bringing up issues and drawing out the groups. The participants were divided into four groups.

1. The men’s group, age: 45-75, seven (owners of local retail shops, workers and old people).
2. The women’s group, age: 20-50, five (students and housewives).
3. The children’s group, age: 9-12, ten (students from an elementary school).
4. The teenagers’ group, age: 13-18, eight (students in secondary school or high school).
The children did not care too much about others' needs. "They want to build a Disney Land," recalled one student. The students technically guided children to think about other's needs. And gently asked them to 'give up' some impossible proposal such as 'a big lake for high-speed surface-motors.' In the end, a swimming pool was their last line. They would scream if somebody touched it.

**Figure 2-6**

In the teenagers' group, agent A said: "We should put the basketball field on the northwestern side of the park. That place is a dead corner, two sides of the place face side walls of residential buildings."
Agent B said: "We should put the basketball field on the northern side. I can go to play basket ball easily."
Agent C: "Yes."
A explained reasons.
The student (a designer) in this group agreed with A.
B insisted on his plan.
A explained again.
B and C said, "It is up to you. You can do whatever you like," and left the room. The student failed to keep them. They came back to the room later but stood behind tables.

**Figure 2-7**

2.2.4 Further development of the design

In the following phase, the redrawn schemes would be the bases to enable the participants to modify the schemes and to have further discussion. The elaborateness of the tools and drawings for the subsequent phase was also a step further than that of the preceding one\(^4\). The basic criteria for this

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\(^4\) This workshop could have several phases during the whole process, depending on the characteristics of the project. Tools and drawings for physical design vary from abstract and conceptual to specific and concrete. There was only one phase in this project due to the time limit.
representation were that the schemes must be understandable by all the participants and that they could be accepted by the original groups who generated the design.

After the group design, the students had a major meeting. The purpose of the meeting was to represent schemes generated by participants. Students who participated in the design groups were asked to present the designs in this meeting.

At first, the students did not know how to present the designs. Most students didn't have design training. They worked on the recording process first, then they had a exercise (called the Memory Palace) before they went on further representing the schemes. They used four sheets of A4 paper for the recording. On the first page, they were asked to put the photo of the design model in the centre, and to indicate the design concepts of the schemes with lines and arrows and to write a description. On the second page, they simply redrew the design to make it more understandable. On the third page, they wrote down the major arguments in the group in which they have participated.

Memory Palace

This technique is adapted from a theory called "Memory Palace" developed by Charles Moore⁵. His theory was that a person stores his/her experience about architecture in his/her own memory and creates an imaginary "Palace." In order to capture this stored experience, he/she has to "enter" the Palace to search for the architecture image he/she needs and then to represent them. Students sat around the room with their eyes closed. And the instructor led them through a mental tour of the Palace. (See Figure 2-8).

⁵ This author has personally studied the theory of Memory Palace with Charles Moore.
Imagine you are sitting in a comfortable chair. (Pause). You are very relaxed. Try to feel the chair. (Pause). You are inside a room. Look around the room. What is there? (Pause). Is there any music? Listen to it carefully. (Pause). Now imagine there is a big hand. The hand grasps you, lifts you up and put you in a beach. You are lying on the beach. The sunshine is warm and comfortable. Feel the warmth. (Pause). There are people near by. (Pause). Look at what they are doing. (Pause). You look at the ocean. There are boats. What are they look like? (Pause). You stand up and start walking. You walk into our park (the project). You are coming from the entrance. (Pause). You are walking under shade trees. Wind is blowing on your face. You feel very nice. (Pause). You come to a bench. Look at the bench. What is it like? (Pause). You sit down on it. You look around. There are many trees. (Pause). You see a pavilion. What does it look like? (Pause). There are children playing. How many, and how old are they? (Pause). Watch what they are doing. Are they playing ball? (Pause). You raise your head and look at the sky. The sky is blue and clear. (Pause). Now your are back in this room. Open your eyes.

Figure 2-8

2.3 Product

In general, people consider the product of the participatory design process to be design schemes drawn or physical models made (See Figure 2-9). In this study, we propose to look at the knowledge that is generated and information that is linked up as the result of the process. We are interested in how design concepts are formulated in the participatory design dialogue and how design dialogue is generated through the interaction of a group discussion.

the design dialogue

Here we quote design dialogue from the participatory design workshop. For the purpose of our analysis, we do not indicate who says what at what time.
Figure 2-9  The four design schemes made by the participants
Sometimes, the same person or different people repeated similar ideals to emphasize the needs, and some concepts are picked up and repeated or are generated from other previous ideals. Statements can be categorized into many different types. In this case study, we record only "related" dialogue and ignore the rest. The criteria for selecting relevant statements were:

1. that the statement has an action
2. that the statement is a reason for an action
3. that the statement has a rule, directive, goal, principle, or need
4. that the statement is a fact (state, process, event)
5. that the statement has empirical information backing the truth of a fact
6. that the character of the statement, as mentioned above, is in itself clear without the support of intonation.

a set of design dialogue: example 1:

- You do not have to tell me these things. The most important thing is to build a public toilet.
- We, the old men of the community, stay in the park all day long. It is an inconvenience for us to go back to our own houses only to use the toilet.
- When our friends come to visit us and find out that there is no public toilet in the park, we lose face. A park should have a public toilet.
- If I stay at home all day long, my daughter-in-law thinks that I am wasting water by using the toilet and wasting electricity by using the air conditioner. I prefer to stay in the park.
- It is not only too hot but also boring for us to stay inside our homes all day.
- Whenever you enter the park, you see us, the old men. Old men are tightly linked with the park.
- We do not need a public toilet.
A Dialogical Model for Participatory Design

- Who is going to manage it? It will be dirty and stink.
- We have to hire a janitor to maintain it. Who will pay for this?
- Everybody has a toilet at home. Why can’t they use their own toilet at home?
- Some strangers will also come to use it. It will be a perfect place for crimes.

a set of design dialogue, example 2:

- We should tear down the old house.
- It is too expensive to maintain the old house.
- I think we should shift the old house to a new location. We can move the old house ten meters to the west of its original site, so that the old house will be facing the main entrance of the park.
- Do not tear down the old house, I used to live in it.
- The old house might collapse if we move it.
- The old house is too old and it is too expensive to maintain it.
- The old house is not valuable historically or architecturally. We can ask some experts to make the evaluation.
- We should tear down the old house and then build whatever is necessary.
- The park is not an old men’s centre.
- Keep the old house and make it a local historical centre. We can put a library in it. The park shall become a community centre.
- Keep only one wall of the old house and build another structure to resemble the image of the old house.
- The old house will be the landmark of the surrounding areas.
- It will be very expensive to preserve the old house.
- The mayor say that he will keep the old house as a library.
- If any of you (the students) can shift the old house and make it sit on the axis of the park, I will host a festival for you.
- Let’s (tear down the old house and) build a huge pond in the park so that we can have water-bikes.
2.4 Analysis

The participatory design project in Hoe-Ju-Wae started as a professional intervention. The role of the municipality was not clear because officials, including the mayor, were skeptical about the participatory design approach. The relations between the old and the new residents were then explicitly discussed by the residents. These issues seemed important to the further investigation.

However, as mentioned at the start of this chapter, in doing this case study, we focus mainly on problems related to participatory design methodology. In this sense, we do not enter into the discussion of the social-political issues of the project, such as government control, the relation between the design team and the neighbourhood, the economic development of the Hoe-Ju-Wae areas, the tension between new and old residents, the problem of gender in relation to traditional family values, etc. Those problems are beyond the scope of this study. In focusing on the participatory design method, our case-study is on the following three items: 1) some observations related to methodological problems, 2) some basic assumptions in developing a new method and 3) the development of adequacy criteria for the method.

2.4.1 Some observations related to methodological problems

As mentioned in Section 1.3.3, we use the case-study method as a heuristic device. Focusing on the participatory design project, we have identified several methodological problems. We have categorized them into four types: 1) the user-as-designer myth, 2) ill-structured information flow, 3) the result-oriented process, and 4) the paradigm of the two categorized groups.

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6 This is based on the observation of the author.
**the user-as-designer myth**

1) Most users were concerned about certain objects, and they were concerned about how their opinions would taken into consideration. Sometimes, when their opinions were rejected, they would take it personally. It was difficult to separate the people from the problem.

2) When the designers had to develop a comprehensive design, at first, they had difficulty because different participants had different ideas about what should be incorporated in the design.

**ill-structured information flow**

1) For the design team, it was difficult for the design team to understand, analyze and manage the amount of information gathered during the operation. Members of the design team remembered different things according to their roles in the workshop. Sometimes, they interpreted the same situation differently. It was unclear whether an idea was originally uttered by the user or whether it was the interpretation of the team member.

2) In the design studio, the design team was a worried about misinterpretation of the concepts generated by the users. In the project, in a location away from the site, the designers interpreted from memory what the users had said, aided by the design schemes generated by users and the students’ notes, what the users had said. Without further confirming their interpretation of the users’ design dialogue with the users, the designers developed the final design. A question that remained was in how far were these interpretations reliable?7

3) There was a struggle between the participatory designers when they had to generalize the design schemes made by users. Designers did not know where to start because information was not available, and the...

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7 People tend to utter rational or reasonable statements. When they have to verbally present what others have said, or have performed, they are likely to fill in certain missing parts of the original utterance, or interpret the phenomena from the basis of their own belief systems. For further discussion on this aspect, see Section 4.2.4.
information available was difficult to organized in a way that could be easily employed by the designers.

4) In the project, drawings and design models were used as the media for design. Since one design group could have only one design scheme, any disagreement had to be resolved and the design had to be made within the time limit. In the end, four design scheme from four design group were made. However, disagreements were not taken into account in order to achieve the group design task.

*the result-oriented process*

1) It was difficult for the design team to generate one design based on the four design schemes by the four separate design groups. This was because the needs and wants of the groups had been transformed into forms. How and why these needs and wants were transformed into those particular forms were not clear.

2) Because of the time limit given by the mayor (i.e., one month), the design team was under pressure to summit a new design scheme for the park to the municipality on time.

3) There were complaints about the representativeness of the design workshop participants.

4) The design team was aware of the potential conflict between the two groups of the residents. In order to achieve their task on time, the design team avoided to perform activities that might invite conflicts.

*the paradigm of the two categorized groups: the designer and the user*

1) In developing their participatory design method, the design team first applied the notion "That there is a gap between the designer and the user". Later, they found that conflict did not only exist between the designer and the user; conflict could arise between each two agents who participated in the discussion.

2) Agents in the discussion used different reasons for being for or
being against the same thing. They had different ways of reasoning. The relation between such different ways of reasoning and the "role" in the discussion was unclear. The distinction between the role of the user and the role of the designer did not determine the way people thought.

In the following chapter, Chapter 3, we will associate the four types of problem that we have defined in this particular case with those of broader general participatory design methods. Let us now look at some basic concepts of the development of a new method.

2.4.2 Some basic concepts of a new method

As we can see, in the participatory design workshop, people perform informally using ordinary language, and rules for the operation of participatory design are unclear. However, we have found a potential for using a structure to formulate design dialogue, which may serve as an information system to support the discussion. The content of design discussion may vary, but it is possible to develop a structure of design dialogue which can support and make clear the design discussion. Here are some of our observations concerning the design discussion and the design dialogue.

about the design discussion

Here are some observations about the design discussion:

1) The discussion takes place in a semi-formal setting.
2) The actions of participatory designers are: receiving information, representing design concepts in text or drawings, eliciting information, providing precedents, analyzing information and controlling the foregoing processing.
3) There is a beginning and an end of the design discussion.
4) At the beginning of the group design discussion, a group design task is given. At the end of the group design session, the results of the design discussion are summarized.

5) Sometimes, participants are in conflict because of misunderstanding of other people's design concepts, or the ambiguity of their own design concepts.

6) The actors involved are of two types: the people who will use the design product, and the people who will not use the design product but had an interest in the project.

**about the design dialogue**

Here are our observations concerning the design dialogue:

1) Participants use everyday language to transmit and express design concepts.

2) The ways the participants make their claims, explain the ground of claims, and assert reasons to support or reject claims appearing highly similar.

3) Design concepts which are expressed in statements can be decomposed and categorized into certain types, and there are relations between these different types of concepts.

4) The design model and drawings fail to represent certain design concepts expressed in the design dialogue.

These observations lead to our assumption of developing a useful method to support the design process based on a structure of design thinking. In the domain of participatory design, there has been a need for spending efforts on the participatory design process in order to "achieve effective and efficient participation in designing" (Sanoff 1988: 42). We now further develop the adequacy of the participatory design criteria that we have developed from the case-study.
2.4.3 Adequacy criteria for a new method

As we have mentioned in this study (see Section 1.3.3), the project was selected for the case study because it was a typical participatory design project. Through our case study, we have developed adequacy criteria for the method which will lead to the development of a tools; or, to be more precise, criteria for developing a tool to support the small group design discussion in a face-to-face situation. These criteria are:

1) validity; that tool should be able to achieve its functions
2) effectiveness; the tool should be able to support its users in achieving their goals
3) efficiency; that the resources needed to achieve the goal by using the tool should be minimal
4) reliability; that the tool should be generally applicable
5) robustness; that the tool should lead to new development

We now associate the description of these criteria with the problem which this study wishes to address. A tool for supporting the structuring of design concepts of a small group discussion in face-to-face situations should fulfil the following descriptions of the five criteria:

1) The tool should support the structuring of the design dialogue. Through which, participants in the discussion can easily understand what has been said; what is the relation between two design concepts; what is the problem; what is the solution; what is the relation between the problem and the solution; what are the reasons support, or reject, the solution. If there is a conflict, then by using the tool, they can understand why the conflict occurs, and what may be able to resolve the conflict.

2) The tool should be effective. The application of the tool should lead to achieving of the goal — where the goal is to support the design discussion, which will in turn lead to a satisfactory result.

3) The tool should be efficient. The application of the tool should
use fewer resources then is currently the case. Normally, budget is one important issue in the participatory design operation. If the tool requires large support of equipment or manpower, or operating the tool is time consuming, the efficiency of the tool is low; on the other hand, if the use of the tool saves time, manpower and operating the tool is not such time consuming in comparison to existing methods, then the efficiency is high.

4) Users of the tool should be able to operate the tool in a wide variety conditions. The operation of a participatory design normally take place in the field. If the tool can not be operated on site, the application of the tool will be very limited.

5) Because there may be other tools which can be applied to support participatory design, the application of the tool should be flexible to a certain degree. Moreover, in order to apply up-to-date technology for supporting designing, the method which has led to the development of the tool, should be able to employ further developments and extensions to develop improved tools.

2.5 Concluding remarks

Throughout this case study, we have felt that given the dramatic change in the design, and the process that resulted from the application of the existing participatory design method, the method itself has certain drawbacks. At certain moments of the project operation, the participatory designers felt that current methods employed failed to support them in their actions. Further, as seen in the case-study project, there were also problems with the participatory design programme. We suggest that for a successful application of a participatory design process, certain things are necessary, or at least need to be taken into consideration. They are: 1) a method that helps in formulating the programme, 2) trained facilitators working as a team, 3) cooperation of the participants, 4) careful control of the process, 4) sufficient financial support, 6) a social context that supports the participa-
tory design approach, 7) sufficient time and 8) the appropriate timing of participation consultation. However, for the development of a new method, we focus mainly on aspects related to the participatory design methodology.

Through our analysis, we have defined four types of methodological participatory design problem: 1) the user-as-designer myth, 2) ill-structured information flow, 3) the result-oriented process, and 4) the paradigm of the two categorized groups. We feel that we need a deep investigation into the methodology of participatory design, in order to perceive not only the development of participatory design methods, but also those problems which these methods are targeted to solve, and to link these problems with their social contexts. We have developed the adequacy criteria for the new method. They are: validity, effectiveness, efficiency, reliability and robustness. In developing the method, we think it is necessary to examine the attitudes to the problem, the conflict resolution theory and the existing methods of structuring design dialogue.

Summary

In this case-study, we have presented a participatory design project in a real-setting situation. In this investigation, we concentrated on information related to the methods applied in the design workshops. We have developed adequacy criteria for participatory design and some basic concepts for developing our method. Other findings of this case study are 1) there are certain drawbacks to current participatory design methods because of the way in which the methods are formulated and 2) the analysis of design dialogue seems to have great potential to aid in improving the participatory design method.
CHAPTER 3

METHODS OF PARTICIPATORY DESIGN

In the previous chapter, we presented a case study based on a participatory design project. In our analysis of the case we have identified four methodological problems with the current participatory design practice, from which we have derived some basic concepts for the development of a new participatory design method, and the adequacy criteria for the new method. In addition, we have pointed out the need to re-examine current methods of participatory design. In the first part of this chapter, we review the historical parameters of participatory design and the participatory design movement. In the second part of the chapter, we study the problems associated with current participatory design methods and analyze certain key issues of participatory design methodology.

3.1 Historical parameters of the participatory design method

In this section, we review the historical parameters of the development of the participatory design method in generating criteria for the evaluation and development of our method. In doing this review of participatory design methods, we make two statements. First, this review is not a complete history of participatory design because it does not cover the history of
participatory design in all places. Although the review is based mainly on literature published in English, we are aware of the fact that there are bodies of literature on participatory design that are published in other languages (e.g., Dutch). These works which also deeply examine participatory design, are based on the unique history of participatory design in a particular country. The participatory design history of different regions can certainly reflect the content of the social-political context. However, since we have decided to focus on the methodological aspects of participatory design, we have reviewed only some of the historical background of the methods examined in our case study. This is because the main methods applied to the project in our case study were developed in North America — "Take Part" was developed in the United States and "Co-Design" was developed in Canada. Further, the case-study project design team's knowledge of participatory design approaches had strong American influences. Therefore, we think it is important to examine the context of the development of these participatory design methods, in order to have an in-depth investigation of the methodological problems mentioned in our case-study chapter (see Section 2.4.1).

Second, we start this review with certain historical events as they relate to participatory design, because we think it is necessary to have an overview of its historical background. Further, although we stated at the beginning of this study (see Section 1.3.1) that we would focus mainly on the design reasoning of a small group engaged in design discussion, the background of the development of the method for such a design process cannot be isolated from the overall development of the participatory design movement.

In this section, we look at how participatory design began with a state intervention, how the current top-down process was criticized, and at what problems the participatory design method was intended to solve.
3. Methods of Participatory Design

3.1.1 Beginning of the participatory design movement in North America

Since the early 1960s, in many places, there has been an important movement towards the participation of the public in the determination of their built environment. In North America, the movement started with an ideological and radical act of the government of the United States on domestic policies. In 1964, a federal programme, the Community Action Program (CAP), was launched to help local communities to establish new organizations or designate existing ones as community action agencies. The agencies were supposed to operate as intermediaries between institutions and clients. The programme was used to mobilize local resources for a comprehensive attack on poverty, under the framework of Lyndon Johnson’s ambitious plan — the "War on Poverty". The goals of the CAP were to motivate the poor and to reform institutions in local communities.

Like many other social phenomena, participatory design was not an independent event. The background of Johnson’s initiative of CAP was a society facing rapid social changes in the 1960s. Criticism of the then current ideas, and the new ideas for the future, had emerged before the CAP, such as Jacobs (1962), Gans (1962), Fried (1963). Johnsons’ programme helped to create an even faster, wider and deeper influence on the society. During the peak of the movement 1964-1965, an estimated one thousand communities across the United States were involved in the CAP (Arnstein 1969: 217).

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1 Lyndon Baines Johnson was the 36th president of the United States (1963-69).

2 "Community action was supposed both to elicit the cooperation of local institutions and to reform them — to promote community consensus and to risk conflict." (Matusow 1984: 245).

3 For example, Comerio (1984: 229-232) claims that the ideas that formed participatory design are: 1) the revolt against a professional/technical bias, 2) the emergence of pluralism and participation, 3) the revolt against a physical bias, and 4) socialistic ideas in the democratic process.
The local institutions first resisted the reform programme but then they found ways to cope with it, that is, to control the power of the community reform action in order to protect people who had vested interests. As a result, in the reform process, the power holders claimed that all sides were considered, but made it possible for only some of those sides to benefit (Arnstein 1969: 217). Two years later the triumphant horn of community reform was silenced and the programme was quietly stopped in 1974 (Matusow 1984: 270). Nevertheless, through this radical action, the notion of participatory design had been born, and it still exists in the professional practice of architecture.

3.1.2 Criticism of existing top-down approaches

The cause of any historical event can be variously interpreted differently. Since our study aims at improving the methodology of participatory design, we focus on the criticisms related to design and planning approaches before the participatory design movement was initiated. This will aid in understanding what people intended to improve through the movement. Criticism of the methodology of design and planning approaches can be categorized as: 1) the ideology of Modern Architecture, 2) central and top-down planning approaches, and 3) engineering-based, computer-based approaches.

*Modern Movement*

In the early twentieth century, the concept of the Modern Movement which combined revolutionary technology and utopian dreams had proposed a vision of social justice and quality of life (Comerio 1984: 232). The modern architecture of Functionalism and the International Style, as in the writings of Le Corbusier and Gropius in the early years of the century, claimed that architecture had been liberated from the traditional architectural norms and that a universal visual order (Cullen 1949) had become the new, modern architecture. This urban utopia, along with the ideology of urban modernity
of the post war era, strongly influenced the architectural design and planning of the first and third world countries. Under this paradigm, which is called "style metaphysics" by Newman (1980: 294-5), the particulars of the specific user were ignored.

The idea of the universal norms and the corresponding institutions of architecture were applied to both the visual and the functional aspects of design. Furthermore, based on the concept of the Modern Movement, the architect should not only know architecture, but also the architect should decide how architecture ought to be. With the support of the state these architects designed or planned housing, and leisure for the people. Such concepts were associated with "Welfare State Architecture" (Tzonis and Lefairve 1975: 6) because the action to realize those concepts required the support of state. Let us now move to a similar criticism, the criticism of centralist planning.

centralist planning

The concept of planning was considered as a caretaking of the stakeholder since the late-nineteen century in the Western world. Planning was considered a top-down process for three reasons. First, planning was always part of governmental actions. Planners "operated from the base of institutions created and legitimized through legislation brought into being by a coalition of political forces." (Schön 1983:205).

Second, physical planning is considered by some influential professionals to be a work of art; especially in the vision of some twentieth century urban utopians, such as Le Corbusier who said, "the design of cities was too important to be left to the citizens." (Fishman 1977: 190).

Third, the knowledge of planning had become so highly specialized that only "experts" could handle the knowledge. It was believed that the specialized expertise could be applied to other people's problems only through experts. The planner, the expert, "framed his role at the centre of a system for which he planned, in relation to agencies which would implement his plans and clienteles who would benefit from them." (Schön 1983: 63)
205).

Following the rise in economic development after the Second World War in the western world, many people, especially the poor and ethnic minorities in the inner cities, were moved, and relocated to make room for commercial districts, highways, or manufacturers that would bring in capital to the city. Such state planning projects were criticized for serving only the interests of the government, real estate developers, or large corporations (see, for example, Gans 1962 and Jacobs 1962).

Meanwhile, housing projects run by states were also criticized for providing "squalid barracks" (De Carlo 1948: 2) that locked the poor in the "culture of poverty" (Hall 1988: 250). Urban rehabilitations or renewals were blamed for causing new problems while endeavouring to solve old problems (Dear and Scott 1981: 14-15). During these state-determined actions the voice of the people was ignored. Such a top-down process, with its centralized power and clearly defined target, simplified the problem and excluded the "right of the citizen."

**analytical approach in design and planning**

By the mid-1950s, in the professional practice of architecture, methods of urban planning integrated with a highly engineering-based approach, viz., systems planning. The traditional master plan method was challenged by engineering-based systems approaches to solving complex problems. With the help of computer technology in the systems approach, planners were able to process mass data on the rapidly changing population or economically booming society.

Under this new paradigm, some architects and planners were hoping that a "formal mathematical model would lead to a methodology that would externalize the decision-making process" (Comerio 1984: 230). The assumptions of such approaches were task oriented. There was first a given problem from the client and then the expert formulated a solution on the basis of his professional knowledge (Grant 1973: 3-4).

Systems planning soon replaced the old master plan approach in
physical planning, and established its own process of deciding and acting inside the recycled series of logical steps of goal-setting, forecasting, evaluation, and monitoring (Hall 1988: 330). Throughout the 1960s, the thrust of the design and planning revolution moved in two directions: on the one hand, the discipline of physical planning shifted from methods operated by personal knowledge to that of systematic approaches (Hall 1988: 327). Planners or architects could no longer control the whole planning process from the basis of their personal training and experience. Even more astonishingly, in Chermayeff and Alexander’s book, *Community and Privacy* (1963), the two authors claim that architectural design, one of the most creative acts of the human mind, can be carried out automatically by the computer. Following this Chermayeff-Alexander paradigm⁴ (Tzonis & White 1994: 3), there was a period of rapid development and improvement of computer-based approaches in design and planning in the late 1960s (e.g., Alexander 1964, Armour & Buffa 1963, Eastman 1968, Vollmann et al. 1968).

However, these primitive computer techniques, the development of which was based on the Chermayeff-Alexander paradigm⁵, also had, in practice, difficulty on supporting the action group in the resolution of problems at hand⁶. One major problem with these analytical computer techniques then was that, when confronted with a single specialised task and a well-defined set of data, computers could give optimized solutions to highly sophisticated layout problems, but they would fail to respond to ill-defined problems that involved multiple issues (Tzonis & White 1994, Tzonis 1990)⁷. The mobility of the computer was very limited and human-

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⁴ We refer this term to Kuhn’s “paradigm shift” (Kuhn 1962).

⁵ These computer-based analytical approaches should not be confused with the development of computer-aided design (CAD).

⁶ According to the discussion with H. Priemus by the author.

⁷ Answers to this problem were provided later by the development of multi-criteria evaluation. See, for example, Tzonis & Oorschot (1987).
computer interaction was problematic, as is widely discussed today, but the
problems were ill-defined at the time. In general, in the early years of the
development of computer technology, these newly developed techniques
failed to satisfy the needs of the action group working in the field. The help
of such computer technology remained questionable throughout the later
years of the development of participatory design methods⁸.

3.2 Participatory design movement

The participatory design movement can be divided into three stages which
are based on the theme of the movement: the first phase was about the
quality of life and social justice, the second phase was about the
improvement of the built environment and the third phase was about the
cooperation between user and designer. These three phases are like three
waves. In the first phase, social workers and community reformers were
looking for a new approach to achieve social justice and quality of space
that society had failed to achieve; in the second phase, the problem was
more modestly defined and the new expertise of "participatory designer"
distinguished itself from the social activist or the architect of the capitalist;
in the third phase, with newly developed computer technology, many con-
cepts of participatory design can be realized and participatory design has
become a means to improve the quality of both workplace and lifestyle.

3.2.1 Phase one: the quality of life and social justice

In the late 1940s, planners' attempts to achieve social justice and quality of

⁸ H. Rittel proposed his issue-based information system (IBIS) for participatory design
in the early 1970s (Dehlinger & Protzen 1972), yet, the application of computer techniques
in participatory design has been very limited.
life according to the ideology of the Modern Movement were blamed for causing more problems than they solved. For example, anarchist architect De Carlo argues that "the housing problem cannot be solved from above. It is a problem of the people." (De Carlo 1948: 2). The major argument then was: social justice is possible only through the empowerment of the people on the level of bottom of the social hierarchy; quality of life is not defined by some particular types of architecture.

The starting point of a full-scale movement of participatory design in this phase was the CAP. Under the CAP, the practice of bottom-up planning in order to include the participation of the grassroots level, and the concept of advocacy taken from legal practice implied the new role of planners and the planning process. "Advocacy" and "pluralism" (Davidoff 1965) soon became the main themes of the professional practice of planning in the late 1960s. The premise guiding the movement was that in a democratic society the public should have the right to participate in the planning of their own lives and that the professionals were the advocates of the users.

In architectural design, a new movement of aesthetic architecture emerged from the observations of "outdoor publicity" (Cullen 1949), "populist taste" (Haskel 1958), "non-stylistic architecture" (Banham 1965). They replaced the myth of universal order of the modern architecture with the new "quality" derived from popular culture and vernacular architecture. This approach was later integrated with 1) social meaning of the design decision-making process and 2) the flexibility of buildings, e.g., in the works of Turner (1968), Habraken (1972a), Fathy (1973) and Kroll.\footnote{The concept of advocacy as taken from legal practice implies the opposition of at least two contending viewpoints in an adversary proceeding." (Davidoff 1965: 333).}

In this phase, the central theme, citizen participation, had become a categorical term for "citizen power." Participatory design was generally considered as the redistribution of power that enables the have-not citizens, presently excluded from the political and economic processes, to be
deliberately included in the future (Arnstein 1969). By the late 1960s, the widespread distrust of experts, the increasing paranoia about the systems approach, and the riots in many industrialized countries had proved fatal to the legitimacy of systems planning (Hall 1988: 332). The revolution in communication had also made people more aware of the problems associated with government and government agencies. As said by Davidoff (1965: 331), "The prospect for future planning is that of a practice which openly invites political and social values to be examined and debated. Acceptance of this position means rejection of prescriptions for planning which would have the planner act solely as a technician." In turn, that new approach also became a means for government agencies to reduce confrontation and increase consensus on governmental policies.

3.2.2 Phase two: the improvement of the built environment

Since the late 1970s, the political model of empowerment in the early years of the participatory design movement was replaced by a practical economic model — the entrepreneurs (Comerio 1984). In this phase, participatory design became less ideological than it was at first. "People start to understand that slogans and easy solutions are not sufficient answers; that hollow cries and catch-phrases do not offer a solution for the complex relation between the resident and his surrounding." (Smets in Schreurs et al. 1981: 9). Participatory designers started to recognize what participatory design can do and cannot do.

Some researchers, mainly from architectural viewpoints, criticize the movement of participatory design in the first phase as having been idealistic. This is partially because social-political problems cannot be solved simply by applying participatory design.

In addition, a process without result is not preferable for most designers, who would like to see their design implemented. Therefore, professionals in design and planning started to define their problems differently. For practical reasons, in the second phase, practitioners had re-
defined their means and ends to their approaches. They withdrew from the battlefield of social-political confrontation to a more pragmatic practice of architecture and urban design. Since then, more projects have been completed, and more design problems have been solved. In a sense, realizing the complexity of social problems, the parties involved in the project were able to agree on the setting of a specific problem. This actually led participatory design from the use of social-political terms to professional, sometimes technical, terms.

By the 1980s participatory design had been inserted into mainstream professional practice, particularly by architects and urban designers (e.g., C. Moore 1984, J. Burns 1979, H. Sanoff 1988, S. King et al. 1989, Kernohan et al. 1992, etc.)

These participatory practitioners shifted away from leftist rhetoric and utopian idealism. They had clear, defined means to ends and were more concerned about getting things done (Comerio 1984: 235). By then, it was clear that in the practice of architecture and urban design, the aim of user participation methods is to introduce the needs and aspirations of the users, which professionals fail to predict, into the decision-making process of planning or design.

3.2.3 Phase three: the cooperation between users and designers

Since the mid-1980s, starting in Scandinavia and then North America, there has emerged a new stream of participatory design which focuses on improving the workplace environment and user-friendly technology. It sees the users as the experts and the designers as the technical consultants. This new trend focuses on the economy and productivity of the industrial workplace through the participatory design approach. It has also been applied to the development of computer technology as the new approach towards computer systems design in which the people destined to use the system play a critical role in designing it.
Although the motivations of this new phase, as stated by Schuler and Namioka (1993)\textsuperscript{11}, is similar to those ideas as have been stated since the 1960s, viz., democracy, the study of the users and working environment can be traced back to "action research" started in the late 1940s and led by K. Lewin (1946). In general, the new trend in the 1990s concerns the application of human-machine interaction, workplace-technology relations and user-designer cooperation.

3.3 Some methodological problems

Participatory design can be interpreted, or manipulated, to serve different purposes in different situations. It can be a means to an end, or it can be an end in itself. To some, the existence of a participatory design process may be more important than how the process is carried out. To others, the reverse is the case. In this study, a useful participatory design method to construct a comprehensive built environment through participatory design is the ultimate goal of methodological improvement. In general, current methods in the practice of participatory design are not effective or efficient. This is caused by two factors: social-political factors, and methodological factors.

To participatory designers, social-political factors are predictable but are not desirable, because such problems can be very complex. For example, decisions made by higher authority might capriciously interrupt the process or reject the results generated by the participants. At the end of the participatory design process, a client (i.e., the sponsor of the community design project) might cancel or postpone the whole project for certain

\textsuperscript{11} In editing their book, \textit{Participatory Design}, Schuler and Namioka (1993: xii) say, "During the course of editing this volume we have come across several disciplines that prominently incorporate the idea of participation. These include participatory education, participatory architecture, and participatory economics," and "The most basic motivation is the idea of democracy."
reasons (e.g., budget cut, new election, priority of other actions, etc.). Or, the participants might lose patience and turn violent\(^{12}\). Or, the whole participatory design might be institutionalized and used as a symbolic notion to serve other purposes\(^{13}\). Or, participatory design can represent the interest of public or the planner (Peattie 1968: 85, Gundry & Heberlein 1984, Hall 1988: 333). These problems involve complex factors that need to be examined through social-political perspectives. However, these problems are beyond the scope of our study. This study focuses mainly on the second type of problem caused by methodological factors. As mentioned in our case study, four methodological problems that figure prominently in current participatory design practice are:

1) the user-as-designer myth  
2) ill-structured information flow  
3) the result-oriented process  
4) the paradigm of the two characterized groups

3.3.1 The user-as-designer myth

The idea of turning a user into a designer has recently been dominating many participatory design approaches. It makes some architects afraid that they will lose control of the "quality of design" and it causes some social activists to romanticize about the "power of grassroots." Following this myth, some people claim that users can and should design for themselves. Architecture, especially housing, should not be designed on behalf of the user but by the user. This claim involves two false assumptions. The first

\(^{12}\) In the H. Harm's case (Schreurs et al. 1981: 38) when the project was rejected by the local authority, participants threw away all the documents they had put together, stoned the rooms of the company and vandalized the surrounding neighbourhood.

\(^{13}\) See the discussion on the later development of the Community Action Program (Matusow 1984: 234-271).
one is that the user had the natural ability to design long before the profession of design was established in human societies. The second assumption is a variation on the first. It says that since high quality architecture designed and built by non-professionals exists, and poor quality architecture designed and built by professionals also exists, it is very possible that the architect should not only learn from the user but provide opportunities for the user to demonstrate his/her natural design ability (e.g., Rudofsky 1965, Alexander et al. 1977, Alexander 1979). As Alexander (1979: 23) has said, "There is a central quality which is the root criterion of life and spirit in a man, a town, a building, or a wilderness. This quality is objective and precise, but it cannot be named." This claim brings the quality of design, as proposed in the "timeless way of building," to an a priori truth.  

In many participatory design workshops, users were urged to design. Their sketches were re-presented as hard-line drawings and even implemented as authentically as possible. This has a strong implication that users not only know what they want, but they also can design what they want.

As is said by Kernohan, et al. Users know about buildings through experiencing them. Their knowledge is gained in the course and working in built environment." (Kernohan et al. 1992: 140). However, it is dangerous to say that human beings have the nature of design. This kind of myth has nevertheless been misleading the supporters of participatory design for many years. The development of many methods of community design (e.g., the Take Part, Co-design, etc.), has been based on this myth. In such methods, it is assumed not only that users can design but also that they have the ability and knowledge to design as a group.

14 "It [the pattern language] cannot represent — nor does it even give attention to — the interplay of different concepts and competing theories of architectural design. Although each pattern contains some discussion about a problem, the overall impression is rather that of a bible presenting a-priori truths of a timeless way of building', as Alexander's introduction to the pattern language is entitled." (Kühn & Herzog 1994: 74).

15 See the comparison between sketches of designs and photos after the construction of those designs in King et al. (1989: 38-41).

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Our point is that, human beings learn how to design in one way or another\textsuperscript{16}. They apply rules generated in a \textit{logical thinking process} and implicit knowledge that exists in a \textit{non-logical process}\textsuperscript{17}. When a group of users in a contemporary society design together, they have to learn how to design cooperatively, particularly when they do not have the experience of designing cooperatively.

3.3.2 Ill-structured information flow

As seen in the case-study, in the design discussion, there is an information flow which is ill-structured\textsuperscript{18}. Information generated in participatory design, as well as other forms of design, is often poorly organized\textsuperscript{19}. People in the participatory design process use all kinds of information. In participatory design dialogues, people talk about presupposed concepts; they rephrase or modify ideas they have adapted from others; they may intend

\textsuperscript{16} For example, a student had moved into a student dormitory and she wanted to rearrange her furniture. She tried and tested new settings for a while and then rearranged it again until she had found a good solution. For the first time, she learned what was the right design for her to live satisfactorily in such a dormitory by trial and error. If she moves to another room next time she will apply 1) rules generated from her arranging the first room and 2) the experience of living in the first room as a reference to designing the second room.

\textsuperscript{17} The distinction between a \textit{logical thinking process} and a \textit{non-logical process} refers to Barnard (1938).

\textsuperscript{18} We refer the notion of "ill-structured" to a concept developed by Simon (1973), "the structure of ill structured problems".

\textsuperscript{19} A remark made on the fragmentation of the professional design process by Harrison (1993: 10-11) is: "Some people are cut off from each other by walls, miles, time zones, or the pressure of other work. The technological response to this has been increased reliance on telephones, FAXes, beepers, modems, and networks; the organizational response has been increasing bureaucratization of process and specialization of function...Design activities become discontinuous — fragmented by meetings, telephone calls, and presentations made across town (or halfway around the world) and the responses are increasingly unsatisfactory."
to gain hidden objectives by debating irrelevant issues. In addition, people chat, greet each other, and say things that are irrelevant (e.g., sports, politics, family, etc.).

The current technologies that support and record the discussion process are, simply, a tape recorder or a video camera, as seen in the case-study in Chapter 2. Normally, the facilitator records all the dialogues that occur in the participatory design process with these tools. From the beginning to the end, he/she records every word. And then, he/she listens to and/or watches the tape repeatedly to find statements directly related to design. This method can accurately record the whole dialogue, but the process of reconstructing the design argumentation is time consuming and low in efficiency.

Without using a tape recorder or video camera, a well-trained human agent using a notebook to simultaneously record the design discussion would seem to be more efficient. In addition, the notebook can easily be upgraded by making use of a typewriter or a word processor. However, this is merely the effort of representing the dialogues. There is not much difference between the notebook and the tape. The only improvement is that use of the notebook produces a text directly, but the tape needs to be transformed into a visual representation by human agents.

The problems we are facing are not those of how to record or transform the text accurately or efficiently, but those of how to analyze information which is simultaneously interacting in the discussion. Because of the limitations of current methods, the product of the discussion, the "useful" design statements, might be unsatisfactory, or so insufficient that participatory designers have to go back to the field to request further explanation. For example, one participant said, "We need palm trees in the park." And then the discussion went on, while the reason for having palm trees had not been mentioned. Instead, participants were talking about the possibility of growing a palm tree in that region. In such a case, the professional designer might have to go back to the field, find the person who mentioned palm trees, and ask him: "What did you mean by 'palm trees' in the last meeting? Did you mean you need more shade areas or would you
like to have a view of palm trees?" One might argue as to why we don’t ask the person his/her reason (for the palm trees) immediately and record the reason at the discussion? The reason is that without an efficient method, it is difficult for participatory designers to build up the connection between design concepts simultaneously and keep track of them continuously.

Traditionally, the work the human agent invests in this recording and transforming process does not require complicated skills. This work can be conducted separately from the work of the trained designer. For example, it can be easily done by a secretary or a volunteer student. The designer then reviews the text and tries to find from the text his inspiration, accounts of his design, or to generate a compromise solution to the conflict. In current practice, participatory designers tend to collect design concepts randomly from the group design process. These fragments of ideals or figures are then interpreted and represented in hard-line drawings by the designers in a remote design studio. As we discussed in our case-study, there were difficulty for the interpretation and representation.

We argue that what we should collect is not these fragments of information, but the needs behind these design concepts. If we cannot clearly identify the needs, we will be misled by the design generated by the participants. The image we form can be interpreted in many different ways. It is the prescription for the image that matters. The sketch is merely used to represent the image in the participants’ minds.

The key to the problem is that we need a better system than a notebook. We need a better guiding system to not only record but to reconstruct the argumentation simultaneously. The tool is not a "real-time" machine that gives advice automatically. Instead, it serves as a guiding system, an intelligent information system, for the whole discussion period, which might take from a few hours to several years.

3.3.3 Result-oriented process

In contrast to traditional finite approaches, participatory design is based on
open-ended (Day 1973: 25) approaches. However, in practice, this hypothesis has its limits. In many participatory design workshops, participants are divided into several groups, and are encouraged to design according to the same scheme. Normally, in order to accelerate the group design process, time is limited to three to four hours. The director announces the time limit and that there will be a group presentation where each group must present its schemes. The strategy of this is to force the group to come out with a design under this given "command". Participants are under pressure to finish the design on time so that their scheme can be reviewed on the board. The constraint creates the consensus among group members. It is an effective technique to produce products in time.

In current participatory design practices, the products of participatory design are drawings, sketches, models or even collages of images. Mostly, participatory designers treat these as design solutions. We argue that they should be treated as being only tools to use for communication purposes during the participatory design process, instead of being treated as final design solutions for implementation. In drawings, design concepts are represented graphically. Drawings are statements of design concepts that can constrain the discussion. In the past, participatory design workshops tended to create drawings as if structures would be built right after the meeting, based on the drawings generated by the participants. In other words, some final design schemes have been carried out that were based on the rough sketches drawn by users, or by the designers.

Participatory designers of workshops tend to urge participants to draw the images generated in their mind as well as to present them verbally. In some cases, an artist draws under the instruction of participants. These kinds of approaches are misleading to the participatory design process. To ask the participants to design/draw together on the same paper, or to assign one artist to draw under the instruction of several participants may not produce adequate results\textsuperscript{20}.

\textsuperscript{20} Such group work, without effective "rules of order" (see Robert 1943) may produce inadequate solutions. As is said by Hoffman (see Guzzo 1982: 99), "A camel is a horse designed by a committee."
This practice can also easily limit the solution proposal to particular directions, as often occurs in a brainstorming process (Hoffman 1982: 115), and may place constraints on the participants and prevent them from generating new solutions. For example, sketches of Co-design workshops are full of images of people and balloons occupying space. Participants are convinced by these illusions since designers can easily create the atmosphere that the participants are asking for. The question is, participants are convinced by these drawings, but to what degree are these sketches realizable? Further, participatory designers tend to construct the built environment according to these drawings. They tend to directly use the drawings produced by the participants to show the visual evidence of participatory design — the physical realization of users' images — to prove the effectiveness of the user participation approach.

Current processes of participatory design are result-oriented. Drawings, sketches, models, collages are collected for further representation and interpretation. These are only design fragments. What is missing in current participatory design methods is a framework for clarifying these concepts, ideal or needs. In a traditional design process, we have a given architectural programme that covers the functional requirements of the design project. But these fragments abstracted from participatory design are not sufficient for design uses. The designer still has to fill in much of the missing part, to generate linkages among concepts and solutions, or to

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21 "Brainstorming is a group process in which the members, usually from different backgrounds, respond to a central question or theme. Emphasis is placed on generating a large number of ideas while deferring criticism and evaluation. Brainstorming is especially useful for attacking new problems or for identifying new ways of looking at old problems." (Delp et al. 1977: 3).

22 This problem occurs quite often in the brainstorming method. The brainstorming method was developed and first used by Alex F. Osborn in 1939 in an advertising agency. It is "a group process in which the members, usually from different backgrounds, respond to a central question or theme. Emphasis is placed on generating a large number of ideas while deferring criticism and evaluation." (Delp et al. 1977: 3). Two other social-psychological problems widely accepted are: 1) superior-subordinate relationships outside the session of the discussion and 2) suppression of group members due to one or two members’ dominating the discussion (Delp et al. 1977: 3).
resolve some minor contradictory ideas. All these activities are carried out by the designers in the design studio, and users are kept outside. The problem is, when time is up, design schemes are finished, but many disagreements and conflicts are ignored or put aside temporarily to make way for the presentation at the end of the design workshop.

During the group design phase, in our case-study project (see Chapter 2), some participants left their team to join other teams, or left the room because their opinion was not listened to. Such behaviour can be reduced by delaying the decision-making stages. It can be precipitated by making the evaluation of design decisions too early in the participatory design process.

Drawings produced by the participatory design workshop are too close to the end of the whole design process, which sometimes makes further negotiation difficult; although they can be a useful means in participatory design for the purpose of communication, or generating design concepts. We note further that it is difficult for the users to talk about a design without access to references or a frame of reference.

3.3.4 Paradigm of the two characterized groups

Current studies of participatory design tend to categorize the people involved in the process into two groups. The first group is the future user of the built environment, who is excluded from the decision-making level of the traditional design processes. The second group includes people who may not be the user of the built environment but who are involved in the decision-making. These two groups are of subtly different categories such as, professional-nonprofessional (Sanoff 1988), user-expert (Pollack et al. 1982), user-provider (Kernohan et al. 1992), user-designer (Comerio 1984, Schuler and Namioka 1993). In traditional approaches to participatory design, one of the main tasks is to increase the communication between the two groups because it is the first step in resolving conflict between the two "different cultures" (Kernohan et al. 1992: 11-13).
This classic distinction can be traced back to the "crisis of confidence in professional knowledge" (Schön 1983: 3-20) since the 1960s when people started to question the notion of "expert." This distinction has haunted many participatory designers. In the 1990s some participatory designers are still using this paradigm to develop their major themes\(^ {23} \). To those participatory designers there is always an imaginary gap or an invisible wall between the two groups. They then try to increase the communication between the two groups—the two types of belief system—in order to achieve consensus. The present study argues that people do not come into conflict simply because of their "role," but because of their attitudes (see Section 4.2.4). As seen in our case-study in Chapter 2, people used different reasons for being for or against the same form. This is not because they had different roles, but because of their different belief systems. As said by Habraken (1985: 83), "We can, obviously, discuss the form. We can describe it, we can give our opinion about it and express our feelings relative to it. But that does not 'translate' the form nor may it explain the act that brought it forth. For the same act, agreed upon by all, different reasons will be given by different participants...Because the form stands for itself it is possible to agree about it without ever agreeing about the reasons, motivations and 'meanings' behind it." In this study, we consider participatory design dialogue to be the communication among multiple persons with multiple beliefs. We are trying to support the structuring of design concepts which are generated by the participants, through which a better understanding of the design problem can be achieved.

\(^ {23} \) For example, in a recent book about participatory design, Kernohan et al. (1992: 15) claim that "the two cultures of users and providers are in conflict — a conflict of interests and values that, left unresolved, virtually ensures a mismatch between what is needed in facilities and what is provided."
3.4 Analysis

Methods of participatory design were generated for particular purposes (e.g., political stability, social justice, comprehensive design, productivity of manufacture, economic development, democracy) under certain circumstances. The relationships between the methods generated and the social-political climates were tight. For the purposes of our study, this section focuses on the following three key issues of design method: 1) the problem-defining and solving, 2) conflict resolution and 3) structuring design dialogue.

3.4.1 Problem-solving and defining

Whether a problem is solvable or not depends on the definition of the problem itself. As Grant (1972: 23-28) has said, a problem is "a discrepancy between two types of knowledge; factual knowledge, or knowledge of what is and deontic knowledge, or the collection of one's images about what ought to be." From the viewpoint of physical planning, it seemed that small things were done through the movement of empowerment. Participatory design with social-political approaches was considered impractical to designers because it seemed that no problems were solved but too many issues were mentioned. This resulted in their breaking away from so-called "leftist rhetoric and utopian idealism" (Comerio 1984: 235) in order to get the job done. In the second phase, the ambition of empowerment through citizens' participation was reduced to a practical "process for negotiating the quality of facilities" (Kernohan et al. 1992).

In some other cases, participatory designers led users to design according to values and quality determined by the participatory designer. For example, applying their approach of the "timeless way of building" to a self-help project, C. Alexander and a group of designers organized four families to develop particular design patterns for their future houses. Some of those design patterns were changed a few years later without the partici-
3. Methods of Participatory Design

vation of the designers\textsuperscript{24}. Moreover, because people were unfamiliar with some construction patterns that were preferable to the designers, houses were built very slowly. Ironically, without the participation of those designers, hundreds of migrants built their own houses using faster, easier and more economic design in the nearby area of that expensive project of four families. (Fromm 1985: 55-58).

In the first phase, participatory design was located in the middle of social movements. Planners and designers were facing complex social problems. Social problems are not like traditional military operations where setting a target is followed by making plans, followed immediately by actions. In this period, the \textit{process} was considered to be more important than the \textit{product}. Some advocates of participatory decision-making appeared to believe that the process is far more important than the outcome, and that, in fact, there is no truly independent way of judging an outcome other than by judging the process by which it was reached (Brooks 1976: 129-130).

Rittel and Weber, in their article "Dilemmas in a General Theory of Planning," claim that, social problems are never solved and that social processes are a linked, open system where output from one becomes input to others (Rittel & Webber 1974: 33)\textsuperscript{25}. Rittel proposed the Second Generation Design Method\textsuperscript{26} for social problems in contrast to the First

\textsuperscript{24} Particularly, "vault roofs" and a common court that were considered as valuable concepts to the architect were proved to be a failure (Fromm 1985).

\textsuperscript{25} Since the late 1950s, studies on the complexity of "problem" have suggested the two major types of problem: well-structured versus ill-structured (Simon & Newell 1958); simple versus complex (Beer 1959); tame versus wicked (Rittel & Webber 1974).

\textsuperscript{26} First generation design methods are based on the following assumptions (Grant 1973: 3-4, Olsen 1982: 7):

1) That there is professional expertise that can be applied to other people's problems.

2) That the design process is a process wherein the professional informs himself about a client's problem and then formulates a solution on the basis of his professional expertise.

3) That any publicizing or exposure of the means by which decisions are researched is unnecessary because the professional is guided by his code of ethics.
Generation Design Method for technical problems.

To a designer, his/her problem is solved when a project is completed. He/she then will move on to proceed with another design project, to solve another problem. This does not mean that the designer should leave problems for other people. This is because the task of a designer is only part of a complex society. As is modelled by Koberg et al. (1972), to most designers, there are a given situation and an implementation at the two ends of a design process.

In defining the task of a participatory design project, participatory designers focus on information exchange, resolving conflicts, and supplementing planning and design (Sanoff 1988). Perhaps two of the best

4) That quantified, objective measures obviate any need for "objectification" or making understandable.
5) That the development of increasingly complex techniques and procedures leads to better solutions, albeit at the cost of making the professional designer increasingly indispensable.

Second Generation design methods are based on the following assumptions (Grant 1973: 3-4, Olsen 1982: 9):

1) Expertise does not reside solely in the professional, but in all those whose interests are affected by a design or planning problem (especially in the case of deontic knowledge, images of what ought to be).
2) Planning and design should be viewed as an argumentative process or as a network of issues to be argued and decided.
3) Any given issue can always be viewed as a symptom of some more fundamental one.
4) An ideal of "transparency" of argument.
5) The principle of "objectification" (making understandable) as a means toward forgetting less and stimulating doubt.
6) A client who delegates judgment to a professional must be able to maintain control over the delegated judgement.
7) The designer/planner conspires with his client to develop a solution, thus eliminating the problem of getting one's proposals implemented by his participation in producing the proposal.

According to Koberg et al. (1972), the design process includes several stages: accept situation, analysis, define, ideate, select, implement, and evaluate. Their relations can be linear, circular, feedback, or branching. It is argued by Rittel and Webber (1972) that problem-solving and problem defining are one and the same.
examples of such an approaches are: "Taking Part" by Halprin and Burns (1974), and "Co-design" by King (1989). In such processes, the professional assigned only part of the design task of the overall process for the user to participate in. It was clear to these designers that the anarchist ideal of citizen’s power and the social norm of justice could not be achieved merely by participatory design. Therefore, the definition of the participatory design problem was shifted again from complex, social problem to simple, design problem. To designers, the task of participatory design was treated not as a social problem but as a design problem. Since design problems can be solved, participatory design was defined as "a desire to find ways to make what they designed more responsive to all those who use it" (Comerio 1984: 237). To them, a good process of participatory design could help to achieve better results, that is, as stated by Kernohan et al. (1992), better quality of building facilities.

In the second and third phase, participatory design appeared to have become a specialized expertise. The operation of participatory design was once again controlled by particular experts who were either working on a volunteer basis (e.g., researcher, social workers or students) or who were legitimized through their clients. What was missing in this pragmatic approach to participatory design was that issues that may increase the problem of the original setting of the participatory design process will be ignored. Not every issue involved in the participatory design can be fulfilled by providing better building facilities. Facing these issues, designers would argue that only certain kinds of problems are rational. In other words, certain kinds of problem are beyond designers’ concern in terms of solving the problem they have defined. In contrast to those idealized notions of the first phase, which were focusing on the process, now the process and the result are one.

In general, problem defining was still done by the expert. To the expert, if there was not a method then there was not a problem. For

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28 Although some participatory designers have proposed that participatory design should be considered to be part of architectural programming (Sanoff 1977, King et al. 1989), designers generally consider design and programming are one (Duerk 1993).
example, in a participation workshop, a participant came with a request to apply Feng Shui\(^{29}\) to the design. If the designer cannot provide a design solution according to Feng Shui, he/she may easily direct the setting of the problem to avoid this issue. In this sense, to control the process also means to determine the degree of freedom of the participants.

### 3.4.2 Conflict resolution in participatory design

In North America, concepts of participatory design initiated in the revolutionary years of the 1960s, where the civil rights movements, war on poverty, protests against the Vietnam war, and the campus free speech movement were pounding the traditional welfare state policy. The humanitarian "caretaking" tradition which had existed in architecture since the nineteenth century had gone and planning had become more like "dilemmas made up of conflicts of values, interests, and ideologies unresolvable by recourse to the facts" (Schön 1983: 207). The homogeneous "Mass Society," as was predicted in the 1950s, turned out to be a society composed of heterogeneous special interest groups. Each of them shared common interests, common value systems, and stylistic preferences that differ from those of other groups (Rittel & Weber 1974: 37).

By the mid-1960s, "the apparent consensus about the content of the public interest — perhaps even about the feasibility of establishing such a consensus — had faded away." (Schön 1983: 207). This increasing differentiation even created more conflicts\(^{30}\). As a result, efforts made to achieve "empowerment" did not lead to democratic consensus, but to ex-

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\(^{29}\) Feng Shui is a concept of geomancy conventionally used in Chinese society. The early concept of Feng Shui can be traced back to 206 B.C.

\(^{30}\) "In some cases, special interest groups took positions which were in direct and explicit conflict with one another. In other cases, conflicts of interest became clear only as the success of one movement led to consequences contrary to the interests of another. In still others, conflict became evident as the different movements found themselves competing in hard times for scarce resources." (Schön 1983: 207).

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tended conflicts (Schön 1983: 338-344).

Conflict resolution has been a complex problem. In this phase, there was a "turn away from leftist rhetoric and utopian idealism." (Comerio 1984: 235). Comerio calls some participatory designer in the phase the "entrepreneurial groups" because "these agencies focused on one or two actual construction, their work was relatively straightforward, manageable, and highly visible." (Comerio: 1984: 234). "The distinction here is that groups operating under the earlier, more academic models tended to revel in the problems themselves, while 'entrepreneurial' groups have less of an interest in abstract questions of right and wrong, and more concern with getting things done." (Comerio 1984: 235). To them, participatory design is a design project that has a beginning and an end. To complete such a project, conflicts should be reduced to a minimum or should even be avoided. Users could fully participate in the process only under the condition of the framework designated by participatory designers.

Ideally, in a participatory design workshop, participants exchange their norms and beliefs, understand the agreements and the disagreements between them, and reach a compromise at the end. However, the solution is not reached without conflict. There are all kinds of situations in the participatory design process. The assumption is that since users have participated in the process they would show less rejection of the products. However, conflict resolution cannot be measured by the scale of participatory design. Large scale participation does not guarantee less conflict.

In a group meeting, minority voices normally disappear or are forced to disappear by group actions. Participatory designers can control this divergence under the pre-determined framework. Participatory designers have to decide what will help the task and what will not. When participatory designers have to operate the process within a limited budget, a strategy of the management of participatory design is to "maximize income or continue to maximize services" (Comerio 1984: 236). In such a context, controversial issues can be ignored or eliminated. Conflict seems to be an unpopular term to such designers. In current participatory design methods, there is no method explaining how to resolve conflict.
Some people argue that conflict resolution in participatory design should be discussed also on the level of social psychology, not only on the level of design methodology. H. Sanoff, a participatory designer, says that, "My experiences in user participation in design show that the main source of user satisfaction is not so much the degree to which his or her needs have been met, but the feeling of having influenced the decision" (Sanoff 1988: 28). However, social-psychological needs can be included in the analysis of a conflict situation. In real life, conflicts are caused by attitudes toward objects. Such attitudes are mostly influenced by social parameters.

In current practice, conflicts are reduced to a small-scale voting over preferable design schemes\textsuperscript{31}, and then resolved through evaluating and rating. Potential conflicts also can be prevented through careful selection of the participants of the design workshop as a homogenous group.

### 3.4.3 Structuring design dialogue

In the traditional hierarchical design process, design communication is carried on mainly between the designer and the client. Such communication is direct and the understanding about the design project between the client and the designer is explicit, while in participatory design, participatory designers have to understand and remember all design descriptions generated throughout several workshops so that they can apply these descriptions to the design. It is therefore important for participatory designers to systematically formulate these design dialogues.

Sometimes, to participatory designers, the result of a participatory design is about the design, i.e., a conceptual scheme for further development or direct implementation. Although participatory design is considered to have combined programming and concept design (Sanoff 1977: 129-136, King et al. 1989: 20), the structuring of design dialogues is mainly focused

\textsuperscript{31} For example, during a workshop that applied the Co-design method, participants were asked to evaluate and score the images drawn by artists. See King et al. (1989:15).
on generating drawings. Before arriving at such a conclusion, design concepts must be formulated so that the discussion of the group can be focused on relevant design issues. Current methods applied to formulating design concepts tend to be user-friendly, that is, to make the participants feel comfortable about expressing their opinions. Therefore, techniques used in these methods mainly formulate normative descriptions for design without factual descriptions of the underlying reasons.

The first attempt at formulating design dialogue was an argumentative planning model proposed by Kunz and Rittel (1972), viz., the issue-based information system (IBIS). IBIS is designed "to encourage, even to generate, as many conflicts as possible" (Dehlinger and Protzen 1972: 38). According to Rittel, "design is a public discourse that welcomes public debate in order to externalize and extend knowledge about the problem, because no one has the sole expertise to determine a resolution" (Comerio 1984: 231). We argue in this study that conflict does not exist unless the parties are involved on a consensual basis. Such a consensual basis helps create a bound entity for the parties involved. (See Section 4.2.1). A well- formulated design dialogue, such as the IBIS, can support the coordination and planning of political decision processes, guide the identification, structuring and setting of "issues" raised by problem-solving groups, and provide information pertinent to the discourse (Dehlinger & Protzen 1972: 45).

Types of issues defined in IBIS include: deontic, factual, explanatory and instrumental. The classification of issues is derived from the description of what composes a design problem, which is a difference between what is the case (i.e., the fact) and what ought to be the case (i.e., the deontic). Given such a difference, the human agent (a planner, a designer, a decision-

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32 For example, that Agent A likes the colour pink does not conflict with that Agent B likes to have nice views from the kitchen. But if Agent A also wants to paint the kitchen pink and Agent B does not like to have his/her views to have "pink frames" then they are in conflict.

33 The distinction between "fact" and "deontic" as used in design discourse is further developed by Tzonis et al. (1975, 1978). See Section 4.3.3.
A Dialogical Model for Participatory Design

maker, etc.) is looking for ways and means (i.e., the instrumental) to remove the difference. If no immediate course of action is known to him/her, the agent will attempt to find the cause of the difference (i.e., the explanation) with the hope that he/she can do something about it. The core components of the IBIS are issues, the positions that people take on issues, arguments offered in-support-of or in-opposition-to positions, and references cited to support arguments. Other secondary elements include the questions of fact or consensus, answers and evidence.

The structure of IBIS is utilized as a unifying format to collect, store and retrieve information that will be applicable to a meaningful debate about the issues. However, negative criticism of IBIS arises from two types of problems: the low efficiency of computer-aided tools and the ambitious attempts of which lead to over-load of information. First, the computer-aided systems of IBIS were still experimental in the early 1970s. Tools applied in IBIS, such as the tree-structure of issue maps, tables of matrices and issue forms were constrained by the then current stage of development of computer technology: many technical problems can now be more easily solved because of the present-day developments of hypertext-based systems. Second, reviewing the social-political background of the late 1960s and early 1970s, it is not difficult to understand why the primer of such a model for group planning is expected to encourage, or to generate conflicts. However, because of this ambition, IBIS has a wide framework for all information generated in group planning, but it fails to decompose design arguments and associate issues with each other.

Throughout the 1970s and 1980s, studies based on argumentation theory, architectural discourse analysis developed based on the philosophy of language and cognitive science have proposed a better model in understanding and analyzing design dialogue. We will further discuss these development in the following chapter. For the technical development, work about computer implementation and further developments of IBIS were published in the late 1980s, viz., gIBIS and itIBIS. In these new develop-

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34 Our summary of IBIS here is based on Dehlinger & Protzen (1972: 38-45).
ments, technical problems are solved but problems about structuring design dialogues remain unsolved.

3.5 Concluding remarks

Participatory design, in a broad sense, can be used to describe artifacts or plans created through group planning. The term "design," as used in our study, is based on the definition made by Rittel, "design is an activity aiming at the production of a plan, which if carried out, will result in a situation with desired characteristics and without undesired or unforeseen side and after effects." (Olsen 1982: 5). In this chapter, what we have presented is not a systematic analysis of a thorough investigation of participatory design methods, but is a further investigation based on the findings of current problem of participatory design, as presented in Chapter 2.

In this study, we focus on the method of participatory design and examine main issues relative to this issue. We have pointed out three key issues (i.e., problem defining and solving, conflict resolution and the structuring of design dialogue) and four problems (i.e., the user-as-designer myth, ill-structured information flow, the result-oriented process and the paradigm of the two characterized groups) of participatory design. Our new model will be developed based on these findings.

In the following three chapters, we will develop our new method for participatory design, which is consist of three parts: a group reasoning model, a dialogical system of participatory design and a framework for participation-based design guidelines.

Summary

In this chapter, we have reviewed the background of certain participatory design methods. The chapter constitutes a further investigation of the
findings reported in Chapter 2. The attitudes to participatory design problems, the lack of conflict resolution theory in participatory design, and the lack of method to support the structuring of design dialogue are the three key points we consider to be important. These findings dictate the development of a new participatory design method. Starting from the case study in Chapter 2, and the review of participatory design movements and methods in this chapter, we have pointed out four types of problem and have discussed three key issues in current participatory design methods. An important question here is, "How can we solve the problem?" To develop our participatory design method, in the following chapter, we will start with a discussion of group planning in order to examine how these problems can be solved, and how addressing certain issues can lead to practical developments.
CHAPTER 4

A GROUP-REASONING MODEL

In the previous chapter, a critical review of participatory design with respect to its methodology was presented. In this chapter, we examine the process of participatory design from the basis of its fundamentals — the discussion of a group of users in the situation of defining problems and resolving conflicts. Cognitive aspects are selected as the framework for this analysis, because they provide a deeper understanding of how people address design concepts, and of how they provide reasons for deciding for or against particular design concepts. Further, they provide insight into how people achieve agreement and reduce disagreement. As Cohen and Levesque (1991: 487) have said, a joint activity is one that is performed by individuals sharing certain specific mental properties.

4.1 Group-reasoning in participatory design

Participatory design involves intensive information gathering. In this study, we look not only at the agreement on the action to be executed, but also at the agreement on the result of the discussion. In other words, the concerns of this study are how the discussion is conducted, what information is exchanged, and what knowledge is generated. Through this inquiry, we can better understand how people reason in group planning, which understand-
ing in its turn leads to the improvement of the participatory design process. In this section, we should first understand 1) the definition of the group, 2) the orientations of the group, 3) the product and the tool of the process and 4) the activities of a group in cooperative work situations.

4.1.1 Definitions of the group

Participatory design is a group act. A group is "a body of individuals in interdependent role relations, having a set of values (norms) that regulates the behaviour of members in matters of concern to the group." (Patton and Giffin 1978). A group is different from an organization\(^1\). When people are equally involved in a discussion, the characters of the group members determine the dynamics of the discussion, while in an organization, the predetermined relation between positions requires group members to behave under certain rules of hierarchy and the characters of individuals are secondary. "A group is not simply a collection of human bodies gathered at one place at one time. The continued existence of a group indicates that the people have certain common interests and that in a face-to-face situation they undertake to solve common problems." (Braden 1955: 22). Bui (1987: 19) defines such a collective decision-making process as a decision situation in which there are more than two persons who recognize the existence of a common problem and attempt to reach a collective decision.

the size of the group

Group size is a term used in social and behavioural sciences to refer to the number of members in a group. The size of a group is also important to the process of participatory design. Participants are normally divided into small groups so that each individual can fully participate in the discussion.

\(^1\) A group is a collection of mutually responsive individuals, an organization is a set of mutually responsive groups, and societies are clusters of mutually responsive organizations (Steiner 1972).
DeSanctis and Gallupe (1987: 598) have defined four types of group act according to the relation between the size of the group and the proximity of group members: 1) the smaller group, face-to-face in a decision room, 2) the local area decision network, dispersed smaller group, 3) the legislative session, large group, fact-to-face, and 4) dispersed large group computer-mediated conference. The proper size of such a group varies. Warfield (1975: 5) suggests that "the size of a group should never exceed eight persons." Slater (1958: 129-139) claims that "a group number of five is optimal for information processing tasks." According to empirical knowledge from the field of participatory design, the maximum group size for participatory design is suggested to be restricted to four participants plus one facilitator (King et al. 1988).

However, group size is not the only reason that may effect group acts. As Olson has said (1965: 45), "Whether a group will have the possibility of providing itself with a collective good without coercion or outside inducements therefore depends to a striking degree upon the number of individuals in the group, since the larger the group, the less the likelihood that the contribution of any one will be perceptible. It is not, however, strictly accurate to say that it depends solely on the number of individuals in the group. The relation between the size of the group and the significance of an individual member cannot be defined quite that simple."

**the function of the group**

When a group is organized for a particular purpose concerning problem-solving or decision-making, the group is called a "teamlike group," "partnership group," "inclusive group" (Friend 1990: 18-19), "decision-making group," or "task-oriented group" (Wright 1975). In general, these concepts refer to "two or more people who are jointly responsible for detecting a problem, elaborating on the nature of the problem, generating potential solutions, or formulating strategies for implementing solutions." (DeSanctis & Gallupe 1987: 590). Members of such groups "may or may not be located in the same physical location, but they are aware of one
another and perceive themselves to be part of the group." (DeSanctis & Gallupe 1987: 590).

As seen in our case study (see Chapter 2), participants were divided into small units in the group design exercise. The size of the group was generally limited to four or five people. Such a division of groups into small units can obviate unbalanced participation among members, reduce the dominance of high-status, aggressive, or articulate members of the group, and prevent premature evaluation and criticism of ideas. Further, bonding individuals into small units can increase the intragroup cooperation and then lead to increase intergroup cooperation (Delp et al. 1977: 14).

4.1.2 Orientations of the group

Current studies of group problem-solving tend to divide groups into two types which are based on the orientations or purposes of the group: the task-oriented group and the social group (Wright 1975, Olsen 1982). The task-oriented group focuses on group goals and on generating a group product, while the social group focuses on satisfying the social-emotional needs of individual group members (Wright 1975). Here we feel that it is necessary to make a distinction between social needs and emotional needs. Needs that cannot be satisfied through well-defined problem-solving approaches might involve social or interpersonal factors, but they are not necessary emotional. On the one hand, a well-defined task might serve an emotional need. How do we judge whether a need is emotional? Do we examine the intention of the need? What if a so-called emotional need becomes a group goal?

Here, one type of non-task-oriented goal is about the goal of the

\[2\] This is also a problem that the Nominal Group Technique (NGT) serves to overcome (Olsen 1982: 420). NGT is a special-purpose (single issue) method of structuring communication in decision groups faced with an unstructured problem situation. It was developed in 1968 from "social-psychological studies of decision conferences, studies of industrial engineering problems of program design in the NASA aerospace field, and social work studies of citizen participation in program planning" (Van de Van 1974: 2).
group, which has less of a problem. For example, "family values" is consider to be a group goal among members of the group who want to build houses and live together. This kind of need in planning is normally called "mission" which is a higher goal, and is moved out from the category of goal. For example, in strategic planning, mission is "the business that the organization is in" (King & Cleland 1987: 63). This kind of group goal is included in traditional planning approaches.

On the other hand, another type of non-task-oriented goal is about goals that are considered to be "emotional," which may result in controversial decisions. For example, in a group planning situation, participants are in discussion about the influence of Feng Shui. The issue is, "How would the location of a new high building result in the bad fortune for people with a certain surname in the village." For participatory designers who are not familiar with such a concept and the related rules of that concept, they might refer to those participants as a social group.

We argue that this traditional distinction between a task-oriented group and social group creates confusion when facing complex problems, and it may be misleading when facing unfamiliar problems.

Social factors have since the 1950s long been recognized as being important in the group problem-solving process (DeSanctis & Gallupe 1987: 592). Early research pointed out that interpersonal exchange in a group tends to be oriented toward task or social needs (Blake & Mouton 1964) and that the two major needs in group problem-solving are the need to complete the task and the need to maintain the group (Bales & Stroudbeck 1951). Recent approaches to the study of group problem-solving "have been developed to isolate these components in interpersonal exchange, although the constructs are difficult to separate." (DeSanctis & Gallupe 1987: 592).

This definition helps those studies to specify the "unresolveable" problems in group planning and to stay inside the range of the "rational" procedure of problem-solving. Nevertheless, in practice, the simplified spec-

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3 For recent studies on Feng Shui theory and rules for practising architecture based on Feng Shui theory, see Li (1993) and Yu (1994).
ification can often lead to dangerous assumptions. Most studies concerning
group problem-solving define their target groups as task-oriented groups and
categorize many non-operational factors as social factors that cannot be
solved by "rational analysis." The function of the social group is oriented
to satisfy the "social-emotional needs of individual group members" (Olsen
1982: 5).

Whenever the label of "social-emotional need" is given, the issue is
excluded from those studies. We argue that the definition of the "social-
emotional need" is ambiguous and that the judgement is often given ar-
bitrarily. How do we judge whether a need is emotional or not? What if an
"emotional need" is a key to the whole conflict? Can we, through architec-
tural means, simply regard certain needs as being emotional and not oper-
atational through architectural means? Sometimes, in a design discussion,
such labels are given simply because the architect does not have the knowl-
edge to transform the issue from concept into form. For example, in a par-
ticipatory design discussion, a participant claims that a public toilet is
necessary in the community park in order to "save our face." Is this
requirement rational or emotional? How do we define architectural forms
that can "save someone's face?" What kind of built environment has this
"function?" Can we ignore this need? To answer these questions, one must
go beyond the constraint of this definition.

4.1.3 Dialogue as the medium and as the product

In a design discussion, dialogue is the medium used by people to transmit
and express their design concepts, and to receive and understand other
people's design concepts. One of our assumptions in this study is that every
design concept, after it has been generated in the mind, can be verbally
represented to a satisfactory degree, and that through this verbal represen-
tation a system of analysis of the expressed design concepts can be
reconstructed. For the purpose of this study, we start with the analysis of
explicit design dialogue of the external world, through which the implicit
process of reasoning which takes place in the internal world can be understood.

The discussion of participatory design may contain intensive dialogue interaction. In such a discussion, participants pick up what has been said and develop themes of talk. There are many terms employed when discussing the action of using language. For this study, we have to understand the definitions of: communication, dialogue and conversation.

The term communication is used to "designate any exchange of messages between human beings, whatever the number of persons participating in the communication, whatever the code used or the type of situation in which this exchange takes place." (Runcan 1984: 251).

Dialogue is characterized by three types of constraints: syntactic, semantic and pragmatic constraints. Syntactic constraints refer to the formal structure which characterizes a language. Syntax concerns how words are organized, e.g., a book of grammar is about syntactic orders of dialogue. These structures determine the ordering of a language. Semantic constraints refer to the reference of language. Semantics concerns the true meanings of words, phases, sentences, etc., e.g., a dictionary is about references of a language. Pragmatic constraints refers to the actual use of language — how the language, used by the speaker, is intended to effect the recipient. For example, in the statement, "Dogs are not allowed to enter the park." the grammar of this sentence is about the syntactic constraints; the references of "dog," "park," or the meanings of the statement, are about the semantic constraints, and the intention of the utterer of this statement is about the pragmatic constraints.

According to Runcan (1984: 251), an exchange of messages between two or several participants does not constitute a dialogue unless it results in a text — a set of statements, and that any change in the topic of discussion marks the end of a dialogue. If there is only one speaker, we generally think that it is monologue because there is no role exchange of the sender.

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4 However, we are aware of the fact that knowledge also exists in a tacit dimension (see Section 6.3.4).

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and the recipient. In a *conversation*, there is also the speaker and the receiver, who in turn change their roles. Conversation has less semantic restriction than dialogue. However, according to Schön (1983), conversation is collective verbal improvisation. In a metaphorical sense, conversation is also the making of an artifact. Schön develops his concept of the *reflective conversation* based on this metaphor: in a single-person design process, although there is only one person, he/she may be in conversation with the situation, such that the state in the material world and the state of mind of the person are interacting.

In accordance with the above definitions, dialogue is a dialogue if it fulfil certain criteria. According to comments made by Runcan (1984: 251), "an exchange of messages between two or several participants does not constitute a dialogue unless it results in a text," and "any change in the topic of discussion marks the end of a dialogue." This utterance which creates a shift in the discussion is called a "conversational move" (Reichman 1985: 21).

### 4.1.4 Group acts

What are the activities of a group in participatory design? What does the group "do"? A participatory design group may perform particular activities such as problem definition, problem analysis, information gathering, developing alternative solutions, assessing the alternatives, and choosing. These activities are called *problem-solving* or *decision-making*. A group is called a decision-making group when it performs these activities.

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5 These activities are what decision makers perform in a decision making process (Mason and Mitroff 1981).

6 See DeSanctis and Galle (1987: 590-591) for a definition of decision-making group.
problem-solving and decision-making

Problem-solving and decision-making may refer to different activities performed in a group meeting. Problem-solving refers to the total process of the search for and discovery of a means to achieve or to prevent a transformation from one state of affairs to another, where the affairs may be abstract or concrete (Gregory 1966, Olsen 1982: 6). In artificial intelligence, problem-solving has been used to denote disparate forms of intelligent action to achieve well-defined goals (Carbonell 1983: 64). Decision-making is one aspect of problem-solving and it involves the activities of evaluation. It is "the reaching of a conclusion on the basis of reasoning from premises by connected thought." (Archer 1970). Sometimes, group problem solving and group decision making are used to describe the same activities of the group, depending on the focuses of the group act. Both group problem-solving and group decision-making can be covered by a more inclusive term, viz. group planning.

group planning

Planning is the activity of anticipating and specifying how an objective can be achieved (Archer 1970). In this study we focus on such activities performed collectively by a group. This act is called "collective action" (Olson 1965: 1-2), or "group planning" (Olsen 1982: 5-6). According to Olsen (1982: 6), the methods of group planning are political and participatory methods, because "they reflect a new attitude toward the process of designing." Based on this new attitude, as defined by Rittel, solving the problem and defining the problem are the same (Olsen 1982: 9). They are termed "second generation" design methods by Rittel (1972: 5-10), "Second generation problems may be characterized by a design process that is iterative and consisting of design activities that are carried out simultaneously."

The process of group planning includes many types of "group tasks." Olsen (1982: 25-28) defines these group tasks in four categories: unitary
tasks and divisible tasks; maximizing tasks and optimizing tasks; disjunctive tasks and conjunctive tasks; additive tasks and discretionary tasks.

**group reasoning**

Another main concept we use in this study is *group reasoning*. The collective reasoning of individuals in participatory design is the major mechanism of the information processing. Individual reasoning is based on the knowledge and belief\(^7\) of the individual. Information may come from his/her own internal memory, or external sources (e.g., books, video, etc.), while in the group design discussion situation, the external information sources also include other people's knowledge and belief.

In a design discussion, one person's opinion can serve as another's input (Olsen 1982: 2). It can be applied immediately as a "hitching-on" concept\(^8\). Most dialogues in a group discussion are based on previous dialogues. This does not mean that the participants can fully share their knowledge and belief. They share only certain design concepts, or relations between design concepts, which accord with what has been expressed in the previous discussion. One can assume there are unexpressed meanings behind the dialogues or particular postures of the speaker. These behaviours can certainly convey messages. However, these things are beyond the scope of the study. We here examine only the process where meanings are expressed through dialogues, explicitly or implicitly.

In this study, we focus on group activities related to group planning. These

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\(^7\) The concept of the two terms, "knowledge" and "belief," is after Hintikka (1962). "The conditions into which we are trying to catch the logic of knowledge and belief are in terms of certain alternatives to a given state of affairs. Roughly speaking, these alternatives are possible states of affairs in which a certain person knows at least as much as — and usually even more than — he knows in the given state." (Hintikka 1962: 56).

\(^8\) Such activities can be seen in a group discussion, particularly in a brainstorming exercise in which the goal is to "produce a large quantity of ideas during the ideation phase of problem-solving in order to increase the probability of novel and creative solutions to a problem" (Olsen 1982: 396).
kinds of group act go back, at least, to Aristotle, who wrote, "Men journey together with a view to particular advantage, and by way of providing some particular thing needed for the purposes of life, and similarly the political association seems to have come together originally, and to continue in existence, for the sake of the general advantages it brings." We now turn to an essential problem of the group, conflict resolution.

4.2 Conflict resolution

Conflicts may arise from inconsistencies between the intended uses of objects. The objects by themselves do not uniquely determine these intentions, rather, they are "part of it". Therefore, there are cases in which people, once they recognize the true nature of the conflict, may resolve it by changing those intentions, e.g., by changing the interpretation of the pragmatic value of those objects.

Conflict resolution is a complex task. The more people are involved in the participatory design, the more explicitly is the conflict defined — not necessarily resolved. Sometimes a clearly defined conflict is not what the stakeholders would like to see. They may be afraid that it would cost time or money to resolve a conflict once it appears. But, if the conflict is not well defined, agreed upon by all parties involved, or resolved in the early stages of the overall process, more problems may emerge in a following stage.

What is the most effective and efficient way of resolving conflict? Can we build machines for conflict resolution? How can machines help humans resolve conflict? Before resolving the conflict, one should first understand it. As Schön has said, "It is plausible that when scientists or policy makers are caught up in frame conflict, their ability to reach agreement depends on their learning to understand one another's point of

*Ethics* viii. 9. 1160a. From Olson (1965: 6).
view. In order to do this, however, each party would have to be able to put in terms of his or her own frame the meaning of the situation as seen by the other in terms of the other's frame." (Schön 1994: 45).

4.2.1 The structure of conflict

What is the structure of conflict? We start our investigation with Coombs and Avrunin's "Structure of Conflict." According to Coombs and Avrunin (1988), there are three types of conflict:

*Type I conflict* is a conflict within an individual who is moved by inconsistent considerations.

*Type II conflict* is a conflict between individuals who want different things but must settle for the same thing, (e.g., a couple is planning to go on a trip together and they want to go to different places).

*Type III conflict* is a conflict between individuals who want the same thing but must settle for different things, (e.g., a couple is fighting about the custody of their children).

*Type I conflict*

Type I conflict is a conflict within the individual. Such a conflict is described by the model of Single-Peaked Functions (SPF)\(^{10}\). According to the SPF model, the seeking for the preference balance is like adjusting the temperature of a shower. There is a highest peak in the searching for the optimal solution. "The significance of SPFs is that they allow a simple search process that converges on the optimal decision." (Coombs & Avrunin 1988: 12).

However, the single peaked function is only a normative theory for certain types of conflict. It cannot apply to all kinds of conflict within an

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\(^{10}\) This concept can be traced up to Priestly (1775) and Wundt (1874).
individual. It fails to explain the situation when there are multiple criteria that need to be taken into consideration in decision-making. For example, a person wants to do action \( a \) because of reason \( p \), and he also wants to do action \( b \) because of reason \( q \). If \( a = -b \), then this person has two contradicting opinions about the action which are based on two different reasons (e.g. "Cut down the tree for reasons of safety" and "Keep the tree for ecological reasons"). Such a conflict can be resolved if the person applies a rule to evaluate the two reasons (e.g., "Safety is more important than ecological issues"). Furthermore, this kind of inconsistency within the individual can be very complex when the change of one’s opinion in time is also taken into consideration\(^{11}\). A person may disagree with what he/she has said before, or, his/her behaviour may be inconsistent with what he/she has said about himself, or, he/she may describe his/her opinions, or himself/herself, in many different ways. In general, people tend to perform, and anticipate others to perform, consistently because of social factors, while there may have been much inconsistent thought within the individuals.

Here we are moving toward the relation between conflict within the individual and the relation with other people. If the above two statements (i.e., "Cut down the tree for reasons of safety" and "Keep the tree for ecological reasons") are held by two individuals, then it is another type of conflict, the Type II conflict.

Type II conflict

Type II conflict is a conflict between at least two parties. Based on the model of SPF in Type I, Type II can be described as two separate "peaks" occurring on the same occasion with respect to two parties. The problem in type II conflict is "how to aggregate the two adversarial arms of SPF\(s\) from different heads to determine an optimal decision." Such a conflict is normally resolved not by rational analysis but by normative principles and procedures. In other words, there are normally some other rules supporting the

\(^{11}\) See also the discussion in Section 6.3.6. and Section 8.2.1.
decision-making. For example, in making a decision, we have three constraints, "if \( a \), then \( p \)," "if \( b \), then \( q \)" and "\( a = -b \)." Since \( p \) and \( q \) are two equally favourable or agreeable norms\textsuperscript{12}, we have difficulty in choosing between two contradicting actions, \( a \) and \( b \). We then need another rule, e.g., "if \( p > q \), then eliminate \( b \)," to support the decision-making. As discussed in the Type I conflict, an individual may be struggling about which norm, safety or ecology, is more important, while in the Type II conflict, since these norms may be held by different individuals, deciding whose goal is more important, or less important, may involve social-psychological factors. In practice, the attempt to separate the opinion from its utterer (or, to separate the problem from the problem) requires strong agreement among parties involved in the group act. According to Fisher and Ury (1981), factors that impact the structuring of a negotiation are:

1) separate the people from the problem;
2) provide communication between negotiators,
3) help negotiators identify their real interests,
4) general options for mutual gain, and
5) use objective criteria.

However, it is not unusual for parties who are in conflict to turn to a third party (i.e., a mediator, negotiator, arbitrator, etc.) to resolve the problems. Normally, an acceptable compromise rather than an optimal solution can be found through negotiation, which is a common technique in solving Type II. In this study, we make a distinction between acceptable and optimal. There are the rules of the decision-making task, meta-rules for the group act in making a decision, and the individual’s rules for him/her to act in the group decision-making. For example, in a group planning, the task is to decide whether the old tees in the park should be maintained or not; because

\textsuperscript{12} The term "norm" in this study refers to need, goal, or objective. A norm is contained by prescriptive statements, or normative statements. If one says, "We need safety in the playground," then there is a norm "safety in the playground" expressed in this normative statement.
of the conditions of the trees, it would be dangerous if no action were taken; the budget can only afford the cost of cutting down the trees. The decision is, "cut down the trees."

Suppose a member in the group strongly disagrees with this solution because he/she thinks the trees should be saved for ecological reasons. However, in the end, only one tree is saved as a compromise. In this example, a solution may be optimal based on constraints of the decision-making task may be optimal (i.e., the limits of budget, the conditions of the trees), but the primitive solution (i.e., cutting down all of the trees) is against the individual's beliefs (i.e., the trees should be maintained for ecological reasons). According to a rule of the group (e.g., action is needed), this individual has to accept the decision. However, the compromise made is based on another rule of the group (i.e., if there is conflict, then try to compromise).

Acceptability and optimization are two different concepts. It would be misleading to say that a compromise is optimal for the individual from that individual's point of view. We argue that in Type II conflict, the parties involved are searching for acceptable solutions. An ideal participatory design process can be regarded as a means leading to the production of optimal design solutions which, if implemented, should fulfil the needs and wants of the participants. In reality, design solutions are not optimal to every participant and rarely do all participants feel satisfied. Let us now turn to another type of conflict, the Type III conflict.

**Type III conflict**

Type III conflict is an extreme situation of social conflict. It can be rationally controlled and organized to create excellence. It can also be determined by a zero-sum game where the one who has the greater power wins. The way described by Coombs and Avrunin to solve Type III conflict is 1) to find a third-party power to control the escalation or 2) to transform the conflict from Type III to Type II. Type III conflict is most likely to escalate unless it has a ceiling to prevent escalation. The only restraint on escalation
in Type III is fear of the consequences. However, any recognition of third-party power is a loss of sovereignty. We need a trusted person/party in the role of mediator. This person or party then offers no threat to sovereignty and is face-saving. The transformation of Type III to Type II can lead the problem-solving orientation toward conflict resolution.

As discussed in the Type II conflict, there are rules of the group and rules of individuals. In Type III conflict, the rules of the individuals are stronger than the rules of the group. Moreover, the state of the group may be changed. For example, let us use the example of the trees in the park again. If our actor insists on saving all of those trees because he/she considers his/her personal norm (i.e., ecology) to be stronger than the group rule (i.e., if there is conflict, then try to compromise), then members of the group may become involved in a Type III conflict.

**transformation of conflict type**

Coombs and Avrunin introduce the concept of the transformation of the conflict types: the types of conflict can easily be transformed "down" or "up", depending on the attitudes of the parties evolved. The transformation is based on how the parties involved perceive the situations. "The transformation of a conflict is sometimes no more than an exercise in semantics." (Coombs and Avrunin 1988: 204) "The classification of a conflict is in the eyes of the beholder and may be differently classified by the antagonist and by observers." (Ibid.). The type of conflict can easily be transformed from Type II to Type III but reverse transformation is difficult. It takes only one party to transform from Type II to Type III, but it takes both parties' cooperation to transform from Type III to Type II.

The concept of conflict type transformation has been developed to resolve Type III conflict by "transforming" it to Type II conflict. The key to the transformation is the creation of a "bond entity" for the parties involved in the conflict. In Type II, there is some basic consensus between the parties involved. These parties form an entity, such as a committee, a family, a couple, the UN, etc. While in Type III, there is no such entity.
Furthermore, parties involved in a Type III conflict have no intention forming such an entity. However, if an entity has been created, each opposing party can then have constructive communication. They can express their design statements and understand the others’ statements.

4.2.2 The atlas of conflict resolution

How can such structures of conflict be represented? Graphical representation can improve the understanding of the conflict. Figure 4-1 is a graphical representation of how a conflict is resolved through making trade-offs between two agent on goals.

example, part one, the conflict:

Jane wanted Dick to drive her to buy a statue of Buddha to put in the living room. As a practising Buddhist, she intended to use this statue in her daily worship. Dick did not agree. He was an agnostic; he did not want his friends to see a statue of Buddha in his house. Furthermore, he did not want to make this trip to buy the statue because he already had another plan. They had a fight.

analysis of part one

For Jane, agent A,
Goal A1 is to put a statue of a Buddha in the living room for daily worship,
Goal A2 is to become a Buddhist,
Goal A3 is to obtain a ride to buy the statue, and
Action A is Dick’s driving Jane to a Buddhists’ shop.

And, for Dick, agent B,
Goal B1 is being an agnostic,
Goal B2 is not wanting to let friends see a statue of Buddha in the apar-
Goal B3 is to carry out another plan, and
Action B is not to drive Jane to buy the statue.

The character of the conflict is Type II. It may escalate and result in the breaking off of the relationship between Dick and Jane. Or, it may be resolved easily by one side’s giving in totally if one of them is markedly more dominating or softer than the other. For the purpose of demonstrating a conflict resolution through negotiation, the story is directed towards a rational discussion between Jane and Dick. In our story, Jane and Dick both agreed upon a "common goal," "living together for economic reasons." This agreement is a meta-rule above all the rules applied in their discussion. Such an agreement is achieved so that further negotiation is possible. Under this agreement, they have to find a solution, one that excludes the possibility of one of them moving out of the apartment. According to Coombs and Avrunin’s theory of the structure of conflict, the conflict can be resolved by the decision that makes the trade-off concerning which (whose) goals will be favoured.

**example, part two, the resolution:**

After their tempers cooled, Dick and Jane agreed that they had to live together for economic reasons, therefore they ought to resolve this little conflict. Dick agreed to have the statue in the apartment but he asked Jane to put it in the study. Jane was not sure she could put the statue in the study and she wanted to consult with a Feng Shui master. Jane went to buy the Buddha herself. The shop owner told her it was all right to put the Buddha in the study according to his knowledge of Feng Shui. Jane was satisfied.

**analysis of part two**

We now try to build an abstract diagram of the conflict in our example based on the Structure of Conflict. In Figure 4-1, the diagram on the right
shows that Goal A1, Goal A3, Goal B1 and Goal B2 are redefined. These changes are the trade-off made between Jane and Dick in order to achieve a compromise, Action C, which includes several sub-actions:

Figure 4-1 Resolution of conflict

C-1: Jane would buy the Buddha herself,
C-2: Jane would consult a Feng Shui master about the location for the Buddha statue,
C-3: put the Buddha in the study if the master permits,
C-4: Dick would prepare a space in the study for the statue, and
C-5: Dick would lend Jane his car.

For Jane, agent A, the goals become:
A1*: put the Buddha in the study for daily worship,
A2: to become a Buddhist,
A3*: use Dick’s car to buy the Buddha.

For Dick, agent B, the goals become:
B1*: *being an agnostic*\textsuperscript{13},
B2*: *do not want to let friends see a statue of Buddha in the living room*, and
B3: *do not wish to drive Jane to the shop*.

There is a happy ending to our story. Of course, Jane and Dick were lucky that the shop owner told Jane that it was permissible to put the Buddha in the study. Also, there would be some potential problems that needed to be discussed such as, the new arrangement of the study, the smell of incense and the sound produced during worship, the cost of purchasing the Buddha, etc. For the moment, the conflict is resolved.

In the above example, we started with limited information about the situation. Then, we introduced new information which resulted in the modification of old goals, and generation of new goals. In our analysis (see Figure 4-1 and Figure 4-4), we showed the change of some of their goals (i.e., A1, A3, B1 and B2 became A1', A3', B1' and B2'). However, this analysis is very abstract. The change in their attitudes towards their goals could be very complex. People may have conflicting "frames" in a dispute\textsuperscript{14}. The interaction of their belief systems, the process of associating goals with actions, the process of reasoning is not mentioned here. We will discuss the process of reasoning later on.

However, our intention is to make a simple diagram in order to demonstrating a structure of conflict resolution, which is developed on the basis of the structure of conflict proposed by Coombs and Avrunin. Through that exercise, we have found that there are certain relations between the notion of the "goal" and the "action." To understand these relations, let us examine these relations by borrowing a method from

\textsuperscript{13} The "agnostic" in Goal B1 does not accept the concept of allowing a statue of Buddha in the home while the "agnostic*" in Goal B1' does.

\textsuperscript{14} We refer the notion of "frame" to Minsky (1975: 96), "A frame is a data-structure for representing a stereotyped situation, like being in a certain kind of living room, or going to a child's birthday party. Attached to each frame are several kinds of information." See also Tzonis & Oorschot (1987), and Schön (1994).
artificial intelligence, viz., means-ends analysis.

4.2.3 Means-ends analysis

Means-ends analysis, developed by Newell and Simon (1972), is a method applied in artificial intelligence to analyze the relation between goals. In means-end analysis, one goal may serve as a means to achieve another goal which may serve as an end, and the second goal in turn can be a means to another end. Up to now, we have used "goal" to refer to the act intended to bring about the state of a "need". For example, the Goal A3, to obtain a ride to buy the statue, contains a need, a ride to buy the statue. "In the context of problem solving, states corresponding to where you are or might be in the process of solving a problem." (Winston 1992: 50). The state of a system is a description that is sufficient to determine the future. In a state ground, each node denotes a state, and each link denotes a possible one-step transition from one state to another.

In this section, we apply means-ends analysis to examine the example given in the Section 4.2.2. As Winston says, "The purpose of means-ends analysis is to identify a procedure that causes a transition from the current state to the goal state, or at least to an intermediate state that is closer to the goal state. Thus, the identified procedure reduces the observed difference between the current state and the goal state." (Winston 1992: 50). Further, we want to examine how such a semantic net can help represent the relation of goals in a joint plan.

*individual's plan*

The diagram in Figure 4-1 shows that Agent A has three goals and is expecting to achieve these goals by Action A. There are also sub-goals within sub-goals. For agent A, the four goals are linked as one chain. In order to achieve Goal A2, Goal A1 must be achieved; in order to achieve Goal A1, Goal A3 must be achieved; in order to achieve Goal A3, Action
A must be achieved (see Figure 4-2). For Agent B, Action B leads to two goals, Goal B2 and Goal B3, and Goal B2 in turn leads to Goal B1 (see Figure 4-3).

![Diagram of single-chain arguments](image)

**Figure 4-2 Single-chain arguments**

![Diagram of multi-chain arguments](image)

**Figure 4-3 Multi-chain arguments**

*a joint plan*

When the two agents in our example agreed to cooperate under the common goal, they then planned together (see Figure 4-4).
In this joint plan, both sides accept each other's goals and treat these goals as "goals of the team." This trade-off is under a meta-goal, the Common Goal. In such a joint plan, some goals are even more complicated than others although the necessity may be more important to the agent. For example, in Figure 4-4, Goal A1' has three links attached to it while Goal B3 has only one link. Goals linked to Goal A1' are A2, A3' modified from A3, B2' modified from B2, and C-4. Goals at the bottom of this map are action oriented (i.e., goals that can be applied as actions), while goals at the top of this map are norm oriented.
knowledge and belief

The knowledge and belief that support the two agents in making their plans vary to a certain degree. While building their respective plans they drew on their individual bases of knowledge and beliefs (i.e. what one knows and what one believes). There are 1) individual, 2) shared and 3) contextual knowledge and belief. In Figure 4-6 a joint plan is built that is based on the knowledge and belief shared by the two agents.

Figure 4-5  Plans of different agents

Figure 4-6  The joint plan of two agents
However, knowledge and belief are not mental states which can be recognized by introspection (Hintikka 1962: 56). The knowledge and belief of the two agents can easily be influenced by the information drawn from the contextual knowledge. For instance, in our example, the information from the shop owner, or the condition of the car, could have altered the situations.

4.2.4 Locations of conflict

People generally intend to define the area of conflict so that they can resolve it. Coombs and Avrunin (1988: 209) say, "It is customary to refer to competing goals as giving rise to conflict. But goals do not compete. The conflict is over options, not goals....Conflict arises, then, because a choice has to be made between options. And the conflict is resolved by the decision that makes the trade-off, that is, which (or whose) goals will be favoured." We argue that conflict is not about goals nor is conflict about "action\textsuperscript{15}".

Our point is that conflict exists on a consensual basis. It exists only if the parties involved consider it to exist. Of course, one may not explicitly say what he/she thinks. In this study, we rule out the inconsistency of saying the reverse from what one is thinking on purpose. We only examine the meaning that the utterer is intends to express in statements. Conflict is about the state of the attitude of, at least, two parties. It needs certain criteria to enable the conflicting parties, the opponent and the proponent, to differentiate themselves. In other words, a framework serving as a context of the conflict is necessary. For example, there is no conflict between two people, one who appears enthusiastic and another who appears indifferent to the same issue. If the first person in this example complains about the situation to a third person, and the third person fails to change the attitude of the second person who pays no attentions to the issue, then the conflict, as is claimed by the first person, does not have a consensual basis.

\textsuperscript{15} Here, we use "action" to replace "option".
We now look at a hypothetical example of a conflict. In this example, there are four constraints:

1. Two agents have to develop a joint plan.
2. Each one can select only one goal, $p$ or $q$, and one action, $a$ or $b$.
3. One presupposition can lead to only one inference.
4. There is no contradiction between action $a$ and action $b$ (i.e., $b \neq -a$).

In Figure 4-7, we have eight situations in two rows. It the first row, from cell 1 to cell 4, the two agents select their goals and then decide on their actions. In the second rows, cell 5 to cell 8, the two agents select their actions and then decide on their goals.

<table>
<thead>
<tr>
<th>1. no</th>
<th>2. no</th>
<th>3. conflict</th>
<th>4. no</th>
</tr>
</thead>
<tbody>
<tr>
<td>$p \rightarrow a$</td>
<td>$p \rightarrow a$</td>
<td>$p \rightarrow a$</td>
<td>$p \rightarrow a$</td>
</tr>
<tr>
<td>$q \rightarrow b$</td>
<td>$p \rightarrow a$</td>
<td>$p \rightarrow b$</td>
<td>$q \rightarrow a$</td>
</tr>
<tr>
<td>5. no</td>
<td>6. no</td>
<td>7. no</td>
<td>8. conflict</td>
</tr>
<tr>
<td>$p \leftarrow a$</td>
<td>$p \leftarrow a$</td>
<td>$p \leftarrow a$</td>
<td>$p \leftarrow a$</td>
</tr>
<tr>
<td>$q \leftarrow b$</td>
<td>$p \leftarrow a$</td>
<td>$p \leftarrow b$</td>
<td>$q \leftarrow a$</td>
</tr>
</tbody>
</table>

**Figure 4-7** Eight situations of a joint plan

Conflict occurs in cell 3 and cell 8 situations when the two agents have the same presupposition but different inferences. That is, they disagree on the process of reasoning. In the cell 3 situation, the conflict is about "which action, $a$ or $b$, can better serve the goal $p$?" The conflict in the cell 8 situation is about "which goal, $p$ or $q$, can the action $a$ achieve?" In these two situations, based on the same presupposition, the two agents apply their own belief systems so that the inferences are different. In the other six situations, the two agents are not in conflict though they may have different
goals or actions. If the two agents should have a conflict in these six situations, it would be caused by other factors that are beyond the scope of our analysis (e.g., one agent does not like the other agent to have different, or the same, opinions about their joint plan. Or, one agent does not like the other agent).

In this example, we can clearly see that the conflict is not about the goal or about the action, nor is it about belief systems. It is about the process of generating, justifying or reasoning arguments between different belief systems. Therefore, conflict is resolved not only because a "correct" goal or action has been found, but also because people have changed their attitudes during the process of conflict resolution. One of our basic assumptions in this study (see Section 1.3.1) is that, each individual in the group uses his/her own "design logic" in design reasoning. As seen in Figure 4-7, the application of a standardized logic for people involved in design to follow is impractical\textsuperscript{16}.

A homogenous group may have less conflict than a heterogenous group, because people, whose knowledge and belief systems are similar, tend to use similar processes in such reasoning\textsuperscript{17}. While, in a heterogenous group, interpersonal differences and communication problems may increase, but there may be more creativity in such a group (Delp et al. 1977: 14-18). For example, when a conservative community is making a plan, they may be hesitant in inviting people from "outside" to participate in the discussion in order to avoid potential conflict. This is not only because they are afraid of new ideas or new suggestions, but because they are afraid of people who "think" differently. In other words, people understand the same phenomena differently and, based on the same ground, they may infer different things. A study on such different ways of thinking is Carbonell's Subjective Understanding. He says, "People interpret a story in different ways, depending upon their subjective interests, personal motivations, beliefs, and knowledge about the various actors in the story. Differences in

\textsuperscript{16} For further discussion on individuals' different "design logic," see Section 6.2.2.

\textsuperscript{17} Evidence of this is easy to find in cross-cultural studies.
interpretation include formulating different opinions on possible consequences of the story, assigning different motives to the actions of the characters, and inferring completely different consequences from the same natural language text of the story." (Carbonell 1981: 2). This different way of thinking can be the origin of conflict.

4.3 Cognitive structures

The Structure of Conflict provides a prototype for our group-reasoning model. We will examine the transformation from a cognitive perspective. Based on previous discussion, we point out two major distinctions in our analysis: 1) the analysis of the "transformation of conflict" in this study is about the transformation from conflict between two parties to conflict between members of a group, and 2) the analysis of the process of reasoning is from single-agent to multi-agent.

Participatory design is a group action that leads to the production of a collective set of norms for future implementation. These norms can be seen as commands because participatory design is about how a particular built environment ought to be18.

In a participatory design workshop, participants enter the meeting room with various kinds of needs or wants. They describe all kinds of thoughts, problems, principles, directives or ideas. Most of all, they want certain design decisions to be made and then actions to be taken according to these decisions. Sometimes, they have normative attitudes toward what they have described. These descriptions then become prescriptions. For example, the assertion, "There is a public toilet at the park in the mayor's neighbourhood," can be a used as descriptive statement, but it also can be

18 See Searle (1969: 175-197) for the distinction between "ought" and "is". In IBIS, there is also a distinction between the current state (called "fact") and the preferable state in the future (called deontic). (See Section 3.4.3). For other discussion on the distinction between these two notions, also see Searle (1964).
used as a prescriptive statement if the utterer is intending to argue that the park in his neighbourhood ought to have a public toilet as is the case in the park in the neighbourhood of the mayor.

In traditional architectural design, design decisions appear to be generated through a linear process. Abstract commands (i.e., brief descriptions of the needs of a particular built environment) are given by the client to the architect and then more specific commands (i.e., working drawings) are given by the architect to the builder. In participatory design, forms are decided together by individuals. They have to reason together though they may have diverse backgrounds (e.g., a mathematician may be working with a peasant). For further discussion on the logic of command, see Section 6.3.2.

Before we move on to discuss the group-reasoning of design commands in participatory design, we have to know the hierarchy of such collective norms and the logic in constructing such hierarchical structures in current professional practice.

4.3.1 Collective normative statements

A set of normative statements can be reconstructed from a simple checklist and made into a hierarchical structure. The best example of this structure of norms is that which the Quality Function Deployment method in industrial design uses to systematically transform the voice of the customer into requirements of the product. In such a process, the users' descriptions of a particular product obtained from survey are "deployed" (i.e., categorized, grouped and, then, rearranged) into a set of "quality requirements". This set of quality requirements is then cross-checked with a set of "function requirements" to see what to improve and how to improve that particular product. In our study, we use norms instead of "requirements," and we use "normative systems" instead of "quality/function deployment". Norms can be seen as details of a meta-command that command the designer to integrate design concepts generated by the
participants into the design. This meta-command is a norm of higher order (Von Wright 1963: 189-207).

In such systems, norms are categorized in several layers. As is shown in Figure 4-8, a higher norm is to the left of a link and a lower norm is to the right of a link. Together, they form a "normative system." The locations and relations of norms on this tree structure are context dependent. Different settings of a problem can have a different hierarchical normative structure. For example, in our case, in the participatory design dialogue presented (see Chapter 2), a highest norm is "hospitality", a lowest norm is "a public toilet in the park", and a norm in between is "public facilities at the park". Generally, in architectural discourse, the lowest norm is architectural form. Properties such as dimensions, colours and shapes may be found in the lowest norm. The highest norm is the "performance" of the
4. A Group-Reasoning Model

built environment. Tzonis and Oorschot (1987: 87) have categorized five major groups of architectural norm. (See Figure 4-9).

In participatory design dialogue, users may have their own norms, which are not conventional to designers' norms. They may discuss social norms (e.g., equality, prejudice, ethnicity) or norms that designers may not be familiar with (e.g., ecology, particular cultural factors). It would be impractical to make a universal list for all kinds of norms, but it is important to make a "minimum necessary structure" (Tzonis et al. 1978: 3) so that we can locate these norms, once they are generated, for further analysis and manipulation.

In participatory design situations, users argue about how the design ought to be by using everyday words and informal logic. In developing a collective set of design commands, users are also generating a set of joint intentions which are "formulated as a joint commitment to perform a collective action while in a certain shared mental state, as the glue that binds team members together" (Cohen and Levesque 1991: 489). The generation of design guidelines can be regarded as the result of "collective action" (Olson 1965) or "collective creative creativity" (Halprin & Burns 1974) that is "performed by individuals sharing certain specific mental properties" (Cohen and Levesque 1991: 487).

When a set of norms, a normative system, is held by one person, the inferencing from one norm to another norm is based on that particular individual's knowledge and beliefs. People understand things differently. This process of applying the beliefs, motivations, and interests of the understander to the task of formulating a full interpretation of an event is called "subjective understanding" by Carbonell (1981: 2-3). There may be a generally accepted normative system for particular purposes in particular fields so that two experts with similar training may construct two similar normative systems. When a norm system is generated by a group, then multiple beliefs are involved. The diversity of the individuals' knowledge

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19 The term "performance" was introduced to architecture in the 1960s for evaluating the performance of building. See Eberhard (1965).
I. Norms associated with monetary cost or benefit
   A. circulation cost
   B. cost of services
      1. energy
      2. maintenance
      3. cleaning
      4. grounds-keeping
      5. mechanical transportation
   C. space efficiency, used space/circulation ratio
   D. rentability

II. Norms associated with individual comfort
   A. circulation discomfort
   B. disorientation
   C. lighting
   D. variety
   E. acoustical
   F. microclimatic
   G. view
   H. cleanliness and sense of order
   I. contact with ground and green

III. Norms associated with social aspects
    A. community
    B. privacy

IV. Mixed norms
    A. safety
    B. security
    C. intervening opportunities

V. Norms of dynamic character
    A. flexibility
    B. change and growth

Figure 4-9   An example of a list of design norms. (From Tzonis and Oorschot 1987: 87-88.)

and belief may lead to different ways of reasoning. Such a structure of normative statements is insufficient to explain these different processes of reasoning, because it is assumed that there is only one design reasoning process, one belief system, supporting the generation and justification of norms. While, in participatory design, there are more than one belief system. In order to understand how a belief system can influence the process of reasoning, we examine how a model of single-agent reasoning
is constructed and then, departing from that, move to the development of a cognitive structure of group-reasoning.

*a model of collective normative system*

In Section 4.2.3, we described how based on their shared knowledge two people generate a joint plan (see Figure 4-5, 4-6). When there are more people involved in making a joint plan, there is still a "core" of such shared knowledge among the normative systems of the group. In addition to the two-dimensional, individual’s normative system, since such normative systems have a hierarchical structure (see Figure 4-8, 4-5), we use a three-dimensional model to explain how these two relations, individuals and the group, are integrated (see Figure 4-10).

![Diagram](image)

*Figure 4-10  Joint normative systems*

In Figure 4-10, the squared frame on the upper left refers to a ground of norms by four agents, A, B, C and D. Shade possessed areas represent recognised norms. The core in the centre contains joint norms of the four
people. (Here we do not look at norms that are shared by only some of them and not by the others). Based on this 2D model, we move these four normative systems into a 3D column. The mass of the columns represents the space of the norms. A shared normative system is located in the kernel of a 3D column. The higher the space is to the top of this columns, the higher is the norm. In a group discussion, there may be many sets of shared normative systems (e.g., security, health, privacy, community, etc), depending on the interests of the group and the way norms are defined. Therefore, a dialogue can be formulated into a semantic net composed of many of these 3D units that are decentralized and interrelated (see Figure 4-11).

We use this 3D net structure to demonstrate a complex multi-agent, normative system. Note that we have not included belief systems in this model as we have pointed out that people think differently. The question we are interested in is how these different ways of thinking can be formulated. We now introduce the concept of "reasoning."

Figure 4-11 A net structure of multi-person, decentralized normative systems.
the process of reasoning

The structure of generating "reasons" to back up arguments is better explained in Toulmin's analysis of the structure of arguments (Toulmin 1958, Toulmin et al. 1979). Another models of cognitive structure is given in the Conceptual System (Tzonis et al. 1975, Tzonis et al. 1978). Through the analysis of writings on architectural thinking, Tzonis and his colleagues have developed a knowledge structure called the conceptual system and have proposed a "kernel of architectural knowledge" (Tzonis 1992: 147-155). Although both Toulmin's and Tzonis' models are used to explain single-agent reasoning, they can be seen as "meta-structures" representing certain mental operations of human beings. They can not only be applied to analyze the individual's reasoning, but have also been developed into a model of the process of group-reasoning.

Starting from this discussion about normative systems and normative models, we now move to examine how reasoning can be formulated according to these two theories about knowledge structures.

4.3.2 Structures of arguments

Argument is a method of knowledge that may transmit value and fact. In general, an argument contains a statement and its support(s). For example, a user utters a statement, "We should build a public toilet in the park." The statement can be used to argue but it is not a complete argument. One can anticipate that there may be an implicit or explicit reason for this statement. To understand arguments made by different people in group planning, we need a "superstructure" that presupposes that a dialogue can be decomposed into a limited set of components that combine with one another in regular ways (Reichman 1985: 51). In this and the next section, we introduce Toulmin's study of argumentation theory and Tzonis' theory of the kernel of architectural knowledge.
argumentation theory

The art of argument is called "argumentation." Argumentation has been defined as "the activities of making claims, challenging them, backing them up by producing reasons, criticizing those reasons, rebutting those criticisms, and so on." (Toulmin 1979: 13). "Argumentation is a social, intellectual, verbal activity serving to justify or refute an opinion, consisting of a constellation of statements and directed towards obtaining the approval of an audience." (Van Eemeren et al. 1987: 7). Argumentation also refers to the process of justification and generation of an argument in architectural discourse analysis (Tzonis et al. 1975). In our study we consider argumentation to be the art of argument. We use "argumentation" and "reasoning" interchangeably because they can be used to refer to similar activities.

Over the past few decades, the field of argumentation theory has developed widely from a nineteenth century forensics pedagogy to include the study of argument in various forms and contexts. "Scholars have come to claim as subject matter the study of practical argument in jurisprudence, politics, social controversy, art, and ordinary conversation; and the role of argument in epistemology has become a core concern." (Cox and Willard 1982: xiii). Stephen Toulmin's work, The Uses of Arguments, had strong influence in the 1960s and 1970s on the development of argumentation theory.

Toulmin's analysis of the structure of argument is based on the form of informal logic and is developed into a schematic structure. (See Figure 4-12). Toulmin does not attempt to make his model universally applicable but he demonstrates it to support his own argument that "validity criteria for arguments are field-dependent" (Van Eemeren et al. 1987: 199). In our study, we take Toulmin's schematic structure as leading to the development of an analytical system of design arguments, a purpose which may be different from Toulmin's original one.
4. A Group-Reasoning Model

*Given grounds, \( G \), we may appeal to warrant, \( W \) (which rests on backing, \( B \)), to justify the claim that \( C \) - or, at any rate, the presumption (\( M \)) that \( C \) - in the absence of some specific rebuttal or disqualification (\( R \)).* (From Toulmin et al. 1979: 78.)

*Figure 4-12  The basic pattern of the structure of argument. (From Toulmin et al. 1979: 78.)*

4.3.3 Kernel of architectural knowledge

The "real" internal design thinking process of the human agent is obscure, but such a process can to a certain degree be described and understood through a model. A rational analysis can be applied to understand the internal thinking process of human beings. To do this, we focus on the external thinking process that can be represented explicitly and develop a minimum structure as a representation of cognitive structures.

*architectural discourse*

In constructing a meta-structure of architectural thinking, Tzonis et al. propose their development of an architectural discourse analysis. The method of discourse analysis was developed within the framework of a
study on the transformation of architectural thinking between 1650-1800, the period during which modern thinking and practices of architecture had gained full ascendancy over the more archaic medieval traditions (Tzonis et al. 1975).

In participatory design, this external thinking process can be reconstructed through the analysis of design dialogue, which is a schematic representation of design reasoning. The theory of conceptual systems applies argumentation theory to the analysis of the design-thinking process and the schematic representation of design argumentation.

the Conceptual System

Design and planning argumentation is an internal process that determines the external utterance. As Tzonis et al. (1978: 2) have pointed out, in order to understand the external form of sentences, we must understand the internal rules that produced the sentences. The system they developed is called the "Conceptual System." The structure of the conceptual system is a primitive universal organization which is common to any design discourse.

![Diagram](image)

**Figure 4-13** Kernel of a conceptual system (KCS)

![Diagram](image)

**Figure 4-14** KCS with Backing module
The kernel of design argumentation contains two branches: the *deontic* (also called normative) and the *factual*. Deontic descriptions will lead to the generation of the design directive and the justification of the design norm. A norm is expressed by a normative statement. Such a norm can be a goal, a need or an objective. A *directive* also has the characteristics of a norm.

A norm and a directive can be states or actions to bring about states. If one norm can bring about another norm, then the first norm is also called directive. Factual implication or implied statements are about *facts*. Sometimes they have implied nature which implies the IF-THEN structure: IF Directive, THEN Norm. In this study, we use *fact* to refer to factual statements that have this implied nature that serve as mediation between norm and directive. (See Figure 4-12). Factual descriptions include two types: *backing* and *base*. Backing is a descriptive statement that says why the fact component is true. (See Figure 4-13). Base provides arguments for the truth value of the backing. (See Figure 4-14).

Here is an example:

Norm: *the health of old people in the neighbourhood*.
Directive: *to build a public toilet in this park*.
Fact: *if there is a public toilet in this park, then that is healthy for old people in the neighbourhood*.
Backing: *the survey shows that old people in this neighbourhood spend most of their time in the park and that they frequently need to use the toilet*.
Base: *the survey is trustworthy*.
In a complex design discourse, a directive may be the "higher" norm of another directive (see Figure 4-16). The structure of the conceptual system of a design discourse is made up of the basic kernel of architectural thinking, but the structure of that conceptual system may be a unique structure.

Figure 4-16  A linear sequence of arguments

Through this systematic modulation of the conceptual system, we can understand the internal rules generating and justifying the utterance in the external world. Further, we are able to capture implicit design and planning concepts which are beyond the utterances. What determine design and planning action is the concept behind the superficial representation, verbal or text, not the representation itself.

4.3.4 A model of collective concepts

The collective design discourse is the representation of a set of arguments supported by the beliefs of the designer at a particular time. In the Conceptual System, a discourse is regarded as a design argumentation that designers generate, the "directive" of a design solution which justifies the directive by an architectural "norm". In this sense, in the making of architectural discourse, the group generates a design argumentation collec-
tively\(^{20}\). Toulmin's structure and the Conceptual System are both the cognitive structures of single-agent reasoning. These kinds of knowledge structure are useful in helping us to develop our model of group-reasoning because participatory design is carried out in informal settings, all kinds of issues may be brought to the discussion table.

![Diagram](image)

**Figure 4-17 Three layers of the concept**

This section is a graphical representation of such collective concepts. We have proposed a model of normative systems of group planning (see Figure 4-10), let us now introduce a group-reasoning structure, which includes the structuring of both normative descriptions and factual descriptions. In Figure 4-17, the basic element of the Conceptual System is placed within a three-layer structure. The first layer is for normative concepts, we call it the *norms layer*. The second layer is for reasons that back the inference on the layer of norms, we call it the *backing layer*. The third layer is for factual descriptions as the resource of the reasons on the layer of backing, we call it the *base layer*.

Normally, the beliefs of one person form one conceptual system. In a collective conceptual system, group members have different beliefs. They have their own norms and design solutions that apply to the built envi-

\(^{20}\) According to Rittel and Webber (1974), planning is a 'public discourse'.

131
environment. They infer different directives which are based on the same norm, or they apply different norms to the same design solution. They have their own reasons for these inferences, and they can provide "facts" based on their own understanding or interpretations.

\[\text{Figure 4-18 A model of two conceptual systems}\]

In this model of group conceptual systems, all deontic concepts are in the first layer. The relations between concepts are inference links (IL). In a design discussion, all kinds of concept discourse are possible and should not be excluded from further deliberations. Deontic concepts, related or unrelated, are located in the first layer. The reasons for supporting the inferences from one norm to another are located in the second layer and are linked to the corresponding spots with support links (SL). Data quoted from particular sources, personal experience, stories, and relevant cases are located in the third layer, and are linked with the backing layer by resource links (RL). (See Figure 4-17). Thus, the model is a multi-agent, multi-layer meta-structure composed of the collective conceptual systems. In Figure 4-18, two conceptual systems are incorporated in the model. They
were uttered by two people who disagreed with actions that may be taken.

In collective conceptual systems, the same norm will result in different directives, and the same directive will lead to different norms. In single-agent reasoning, the hierarchy and priority of the norms is determined by one agent with his/her beliefs as a base. While in multi-agent reasoning, certain higher norms are equally important.

In the Conceptual System, all norms and directives are linked in a chain or a tree-structure. A directive may, in turn, become a norm for "lower" directive(s), or a norm may actually be the directive of a "higher" norm or norms; norms and directives are linked as a net. The net model can explain why the change of beliefs of some participants will not affect the overall structure. Our net structure model can better represents the conceptual system than the two-dimensional model (see Figure 4-15). In a single-agent discourse, when the argument grows, some norms and directives on different ends of the tree structure may be connected, and some norms and directives may be isolated. When formulating an argument to be rational and logical, people tend to perform consistently. Therefore, norms that appear isolated or to contradict to other norms in a single-agent normative system may be excluded. However, in a group discussion, these seemly irrelevant or contradictory norms may be important to their utterers. There is no centre or periphery to such a semantic net.

In a multiple belief systems situation, there is hardly any definite centre or highest norm. In the net model, there are performances at the one end, form at the other end, and operations in between. These components emerge randomly in a shared cognitive structure. Only some knowledge is retrieved in the short term memory in order to make the decisions and carry out the action.

4.4 Concluding remarks

Participants in a participatory design situations are generally talking about
how things ought to be. Participants care more about the product rather than the process. In a participatory design group, there are the goals of the group (e.g., to produce a design scheme), the goals of individuals (e.g., to prevent people from putting the garbage collection bin in my backyard) and the goals that are only shared by part of the group. An individual goal can become a group goal when it is accepted by the majority of the group members. Such a selection of group goals includes many social activities. A goal accepted by the group may be very scientific such as, "to reduce the Heat Island Effect", but the selecting of the goal may be based on a normative factor inside the group such as, "to select a scientific goal". One example of this is that, based on the same given constraints, different groups may come out with different plans because social factors play an important role in a group process and different social factors determine different result.

Dividing groups into smaller units is criticized because, while it may enhance "intragroup" cooperation, it may also decrease "intergroup" cooperation (Samuelson et al. 1986). This kind of decrease in intergroup cooperation may imply potential conflict. However, an intergroup conflict can be seen as an intragroup conflict when we see the different groups as one entity. In the distributed process of group design, the type of conflict has been shifted from Type III into Type II conflict, because the groups are bound by the bigger group, the organization.

Without analysis of the relation between abstract goals and concrete design actions, conflict resolution in participatory design will perform rely on some mysterious forces or social factor. The transformation of conflict types we have introduced is an abstract concept. In the "Structure of Conflict," Coombs and Avrunin point out the direction of conflict resolution without explaining how conflict is resolved. Because of the psychological nature of the approach (Klein 1993: 260), the Structure of Conflict does not demonstrate how to solve conflicts specific to engineering, or architectural problem. In our model of the atlas of conflict resolution, we have discussed how a joint plan is developed through negotiation and leads to the development of an analytical system for mapping conflicts, which is given in later
chapters of this study.

The action of information exchange in participatory design leads to the change, or non-change, of the course of nature. The action is in the world outside the human mind. Only the result of the act can be interpreted to fulfil the goal which is in the inner world of the human mind.

The role of participatory designers in conflict resolution can have the characteristics of mediator, consultant, decision-maker, or designer. They may also be involved in conflict because of the ambiguous nature of their role. In the following chapter, we will use "facilitator" to define such a role of a human agent. Further, we use the term, "FACILITATOR" to refer to entities (either human agents and computers), who operate cooperatively to carry out the task of human facilitators.

Summary

In this chapter, we have examined the process of group reasoning in participatory design. We have developed a theory of the cognitive aspects of participatory design, which leads us towards the development of a group reasoning model. We have defined what a group is, what the orientations of a group are, what role dialogues play in the settings of participatory design, and what mental activities a group may engage in. We then discussed one essential problem of a group task: conflict resolution. We did not intend to develop a tool for conflict resolution. By understanding the process of how conflict may be defined and resolved through negotiation, we can better understand what situations may lead to the structuring of a joint plan. We argue that conflict is neither about different concepts of norm, directive or fact, nor is it about belief systems. It is about the process of generating, justifying, or reasoning, arguments between different belief systems. In developing a model of a collective structure, we have proposed a layered structure that can capture both normative and factual descriptions of the cognitive structures that are verbally presented in a group discussion. The questions to be answered now are: How is dialogue interaction between
participants carried out? How information emerged through dialogue? What would a computer-supported dialogical system be like? We now turn to Chapter 5.
CHAPTER 5

A DIALOGICAL SYSTEM OF PARTICIPATORY DESIGN

In the previous chapter, we discussed group-reasoning activities, the development of a joint plan through conflict resolution, and means to reconstruct group-reasoning cognitive structures. In this chapter, we want to answer the questions: How is dialogue interaction between participants carried out? How information emerged through dialogue? What would a computer-supported dialogical system be like? We examine information-processing of design discussion in face-to-face situations. We propose a group decision support system, viz., the dialogical system. Two other developments of this system are the FACILITATOR model and the distributed information-processing system (DIPS).

5.1 Supporting dialogue interaction in group planning

In this chapter we move to a practical development of a support system. We deal with the problem of information processing in the early stages of a design process concerning multiple agents planning collectively. In such a group planning situation, design solutions are generated through dialogue
interaction whereby the interchange of normative and factual descriptions collectively form a design discourse. With the support of computer technology, following a discussion, a design discourse can be explicitly constructed. The technique developed in this work can support a decision group in generating a joint plan, and it helps in representing design argumentation with a computer-supported analytical structure, which leads to a development in group decision support systems (GDSS).

5.1.1 Structuring design dialogue

As we have seen in the case study (see Chapter 2), in participatory design situations, most statements generated by users are verbal descriptions such as issues, reasons for or against particular prescriptions, knowledge about other built environments or personal experience about these environments, or explicit principles or rules, information used as the basis of reasons, etc. In this paper, we use the term "participatory design dialogue" to refer to these verbal descriptions. As we have found in the case study (see Chapter 2), participatory design dialogue is generated in a semi-formal setting, such that the organization of design concepts are loose.

In the current practice of computer-supported decision making systems, applications primarily include programs for collecting ideas and for classifying, ranking, or rating these ideas. In some computer-based systems, information must be "digitized" so that human actors are able to manipulate information in the systems\(^1\).

In this study, we rule out rating or weighting, because while rating or weighting techniques have their advantages they also create problems. First, when voting is introduced, the states of options are normally poorly described and are illustrated by rough sketches, or elaborated perspectives, representing the future built environment. By using such illustrations as

\(^1\) An example of such systems is the Open Information System (OIS) developed by Hewitt (1990).
options for the voting, we may constrain the orientation of the development of solutions. Second, the description of the options may be manipulated by illusions created by designers' elaborated perspectives. This is partly because "the reality of how an environment looks and is used is often different from how the designer envisioned it (Marcus and Sarkissian 1986)\(^2\)." Third, when an option is voted down, supporters of the option have to modify their goals under a rule of the game, viz., "following the majority". This may create negative effects on another norm, "working cooperatively."

It seems natural to apply voting in democratic societies, but the integration of the needs and wants of the minority is often neglected in the processes that follow after the voting. It is not surprising to see that users are instructed to record their votes on forms, because people generally regard the state of physical objects as the conflict (i.e. voting between the existence of an object, \(a\), or the non-existence of the object, \(-a\)). In such a voting procedure, people think that if they solve the dispute over different options, they have resolved the conflict. Consequently, if people vote down an option, normally a form, they may also vote down certain needs of some participants. This will be the moment when those participants have to decide whether they should stay in the workshop or not.

Voting or rating are effective tools for solving short-term problems (i.e. the immediate need for a decision), but may result in more problems in the long term. To participatory designers, the completion of forms is a goal of their design tasks, while to users it may be just a state of affairs which will lead to the achievement of their goals. In this sense, voting can be seen as a means to achieve designers' goals, not those of users. In sum, arriving at a solution too early in a group planning process may result in negative effects. According to DeSanctis and Gallupe (1987: 592), "successful groups tend to devote adequate time to problem formulation and

\(^2\) Marcus and Sarkissian, in their study of medium-density family housing, compare a perspective drawn by a designer and a photo taken after the project had been built. The perspective shows a common open space full of shade threes and twenty-seven human figures, while the photo shows the same view with barren trees and two children. (Marcus and Sarkissian 1986: 122-123)
planning of meeting strategy, whereas unsuccessful groups tend to immediately begin to search for alternative solutions."

With this in mind, we suggest not to rush into decision-making, but to draw group members to focus on problem-solving and defining. What a participatory designer needs to know from the participatory design workshop is a problem, not a solution. The designer needs such a clearly defined problem so that he/she can develop solutions based on the descriptions. With clear normative and factual descriptions, the designer may have more freedom in generating a design as the solution.

We re-examine the information processing in participatory design to see how a computer-supported system can better support the human facilitator\(^3\) of participatory design in operating the process in order to gather and reconstruct design descriptions, through which problems can be clearly defined and the understanding of problems can be increased. To develop the technology, we turn to review a category of practical tools developed to manage information processing of group design support systems (GDSS).

**5.1.2 Group decision support systems (GDSS)**

"The need to improve group decision making is of long-standing concern to organizational researchers, having strong practical as well as scientific relevance. Within this tradition, there is growing interest in group decision support systems (GDSS), which combine communication, computer, and decision technologies to support problem formulation and solution in group meetings." (DeSanctis and Gallupe 1987: 589). Current methods\(^4\) of GDSS

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\(^3\) Here we draw a distinction between "facilitator" and "participatory designer". A facilitator is the person who organizes and operates a participatory design process. A participatory designer can also be the facilitator but he/she is also responsible for developing the design that is under discussion.

\(^4\) For an overview of decision issues and existing software, see Jelassi & Foroughi (1989).
are categorized in the following three levels:

1. those that are facilitator driven with no computer support,
2. those that are facilitator driven but involve real-time computing that is integral to the activity of the group, and
3. those that involve direct keyboard entry from members of the group (Eden 1992: 200).

In this study, we developed a support system called the dialogical system (DS). It includes a structure of information processing in participatory design and a working system called the distributed information-processing system (DIPS). This study contains both the properties of the first and the second levels. The system is an interactive system driven by facilitators and can be developed for direct keyboard entry by participants in remote locations. Its development is based on two main concepts: 1) the result of participatory design is about acceptability, not optimization, and 2) the task of decision-making can be supported, not replaced, by machines.

**acceptability, not optimization**

The system does not provide optimal solutions. The nature of conflict resolution in a group situation is that although individuals might be looking for the optimal solution according to their own interests, the group as a whole is looking for an acceptable solution. This acceptable solution is not necessarily optimal to each individual in terms of serving his/her own interests. However, it is considered acceptable by the group as a whole. The system also does not include rating or voting, because the output of the dialogical system is a set of definitions of goal and actions to achieve the goals, instead of a set of concrete design solutions.

This study does not only focus on the decision making process, but focuses on the problem of defining, and the description of the possible solutions and the criteria of the solutions. The choice depends on the social factors of the process, such as personal preference. The aim of the system
is to reduce conflict by bringing the focus of discussion toward concept design rather than parametric design.

*process support, not solution driven*

Most current decision support systems (DSS) are solution driven, where "the computer calculates a proposal, indicates an equitable agreement, or suggests negotiation strategies" (Carmel et al. 1993: 33-34) and quantitative components are provided. As opposed to these approaches, the dialogical system is a system for process support. Such a process support system addresses two dimensions that solution-driven systems do not: enriched communication channels and cooperative work (Ibid.). In addition, relevant design precedents can be retrieved, demonstrated and marked. This can prevent misunderstandings and can provide a basis for further manipulation of design precedents.

The construction of the Dialogical System is based on computational theory which intends to specify, in explicit terms, the design problem that the device deals with. It considers multiple points of view, the information that may be available, the beliefs of the participants involved in the process about the problems, as well as their understanding about the beliefs of the others of the problems, the agreements and disagreements, and the information required to solve such problems, etc.

**5.1.3 Structure of the Dialogical System**

In this section, we use a computational model to examine the structure of the DS. Through this approach, we can clearly define input, output, the mechanism, and the belief systems of the dialogical system. Moreover, the relation between the dialogical system and outer information systems can be understood.
5. A Dialogical System of Participatory Design

**Figure 5-1** Input, output and the mechanism of the dialogical system

**input, output, and the mechanism**

The input of the dialogical system is participatory design dialogue generated at a face-to-face discussion. This information may be in many different forms, e.g., words, photos and drawings. The mechanism is performed by facilitators, who operate a computer support system, viz., the Distributed Information-Processing System (DIPS). The output is a collective set of a design discourse, which can be a joint plan or a set of statements. (See Figure 5-1.)

**Figure 5-2** Interactions and supports of belief systems

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belief systems

The knowledge bases of the system is the beliefs of the users and facilitators. These beliefs are constantly interacting. (see Figure 5-2). Users and professionals are learning from each other through the dialogical interaction. They gain knowledge and modify their beliefs. This is the centre point of such participatory design. If people refuse to change their beliefs, refuse to learn from others, then the condition will move back to conflict negotiation. According to Coombs and Avrunin’s study of the structure of conflict (1988), conflict is resolved by 1) finding a higher common goal, and 2) making trade-offs between individual goals (see Chapter 4). In participatory design, conflict can be resolved through the participants’ learning other parties’ beliefs and redefining their means to ends.

an open system for learning

Dialogical systems have the character of open information system (OIS). OIS, as is defined by Hewitt (1991:79), "are always subject to unanticipated outcomes in their operation and which can receive new information from outside themselves at any time." In participatory design, knowledge is exchanged intensively and the state of individuals’ beliefs stored in their cognition which is called, "hot cognition" (Abelson 1963), "short-term memory" (Dijk 1984) or "working memory" (Baddeley 1974, 1983, Mayes 1992), is constantly changing. In participatory design, most participants have not experienced such a group design before. Most of them do not act strategically. They have not deliberately planned and then react in following their plan in the discussion. Instead, although they have certain prototype reactions to certain situations, they are only prepared to talk about things that concern them.

Most problems in participatory design are so-called "wicked problems" (Rittel and Webber 1974: 35) that have no stopping rules. The Dialogical System itself does not indicate when the end of an operation
occurs. It is human operators who decide when to terminate the process. Decisions are made not because there is a true solution but because there is an acceptable result. The knowledge necessary to evaluate the resolution relies on the interaction of beliefs or the influence of outer information systems (e.g., the election of the mayor, the economic decline, fund exhausted or budget cut). (See Figure 5-3).
5.2 Distributed system

In participatory design, redistribution, is a popular term used in the 1960s and 1970s. It refers to "power redistribution" (Arnstein 1969: 217) and of enabling the powerless to be included in the political and economic processes (Arnstein 1969: 216). The traditional top-down decision-making process is criticized for having ignored the right of those who would be affected by those decisions. Based on the notion of this redistribution, the bottom-up decision making process has been developed as an extreme counter act to the top-down process. Therefore, the term distribution in participatory design generally refers to the art of dividing the power of decision-making.

However, "distribution" in our study refers to a technical term applied in a distinct sub-field of artificial intelligence, known as distributed artificial intelligence (DAI). (See Section 1.3.2). In this section, we introduce our development which includes the FACILITATOR model and the distributed information-processing system (DIPS).

5.2.1 Intelligence of the FACILITATOR

We first make a distinction between the two terms, facilitator and FACILITATOR. A facilitator is the human agent who facilitates the participatory design process, while a FACILITATOR is the entity of human agents and computers which operate collaboratively in order to facilitate the participatory design process.

As we have seen in our case study (see Chapter 2), when a facilitator performs in a decision group, he/she is intensively processing information: He/she has to receive, to represent, to inquire about, to provide, to analyze, and to summarize information. In addition to the six group activities — problem definition, problem analysis, information gathering, developing alternative solutions, assessing the alternatives, and choosing (see 4.1.4) — we further examine the cognitive activities of the
facilitator that are applied to operate the group activities. These cognitive activities of a facilitator can be shared or supported by other human agents, or they can be supported by computers when human agents and/or computers apply their knowledge to operate these seven functions collectively, they are performing as an entity. We call this entity the FACILITATOR.

We have divided the function of the facilitator into seven sub-functions and examine how these sub-functions can be operated concurrently by multiple human agents and/or supported by computers. Our intention is to control the quality of the FACILITATOR by distributing and supporting these tasks. In this study, we assume the task of the FACILITATOR is to produce a collective set of design guidelines — including texts and drawings that are generated by the group — through a step-by-step mapping. The quality of the result depends on the training of the agents of the FACILITATOR. Of course, there are also many other factors that will affect the result of participatory design, such as the nature of the design project, the knowledge and beliefs of the users, the process of the participatory design, etc. In this study, we focus on how to improve and control the effectiveness of the FACILITATOR. We try to answer questions such as: What tasks this entity, the FACILITATOR, performs? What knowledge does the FACILITATOR need in order to perform? How is information transmitted between the FACILITATOR and the users? How does this interaction influence belief systems of the facilitator and the participants?

In a real participatory design situations, the FACILITATOR has to open the process, guide participants to perform those six group activities and, at the end of the process, summarize the result — agreements and/or disagreements that are understood by all participants — of the meeting. Between the beginning and the end, the FACILITATOR has to answer questions, ask questions, analyze information and transfer information inside

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5 This is called being "context sensitive" by Olsen (1982: 23).

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the FACILITATOR itself⁶. As is seen in our case study (see Section 2.4.1), participatory designers have to operate the seven sub-functions:

- receiving (RC)
- representing (RP)
- inquiring (IQ)
- providing (PV)
- analyzing: classifying (A-C) and locating (A-L)
- summarizing (SR)
- controlling (CT)

**receiving (RC)**

The FACILITATOR receives verbal words or visual drawings. The human agent not only listens to the dialogues and watches the drawings, but most importantly, observes the actions and interactions of making dialogues and drawings. These actions and reactions also have meanings. Sitting in the same meeting room with participants, the human agent can observe these behaviours. This function requires only a low level of human cognition, but it is a challenging task for machine-based group problem-solving systems. By listening to the intonation and watching the behaviour, a human agent can easily receive the message that, "the utterer does not agree with the fact that other people wanted to build what is shown on the photo in his hand."

**representing (RP)**

Verbal representation is carried out by human agents, because human agents can better understand statements uttered by other human agents in the complex process of dialogue interaction. To represent statements transposed

⁶ Here we refer to the communication between human agents, between human agents and computers, or between computers (Rosenschein and Zlotkin 1994). How information is transmitted inside a human agent — how one I talks to another I (Hermans and Kempen 1993) — is beyond the scope of this study.
from voice to text, human agents have to understand and then interpreted. The process requires full control and understanding of the semantic, syntactic and pragmatic constraints of the dialogue. (See Section 4.1.3). For example, imagine in a real discussion situations, one participant grasps a photo taken from the table, and, pointing at a corner of it, and says to the FACILITATOR, "This is what we want to build." The human agent can understand such an situation requires more easily than the computer. However, the computer can better support the human agent to represent the concepts expressed in that statement.

**analyzing: classifying (AC) and locating (AL)**

The understanding of the information generated by participants is based on the inference processes of the human agent. In our system, the analysis of verbal descriptions is also operated by human agents, because human agents can better understand natural language than computers\(^7\). Furthermore, in a face-to-face discussion, the human agent can confirm his analysis by making confirmatory statements with the utters of statements. Thus, the possibility of misinterpretation can be reduced.

**inquiring (IQ)**

The FACILITATOR needs to inquire after two kinds of information, the information that continues and expands the dialogues, and the information necessary to start a new dialogue. Most dialogues are incomplete argu-

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\(^7\) An extreme argument related to this is made by Winograd and Flores (1986: 107) that, "computers cannot understand language." Here we also refer to a philosophical problem, "what computers cannot do." See Dreyfus (1979). As is said by Reichman (1985: xi), "There are two problems confronting us before we can make a computer understand our everyday language: 1) getting the computer to think and 2) getting the computer to know the rules of a particular language.
ments. The FACILITATOR needs further clarifications of the dialogue for its analysis. Such information is of three types: factual reasons, norms towards form, and norms towards performance. The second kind of information inquiry is the question to start a new dialogue.

**providing (PV)**

Design precedents and quantitative data are two kinds of knowledge base pre-stored in the FACILITATOR. The FACILITATOR has to provide precedents as examples that will help to lead the discussion. The facilitator has to know when and what precedents are needed. The application of architectural precedents at this stage is a case-based reasoning process. The FACILITATOR provides as references cases relevant to the situations at hand as references. In the Dialogical System, the FACILITATOR provides the main mechanism, the inputs are the dialogues of the participants, the outputs are the design guidelines reconstructed by the FACILITATOR, and the knowledge for this mechanism includes the reasoning of the participants and the FACILITATOR.

**summarizing (SR)**

Summarizing is the conclusion of the result of the participatory design dialogue. This function is accomplished by human agents. A skilful human agent can summarize the result in such a way that it may be accepted by most of the participants. A well-structured design discourse serves as a visible map for the human agent to operate this function.

**controlling (CT)**

Controlling is a meta-function that controls the processing of the above six

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8 For the definition of a complete argument, we refer to Toulmin (1958). See Section 4.3.2.
functions. If there is a conflict between two functions, this function should operate and resolve the conflict.

5.2.2 Distributed information-processing system

The FACILITATOR that operates the participatory design process is composed of a group of intellectuals who work concurrently in the distributed information-processing system (DIPS). The DIPS is a synchronous, distributed system that supports participatory design processes under the framework of the Dialogical System. We use the mind of the human facilitator as an analogy to define the actor, the FACILITATOR. The DIPS is the computer mechanism operated by the actor.

In an ideal situations, there are seven agents in the DIPS system. Agent RE (i.e. the agent who performs the function, receiving) listens to the discussion and abstract statements, agent RP represents verbal dialogues in the form of text and labels relevant graphics, agent IQ asks questions, agent PV provides information, agent AC-AL analyzes information and constructs design dialogues, agent SR summarizes the result of the discussion. When these functions are performed by one human agent, whether there is communication between different selves — while each self may play a different role during internal dialogue interaction — is under philosophical discussion (Hermans and Kempen 1993). However, when there are separate agents performing together, such activities are explicit. That is, one agent has to communicate, through certain forms, with other agents.

This communication can be carried out by team members who share certain cognitive structures. In such situations, a short phrase, a smile or an exchange of eye contact between two human agents may refer to a series of actions. Take military action as an extreme example: when a command is given, certain actions that are stored as packages are processed. In everyday life, we perform certain routine actions under particular "commands". Concepts developed to describe the relation between actions and situations include, "schemata" (Rumelhart & Ortony 1977), "frame" (Minsky 1975),
"scripts" (Schank & Abelson 1977), or "knowledge structures" (Dijk & Kintsch 1983). Although different people may perform differently to the same command⁹, members of a homogenous group can perform similar actions because they share the same belief systems (see Section 4.2.3). In a cooperative team, team members can anticipate what the others may perform in response to certain commands. As Dijk and Kintsch (1983: 47) have said, a person's "knowledge must be organized in packets, [such] that it cannot be represented simply as one huge interrelated network of nodes, but [such] that there must be subsets of that network that can function as wholes."

In this study we rule out the situations where conflict occurs between agents of the FACILITATOR because this can be obviated when developing a FACILITATOR for a particular project. If agents of a FACILITATOR share sufficient cognitive structures for the cooperative work, then the conflict about the method can be avoided.

5.3 Dialogical system in use

In order to make the DS more comprehensible, we describe the possible applications of our development in participatory design situations. In this section, we first sketch the computer environment of the DIPS tool in order to examine the extent to which computer technology can support the information processing of the dialogical system. Second, using this conceptual model of computer-supported technology — the DIPS tool — as a presupposition, we describe several participatory design situations, in which we demonstrate how the information processing in a DS works and

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⁹ For example, in a role-play game, roles are assigned by short commands, (e.g., "You play the role of the developer."). The game players understand these commands, which is based on their knowledge about the content of the roles in the given situation. In everyday life, if a fireman enters the room and says, "There is a fire in this building," we know how to react to this "command".
how the operation of the FACILITATOR works.

![Structured Discourse](image)

*Figure 5-4 A sketch of the computer environment of DIPS tool*

### 5.3.1 Computer environment of DIPS tool

The DIPS tool provides an environment where members of a FACILITATOR can communicate with each other through the dialogical system. In a face-to-face discussion, the communication between agents of the FACILITATOR should be efficient since they share the belief systems for the operation. The working environment of the DIPS tool contains four main windows: the Participants window, the Facilitator window, the Library window, the Descriptions window and the Structured Discourse window.
A Dialogical Model for Participatory Design

(See Figure 5-4).

Participants window.

Participants' statements are typed into this window in the form of natural language.

Facilitator window.

The FACILITATOR's statements appear on this window also in the form of natural language.

Library window.

Images can be retrieved onto this window from a library of precedents or through scanners. Tools for the editing and labelling of these images are necessary so that these images can be linked with particular dialogues in the dialogical windows or with statements in the discourse window.

Structured discourse window.

Dialogues on the Participant window are analyzed and located in this window. The window is a hypertext-based tool, such that text is organized by and can be retrieved from a non-linear process. New statements can be located at any part of the structure and viewers can browse through these statements starting and ending at any point on the structured discourse.

5.3.2 Development of the dialogical system

We use three scenarios to explain how the FACILITATOR model and the DIPS tool can be applied to participatory design situations. In these three scenarios, organizations of FACILITATOR and the DIPS tools are designed
differently and are based on the setting of the DS (i.e., the scale of the participatory design and the degree of participants' involvement.) These three scenarios correspond to the three levels of the development of GDSS defined by Eden (see Section 5.1.2).

![Figure 5-5](image)

**Figure 5-5** An information processing system of current approaches

**scenario one: facilitator driven without computer support**

The FACILITATOR in this first scenario is one agent who works with a small group of participants without the support of a computer. In this case, the human facilitator has to operate all of those seven functions (see Section 5.2.1) in order to process information in a participatory design dialogue. He/she has to rely on his/her personal knowledge for all these operations. When further information is required, he/she may have to request information from other sources, (e.g., documents about the project, books with photos of other design projects, photos of the site, etc.) Or, the human facilitator may have to consult with other facilitators for more information.

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This kind of informal information exchange is a common scene in current participatory design workshops. (See Figure 5-5).

Figure 5-6  Applying DIPS to participatory design

scenario two: human facilitator driven with computer support

In a meeting room, human facilitators operate as a team with the support of technology, such as, overhead projector, slide projector, computers, videocamera, etc. Information is more organized and can be better controlled by the facilitators. Facilitators share the seven functions, as mentioned in Section 5.2.1, and computers are applied to support certain functions and are part of the FACILITATOR. (See Figure 5-6). Images, drawings and photos can be scanned, stored, reviewed through the support of computer technology. moreover, corresponding descriptions, either normative or factual, can be attached to the graphics.
A team of human facilitators, with a few team members, operating in a meeting room with the support of multi-media technology. Participants can input directly through keyboard entry. (See Figure 5-7).

5.4 Concluding remarks

The seven functions are divided into several sub-tasks and are operated by several agents on different computers. The systems provide recording and analyzing functions that can formulate the discussion of participatory design simultaneously, while in current participatory design the tape recorder or video camera is used to record the conversation but the analysis of the
dialogues always takes place separately and the result is not satisfactory. The old process is time consuming and ineffective. With this dialogical system, design concepts can be analyzed alongside the discussion.

Communication is an important part of information processing in the participatory design process. People reason through dialogical interactions in the process. Design decisions are the result of these dialogical interactions. In the dialogical systems an efficient and effective computer-based dialogical system to support these interactions can improve the process in many respects. According to Heintz (1993: 9), an ideal GDSS environment should support three primary tasks:

1) accounting for who is participating in what meeting or discussion dialogue.
2) allowing for the sharing of meeting information among all individuals that are logged into a meeting.
3) making available to meeting participants a variety of software tools or applications to enter, display, and analyze the meeting-related information.

The computer-based system supports the management of the information across many independent processes for both individuals and the group in total. We do not attempt to develop a self-contained GDSS tool. In current participatory design, information is processed independently. In some cases, participatory designers work as a team. In the team each participatory designer is a sub-centre for information processing. Apart from the process with user participation, participatory designers communicate, share notes, and exchange information in order to create consensus between themselves.

Summary

In this chapter, we have presented our development for a support system for group planning, viz., the dialogical system. The dialogical system draws
knowledge from existing group decision support systems (GDSS), and is structured on the basis of a distributed information-processing system (DIPS). The two main developments of the dialogical systems are the FACILITATOR model and the DIPS tool. Despite the lack of actual implementation of the dialogical system, we have developed the necessary computer-supported environment of the system, which can lead to further realization. The next question to be answered is: What particular problem in group planning can be solved through what means? In the following chapter, we will examine one particular, and practical development of the dialogical system, viz., the framework for participation-based design guidelines.
A Dialogical Model for Participatory Design
CHAPTER 6

A FRAMEWORK FOR PARTICIPATION-BASED DESIGN GUIDELINES

In chapters four and five, we developed a group-reasoning model and a dialogical system of participatory design. In this chapter, we now turn to the technical development of a practical tool, viz., a framework for participation-based design guidelines (PBDG). We also develop a working system called the PBDG tool. The PBDG tool is a rigorous analytical framework for reconstructing participatory design dialogue into a structured discourse — a set of design guidelines. The overall process of participatory design can be long and complicated or short and simple (see Chapter 3). In this chapter, we focus on the structuring of the result of the participatory design process. We review domain problems, the state of the art of design guidelines, and discuss the PBDG tool.

6.1 Participatory design discourse

A well-organized group discussion may result in a preferable discourse, while a poorly organized one may only be a waste of time. Thus, a good method to support the discussion is very important. The framework for participation-based design guidelines is a rigorous analytical tool for
reconstructing participatory design dialogue into a set of design guidelines. It is a computer-supported method for mapping and reconstructing normative and factual descriptions and the relations between them\(^1\). With a semantic representation of a normative system designers can always refer to the system to see whether the design work at hand is following the given guidelines or, if there is conflict, what judgements to make.

In our literature review of the development of analytical tools for natural language, we found that many researchers move towards representation or computer algorithm of language (e.g., Hewitt 1990). In this study, we have decided to us ordinary text to represent language so that the participants can easily understand how their dialogues are processed. The development of our technology is based on the assumption that qualitative aspects are the main concern in participatory design. Since language is the main tool for communicating these qualitative aspects, and human agents — in our case, non-professionals — are the main actors in the operation, language should remain in a form which is close to the natural state of language so that with these representation as a basis human agents can easily understand and communicate\(^2\). Moreover, in developing the framework, we focus on pragmatic purposes — how a framework can support the operation of participatory design — rather than a philosophical discussion — what the true framework of such design discourses is.

### 6.1.1 Domain problems

The outcome of a participatory design workshop may be examined differently from different perspectives. The attitudes toward the "product-process relation" of the design process may also vary. In general, participa-

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\(^1\) For studies related to semantic representation, see Minsky (1975), Schank & Abelson (1977), Wilensky (1983), Hewitt (1991), and Gasser (1991).

\(^2\) We refer for this qualitative approach to the study of natural language to Dehlinger & Protzen (1972), Pollack et al. (1982).
tory designers are more concerned about whether the information collected or the design schemes generated from a workshop are useful for further development or not, while user are more concerned about whether their concepts will be taken into consideration in the design. Many methods have been developed to transform design concepts into forms. There are several assumptions:

1) To organize a participatory design workshop requires the employment of many social activities such as gathering the participants together finding a proper place for the meeting, arranging equipment, recruiting professionals (designers, social workers, students), applying for subsidies. These social activities involve instability and uncertainty, and thus lead facilitators to maximize the outcome of every participatory design workshop. Therefore, it is reasonably important for facilitators to encourage — or to help — users to produce a design scheme as early as possible.

2) In many cases, designers are also the facilitators of the participatory design workshop. They are responsible not only for the process of the workshop but also for the result of the design which will be implemented in the future. Therefore, if a final design can be built as authentically as the design which was generated in a workshop, then the responsibility of the designer is shared by or shifted to the user³.

3) Since participants in a workshop are representatives of a community, if a design is accepted by these representatives it is likely to be accepted by the community once the design is implemented⁴.

4) In participatory design, designers — especially architects — have

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³ For example, facing criticisms of their design, participatory designers may say, "We know the design generated from the participatory design workshop is terrible but it was designed by users."

⁴ For the representativeness of the opinions of public meetings, see the study of Gundry and Heberlein (1984: 175-182). They conclude that three things they have done in their study helped produce representative meeting results: "First, the meeting were easily accessible to all interested group. Second, an effort was made to identify and inform the relevant publics." and "Third, the opinions of people attending the meeting were measured by ballot or questionnaire." (Gundry & Heberlein 1984: 181).
a passion for producing objects, and while everybody else speaks with words the designer speaks with forms. Participatory designers are normally anxious to see how design concepts are transformed into forms which are the language with which they are familiar with.

6.1.2 The output of participatory design processes

In this study, we regard the output of a participatory design, as well as all design, as a set of the prescriptive statements, including verbal and graphic statements, of a design project. As said by Kernohan et al., "for the design and management of facilities to be responsive to the changing needs of users and providers, there is a need to integrate the knowledge both hold, and that such integration only occurs through dialogue." (Kernohan 1989: 137-138). In participatory design, users are the main agents who utter. "Users' experience and understanding of buildings are important, because they have direct meaning for them and affect the way they use a building. It is informal knowledge, not easily accessed and generally not recorded." (Kernohan 1989: 139). Drawings or sketches can be used as graphic statements to prescribe a plan. However, compared to verbal statements, they can be more easily misinterpreted if descriptions of these graphic statements are insufficient or ambiguous. Also, graphic statements mostly do not carry

5 M. Van Den Berg, a SAR related architect, made this comment in Leuven Seminar on Participatory Design. "Politicians are using words, and architects are using drawings, so their languages differ." (Schreurs et al. 1981: 61).

6 In a community design project organized by C. Moore and J. Burns in 1990 at Dallas, Texas, facilitators set up a brainstorming exercise where participants were asked to state their ideas with drawings. J. Burns literary asked participants to draw as if the designers in the workshop could not understand words. Recorded from the workshop by the author.

7 "In the context of design we have statements that are verbal and those that are graphic. A text referring to the spacial organization of a building is made up of verbal statements, whereas a portfolio of drawings of a building consists of graphic statements." (Tzonis et al. 1978: 4).
reasons or grounds that can be useful for further adjustment if changes of social context should occur. In the research, we limit the graphic statements because:

1) an unspecific graphic (a rough sketch or a picture with many objects) can be interpreted in many different ways which can result in ambiguity and be misleading, and

2) a detailed graphic (a single object photo or a design plan) implies a fixed form that may make further negotiation or modification difficult.

For instance, when a designer at the second stage sees a picture of a scene at Miami Beach pinned on the plan of a recreation centre, how can the designer judge the norm behind the picture? Does it mean that the atmosphere, the palm threes, or the volleyball field is prescribed? Even the participants may interpret this picture differently. A picture has the characteristic that people interpret it differently, while a rough sketch leaves many possibilities and much uncertainty for the designers.

However, a single-object photo is a fixed design solution. The reason for choosing the particular object is not included and the result of not applying the solution is also untraceable. What should the designers do when there is a contradiction or a possible alternative? An alternative is an alternative only if the alternative maintains the "good" but improves the "bad" of the original solution. The problem is, what norm or norms are guiding the criteria of the solutions? Is it cost, aesthetics, privacy or some other norms?

Our point is that the product of participatory design should be a set of design guidelines that includes normative and factual verbal descriptions generated collectively by the participants. Graphics can be included as references only when the relations between the verbal and the graphic are clearly indicated. Designers then can take these design guidelines and integrate them with 1) a given architectural programme, 2) site analysis and 3) their professional knowledge, to develop the design. As long as the designer does not violate these design guidelines, she/he can design in a
traditional non-participatory process (i.e., a hierarchical design process). In such a process, the creativity of designers will not be constrained by design drawings. Moreover, once there is a new input from the outer information systems, designers can easily trace back to relevant information stored in the PBDG to see to what extent the new information will influence the design, and how to make modifications without conflicting with the prescriptions in the PBDG. Thus, the needs and wants of users are taken into consideration and the design project may maintain its holism.

### 6.1.3 The task of participatory design

Participatory design is part of the overall design process. The structuring of design dialogue is a sub-task that contributes to a broad design task. In practice, participatory design can be applied to a design process before or after a design scheme is completed by designers. Or, it can be operated interactively with a professional design team engaged in a design. The design process of a project is determined by methods that are applied to the process and by the social context. In this sense, each design process has its unique feature. "A normative decision process cannot be established for all groups" (DeSanctis & Gallupe1987: 592). However, we can understand a design process by examining certain activities of the process.

To most participatory designers, for practical reasons, there is a start and an end to a project. In terms of the "problem setting" (Schön 1983: 40), participatory design is treated more like a technical problem than like a social problem. Technical problems can be solved while social problems are never solved (Rittel & Webber 1974: 33). At the beginning of a participatory design process, there is given information including an architectural

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8 Koberg et al. (1972) have defined four models of design process: linear, circular, feedback, and branching. These models include seven design tasks in the design processes. These tasks are: accept situation, analyze, define, "ideate", select, implement, and evaluate. For solving technical problems, a design process tends to start with a given situation and end with an evaluation.
programme, the opinions of the users, reports on site analysis, etc. At the end of the process, there is the output, viz., the design discourse. In this study, we propose a DIPS tool to construct the natural language into a structured discourse (see Chapter 5) which is a collective set of design guidelines. In the next section, we examine the structuring of the structured discourse, viz., the design guidelines.

6.2 Information management for design

Design guidelines are normative descriptions about what a design ought to be. They are categorized or structured in such a way that they can be used by professional designers as the programme of their design tasks⁹. According to this definition, a book with selected design projects may be used as a reference for designing though it may not contain design guidelines.

Here we examine types of design guidelines to see what the drawbacks and advantages of these different types of design guidelines are. We review different types of design guidelines as they are used to communicate between different agents of the design process. Through this critical review, we point out problems that need to be improved in order to develop a proper form of PBDGs. We then review a computer-supported information system, IBIS (Kunz & Rittel 1970; Rittel 1971, 1972; Dehlinger & Protzen 1972; Mann 1972) and its related developments, gIBIS and itIBIS (Conklin & Begeman 1987, Yakemovic & Conklin 1990). Our intention is to draw knowledge from these precedents to develop the framework of PBDG.

⁹ Such references are normally given to the designer by others.
6.2.1 Types of design guidelines

In the early 1970s, design guidelines in architecture were used merely in regulating the visual environment. "These control exterior design and road layout in private housing developments. Growing concern for conserving local vernacular architectural styles and townscape philosophy of urban design influenced the development of design guides..." (Marcus & Sarkissian 1986: 5). Throughout the history of the development of the design guidelines, design guidelines have been drawn up and used in different situations in design processes. Design guidelines can be planned for particular design projects, for designs that have similar characteristics, or for all design projects.

To understand the internal relations and the types of design guidelines, we consider a key dichotomy in how design guidelines are made and used: 1) agents who plan and give guidelines and 2) agents who receive and use guidelines.

<table>
<thead>
<tr>
<th>users of design guidelines</th>
<th>planners or providers of design guidelines</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>client</td>
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<tr>
<td>users of design guidelines</td>
<td>client</td>
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</tr>
<tr>
<td>user</td>
<td>--------</td>
</tr>
<tr>
<td>professional</td>
<td>2. architectural programmes</td>
</tr>
</tbody>
</table>

Figure 6-1 Conceptual map of types of design guidelines

The types of agents who are involved in planning or using design guidelines include: the client, the users of the built environment and the professionals, including designers. (See Figure 6-1). In the table, there are nine cells but we are only interested in the guidelines related to the professional. Other
guidelines planned and used by other agents (e.g., a user's manual provided by the client or the designer to users) are beyond the scope of this study.

**Cell 1. Checklists for building evaluation.** Such measuring checklists are planned by professionals and given to the users.

**Cell 2. Architectural programmes.** They are given by the client and used by the designer.

**Cell 3. Participation-based design guidelines.** In participatory design, design guidelines are stated by the user and are used by the professional. The design guidelines of participation are mostly loosely structured.

**Cell 4. Design guidebooks.** They are planned by professionals and used by other professionals.

This division of design guidelines corresponding to the relations between the planner and the user of the guidelines is not absolute. This is because there is a distance between intention and actual situations. In practice, architects rarely apply design guidebooks written by other architects as direct references for their design. Also, design guidebooks written for the layman are not used as the writers anticipate. Take *A Pattern Language* (Alexander et al. 1977) as an example, the authors' intention was to write a design guidebook for the layman, but most users use their own language in designing.

The purpose of making these distinctions is not to establish a boundary between different kinds of guidelines, but to develop a conceptual map for linking different types of design guidelines with their contexts. **Cell 3** will be discussed in a later section. We now select three other types of design guidelines from Figure 6-1 for further investigation. They are: checklists of building evaluation, architectural programmes and design guidebooks.

**checklists of building evaluation**

Building evaluation, also known as Post-Occupancy Evaluation is a stage in
the building process that follows the sequence of planning, programming, design, construction, and occupancy of a building (Preiser et al. 1988: ix). "POE focus on building occupants and their needs, and thus they provide insights into the consequences of past design decisions and the resulting building performance." (Preiser et al. 1988: 3).

The concept of evaluating building performance is a product of the mid-1960s when people started to identify problems created by professionals — including architects. People started to question whether architects really understood people's needs, and whether the built environment could satisfy these needs. The quality of design was considered to have multiple criteria. The "performance concept" was first introduced into architecture by Eberhard (1965). It came from the analogy of analytical evaluation of the performance of behaviours, qualities, and accomplishments of people with things such as batting averages, horse racing odds, or stock market averages (Preiser et al. 1988: 31). For early attempts in building evaluation, see Osmond (1966), Sommer (1969), Hall (1966). Later developments of POE have included large number of tools for quantitative evaluation (see, for example, Preiser et al. 1988: 157-183).

A typical tool for the application of these evaluations is a set of checklists for grading the importance or level of the performance (e.g., REN 1992). Such evaluation checklists and related tools can be designed in many different forms, but the spirit of building evaluation is similar — to examine the performance of the building. Such checklists are normally formulated to include aspects which are related to a particular built environment. As said in the REN (1992: 11), they are a kind of measurement

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10 According to Schöen (1983: 9), in the period between 1963 and 1981, "the expression of lagging understandings, unsuitable remedies, and professional dilemmas has become the norm, and the note of triumphant confidence in the knowledge industry is hardly to be heard at all." As was pointed out by Osterman and Gross in 1973, professionals claimed to have contributed to social well-being, to have put their clients' needs ahead of their own, and to hold themselves accountable to standards of competence and morality; however, the professionals were criticized by both popular and scholarly critics for serving themselves at the expense of their clients, paying no attention to their obligations to public service, and being unable to police themselves effectively (Schöen 1983: 11-12).
method that "enables objective discussion of real estate quality based on an as comprehensive a list as possible of selected quality aspect definitions."

**architectural programmes**

Architectural programmes can be used as agreements between the client and the architect. Such programmes may be proposed by the client or by the architect, or planned by the client and the architect together. Once the client and the architect have agreed on the programme, they are bound by the programme. In this sense, an architectural programme includes a package of norms (see Section 4.3.1) that are shared by the parties who are involved in planning the programme.

The process of planning a programme is called programming. A detailed programme may have a vast amount of information including: programming and space determinations, codes and land use restrictions, functional considerations of building types, influence of site conditions, cost estimating and budget analysis, organization concepts, sociological and psychological aspects, and design and construction scheduling (Kemper 1979). A recent concept on architectural programming is to treat it as an "information management for design" which focuses on a step-by-step process for the gathering and organizing information as well as on how to create and present a programme document (Duerk 1993).

We see the process of architectural programming as that of defining a problem, because the main goal of programming is to define the problem agreed on by both parties, which the design must solve (Kemper 1979: 145). Therefore, a well-planned architectural programme serves as a clearly defined problem so that the client and the architect can refer to this set of agreements in following processes.

In general, architectural programmes are descriptions of how design projects ought to be. Both parties, especially the architect, have to follow this agreement. In this sense, a programme also has the function of a higher command. Information provided in the programme supports this higher command.
design guidebooks

Design guidebooks are formally, and structurally, organized architectural knowledge for making architecture, which mainly focus on qualitative aspects of the built environment. The Image of the City (Lynch 1960) and Team 10 Primer (Smithson 1965) are two early attempts that focus on finding alternatives and developing the criteria of the quality of design. These books propose lists of requirements which would be called later "design guidelines".

Major work about design guidelines has been done to a certain degree. A good example is the design guidelines of social housing in the Netherlands. The most well-known work about design guidebook in the architectural world is certainly A Pattern Language (Alexander et al. 1977). This guidebook is designed as a handbook providing many architectural precedents and principles, which are called "patterns" by Alexander and his colleagues. This book draws from an earlier guidebook, Community and Privacy (Chermayeff & Alexander 1963).

The work of Chermayeff and Alexander is perhaps the earliest guidebook with itemized requirements. They propose develop a process to link between vague information and physical design. This process will help clarify the problem and permit the development of automation. It was the first attempt developed to reduces the problem of vague, or complexity, of the design problem.

On the other hand, the attempt of A Pattern Language is to design a guidebook as a standard language which may allow any lay person or group of persons to design any part of the environment for themselves. The main concept of the application of such design guidebooks was that users can select relevant patterns as references for solving their own design problems.

11 "Each pattern describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice." (Alexander et al. 1977: x).
Influenced by Alexander, in another recent design guidebook called *Housing as if People Mattered*, Marcus and Sarkissian develop design guidelines for medium-density family housing. It addresses not only "site planning issues, but design guides approach the quality of housing environments from a primarily aesthetic perspective, as defined by professional designers and planners." It also addresses "the quality of housing environments from a social perspective, as defined by residents." (Marcus & Sarkissian 1986: 5). However, their work is based on a more objective method, viz., post-occupancy evaluation.

### 6.2.2 Problems of design guidelines

In developing the PBDG tool, we draw from existing developments on design guidelines as our precedents. Based on this assumption, it is important to understand problems that need to be improved and how to improve them. These problems may not be problems in serving the original purposes, but if we want to develop a model based on knowledge drawn from these existing models, it will be valuable to point out things that need to be improved in order to develop a model to serve the purpose of participatory design. Through this comparison and analysis, we develop a clear picture of the requirement for the development of the PBDG tool.

**Problem 1: contexts of design patterns**

Many handbooks of design guidelines contain design cases. These cases are drawn from actual design projects where architects' personal judgement has been exercised (e.g., Lynch 1960, Alexander et al. 1977) or through objective post-occupancy evaluation (e.g., Marcus & Sarkissian 1986). However, many design guidelines appear unreliable when they are applied to contexts which are different from the contexts from which these design guidelines are abstracted.
**problem 2: criteria of selection in design guidebooks**

Perhaps the one major attempt that is made in design guidebooks is to answer the question, "What is the quality of design?" In Alexander et al. (1977), the authors try to answer this question in a broad sense, which includes the quality of towns, buildings and construction, while Marcus and Sarkissian (1986) scale down to a particular type of architecture, medium-density family housing.

However, unavoidably, most of those design patterns or principles selected and planned are preselected and represented through the eyes of the authors who are architects, or designers in one context. How users, who are perhaps using the guidebook in a different context, can apply these patterns remains obscure. For example, an office room with two windows was considered to have high quality in the 1970s, but, because of too much natural light, these two windows may create problems for people using computers in the same room in the 1990s.

It is clear today that the attempts to generate a priori truths of design quality, whether proposed by the International Style or the Pattern Language, have failed to capture the changing in human behaviour over time and differences of context in space. These guidebooks ignore cultural differences when addressing the local built environment. As a result, such context-free applications can easily create new unacceptable environments. Current developments in design guidelines still maintain the form of a dictionary on the quality of design, which urges the users of these guidebooks to apply these guidelines to their design projects even before the problems have been clearly defined.

**problem 3: selecting design guidelines**

Current design guidelines "leave aside the question of which particular guidelines to follow and how to choose among conflicting recommendations." (Marcus and Sarkissian 1986: 19). Normally when and how to apply a guideline is not clearly indicated and is hence difficult to control. Given
hundreds of design precedents in a guidebook, users tend to randomly select and refer to unfit design solutions\textsuperscript{12}. As a result, conflicts between contradictory concepts are even more difficult to resolve than when applying such guidebooks are not applied. Well-developed design guidelines might be a burden to both designers and users in participatory design.

In practice, users only pay attention to certain aspects of design projects. A holistic consideration of a design project through participatory design is burdensome to users in a participatory design situation. Design guidebooks or the POE checklists contain too many design guidelines for the needs of a participatory design group. It is more practical to guide the users to generate their own design guidelines that are based on their needs and wants, rather than to ask users to select the guidelines their want, or to enumerate guidelines from a given list.

problem 4: individuals' design logic

Different reasoning processes underlie different sets of design guidelines. This is because the various planners of design guidelines operate according to different design logic. As argued in Section 4.2.4 and Section 4.3.4, different people may understand the same phenomena differently: Based on the same ground, they may infer different things. Also, as shown in Figure 4-7, people may decide to apply different actions to achieve the same goal, or consider that different goals may be achieved by the same action. Also, as seen in the case-study reported in Chapter 2, people used different reasons to be for or to be against the same thing. In developing a set of design guidelines, it would be unwise to assume that there is only one system of design logic. It is very likely that the user has a different design logic from that system of the design guidelines. Not only do people perceive the problem of a situation differently, they also generate solutions which are based on different reasoning processes.

\textsuperscript{12} According to this author's experience in participatory design workshops, the user, as well as the designer, also tends to propose objects about which he/she "feels right."
problem 5: analysis versus application

The structures of current design guidelines are more effective in analyzing existing design cases than for application to design. For example, a designer can easily use the structure of the Pattern Language to analyze his/her design, but it would be difficult for the designer to design according to those design patterns.

The structure of an architectural programme lacks such analytical structure. What architectural programmes consist of are either very concrete space determinations or abstract descriptions of the quality of space. Contrary to architectural programmes, design guidebooks have more precise descriptions of the quality of the built environment and the corresponding forms of such quality. Between abstract design norms and concrete forms is the transformation that occurs.

6.2.3 Searching for a dialogue structure

Here we examine the development of a systematic approach to structured design discussion, called the issue-based information system (IBIS). (See Section 3.4.3). The development of computer-based information systems in supporting participatory design can be traced back to the early 1970s. Rittel and his colleagues proposed the structure of an information system, viz., the issue-based information system (IBIS) (Kunz & Rittel 1970, Dehlinger & Protzen 1972). IBIS was originally developed to serve "as an argumentative procedure for decision-making groups to use in the coordination and support of debate over political decisions, including those occurring in planning and design." "The IBIS can be used as a procedure for arguing design, planning, and policy making decisions on any topic." (Grant 1982: 203).

Recent research papers (Conklin & Begeman 1987, 1989; McCall 1987; Yakemovic & Conklin 1990) show that many newly developed projects of information systems reflect the influence of IBIS. IBIS is highly praised in these relative studies. "The IBIS method has been tested and used
for design and planning. It has been shown to be effective in structuring exploratory thinking, providing clarity and rigor on such projects as civic and policy planning." (Yakemovic & Conklin 1990: 106). "...it [IBIS] has shown itself to be useful both in terms of structuring and preserving a complex line of reasoning...and in terms of supporting an explicit rhetorical model..." (Conklin & Begeman 1989: 200).

However, IBIS is criticized in that "...it is easy to smother arguments under mountains of bookkeeping, that the prospect of being frank (and accountable) about one's decision bases can be uncomfortable or even dangerous and may prevent some people from participating in any argumentative planning procedure, and that some people simply find formally structured procedures uncomfortable and/or unacceptable." (Grant 1982: 204). Part of this problem has been alleviated through the recent development of computer-based technology.

Two recent developments of IBIS are gIBIS (Conklin & Begeman 1987) and itibis (Yakemovic & Conklin 1990). gIBIS is a hypertext tool for exploratory policy discussion (Conklin & Begeman 1987). "The goal of GIBIS is to capture the design rationale: the design problems, alternative resolutions, trade-off analysis among these alternatives, and the tentative and firm commitments that were made in the process of the decision-making process." (Lee 1989: 36). itibis was developed to allow the method to be used with "off the shelf" software and hardware (Yakemovic & Conklin 1990: 108). However, comparing these recent developments of IBIS-based systems with the original IBIS (see Section 3.4.3), we see that technical problems have been improved because of the development of computer technology, but the problem of decomposing and reconstructing design arguments is still unsolved.

In addition to the hypertext-based IBIS, there are many other advanced computer-based information systems such as interactive multimedia (e.g., Wiggins & Shiffer 1990), computer-supported cooperative work (e.g., Johansen 1988). These computer technologies are available for supporting cooperative design in engineering and management. Many of these computer-based tools are useful for the collaborative planning process.
because they combine text, graphics, sound, and even video in the support systems. Experts can participate in the planning in different places or at different times.

However, most of these systems are not concordant with the nature of participatory design — the interaction and participation of the users. They inform, but they do not consult the users. In these systems, how and the degree to which the user can participate are ambiguous. Another drawback of such computer-aided drafting systems (Harrison 1993) is that "while much progress has been made in developing shared hypertext environments that support the development of issues and rationale, the structuring of arguments abstracts it from the social fabric where the development of a shared understanding takes place." (Harrison 1993: 14-15). As a result, the improvement of the participatory design process by these computer-based systems is limited due to the highly expert-oriented characteristics of these systems.

6.3 A framework for PBDG

In the distributed information processing system developed in Chapter 4, the input of the system, i.e., participatory design dialogue, is analyzed through the mechanism: the DIPS tool; and a structured discourse is generated as the output of the system. We define this structured discourse as a collective set of design guidelines including verbal description and visual images.

A discussion of participatory design will be overload and become less interesting to the participants if it starts with reviewing a detailed checklist of design guidelines. Therefore, traditional approaches of participatory design tend to start with informal discussion and then lead on to particular problems. One main problem of such approaches, as discussed in Section 3.3.2, is that information is most often loosely organized and ill-structured. For this reason, we need to develop a framework which can support the structuring of design concepts and management of design
information.

In this section, we examine a framework from the representation of architectural knowledge developed by Tzonis (1992), in which he specifies the concepts of performance, operation, morphology and context in design thinking.

6.3.1 The kernel of participatory design knowledge

In Chapter 4, we have introduced a structure for representing design thinking, called a conceptual system, which explains how architectural concepts are generated downwards and justified upwards (see Section 4.3.3). Later development of the conceptual system is a framework for representation of architectural knowledge (Tzonis 1992). In this section, we examine the first three concepts of the framework, which are: performance, operation and morphology. The last concept, context, will be discussed in Section 6.3.4.

The kernel of the framework, the performance, operation and morphology, has been applied to examine architectural thinking (Zandi-Nia 1992, Fang 1993, Li 1993, Yu 1994) and architectural education (Tzonis & Heintz 1995). Here are the definitions of these three concepts:

**Performance** refers to the conditions which a perspective building is intended to bring about, or the degree to which a scheme of building brings these conditions about (Tzonis & Heintz 1995).

**Operation** refers to the process that make up the use of a building, and the role of form in these processes (Tzonis & Heintz 1995).

**Morphology** is often used to refer to the formal aspects of a building or an urban area (e.g., Steadman 1983, Tzonis 1992)

Performance, operation and morphology and their relations compose a "normative system" (see Section 4.3.1) — now, we call this system the POM system. The POM system provides a clearer structural deployment of
the relations of design concepts than traditional form-function relations. The three concepts are three types of interrelated norms. For example, a Performance in our case (see Chapter 2) is about the health of the old people, a corresponding Morphology is a public toilet, and the Operation is the transformation between the abstract concept, the Performance, and the concrete Morphology, a public toilet. In this case, the Operation is "providing a public facility based on the need of the old people."

We use the POM system as a basic structure for representing normative descriptions. Performance, operation and morphology are three interrelated types of norm. In a design discussion, participants want to see their opinions being taken into consideration. This is important for maintaining the group discussion. Sometimes, the rejection or ignorance of a norm may exert a negative influence on the willingness of the participant to continue the group task. Further, some norms may be very important to the participants but unfamiliar to the facilitator. It is not wise for the facilitator to neglect them.

There are also rules of the game and norms that are considered to cover the common interests of the participants. These norms directly influence whether facilitators are able to maintain the group in proceeding with the group task. Ideally, these norms should have been defined before applying the PBDG tool and should be paid particular attention during the process. However, since participatory design is a social activity which may involve conflict and negotiation, these predetermined rules may be changed, or new group norms may be generated.

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13 For the relations between task and maintenance, normative and localized, implicit and explicit, see Hoffman (1982: 105-115). He says, "Task functions deals with the manifest purpose of the group: accomplishing its functions in the organization. The maintenance functions are concerned with holding the group together, facilitating the members' ability to cooperate with each other, and gaining the members' commitment to the task of the group." (Hoffman 1982: 107).
6.3.2 Properties of design statements

In addition to the three types of norms in the POM system, we further specify certain properties of norms. As claimed by Tzonis et al. (1975), they are considered as a minimum structure for actions, particularly in design. In participatory design, norms are used as a command for future actions. The state of a norm may have strong prescriptive implications. Von Wright (1963) defines the distinction between the expression of ought to, may, and must not as used in normative descriptions. They are called deontic operators in the study of normative concepts and discourse (Von Wright 1963: v). The logic of such normative concepts and discourse is called deontic logic (Von Wright 1963) or the logic of commands (Rescher 1966). In addition, we propose two types of operator: suggestion and end-command which are parallel to deontic operators.

*the logic of commands*

Before we enter into the discussion of logic, we have to state that what we describe here is not the discovery of the law of thought, or a set of correct thinking, which would be accepted by everybody. As is said by Von Wright (1993: 4) about the laws of logic, "The a priori nature of the laws of logic seems easier to reconcile with a view of them as prescriptive laws. Shall we then say that the laws of logic prescribe how we ought to think and how we may and must not think?", and, "Yet to say that the laws of logic prescribe how people have to think in order to think correctly is a challenging and dangerous way of talking." What we present here is about argumentation behaviours as they occur in design dialogue.

What is the logic of command? The expressions ought to, may and must not when used in connection with norms and normative concepts bear a striking analogy to the notions of necessity, possibility and impossibility, as discussed in modal logic, and are similar to the basic concepts of all, some and none, as is discussed in quantification theory (Von Wright 1963: 17). In this study, we do not enter into the discussion about modal logic or
quantification theory. We point out these two set of expressions in order to see how these three concepts can be expressed differently.

We have defined norm and normative statement in this study (see Section 4.3.1), and norm and directive in Section 4.3.3. Norm can be a state, or a state with a command that will bring about the state. What is most important, a norm is a norm when it is expressed by a normative statement. For example, in the normative statement, "We must build a public toilet in the park," the norm is "keep the park clean" and the meaning of the first two words turns it into a command. The same intended concept in this statement can be expressed with other normative statements such as, "It is necessary to build a public toilet in the park," or "All parks have public toilets." In these three normative statement, we observe a logic of command, i.e., if certain expressions are added to a state, or an action to bring about a state, then a normative statement arises. The above three normative statements, i.e.,

1) We must build a public toilet in the park.
2) It is necessary to build a public toilet in the park.
3) All parks have public toilets.

are about obligation. They have the same deontic operator, viz., obligatory. The third type of expression, must not, shares this operator. Here is an example,

1) p is a state
2) -p is the state of the non-existence of the state p

Therefore, "ought to p" may be similar to "must not -p." For example, "We ought to build a public toilet in the park," may be similar to "We must not have a park without a public toilet." We now examine the second type of expression, may. For example, let us look at these two statements:
We may tear down the old farmhouse.
It is possible to tear down the old house.

These two statements are about permission in two different senses. The first one is about the laws of human beings, while the second one is about the laws of nature. Here we only talk about the first type. The second type is considered as factual description which will be discussed later. The first statement has the deontic operator, *permissive*.

In natural language, this logic of commands can be expressed in many different ways. Here is an example.

Agent A: *We need a public toilet.*
Agent B: *We do not need the old house any more.*
Agent C: *Dogs are not allowed to enter the park.*

In this example, agent A utters a statement which can be represented into the *ought to* form; agent B utters a statement which can be represented into the *may* form, and agent C utters a statement which can be represented into the *must not* form. To identify these deontic operators, we must understand the meaning of a sentence because two seemingly different sentences may refer to the same meaning. Analyzing the statement by searching for particular words (e.g., should, not, is/are, may, etc.) may result in misunderstanding the meaning of a statement. In our example, Agent C may say: "If dogs can clean up their own dirt, then they can enter the park," as another version of the previous statement. Many other statements with an ambiguous structure also need to be understood in context. For example, in a participatory design discussion, a person says, "Great! Now we have designed a park for the old people. This is what we really should do." Without connecting this statement with its context, we may make the wrong judgements.

We use two categories, the obligatory and the permissive form, as two norm operators. In addition to these two deontic operators, we develop two norm properties for participatory design dialogue: *suggestion* and *end-
command. They are used as additional marks to norms which already have deontic operators.

the role of the suggestion

We first examine the suggestion. The intention of a suggestion may be ambiguous. In a group discussion, the utterer of a suggestion can easily withdraw the suggestion if it is rejected by the group, or he/she can turn a suggestion into an obligatory command when it is accepted by the group. The term "suggest" may be used as a force to support a normative command. (E.g., "I suggest that we should allow dogs in the park."). A clear distinction between the suggestive command and the other two deontic commands is difficult to make because of the ambiguous nature of suggestion. A sentence using words such as suggest, propose, or recommend, does not necessary indicate that the sentence is a suggestion, and vice versa. To solve this ambiguity, we must look at the pragmatic operation of participatory design.

In a participatory design process, the participants are making a plan for the implementer. Sometimes, participants may suggest that the future "reader" — the implementer — of their plan consider, or pay attention to, particular factors. A suggestion may be something the utterer would like to apply to the final solution, while he/she is also hoping that the implementer may have better ideas. Or, it may be a note on particular issues that need further knowledge to be able to manage them. When categorizing, a mark of "a suggestion" can help to transfer such an intention. For example, for a statement like, "We are thinking of using the solution, A, but maybe there is something better than the solution, A," we can mark the statement as being a suggestion-statement. With a procedure for identifying certain norms as suggestions, prompt decision-making can be postponed when the knowledge available for making the decision is insufficient, and potential conflict may be reduced. For example, a participant describes a scene to imply a design solution and, when the scene is being described, for certain reasons it seems that it is beyond the ability of the implementer to imple-
ment the scene in the future. The statement can be marked as a suggestion and linked with other relevant concepts.

**definition of end-commands**

Second, when a group decides not to further develop, to generate or to justify a norm, it means that they are either not interested in developing the norm or do not have the knowledge to do so. We then put a closing-mark on the lowest norm. For example, in a design situation, the group stops at a norm, "build a library". We then mark this norm as an end-command because the group closes the discussion on this branch (of the POM system) at this particular norm. With an end-command, designers in a later process can take over the further development of design solutions. Ideally, since participatory design deals with issues tightly related to social contexts, there should be no definitive formulation of it (Rittel and Webber 1974: 34). However, we have developed this end-command to serve a pragmatic purpose, that is, clearly marking those ending slots where designers should take over and continue developing these norms until design solutions are found.

### 6.3.3 Factual descriptions

Factual descriptions are closely related to how people interpret the world rather than how the world really is\(^4\). In participatory design, participants are engaged in making a plan that will be implemented in the future. The problem about factual descriptions in participatory design concerns not only the difference between the perception of individuals, but also the difference between the material world and that of cognition. In addition, the value of the factual description may change in a different time frame.

\(^4\) Jackendoff (1983) has defined a distinction between the real world and the projected world.
For example, the people of Group A make a plan for the people of Group B to execute. The world of Group B, when they are implementing the plan, is different from the world of Group A, when they are making the plan. In such group planning, people describe not only the past and the present, but also the future. In practice, the fact, as we have today perceived it might change tomorrow. (Or, we may change the way we perceive the same phenomenon). Therefore, the fact which supports the decision-making of Group A may be true in the context of Group A, but may fail to support the decision-implementing of Group B in the context of Group B. (E.g., the budget for the project is said to be limited in the context of Group A, so they make a modest plan. The budget is doubled in the context of Group B when they are to implement the plan). This change of context cannot be captured simply by a set of hierarchically structured norms (see Section 4.3.1), because there is no space to locate factual descriptions. Such information is normally stated independently of the normative system.

Our point to link factual descriptions with normative systems (see Figure 4-17, 4-18) is that normative statements are generally supported with reasons, and these reasons are closely linked with the context. Our definition of the concept, "context," here refers to the state of knowledge of the group at different time. We will discuss this definition in the following section.

According to Toulmin (1958), in making a claim, we need an established warrant that authorizes us to take the step from a ground to a claim (see Section 4.3.2). This warrant is in turn authorized by a factual description. In the development of the Conceptual System, Tzonis et al. (1975) use fact as the mediator for the generation or justification of norms, and define backing and base as the reason and the resource of the reason (see Section 4.3.3).

In the structure of argumentation, there are also other elements such as, modality and rebuttal. In the Conceptual System, fact and backing may be about 1) classificatory or 2) conditional or causal descriptions. In the PBDG tool, we use backing as descriptions that support the inference from
one norm to another and use base as the support of the backing.

However, some factual descriptions may contain unstable conditions which, if the state should change in time, may result in the change of the truth or falseness of these descriptions. Therefore, conditional or causal facts need particular marks so that the reader, either in the same decision-making discussion or in the future decision-implementing, can examine whether these facts are valid, e.g., if a person uses out of date data to support his/her argument, or, in a later stage, if a new statistic proves that data that was used to support a particular argument are wrong.

*Base* is about the resource of factual statements. Types of such statements are: resource to *authority*, resource to *a general law*, and resource to *empirical experience* (Tzonis et al. 1978: 11-12). For example, three different reasons are given as resources of a factual description, *"There is a public toilet in the park in the mayor's neighbourhood."*

1) Resource to authority would be, *"The mayor says so."*
2) Resource to a general law would be, *"Important people have this kind of privilege."*
3) Resource to empirical experience would be, *"We have seen it."*

*Base* may be explicit or implicit. In everyday life, we use many expressions that have implications of reference. For example:

*"As I have said before..."
*"The letter from the mayor says..."
*"According to the newspaper..."
*"Based on our last meeting, we have agreed that..."
*"We, as human beings, should ..."
*"We all know that..."

Such references may be disputable, or may be taken for granted, depending on the dialogue situations. When the discussion is long, it is important to identify the resources of the arguments. If this is not done, false interpreta-
tion can easily happen. For example, in a discussion, agent A says, "As far as I know, p." If p is a false statement, or if it is a personal opinion of agent A and no listeners in the discussion are aware of this, then in the following discussion p may be taken for granted as being true. Here we point out again the risk of approaches that try to separate the people from the problem. It is not only difficult to separate people from the problem, but it may also be dangerous, because we might appear to be objectively making decision under certain conditions of subjective thinking. In some cases, people describe facts according to their understanding or interests. People may hide "I" and use "we" to create an imaginary majority, moving the type of reference from authority to general rule, or vice versa. Therefore, personal experience, e.g., "Every public toilet I have seen stinks," can be confused with general laws, e.g., "All public toilets stink." With a clearly identified base, implementers can better judge the accountability or representativeness of factual descriptions.

The instability of conditional factual descriptions has a close relation with a concept called context. We have mentioned that different times may have different contexts, and that the meaning of the same factual description may change in a different context. Let us now examine the definitions of context used in this study.

6.3.4 Context

Context generally refers to the state in the external world. It is "the whole situation, background, or environment relevant to a particular event, personality, creation, etc." We feel that this definition is insufficient to explain the context of group reasoning.

Under this definition, the reference to the context of events is generally perceived as a "tacit understanding" that is, we think we share the knowledge of what the context of particular events is. However, we do not.

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For example, in a face-to-face human dialogue, two agents may have different perceptions of the context, because one is facing a wide-open window and one is facing a closed door. According to a definition made by Giles and Coupland (1991), it is the speakers’s cognitive representations of objective social situations which are particularly influential in terms of the abundance of the alternative language choices made. The two authors also argue that language and situation are only convenient labels for a complex set of interdependencies, such that the very ways we communicate can themselves construct the nature of the situation we are in and the identities that emerge in them (Giles & Coupland 1991: 30).

The discussion of the concept of context is an emerging topic in artificial intelligence (e.g., Maskery et al. 1992, McCarthy 1993, Brezillon 1994). It is generally accepted in artificial intelligence that knowledge has a contextual component. However, even if its importance is acknowledged, this contextual component is rarely represented explicitly in accessible knowledge representation system and is not used in the processing of knowledge (Brezillon & Abu-Hakima 1995: 87). Prior to a context-sensitive information system, there are questions to be answered such as: What is a context? How can context be modelled? What cognitive aspects are linked to the notion of context? How does contextual knowledge influence dialogue? In this study, we pay much attention to the notion of context and contextual knowledge. As said by Olsen, group planning is context sensitive. The basis of our method for participatory design is also this notion.

the change of context

The context of a particular event can be described in many different ways. For example, a group meets in the same room twice, Timei and Timej. Are these two meetings in the same context? We may say, "Yes," if we refer to

16 These were questions posed in the Thirteenth International Joint Conference on Artificial Intelligence (IJCAI-93). See Brezillon & Abu-Hakima (1995: 87).
the context of the background of the discussion. We may say, "No," if we refer the context to the different stages of the discussion\footnote{From a higher viewpoint, the answer may depend on the pragmatic meaning of the sentence, "Are these two meetings in the same context?" that is, the context of the question when the question is given.}.

Let us suppose in Time$_j$, a group member says, "The context has changed." This person is perhaps referring to the change of particular facts in "outer information systems" (see Figure 5-3 in Chapter 5). Or, because one group member has changed his opinion which he/she insisted on in Time$_i$, the discussion has arrived at a new phase because of the new constraints.

We argue that, in order to more precisely identify the context of group reasoning, we need to further define the notion of context. The statement, "The context has changed," refers to the change of only certain "components of situation" (Brown & Fraser 1979: 35)\footnote{Brown and Fraser divide "situation" into two components, those of participants and scene. "Participants" has been subdivided into individual and relationship, each having their finer discriminations, while "scene" has been further subdivided into setting and purpose, each of which includes finer distinctions. See Brown and Fraser (1979: 35).}. As we can see in the previous example, since the new information — the change of facts in the outer information systems or the change of mind of an individual — in Time$_j$ exists in the belief systems of the group members, the difference between the context of the meeting in Time$_i$ and Time$_j$ is that the group has two different states of knowledge. This change in the state of knowledge is what we are interested to know in this study, because the change of belief systems results in the change of reasoning. Let us now examine how the state in the external world influences the belief systems in the internal world.

context, and context$_j$.

We discussed in the previous section that factual descriptions are about how people interpreted the world, and that in group reasoning these descriptions
exist as the knowledge and belief of individuals of the group. Here we should make a distinction between context₁, which refers to the state in the external world, and context₂, which refers to the state in the internal world. For example, consider there is a document which contains an important information about the project on the table of the meeting room and nobody in the room is aware of the information contained in the document. The observers may say that particular information exists in context₁ of the group-planning process but it does not exist in context₂ of the group-reasoning process¹⁹.

The definition of context₂ is important in understanding the change in belief systems in group reasoning and how the change influences the group-planning process. However, here we are dealing only with the representation — in our study, this representation is about design statements — of the state of knowledge in the internal world. However, it would be unwise to claim that what has not been indicated does not exist in a particular context₂. In this study, we are aware of the fact that knowledge also exists in a tacit dimension, such that people can know more than they can tell (Polanyi 1983: 4)²⁰. Further, there is the "theory of action" which is a particular situation, and a particular consequence, intended in that situation (Argyris & Schön 1974: 5). However, for the purpose of developing a framework for PBDGs, we examine only what is verbally expressed and what can be described verbally.

Without this distinction between context₁ and context₂ of the group, we may confuse our own perceptions with the perceptions of the group. Furthermore, for the practice of participatory design, it is important for the implementers — or the designers who have to develop the plan made by the users — to understand what the users knew by looking at what the users had said, e.g., "We do not have enough money," such that if there is a change

¹⁹ For the distinction between group-planning and group-reasoning, see Section 4.1.4.

²⁰ Some of our knowledge cannot be put into words. As said by Polanyi (1983: 55), "tacit knowing achieves comprehension by indwelling, and that all knowledge consists of or is rooted in such acts of comprehension."
in context$_1$, e.g., "The budget has been doubled," the influence of this new information to the plan can be evaluated.

However, there is also a context$_2$ of the group of implementers, because the fact that a plan has been made by the first group and the fact that new information has arrived in the state of knowledge of the second group. In this study, we are interested in the representation of context$_2$. As is discussed in Section 4.1.3, dialogue results in a text. The context$_1$ of a dialogue can be described in many different ways, which is also confusing. According to the definition of context$_2$, we say that the context of a dialogue is the state of knowledge of the parties involved in the dialogue when the dialogue is produced.

Context$_2$ involves the pragmatic nature of a design dialogue. For example, let us suppose a person says, "A public toilet is so beautiful," in a participatory design discussion, and that person's intention is to mean the reverse. People, including the utterer, in the meeting room know that the statement means the opposite according to the context$_2$. If we read this statement without knowing the context$_2$ of the discussion, we might misunderstand the meaning of it.

**the state of knowledge**

When we apply the POM system to analyze one person's design discourse, the context of the discourse is the state of knowledge applied to construct that discourse at a particular time. This particular state of knowledge in turn has a context. Strictly speaking, when a group is developing a joint plan, the context of this joint plan refers to the state of knowledge of the group during the development of the joint plan. (See Figure 4-6). In other words, in the case of an architectural discourse, if there is an event which is not acknowledged by the author of a discourse, then the information of the fact that the event had occurred is beyond the context of the discourse, although that event may be in the state of knowledge of a reader of that discourse. According to this definition of context, we cannot understand the content of a context.
It is very difficult to understand what the state of knowledge of other people is. Furthermore, people rarely verbally describe all they know but only describe what they think is relevant. This package of relevant state of knowledge is called a "context space" by Reichman (1985). "The fundamental unit of discourse processing — the constituent hierarchically related to other discourse constituents and brought in and out of focus in a discourse — we call a context space. The structure of a discourse can be specified by the identification of its context spaces and the relations between them." (Reichman 1985: 24)\textsuperscript{21}

Generally speaking, the context of a set of PBDGs when it is made, is different from the context when it is used. This is not only because of the difference of the physical world, but also because of the difference of the mental world. For example, the semantic context of the writer and of the reader of a discourse may be different. However, here we do not intend to enter into the discussion of epistemology\textsuperscript{22}, but we are only looking at practical aspects and consequences of this distinction.

For the purpose of the PBDG tool, we are concerned only with the information that is considered relevant and is verbally described in the process. We consider what has been said in the discussion, concerning the description of facts, as a representation of part of the state of knowledge of the group. In other words, the representation is the "text" of a context. In a group discussion, people generally do not mention what is considered conventional or tacitly understood. This implicit knowledge may be very relevant to the text but may be obscure in the text. The PBDG tool is intended to bring as close as it possible to do so the state of knowledge, represented in the text, and the state of knowledge, the context. This will be by linking information in PBDGs with relevant information available in the context by developing a net structure — a set of PBDGs.

\textsuperscript{21} The term "context space" should not be confused with the "ground of knowledge" as is used in many figures of this study.

\textsuperscript{22} To know whether one knows involves deep discussion of epistemology. See, for example, Hintikka (1962).
6.3.5 Types of question

Questions play important roles in design dialogue. In operating the dialogical system (see Chapter 5), both the facilitator and the user are asking and answering questions. How do we understand questions in analyzing the design dialogue? What kinds of question are needed for the facilitator to operate the PBDG tool? To answer these two questions, let us first examine what a "question" is, and then scale down this inquiry to the practical development for our model, viz., types of question.

According to Walton (1989), the term "question" is used to denote an inquiry taking the form of a specific locution identified with an interrogative sentence, and sometimes the term is used to refer to a general issue or topic of inquiry. The first use refers to the concept of question at the "local level" of dialogue, while the second use refers to the concept of question at a "global level" of a dialogue. At the formal level, a specific question stands in relation to previous or subsequent questions (e.g., "What do you mean by public toilet?"), while at the second level the question to be discussed is the issue of the dialogue, the general topic of the inquiry (e.g., "Do we need a public toilet?"). (Walton 1989: 1-2).

Question-reply dialogue can be very complex and can be performed strategically — such as in legal or political debate, or can be plain and straightforward — such as in every day life. In the former situation, there are many kinds of questions, such as tricky, aggressive, fallacious or argumentative. Walton (1989) has analyzed six types of problematic questions. They are: the fallacy of many questions, black-and-white questions, terminologically loaded questions, questions containing personal attacks, replying to a question with another question and ambiguous replies. Using these types of question, questions may serve as means for other questions which in turn may lead to anticipated replies. In the later situation, question-reply is carried out in an informal settings. However, the types of question mentioned above can be applied to participatory design. Facilitators must be aware of the possibility of such problematic questions. In this study, we focus on questions which are based on a meta-assumption.
— that the situation of the group planning is necessary and members of the group should work cooperatively.

We define three types of question based on what questions are intended to elicit, i.e., what kinds of answer will fulfill the question. These three types of question are as follow:

1) The first type of question is about design concepts; it includes: questions as to classifications of concepts (e.g. *What do you mean by saving our face?*), questions as to the justification or generation of norms (e.g. *What will achieve this norm?*), questions to the backing for the inference (e.g. *How can a public toilet prevent us from losing our face?*) and questions as to the base for the backing (e.g. *How do you know?*).

2) The second type of question is a question about the operation, such as, question as to the procedure, the roles of certain participants, the products, equipment, information, etc. These kinds of question might interrupt the flow of design dialogue, and create conversational moves (Reichman 1985: 21).

3) The third type of question is about the question of the meta-assumption. At this level, anything can be challenged — even the role of the facilitator in the operation.

These three types of questions also represent three levels of the state of a group-planning exercise. At the first level, the question-reply dialogue is about design concepts that will lead to a consensus. At the second level, the question-reply dialogue is focusing on background information of the design dialogue — analogically, an upper level. The background information presupposes dialogue of the first level. At the third level, the question-reply dialogue is targeting at the highest level that presupposes the existence of the dialogue.

In the face of these three levels of question-reply dialogue, the strategies of facilitator are 1) to lead the group to accept the meta-assumption so that there will be no questions of the third type and 2) to provide as much as possible background information as early as possible so that the
group will not need to ask questions of the second type and can concentrate on question of the first type.

However, if a type III question is addressed, and the facilitator can recognise its type and mark the question with its type before rushing into emotional dispute, he/she is proposing that the utterer of the question agree to disagree. For example, a user challenges the facilitator by saying, "Who do you represent? The developer, or the user?"

Other problems of identifying the form of the question is that a statement with syntactic characteristics is not necessarily a question. Questions should be examined from the standpoint of both semantic and pragmatic definitions. Current studies classify the concepts of request and assertion as pragmatic concepts that have to do with a communicative act or relationship between a speaker and a hearer (Walton 1989: 4). The utterer of a statement may be intending to use a statement with the form of a question as a command (e.g. "My question about this design is that, since everybody has toilet at home, why do we need a public toilet?"). A facilitator should understand also the intention behind questions, and confirm his/her own interpretation of the question the with the utterer. Our definitions of the types of question will help to identify the intention behind question-statements. Further, if a question-statement implies normative or factual statement, it will be marked as normative or factual description.

6.3.6 Relations

As discussed in this study, there are relations between norms. According to the POM system (see Section 6.3.1), a norm may be higher or lower than other norms; according to the Conceptual System (see Section 4.4.3), a backing may be a reason for an inference, and a base may be a resource to a backing. In single-agent reasoning, these relations are simple. It is presupposed in such systems of cognitive structures that people perform
consistently\textsuperscript{23}, such that there is no contradiction among a person's own belief systems. Consistency can be easily associated with rationality and stability, which is preferable to, or acceptable by, human societies. However, conflict between individuals, or within the individual, creates disagreements which lead to the inconsistency of belief systems, either the belief systems of an individual or of a group. In this study, we have discussed the structure of conflict. Our point is that conflict is not about the goal or about the action, nor is it about belief systems. Conflict is about the process of generating, justifying or reasoning arguments between different belief systems. (See Section 4.2.4). In order to structure these different belief systems, it is necessary to develop relations which can represent disagreements in multi-person belief systems. In group planning, not every disagreement, when it is verbally expressed, can be resolved. Sometimes, the conclusion of a discussion includes the contradictory opinions of different parties.

In our study, therefore, to the three relations of our three-layered system (see Section 4.3.4) — the link between two norms (i.e. the inference link), the link between a support and an inference link (i.e. the support link) and the link between the resource and the reason (i.e. the resource link) — we add the link between original norm/fact and the modified norm/fact (i.e. modification link), the reason against the inference (i.e. against link) and the link between two contradictory norms/facts (i.e. contradiction link). A disagreement to a statement can be raised by other utterers (e.g. an objection to a previous statement), or it may be a voiced by the same utterer who previously uttered the statement (e.g. a modification of one’s previous statement).

To here, we have presented the knowledge required to develop the framework of PBDG. The knowledge includes the kernel of participatory design knowledge, properties of design statements, factual descriptions,

\textsuperscript{23} Consistency is also an essential criterion in developing such models of cognitive structures. Cognitive structures themselves should not have contradictions, and they should be consistent with respect to the intended application.
context, types of questions and relations. In the following discussion, we explain how this framework of PBDG can be operated through a practical tool, viz., the PBDG tool.

6.4 PBDG tool

The PBDG tool is a working system. It has been developed for:

1. documenting issues, points of view, alternatives and debates,
2. the implicit and explicit representation of patterns of action and reactions among participants, beliefs, agreements, disagreement, overlaps, irrelevancies, and complementarities, and
3. procedures for design negotiation, conflict resolution, planning cooperation and collective design decision.

Let us now look at the representation of joint belief systems, the three steps of representing a semantic structure and the constructs of PBDGs.

6.4.1 The representation of joint belief systems

Participatory design usually involves gathering knowledge and defining relations between knowledge. Most of the knowledge remains as internal mental operation. Only some of it is physically represented, such as by audio tapes, texts, drawings, models, photos, video, etc. In current practice, these representations are in different forms, i.e., text, photos, graphics, models, or remain in the memory of the facilitator. Therefore, they are also physically disconnected. Under such circumstances, the information management for design is loosely structured. Not only the designer or the implementer may received incomplete information, but also people involved in the discussion have to assimilate information piece by piece in their
short-term memories and remember the meanings of and relations between each piece of information.

We have argued earlier in the study that the result of participatory design should be a set of agreements towards a future built environment. These agreements, in present practices of participatory design, are loosely constructed. Many of these agreements, among other information, remain only in the memory of the participatory designer. In our method, we have developed the PBDG tool to help facilitators to interpret and represent conceptual systems of the participant. What needs to be paid particular attention to is the possibility of misinterpretation.

In a discourse-analysis or text-analysis approach, misinterpretation can easily take place. As discussed in Section 4.1.3, dialogue includes three constraints: syntactic, semantic and pragmatic. Without having captured these three constraints of a discourse, the listeners may interpret sentences or words based on their own reasoning, use different references for words, or misunderstand the intention of the utterer. For example, if a researcher compares two discourses on "architecture" written by two different authors, the word "architecture" may refer to more than three definitions, including those of the two authors and that of the researcher.

6.4.2 Three steps of a semantic representation

PBDG is a product of group intentions. We have developed a semantic representation to represent PBDG. We use the semantic representation as a method to describe a problem defined by participatory design. As Winston (1992: 18) has said, "Once a problem is described using appropriate representation, the problem is almost solved." In PBDG, factual and normative descriptions, and the relations between them are explicitly marked with nodes and links. The three phases of operating the PBDG tool are: 1) representation, 2) editing information, and 3) reviewing and reconstructing.
A Dialogical Model for Participatory Design

**step one: representing information**

Words uttered by the participants of participatory design must be transposed in texts for further manipulation. In this first step, the main task is to transform concepts into visible statements. The research concentrates on verbal design descriptions and the linkage between graphics, photo images or sketches, and verbal descriptions. We use verbal statements as the main source of the analysis for two reasons. First, verbal statements maintain a certain degree of flexibility about the form of the final design solutions. Second, verbal statements can be reconstructed into a hierarchical normative system. When graphics are used, descriptions of the images are also important.

**step two: editing information**

The second step is editing information. Editing information requires the intensive activities of understanding and analyzing (see Section 5.2.1). Activities in this step include:

1. developing the structure of the design guidelines
2. locating statements on the net
3. relating statements

**step three: reviewing and reconstructing**

In the first two steps, representing and mapping, human agents can operate faster by using index cards rather than by using computers. The advantage of using index cards is that they are visible and tangible to all participants. Once a concept or a design solution is marked down or is written on a card, participants can physically manipulate them by linking them with other cards, developing new concepts or solutions based on the card, or putting opposite opinions against particular cards that contain certain statements. The disadvantage of using index cards is that the process is difficult to
reconstruct. With PBDG, an explicit record of the process of the development of PBDG is valuable. Moreover, a well-organized PBDG with the support of computer technology is a useful tool for both the participants and the designers in the following stages of the design process.

6.4.3 PBDG constructs

Constructs of PBDG include: structures, objects and relations. Structures are the basic frameworks of PBDG; objects are concepts formulated from statements and relation links are the relations between two objects.

**structures**

**LEVEL:** LEVEL refers to the linear, hierarchical relation between norms. When one norm is higher than another norm then there are two LEVELs. (See Figure 4-8).

**LAYER:** LAYER refers to the distinction between types of information: the layer of norms, the layer of backing, and the layer of base (See Section 4.3.4)

**objects**

**objects of normative descriptions**

**performance norm (PN):** PN refers to norms that have the characteristics of Performance

**operation norm (ON):** ON refers to norms that have the characteristics of Operation
morphology norm (MN): MN refers to norms that have the characteristics of Morphology. (For the discussion on the types of norm, see Section 6.3.1).

operators of norms

obligatory (norm) (O-): When a norm has the operator of ought to or must not, then it is a norm with an "O-", e.g., "We must build a public toilet."

permissive (norm) (P-): When a norm has the operator of may, then it is a norm with a "P-", e.g., "You may cut down the dying tree."

suggestion (norm) (S-): When a norm has the operator of suggestion, then it is a norm with a "S-", e.g., "We can make the whole park a big lake."

end-command (E-): When there is no further generation of a norm, then an "E-" is added to the norm. (For the discussion on the properties of norms, see Section 6.3.2).

types of factual descriptions

classificatory fact (CL-F): CL-F is a statement that says the state of a lower norm is one of the cluster of the state of the higher norm.

conditional or causal fact (CO-F): CO-F is a statement that describes the state in which the lower norm is the condition for bringing about the state requested by the higher norm.

resource to authority (R-A): R-A is a resource to authority.

resource to a general law (R-G): R-G is a resource to a general law.

resource to experience (R-E): R-E is a resource to empirical ex-
type I questions, questions to:
classifications of objects (Q-C):
justification or generation
of norms (Q-N):

backing for inferences (Q-B):
base for the backing (Q-R):

type II questions, questions on:
background information (Q-B):

type III questions, questions to:
meta-assumptions (Q-M):

relation links

inference link (IL):
against link (AL):
support link (SL):
resource link (RL):
contradiction link (CL):
modification link (ML):

experience. (For the discussion on factual descriptions and contextual knowledge, see Section 6.3.3 and Section 6.3.4).

e.g., What is X? (X is a norm/fact).

e.g., What will X bring about? or, How can X be achieved? (X is a norm).

e.g., Why will doing Y bring about X? (X and Y are norms).

e.g., How do you know that doing Y will bring about X? (X and Y are norms).

e.g., Will the mayor/joint our meeting today?

e.g., Who do you represent? The developer or the user? (For the discussion on the types of questions, see Section 6.3.5).
6.5 An example of structuring a set of PBDGs

PBDGs are generated along with the discussion of participatory design. In current practice, such discussion is normally preceded by some basic guides provided by the facilitator. Here is an example of using the PBDG tool to reconstruct a set of design dialogues adapted from the case study in Chapter 2. As many design issues in participatory design, these design dialogues cannot be isolated from the rest of the problem. For the purpose of this demonstration, a set of design dialogues concerning the public toilet in the park are presented from Figure 6-2 and Figure 6-9.

The dialogues are drawn from the case study in Chapter 2. In making the selection of dialogue for this demonstration, no clear distinction is made between related and unrelated dialogues and there are no fixed rules indicating when to start or stop the discussion on an issue. Under these constraints, we select a set of statements from a discussion that took place at a certain moment in the workshop in our case. The dialogues started with a broad question raised by the facilitator, "What do you think is important to the community park?" and ended when one participant started to talk about another issue (i.e. the farmhouse). Actual dialogues are cited in the rounded window, and a PBDG of this discussion is constructed below the rounded window.

At the beginning of this participatory design dialogue, a simple statement is uttered in this first statement. We put the norm in a text box, and set a LEVEL and a LAYER for this norm (see Figure 6-2). In Figure 6-3, the norm expressed in the first statement is marked as "O-ON" (see Figure 6-3) and the text box is closed. The second statement gives a reason for the first statement (see Figure 6-3). A higher norm and a reason for the first statement are identified from the second statement. The higher norm
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No. 1: The most important thing is to build a public toilet in the park.

Level L
Layer of Norms

No: 01
to build a public toilet

Figure 6-2

No. 2: The reason for building a public toilet is that when our friends visit us in the park and cannot find a public toilet, then we "lose our face."

Level L-1
Layer of Norms

dignity
No. 01a
is-a-reason-for

Layer of Backing

If no public toilet in the park, then "lose face"
No. 02

Figure 6-3
Figure 6-4

No.3: Public toilet always stink. We do not want that.

Figure 6-5

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No. 4: As we all know that old men need to use the toilet more than others. We, the old people stay in the park all day long. Whenever you go to the park, you

Figure 6-6

No. 5: The park belongs to everybody. We should not consider only some people's need.

Figure 6-7
No. 6: What if we hire a janitor to maintain the toilet? But, the problem is money. Or, we can set a lock on the door. People have to pay to enter.

Figure 6-8

No. 7: The public toilet will be a perfect place for crimes.

Figure 6-9
is linked with the first norm with an inference link on the first LAYER. The reason is linked to the inference link by a support link and is located on the second LAYER. In Figure 6-4, all text boxes are closed. The reason in statement No.2 is marked as "CO-F", and the norm expressed in statement No.2 is marked as "O-PN." The third statement in Figure 6-5 gives a counter opinion to the previous two statements. The first statement is a reason for the second statement, a normative statement. From here, the facilitator infers a higher norm, sanitation, for this argument. The factual description implied in this statement is that the speaker has seen many stinking public toilets. From Figure 6-6 to Figure 6-9, the PBDG is becoming more complex. But the types of concepts, relations and locations of these concepts on the structure are very clear.

6.6 Concluding remarks

The PBDG tool enables the structuring of a collective set of design guidelines, i.e., PBDGs, resulting from participatory design. PBDGs are a form of structured participatory design discourse. From the discourse, we can understand what concerns a particular group of users have about a particular built environment. It is not to see what kind, or type, of design they prefer, but to understand how they think about the design, what their joint intentions are, what factual descriptions they use to support their arguments, and to what extent the factual descriptions are changed in time. By documenting issues, points of view, alternatives and debates in the guide frames, the designer and the participants will be able to generate more workable design guidelines, in addition to any given, top-down, architectural programme. PBDG applies the system in a tool which captures and represents arguments, points of view, and agreements and disagreements with the design decisions, thus placing the designer in a position to monitor conflicts and help resolve them.

The discourse of participatory design has a different nature from the
architectural discourse made by a single person. The context of the single person's POM system is a "snapshot" of the person's belief systems at a particular time. In architectural discourse analysis, change in this person's belief systems may not affect the validity of the previous POM system. However, the discourse of participatory design dialogue has a strong connection with time. In participatory design, the plan generated in Timei must be developed or implemented in Timej. The context has changed from Timei to Timej. For example, a group was informed in Timei that the budget was limited but in Timej a subsidy had arrived. With this new information, the designers in Timej may find those people who were involved in Timei and re-opened the discussion, or, with a set of well-structured PBDGs, designers may only have to search factual descriptions related to the norm, "limited budget," in Timei.

There is a design logic behind the generation of design statements, principles, and design solutions. Is such design logic an a priori truth, a convention, or is it true only to the person who applies the design logic? We argue that the creation of a true, authentic quality of space is not independent from considerations of social activities. Collective design reasoning must be acceptable at least to the participants. It is at least conventionally true in the context when such a design logic is applied, but it is not necessarily true in other contexts.

The limitation of the PBDG tool is that it is not intended to analyze all information. Relevant information must first be specified by human agents, then be analyzed. With a set of PBDG, participatory designers can design in a non-participatory way with well-organized information from the participatory design workshops, while in current practice, "it is normal to rehash design decisions several times during development simply because no one can recall how the decisions were resolved previously (Yakemovic & Conklin 1990: 105)." Thus, the design project maintains its holism, the creativity of designers is not constrained, and the participation of users is also accomplished. The PBDG tool can be applied to many planning and design practices wherever specified design guidelines are required before the process of physical design begins.
Summary

We have seen in this chapter the framework of participation-based design guidelines (PBDGs). We began with the discussion of domain problems in participatory design discourse in order to understand the output of participatory design processes and the participatory design task. We then moved to review design information management, examining issues such as the types of design guidelines, the problems associated with such design guidelines, and the state of the art in structuring design dialogue. We then developed a framework for PBDGs.

In this chapter, we have presented our investigations on the kernel of participatory design knowledge, the properties of design statements, factual descriptions, context and types of question. These discussions are the knowledge base which serves as the background for operating the PBDG tool. The PBDG tool is a working system for structuring design dialogue. We have explained the concept of joint belief systems, the process of representation and the PBDG constructs. At the end of the chapter, we demonstrated an example of how a set of PBDGs can be structured through the PBDG tool.

To here, we have presented the three modules of the participatory design method. The most challenging question now is perhaps: How complete and consistent is the method? To answer this question, in the next chapter we shift our focus from the development of the method to the practice — where we started this investigation of participatory design. We will test our new method in a real design project to see the extent to which the method is applicable. Let us now examine the test case.
A Dialogical Model for Participatory Design
CHAPTER 7

A TEST CASE

Over the preceding three chapters we developed a participatory design method. The method consists of three modules: a group-reasoning model, a dialogical system, and a framework for participation-based design guidelines. One substantial question still to be answered is: How complete and consistent is the method? To answer this question, we tested our method in a design project. In contrast to the case-study project presented in Chapter 2, which was applied as a heuristic tool for developing the method, this project serves as a test case. Let us now present the test case which was carried out after the development of the method. Below, we describe how the test case proceeded; how the method was applied to the case; what aspects were tested; and the results of the test.

7.1 Test case methodology

The purpose of examining this test case is to see the extent to which the method developed in our study can fulfil the adequacy criteria for a participatory design method developed in Chapter 2 (see Section 2.4.3). These criteria are: validity, effectiveness, efficiency, reliability and robustness. In this test case, we will examine the method based on these criteria. A complete record of the design discussion is given in Appendix
B. Let us now look at the test case methodology.

selecting a test case

In selecting a case, we considered that since our model had been developed to analyze design dialogue in real setting situations, the case had to fulfill this criterion so that we could apply our method to analyze the design dialogue as it takes place during the design process. As Van Dijk (1984: 6) has said about the problem of using materials for analyzing dialogue, "In current laboratory experiments textual materials are mostly 'out of context'. That is, they are not produced, transmitted, understood and 'used' under normal pragmatic and social conditions." Adequate experiments would at least need a simulated context in which subjects engage 'naturally' in verbal interaction (Ibid.) In addition, we also took into account certain practical considerations based on time, budget and relevance to this study. Therefore, a design project was selected that would included the participation of the representatives of multiple interests groups.

background of the project

The project was sponsored by a developer, Arthur Andersen, who wanted to construct a building complex in Amstelveen, the Netherlands. A design company, T+T Design, was hired by the developer to make a design proposal. After the first design proposal had been turned down by the municipality of Amstelveen, in January, 1995, the design company organized a three-day workshop and invited people representing different interests or different perspectives to take part in a participatory design process. After three one-afternoon workshops in a three-week period, a new design proposal was completed and was submitted to the municipality.

working languages

The working languages in the design workshop were Dutch and English.
The set of design statements we selected for our analysis were in spoken English.

*examination of the method*

In this test, we want to find out whether the method is complete and consistent. In the examination, we 1) analyze a set of statements excerpted from the design dialogue that were recorded during a design discussion by applying the framework for participation-based design guidelines and 2) examine the application of the method by using the adequacy criteria developed in Chapter 2 (see Section 2.4.3).

### 7.2 Testing an application of the method

In this test, we apply our new method to analyze the dialogue. As seen in Figure 7-1, there are three categories: "structures," "objects" and "relations". In the first part of the analysis, we identify objects of each statement and mark them with corresponding "marks". In the dialogue, some meanings may not be explicitly expressed by the statements which were used. In the analysis of statements, based on our understanding of the statements when this discussion took place, we modify some. If there are no components in a statement which can be captured based on the framework (see Figure 7-1), we label the statement only with a number. In the second part of the analysis, we construct a structured design discourse by using "structures" and "relations".

#### 7.2.1 Design dialogue

In this section, we present twenty-three statements. This dialogue took place in the middle of the discussion in the workshop during the second week.
A Dialogical Model for Participatory Design

There were ten participants but only Ewald, John, Fred, Berton, Ronald, Hoang, M. and the chairman, Pieter spoke. These statements are:

1. Pieter (the chairman): Before we go on to our next phase, why don't you (Fred) show us your design.
   (Fred showed a design scheme he had made after the first workshop. Fred urged participants to use the design as a basis for the following discussion.)
2. Ewald: The design [Fred has shown] is maybe on the wrong track. We should not have a discussion based on a wrong design.
3. John: We should not let the architect create problems for us to solve.
4. Fred: That is why we are here. The design is only a conceptual scheme based on our previous discussion in the last workshop. It is open to criticism.
5. John: Why are they separated? For instance, here, why do you separate them into three buildings? You need three installations!
6. Fred: Green space between buildings is necessary. It is required by the municipality.
7. John: But your are not talking about problem-solving. We should not only select between solutions: We should know what the problem is first.
8. Fred: I understand you completely. In our first proposal, we made only one building and it was rejected because we did not consider the environment.
9. John: We have to educate them to accept our concepts!
10. Berton: As we can see in many industrial zones, the buildings are all O. K. but no renters. There are many buildings empty because they do not have their own identity. It is better to separate them than connect them.
11. M: To build three buildings is too costly. You need extra facades.
12. John: Can we make it more compact?
13. Fred: I understand what you are saying. But the reality is that if we do not do it like this they will not be accepted by the city council.
14. John: But this is waste of energy. We need three installations.
15. Ronald: The case of three buildings is maybe better than one building. You can easily control the indoor climate of smaller spaces.
16. Hoang: Consider that the building could be used by different companies, the identity of each company should be considered. We need certain flexibility not only for the first user but for the future users.
17. Berton: You can see many buildings are empty because people felt [if they rent these buildings] their company would not have their own identity.
18. John: Why are there so many different heights?
19. Fred: That is the hierarchical order according to Feng Shui.
20. Hoang: According to Feng Shui, this hierarchy is necessary. Three separate buildings in this case is acceptable but not necessary.
21. John: May be we can make underground pipes.
Pieter: In fact, some companies like to have separate buildings. It is like an institution.

Pieter: Why don’t we start the group discussion after a short break.

7.2.2 Structuring the design dialogue

In this dialogue, statement 1 is the beginning. The change of topic in statement 23 resulted in the end of this dialogue. Statements 2, 3, and 4 are statements questioning and justifying the legitimate status of the design scheme, i.e. whether the scheme is valid for further development. Statements 5 to 22 are arguments about the design.

5     -a) O-MN: no separation of the buildings
     -b) CO-F: IF separating the building into three buildings, THEN three installations are needed

6     -a) O-ON: green space between buildings
     -b) CL-F: It is required by the municipality.

7     But your are not talking about problem-solving. We should not only select between solutions. We should know what is the problem first.

8     -a) I understand you completely.
     -b) CO-F: IF there is only one single building, THEN there are no considerations on environmental issues
     -c) R-A: based on the account that the municipality has the authority
     -d) O-PN: environmental issues
     -e) O-MN: not single building
     -f) CO-F: IF no considerations on environmental issues, THEN the project will be rejected by the municipality
     -g) R-E: experience

9     -a) We have to educate them to accept our concepts!

10    -a) CL-F: IF buildings do not have their own identities, THEN no renters
     -b) O-ON: It is better to separate them than to connect them

11    -a) CL-F: To build three buildings is too costly
     -b) O-PN: cost
     -c) CL-F: extra facades are needed if buildings are separated

12    -a) S-ON: Can we make it more compact?

13    -a) I understand what you are saying.
     -b) C: IF we do not do separate the buildings, THEN the project will not be accepted
I. Structures
   A. Layer
   B. Level
II. Objects
   A. objects of normative descriptions
      1. performance norm (PN)
      2. operation norm (ON)
      3. morphology norm (MN)
   B. operators of norms
      1. obligatory (norm) (O-)
      2. permissive (norm) (P-)
      3. suggestion (S-)
      4. end-command (C-)
   C. types of factual descriptions
      1. classificatory fact (CL-F)
      2. conditional or causal fact (CO-F)
      3. resource to authority (R-A)
      4. resource to a general law (R-G)
      5. resource to experience (R-E)
   D. questions
      1. classifications of concepts (Q-C)
      2. justification or generation of norms (Q-N)
      3. backing for the inference (Q-B)
      4. base for the backing (references) (Q-R)
      5. background information (Q-B)
      6. meta assumptions (Q-M)

III. Relations
   A. inference link (IL)
   B. against link (AL)
   C. support link (SL)
   D. resource link (RL)
   D. contradiction link (CL)
   E. modification link (ML)

Figure 7-1   Tools for structuring design dialogue

by the municipality.
-<)R-E: reality
14 -a)CL-F: three building is waste of energy.
   -b)O-PN: do not waste energy
   -c)CO-F: IF three installations, THEN waste of energy.
15 -a)S-: The case of three buildings maybe is better than the case of one building.
   -b)CL-F: You can easily control the indoor climate of smaller spaces.
Figure 7.2  A set of PBDGs

- a): Considering that the buildings may be used by different companies, the identity of each company should be considered.
- b): O-PN: flexibility for the first user and future users
- a): F: You can see that many buildings are empty because people felt if they rent these buildings, they would not have the identity of their companies.
- a): Q: Why are there so many different heights?
- a): O-ON: hierarchical order
A Dialogical Model for Participatory Design

20 -b)O-PN: Feng Shui

20 -a)O-ON: hierarchy is necessary

20 -b)O-PN: Feng Shui

22 -a)P-ON: Three separate buildings in this case is acceptable but not necessary.

21 -a)S-MN: underground pipes

22 -a)CL-F: some companies like to have separate buildings

22 -a)CO-F: IF a company owns several buildings, THEN the company is like an institution.

In Figure 7-2, we show a set of PBDGs constructed from the analysis of these design statements. It has been formulated through computer application. This demonstration shows the operation of applying a particular application of the method, i.e., the PBDG tool, to decompose, locate and reconstruct design dialogue. Let us now investigate how the method is more generally applicable in this case.

7.3 Testing the adequacy criteria of a participatory design method

As mentioned in Chapter 2, the five adequacy criteria for a participatory design tool for supporting the structuring of the design dialogue in a small group, face-to-face situation are: validity, effectiveness, efficiency, reliability and robustness (see Section 2.4.3). In this study, we have developed a method which will lead to the development of a tool. We now examine the application of the method in relation to the fulfilment of the five criteria.

validity

The structuring of the design dialogue, as demonstrated in the previous section, has shown that the technique has been applied to the analysis of the particular set of statements exerted from the design dialogue. The result is a small set of computer-supported design guidelines. It can be linked with
other sets of design guidelines generated in the overall design discussion.

**effectiveness**

Through developing the set of design guidelines, the design concepts of the participants are decomposed and reconstructed to a new structure. Most importantly, these design concepts, including normative and factual descriptions, can now be reviewed, rearranged or modified effectively.

**efficiency**

In the design project process, we added the method to an existing group discussion design process. It the test, we applied very limited part of the method. We did not increase the cost or duration of the process because the technique we applied for the analysis was very simple. However, the overall design discussion had generated a great amount of information. A thorough analysis of the design discussion might be time consuming.

**reliability**

The situation which we used to test our method is a typical small group, face-to-face design. We have used one technique developed in this study, and have tested it under the constraints described above. Despite the lack of a suitable computer software, we think, based on current development of the method, the PBDG is generally applicable to such a situation.

**robustness**

During the process of the project, we also realized that existing methods applied to support small group discussion did not consider the development of a support system that helps to analyze design dialogue. The facilitator of a design discussion can easily apply our method as an additional support to the process.
The scale of this test is very limited. The design dialogue selected for the analysis is only a small portion of the overall design discussion. Despite certain achievements of those criteria, the method has limitations. Current computer technology is certainly better than the 1970s when the issue-based information system was developed, and we now have better knowledge about cognitive structures in understanding how design concepts may be organized in cognition. However, through the test, we have realized that during an intensive discussion, a human facilitator is not able to capture, remember, and analyze simultaneously a large amount of information. By asking to slower the discussion for his/her task may create negative influence. We feel that if there are only certain types of design concepts need to be analyzed, a simpler tool may be quite helpful.

7.4 Concluding remarks

In this test case, we tested the method developed in this study to see the extent to which the method can fulfill its short-term goal — supporting practitioners on site while computer technology is not available. The result presented in this chapter is a representation of normative and factual descriptions structured by the PBDG tool. This set of PBDGs can be combined with other design statements generated in the overall project.

In this test case, we only applied certain part of the method developed in the previous three chapters. One reason for this is because certain support systems (e.g., the software of the DIPS tool) of the method require further development. We therefore applied only the PBDG tool to the case as a test. Another reason is due to the constraints of the test case programme. As mentioned in the case-study (see Chapter 2), in addition to having a useful participatory design method, a successful application of a participatory design process requires certain conditions of the following six factors: 1) the facilitator, 2) the participant, 3) the control of the process, 4) financial support, 5) social context, 6) time and 7) appropriate timing.
Within these constraints, we have tried to proceed with the test case in order to fulfil the purpose of this study.

Although this is a limited test, this test case serves as an example to show that the method has high potential of general applicability. We will further our evaluate the method in the following chapter.

Summary

In this test case, we tested the new method as proposed in this study to a participatory design project. A set of design statements were selected and analyzed. We presented a set of participation-based design guidelines generated from the set of design statements. Through this test, we have shown how this new approach is applicable to real-setting situations. We have examined the adequacy criteria for a participatory design method (see Chapter 2), in order to see the extent to which the method has fulfilled. The test case is a limited test because we have tested only certain aspects of the method. The result of the test is satisfactory only to a certain degree. In the following chapter, we will proceed with examination on the evaluation of the method and further development.
CHAPTER 8

EVALUATION OF THE METHOD AND FURTHER DEVELOPMENT

In the preceding chapters we examined some problems of current participatory design methods, presented a case-study and a test case and proposed a new participatory design method — including a group-reasoning model, a dialogical system, and a framework of design guidelines. In Chapter 7, we tested the method in a project. As an evaluation, the final chapter of our study examines the general applicability of the study and its limitations, and the improvements to be made in the proposed method. It also takes the analysis one step further, to develop a meta-system for the practitioner as a dialogical tool. The future applications and extensions of this study include the development of computer technology and the computerization of the dialogical model. The chapter closes with concluding remarks on the expected contribution the method will make to participatory design.

8.1 A study of a computational model

In Chapter 1, we clearly defined four basic problems of participatory design as: the user-as-designer myth, ill-structured information flow, the result-oriented process and the paradigm of two characterized groups. In Chapter
2, we started our study which is a case-study based on a design project involving participatory design methods. Through these two chapters, we have generated adequacy criteria for a participatory design process, and we have defined three critical factors in developing a method of participatory design: problem-solving and defining, conflict resolution, and the structuring of the statements of design dialogue. Chapter 3 is a historical review of the methodology of participatory design in order to examine the problems of current approaches. In Chapter 4, we discussed a reasoning model of group planning in the participatory design situation. A conceptual development of a computer-supported dialogical system was developed in Chapter 5 and a framework for participation-based design guidelines presented in Chapter 6. Chapter 7 reports a test case to see how our new method can be applied to current practice. We now first examine the general applicability of this study and then analyze the development and limitations of the method, and the improvements to be made in the future.

8.1.1 General applicability

As we mentioned in the introduction of this study, the adequacy criteria for a tool for supporting participatory design include: validity, effectiveness, efficiency, reliability and robustness. In this study, we have developed a method which can lead to the development of a tool. Let us now evaluate this method based on these criteria.

To examine the general applicability of the method, our evaluation starts with the heuristic approach in our case-study (see Chapter 2). The project selected for the case-study took place in contemporary society, where participatory design is a widely understood concept in architectural practice and urban design, and the method applied to the participatory design process of the project drew on techniques from conventional participatory design approaches, namely the Co-Design and the Take Part process.

Although the cultural and political factors of each participatory
design project may play important roles in the participatory design processes, projects of participatory design share similarities in terms of the social-cognitive factors in group reasoning. In the case-study, we have focused mainly on the social-cognitive factors of the participatory design process to see the degree to which cognitive structures are reflected in the design dialogue. The form of natural language used for the design dialogue does not obstruct our analysis, not only because we are interested in modelling the cognitive activities but also because the study of cognitive structures moves beyond the scope of most linguistic\(^1\) approaches. Moreover, our computational approach is also beyond cultural boundaries — though not independent of social context\(^2\). More precisely, although the contents may be vary in different context, the structure of certain relations between social factors and human cognition is very similar though they occur in different cultural context. For example, Luria (1976: 1) has said that many mental processes are social and historical in origin, and that important manifestations of human consciousness have been directly shaped by the basic practices of human activity and the actual forms of culture: Such a finding can be applied to describe in different cultural context the structure between 1) the human consciousness and 2) the basic practices of human activities and the actual forms of culture. In this study, we do not

\(^1\) As said by Searle on the definition of the distinction between the philosophy of language and linguistic philosophy,

"Linguistic philosophy is the attempt to solve particular philosophical problem by attending to the ordinary use of particular words or other elements in a particular language. The philosophy of language is the attempt to give philosophically illuminating descriptions of certain general features of language, such as reference, truth, meaning, and necessity; and it is concerned only incidentally with particular elements in a particular language; though its method of investigation, where empirical and rational rather than a priori and speculative will naturally force it to pay strict attention to the facts of actual natural languages." (Searle 1969: 3-4).

\(^2\) This argument is supported by findings of cognitive psychology (Luria 1976) and by recent cross-cultural comparative studies on architectural thinking (Li 1993, Yu 1994).
find a contradiction in human reasoning and group planning in the two cases we have examined respectively in Chapter 2 and Chapter 7.

In our test case (see Chapter 7), we selected an on-going project in the Netherlands designed for participation, where pioneer work of participatory design started as early as 1958 (see publications in *Forum* from 1958 to 1961); where the work led by John Habraken (1972a, 1972b, 1982, 1983) and his colleagues in the *Stichting Architekten Research* (SAR) had important influence on later movements of participatory design (for recent reviews on SAR, see Priemus 1984, Hamdi 1991); and where recent international conferences on participatory design have taken place (see Beheshhti 1986). The project selected is an ordinary project which architects may encounter in practice. The participatory design approach applied to the project enriches the design process and made the design more comprehensive. We have tested techniques developed in this study to see the extent to which the method can fulfil its short-term goal — supporting practitioners on site when computer-based facilities are not available. In this test, we focused on whether our new method of participatory design can successfully analyze a set of design dialogue. The result is a representation of normative and factual descriptions, and the relations between these components of the design arguments. This short set of participation-based design guidelines can be linked with other speech acts generated in the project. In this project, while the series of meeting were taking place, the architect (i.e. T+T design) worked continuously in developing design schemes for the meeting in a design studio. In this case, a set of updated PBDG can serve as an important and useful reference.

The project selected for the case-study took place in Taiwan, methods applied to the case were drawn from the United States, and then we applied the newly developed method to test a real project in the Netherlands. These three places have their unique culture, but nevertheless social relations between individuals resemble each other to a certain degree because of the trend of globalization and the development of democracy. One reason for the cross-culturality arrangement is because the author has practised participatory design in these three places. Given the author's
familiarity with these places, and with the two projects, data gathering and controlling could be easily dealt with. However, be there advantages, the arrangement of the test case can also create drawbacks. We have our reservations about the possibility on testing the new method in such places where political or cultural factors have a strong influence on social-cognitive interactions. Nonetheless, a cross-cultural comparative study on participatory design should be able to support a more comprehensive development of the method.

8.1.2 The limitations and the improvements

Now let us see to what extent our study of the computational model can improve participatory design; what the limitations are, and what future developments of this work might be possible.

Participatory design includes complex social activities. We have divided methodological problems of current participatory design practice into four categories: the user-as-designer myth, ill-structured information flow, the result-oriented process and the paradigm of the two characterized groups. In addition to addressing traditional socio-political problems that participatory design may face, we propose to develop this new method with new concepts in respect to the participatory design approach. In this section, we will first review the computational approach of this study as proposed in the first chapter, and then examine the three modules of the method which we have presented in chapters four, five and six.

the development of a computer-supported method

In the early age of participatory design, computer techniques were newly developed tools. However, these techniques did not provide a satisfactory response in answer to the question, "How can these new computer techniques help the action group in practice to solve the problems at hand?" To practitioners, "What can computers do?", is a practical question rather
than a philosophical question. Participatory design involves highly interactive social activities that need to be dealt with in particular social contexts. Based on its program, a computer may calculate the optimal according to given data. However, the first question that may be raised is about whose program it is and the second question is about what the context is. For example, an optimal solution calculated by computers of the municipality might conflict with what the local neighbourhood intended. Such programs normally fail to respond to complex issues that may be involved in participatory design.

The development of computer-supported tool in participatory design is relatively slow, compared to the development in architecture or urban planning. One reason for this is the nature of participatory design. As seen in Chapter 2, applying the Take Part method, designers tried to encourage users to use everyday artifacts such as vegetables, cookies, sweets, in designing in order to break the psychological barrier of the participants and turn users into designers\(^3\). Another reason is that there is a gap between participatory design and current computer-support systems. To be more precise, in one of the most recent publications about participatory design (e.g., Sanoff 1994) we find no computer-supported tools developed for participatory design, with the exception of gIBIS and itIBIS (see Section 6.2.3). It has been three decades since Chermayeff and Alexander proposed their concept in 1963 (see Section 3.1.2). We believe that people in contemporary society generally have better knowledge of computer technology than they did three decades ago and, also, that the design of current computer-supported tools is based on a better understanding of human-machine interaction. Therefore, we move towards this computational approach, attempting to bridge the gap and provide a new method of participatory design.

The development of such a method require deep investigation of the work involved the problem. In developing the method, we have generated five adequacy criteria for the method (see Section 2.4.3). In sum, the

\(^3\) This is a technique used in the Take Part process.
method should be valid, effective, efficient, reliable and robust. These criteria are generated from our case-study, and we have tested them in the test case.

*a group-reasoning model*

In this study, we have presented a method which is consist of three modules: a group-reasoning model, a dialogical system and a framework for participation-based design guidelines.

For the first module, group-reasoning model (see Chapter 4), we try to guide and control participatory design in a better way. In the discussion of this group reasoning model, we define what a group is, what the orientations of a group are, what role dialogues play in the settings of participatory design, and what mental activities a group may involve in. We then turn to discuss one essential problem of a group task: conflict resolution. In developing a model of collective cognitive structures, we propose a layered structure that can capture components, either normative descriptions or factual descriptions, of conceptual systems in participatory design dialogue. In this model, we propose not to rush into decision-making to produce results. Instead, we propose to draw the group discussion into clarifying wants and needs, and the reasons for these wants and needs. This approach helps to solve the problems related to traditional result-oriented approaches.

*a dialogical system*

In the second module, based on the group reasoning model presented in the first module, we presented a technical development, the dialogical system (see Chapter 5), which includes a distributed system, the FACILITATOR, and a sketch of a computer-supported working tool, a distributed information processing system (DIPS). The FACILITATOR refers to the entity of agents, either computers or human beings, who operate as facilitators in a participatory design discussion. In developing the model of the FACILITATOR, we examined the intelligence of one single human
facilitator to see what functions in this "highly complex information-processing device" (Rommetveit 1992: 19) were operating in a participatory design process. The DIPS tool is a group decision support system (GDSS) operated by a FACILITATOR. We developed a conceptual computer environment of the DIPS tool to demonstrate what such a computer-supported tool may look like, and we described three scenarios of applying our techniques to real situations of participatory design. One important improvement in this dialogical system is focusing on improving the management of information that leads to a more effective information processing.

A framework for participation-based design guidelines

The third module of the method is a pragmatic application, a framework for participation-based design guidelines (PBDG). (See Chapter 6). In this study, we propose to draw the discussion of participatory design towards concept design rather than decision making. The result of such a discussion is a collective set of design guidelines called PBDG. We have reviewed the structuring of design guidelines in current practice, including those generated from POE, architectural programming, and design guidebooks in order to draw out knowledge for developing the framework of PBDG. We have developed a PBDG tool which helps to capture certain components that are identifiable according to our analytical framework. The development of the PBDG tool is based on the investigations on argumentation theory and architectural discourse analysis of our group reasoning model, and it is part of the DIPS proposed in our dialogical system. The DIPS helps to solve problems of ill-structured information flow.

Summary of the evaluation

As seen in the evaluation of the method above, the method was developed based on the answers to the four methodological problems we have derived from the case-study and the review of the participatory design methods. Further, in the case-study, we have developed five adequacy criteria for the
method: validity, effectiveness, efficiency, reliability, and robustness. Although we have achieved much improvement, in terms of the fulfilment of these five criteria, there are also limitations. The limitations of the method are due to two reasons, 1) the constraints of this study and 2) the assumptions on which this study is based.

1) The problem of this study is to develop a method which will lead to the development of a tool which can be applied to support small group, face-to-face design discussion in participatory design. To do this, we have developed a method which needs further implementation, in order to supplement the actual operation to a highly satisfactory degree. Hence, for the moment, the tools (i.e., the PBDG tool and the DIPS tool) the we have developed can be tested only to a limited degree.

2) The development of our method is based on the several assumptions mentioned in Chapter 1. These assumptions are conditional (i.e., assumption 1, 2 & 5), hypothetical (i.e., assumption 3, 4, 6, 7 & 8), or both conditional and hypothetical (i.e., assumption 2 & 7). If this method is applied to conditions beyond the scope of our assumptions, then this method remains applicable only to a certain degree. However, with this new method, professionals can better control the process of group planning.

Up to now, we have presented the evaluation of our study of a computational model. Let us now examine how, based on the dialogical model, one can apply it directly to support the human facilitator of a group act to achieve particular objectives.

8.2 A meta-system as a dialogical tool

As we have discussed, the result of this study has high applicability in contemporary society, such that it can be used directly in architectural practice as a reflective tool. We now move one step further to examine the relation between the method, and the practitioner during the application of
the method and sketch what the form of such a reflective tool may be and how such a meta-system can be applied directly to current practice.

We examine the process of a group discussion from the perspective of collective knowledge producing. We now use intensive and non-intensive to describe two phases of the knowledge producing process in group discussion. In an intensive phase, people act and react promptly. Decisions to perform a following act are normally made with reference to previous acts. Each speaker says what he/she thinks is relevant and performs according to self-composed rules or rules of the game. In a non-intensive phase, speakers are hesitant to perform for certain reasons. For example, based on what he/she has said, they may be planning carefully about what to say, they may have exhausted their ideas on the issues that are being discussed, or, they may not have much to say. A group discussion may have both intensive and non-intensive phases. In an intensive phase of a group discussion, human agents who act as the facilitator can perform better than current computer-supported tools, while in a non-intensive phase, the reverse is the case — the machine can be of great help in retrieving and scanning through the record, the representation, of previous acts.

8.2.1 From the reflective to the dialogical thinking

A practitioner does not only practice, but he/she learns from practice. Sometimes, people learn how to do, something they learn from what they have done, and they learn while doing. The knowledge acquired through learning from doing is called "theory of action" by Argyris and Schön (1974). For example, a designer designs, sees what he/she has made, and then designs again. In our case, a human facilitator of a group discussion acts, listens to and reflects on the discussion, and then acts again. The interpretation of the situation by the practitioner is called the reflective conversation (Schön 1983). He says that in making things, when unintended changes happen in design, a designer tend to "shapes the situation, in accordance with his initial appreciation of it, the situation 'talks back,' and
he responds to the situation's 'back-talk.' In a good process of design, this conversation with the situation is reflective. In answer to the situation's back-talk, the designer reflective-in-action on the construction of the problem, the strategies of action, or the model of the phenomena, which have been implicit in his move." (Schön 1983: 79). Here the reflective conversation refers to cognitive activities rather than actual conversation between different people.

The situations that occur in a participatory design dialogue can be very complex. A human facilitator has to control the process of a dialogue while he/she is also involved in the discussion. It seems right to say that whether a facilitator can analyze the situation from the point of view of a "meta-system" — a computational model of dialogue — while he/she is using ordinary language is an important factor in facilitating such a group discussion.

In an intensive group discussion, information is being processed collectively and intensively. A skilful chairperson may be able to take a "meta-position" in order to understand the meaning of the dialogue, to analyze the act, and to respond with his/her own acts. The chair may summarize the dialogue, compare one dialogue with another, ask one actor to respond to particular points, decide whether a dialogue is relevant or not, etc.

Let us use playing a card game, bridge, as an analogy. There are certain rules which guide a player when it is his/her turn to act. He/she may have only one, or several combinations of cards, for the next move. To act properly, the player has to understand previous acts, and connecting them to the situation at hand. He/she may analyze the intentions of other players on the basis of their previous moves, and then predict those intentions and their future moves. Then, the player acts. A good player may remember all previous moves and plan the next several moves strategically, while a beginner may remember only one previous move and only plan for the next move. However, in participatory design, in general, people act informally and non-strategically. A widely accepted rule of the game of organizing a participatory design discussion is not to formalize the process of discussion.
and to maintain a certain degree of flexibility. Participants are encouraged to say whatever they feel like saying during the discussion. However, in order to control the process, the facilitator should have clear rules, or tactics, in his/her acts.

In participatory design, there are two agent roles, that of the users and that of the facilitator. They may be in different social positions but the structure representation of their cognitive activities should be similar, except that the facilitator has to pay more attention to a meta-system than the user. We now look at a concept of the "reflective".

the reflective thinking

In a design discussion, people observe the situation, see what has been drawn, search through their memory to see what has been said, refer these data to their state of knowledge, and then plan for the next move. During a design process, there is a kind of activity called reflective conversation (Schön 1983). (See Section 4.1.3). The concept of conversation here denotes not only the language used in direct face-to-face discussion but also refers to conceptualizations of language in human cognition.

In a single-agent design process, the designer perceives the situation created by his/her previous move, and then makes the next move. Analogically speaking, there is a conversation between the situation and the designer. "Designing is the conversational transaction between the designers and the materials of a problematic situation." (Schön 1992: 26.) In other words, a designer may use what he/she has designed as a reflective process for further development.

belief systems of the reflective thinking

In such a reflective process, only one agent's belief systems are taken into consideration. For example, let us assume that we can clearly mark the states of knowledge of a single designer as they accord to three periods of times: $T_i$, $T_j$, and $T_k$. The three sets of the state of knowledge at those
periods of time correspond with three states of the material world: $M_i$, $M_j$ and $M_k$, and each of these material states represents a state of knowledge: $K_i$, $K_j$ and $K_k$ in its time. With the visual states of the material world, $M$, occurring in different times, $T$, we can easily point to these states of design and refer them to corresponding states of knowledge. One important factor of the reflective is that of the knowledge of one's knowledge$^4$.

Sometimes, people identify themselves as if in the past they were other people, people who thought in different ways, that is in ways different from those of the person who utters the expression in the present. Here we look at two examples, "I was thinking in a purely mathematical way," and "I was a happy man when I was a bachelor." The belief systems of these "I's" are not the same as the belief system of the person who utters the statement because there are time factors involved. It is the changing of belief systems over time that helps to create the imaginary I. Moreover, when people seem to be performing under certain sets of belief system they are actually performing under other belief system. The use of such imaginary characters plays an important role in everyday life$^5$. However, without direct references denoting states of knowledge of the past, such a reflective process is based on indirect "free-association thinking" (Minsky 1975: 99) or thinking about one’s memory.

We now see the connection between the reflective conversation and the dialogical thinking, and then move to the dialogical thinking. In a reflective system, the fact that a person may have various and different belief systems in different time, and that there are situations created according to these different belief systems, is comparable to a dialogical system where there are more than one agent taking turns in making a design. The development of the concept of the reflective conversation is

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$^4$ Knowing that one knows is considered as an epistemic notion (Hintikka 1962). Here we only focus on the application of this notion in the design process.

$^5$ See concepts developed in recent studies, such as, dialogical self (Hermans & Kempen 1993) which refers to the imaginary I of an individual, and the study of voice (Bakhtin 1973, Aronsson 1991) which is about voicing opinions actually belonging to a non-present person.
based on this metaphor.

**the dialogical thinking**

An utterer in a group discussion uses what he/she has said as a reflective tool for further discussion. In addition, he/she uses what other people have said as a vehicle, hitching on to it, to perform his/her own act. Through dialogue interaction, one member of the group can build on another member's input, resulting in the production of a larger number of ideas and alternative solutions (Olsen 1982: 2). In making a dialogical model of participatory design, we are interested in knowing how such dialogue interaction processes arguments, or, to be more specific, what knowledge of previous arguments has been taken in and is integrated into following arguments and in which forms.

In a dialogical system, there is more than one set of belief systems interacting at a given time and they are held by different agents at a given time. Since there are multiple agents involved in a group discussion, an act influences the belief systems of the participants who have interpreted the act. However, for example, an act may not change the belief systems of those who see the act but are thinking about other things. In other words, information may be received but not be processed. A well-organized group problem-solving process may produce more information and may have a wider scope of knowledge in a shorter time than generated by a single person’s problem-solving.

In an intensive discussion, information is massively produced. Sometimes, the connection between two related statements is interrupted by other statements (e.g., "I want to respond to what he said few minutes ago, before we entered this discussion."), or the course of the discussion may be diverted by an unrelated, but interesting, topic and may move to another direction. How can a chairperson, a facilitator, control this rapid movement of dialogue? In a non-intensive phase, speakers may be searching through

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*This explains how ideas can be largely produced in a brainstorming exercise.*

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their notes or trying to recall what has been said, in order to plan compose their following acts. Our question that applies to this situation is: How can the chairperson, the human facilitator, guide the participants to continue the discussion? We address these two question in the next section.

Following our example of the reflective conversation, if these states of the material world are produced collectively by a group, then $K$s represents the shared knowledge of the group in time $T$s, which brings about the situation, $M$s. However, in a dialogical system, there are more than one set of belief systems interacting at a time. Therefore, $K$ should become: $K(P_1, P_2, P_3, \ldots, P_n)$. The number of $P$ refers to the number of sets of belief systems that are identified in $T_i$. One person may utter more than one set of belief systems in one speech act. For example, a person utters "I agree on action A. However, if my grandfather were here, he would be against action A." In practice, users in participatory design discussions may utter opinions on behalf of non-present persons. Or, if a person is of a Type I conflict description (see Section 4.2.1), he/she may say, "I like action B but I also do not like action B. I have reasons to support these two contradictory statements." These kinds of inconsistent or logically counter-factual statements can happen in informal discussion. For example, agent A says, "We are in a conflict about cutting down the tree for safety reasons and keeping the tree alive for environmental reasons."

Sometimes, after the exchange of opinions, people may have received the arguments of both sides, e.g., Agent A says, "Cut down the tree in the park for safety reasons," while agent B says: "Keep the tree at the park for environmental reason." To agent C, these two arguments are reasonable. Moreover, the two performance norms, the environmental issue and safety, are equally important, such that it is difficult to identify one norm as being higher than the other.

For the human facilitator of participatory design, guiding individuals to "make up their mind" between contradicting opinions, or guiding members of the group to agree on what has been presented in the discussion.

The main connection between the reflective thinking and the
dialogical thinking is that of the state of belief systems and the formulation of knowledge. However, the reflective conversation is about knowing one's states of knowledge in the past, and such knowledge may be represented in the form of objects (see Schön 1992), while the dialogical model is about what people have said about what they have known, and such knowledge is represented in verbal statements.

8.2.2 A dialogical tool to support design discussion

The participatory design method we developed is for the designer who may be involved in facilitating the face-to-face design discussion. As seen in the three modules (Chapter 4, 5 and 6), we have developed a method for participatory design. Our intention is to provide our user — the designer — with a comprehensive and practical tool. Therefore, despite certain parts of this method needing further development, we now describe how a dialogical tool can be employed in direct applications of design discussion. What we will present in this section is an example demonstrating how a support system can be developed based on the dialogical model, for particular purposes. This tool will answer our question as to how the facilitator can control and guide information-processing when there is no formal setting of computer-supported techniques. Further, we have addressed the fact that, in group discussion, most dialogues generated are based on previous dialogues (see Section 4.1.4). Such a group discussion involves many complex activities. In this study, we are only interested in seeing how design concepts (i.e., norms, facts, etc.) are generated through interaction among the members of the group, and how people's belief systems is influenced through such interaction (see Section 6.4.3).

With the development of the framework for formulating design argumentation as our base, we are able to formulate certain components from a design reasoning process. In this example, we are concerned only with design argumentation for the purpose of the systematic analysis of dialogue and the formulation of design guidelines for the further develop-
ment or implementation of a design. In general, the dialogical models are conceptual models for formulating dialogue to serve particular purposes (see Section 1.3.2). In a participatory design operation, whether a facilitator is chairing the discussion or not, he/she can use such a dialogical model as a meta-system to analyze the conversation according to the pre-determined purposes of the operation.

Based on the development of the dialogical model in this study, we now demonstrate two dialogical representations that can be applied directly to group discussion. Such dialogical representations are used not for developing a model of dialogical logic, but for the pragmatic purposes of design discussion. That is, to understand what has been said and to understand what the relations between them are.

![Diagram of two design statements](image)

Let us set our constraints of the first dialogical tool as:

1. Identify only three types of concept as Valid components: Norm (N), Directive (D), and Fact (F).
2. Mark these concepts with \((n)V\). \(n\) = the number of the statement.
and \( V = N, D, \) or \( F \).

3. Mark invalid components with "(n)?". \( (n) \) = the number of the statement.

4. Draw a circle to contain \( (n) \)Vs if they belong to a same statement.

5. If one valid component appears in two statements, overlap the two circles on this component.

6) If \( (n_j)V = (n_i)V \), and \( n_j > n_i \), keep only \( (n_i)V \).

For example, the first two statements of a design dialogue are:

Statement 1: "You do not have to tell me those things. The most important thing is to build a public toilet. The reason for building a public toilet is that when our friends visit us in the park and cannot find a public toilet, then we lose face."

Statement 2: "A public toilet is very important. As we all know old men need to use the toilet more often. We, the old people in this
neighbourhood, stay in the park all day long. Whenever you go to the park, you see us."

For the statement 1:
(1)D: to build a public toilet
(1)N: reputation
(1)F: IF our friends visit us at the park and cannot find a toilet, THEN we lose face.
(1)?: you do not have to tell me those things
(1)?: the most important thing is...

For the statement 2:
(2)N: health
(2)D: to build a public toilet
(2)Fa: old people need to use the toilet more often
(2)Fb: old people stay in the park all day long
(2)Fc: (on account of common sense that) we all know...
(2)Fd: (on account of our experience that) when ever you go to the park... you see us.

We then draw two circles to cluster these valid components of the statement 1 and the statement 2 on the "ground" of information. (See Figure 8-1). As seen in Figure 8-1, because (2)D is the same as (1)D, we overlap the two domain, 1 and 2, on (1)D and skip (2)D.

Let us suppose when the discussion goes on, more arguments are uttered. As seen in Figure 8-2 one circle represents the domain of one statement. Some components are used by more than one statement and some statements may be isolated from other statement. In this model, we observe 1) that valid components in statement 8 has no connection with other statement and 2) that statement 9 has no valid components (e.g., "Let me tell you something about myself...").

Our second model of such dialogical representations is a flow-chart table. We sketch here a table that formulates only certain types of components
from the design dialogue. For example, we want to observe how performance norms (PNs) are discussed in a group discussion. We use a flowchart representation (see Figure 8-3) as a tool to analyze the design dialogue. With this model, following a group discussion, we identify the PNs of those statements in time. On the flow chart, the first column from the left contains PNs, a to f, which are identified in time. Here we suppose we have eight statements, 1 to 8, labelled according to their sequence. One statement, be it short or long, is considered as one act and is represented by one column. Arrows in the columns refers to the PN mentioned in that statement. Some statements may contain more than one PN, statement 3 and 6, e.g., "Security and privacy are two important issues in this design," while some arguments may contain no PNs, i.e., statement 5 and 8, e.g., "The mayor agrees to found this project." As we can see in the table, the location of the arrow in each column shifts because each statement may be focusing on a different PN. In this dialogue, after the first statement is made, statement 2 focuses on PN b while statement 3 moves back to PN a.
and claims a new PN, c. Statement 4 follows PN c. Statement 5 is a factual description. Statement 6 mentions two new PNs, d and e. Statement 7 comes back to PN a and adds another PN, f. Statement 8 is another factual description.

This flow-chart representation starts with one simple task: to identify what performance norms are mentioned in the discussion. However, after we have abstracted only one particular type of component, the PN, from each statement, we can see the relation between two statements based on the relation between the components of these two statements. This simple representation may serve many other applications. For example, one can easily point at one area of this map, referring to what has been said, or ask to return to the context (see Section 6.4.3) at certain moments of the discussion (e.g., "I want to go back to where we were.").

The two models we have demonstrated are only examples of how a direct application of such tools can be developed based on the dialogical model. In developing these two models, we scaled down our purposes of the analysis to a limited application. In the second model, we only focused on the performance norms of the discussion. These two tools can be further developed and evaluated. However, that is beyond the scope of this study.

In this section, we have discussed the relation between the reflective and the dialogical thinking, and have demonstrated two examples of dialogical representation which can be applied directly to the test of structuring certain types of design concepts. The two tools are designed to serve limited purposes because our intention here is to demonstrate how a tool based on our dialogical model can be easily constructed. Doubtless, there are some other ways to structure design concepts. However, our method is based on most simple structure of design concepts which can be understood through the analysis of design argumentation. Further, the method has general applicability in supporting further implementation or improvement in the development of tools.

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8.3 Future applications and extension of computerization

In our literature review, we find fewer articles about participatory design in the late 1980s than in the 1970s or the early 1980s. Publications about participatory design seemed to have concluded at a report, *Co-Housing* (McCamant & Durrett 1988) and a participatory design handbook, *Co-Design* (King et al. 1989). This is not because people have stopped practising participatory design but because international journals have lost interest in this old topic. However, attention to participatory design has re-emerged in the early 1990s in international journals (e.g., *APA Journal*) and international conferences (e.g., *Participatory Design Conference '90 and '94*) simply because new problems have been identified and new techniques are developed. Among those recent publications, in addition to solving the new problem with the old approach (e.g., Heiman 1990, Dear 1992, Dorius 1993, Rose 1993, Weisberg 1993, Lake 1993), or solving the old problem with the old approach (e.g., Kernohan et al. 1992, Sanoff 1994), we observe a new tendency that is moving towards the integration of newly developed computer technology and the social practice of participatory design (e.g., Whyte 1991, Gustavsen 1992, Schuler & Namioka 1993). We can see that, while there are participatory designers continuously practising in traditional participatory design approaches, there is a new community of professionals who are developing new methods and new techniques to answer the increasing, either quantitatively or qualitatively, demands of participatory design.

Based on what we have developed here, we now look at the possible extension of our new method to see how the development of the computational model can in the coming year contribute to the future of participatory design. We indicate two directions: the first is a practical development of the computer-supported method proposed in this study, linking it with current computer technology; and the second is another step towards computerization of participatory design dialogue, focusing on
exploring the possibilities and limitations of a computer-based dialogical model.

**development and extension of computer technology**

We have defined the problem discussed in this study as problem-solving in small group, face-to-face discussion. Current technology developed in GDSS can to a certain degree help to mitigate this need support this need. The computer environment of the DIPS tool, a multi-entry interface, as proposed in this study, might require further technical advances. With the current advancing technology of interactive multi-media and computer supported cooperative work (CSCW), the realization of the DIPS tool should not be far away. In addition, the DIPS tool can easily be extended to apply to large-scale citizen participation on the debate of public policy, if direct keyboard entry from remote locations would be possible. Through the support of internet or the "super-highway" network, multi-agent on-line communication is already possible. An example of such development in practice is the "virtual office". Furthermore, the DIPS can be developed into a computer-supported system of collaborative design, where the belief systems and roles of participants, and specialists, are better defined, but the structures of group-reasoning and information-processing resemble those in participatory design.

**computerization of the dialogical model**

The computerization of dialogical models is our other aim in the extension to this study. In developing our method, we have proposed a framework for formulating design discourse. Our following attempt will be to move into a deeper development of a "high" dialogical model, the discussion of which we have postponed in this study. In order to further advance the analytical framework of design dialogue, and to move beyond the boundary of natural language, and not to fall into linguistic text analysis at the same time, we have to investigate deeper discourses of logic (e.g., propositional logic,
alternative logic, modal logic) which are related to artificial intelligence. Although the discussion of logic appears philosophical, the purpose of this approach is pragmatic. In this study, we use natural language as the representation of dialogue because the understanding of natural language relies on human agents. However, a proper algorithm and representation of the natural language for computer processing, be it beyond the concern of the facilitator of participatory design, can provide faster information processing. To bridge this gap, we need to further develop a framework to transfer conceptual systems captured from natural language into a meta-language so that both the human agent and the machine can understand and can process this meta-language in his/her mind or in its system.

8.4 Conclusion

This study has been concerned with the need to generate a method for the structuring of design dialogue for participatory design in a face-to-face design discussion. In the first chapter, we developed the general formulation of the problem, and the methodological premises, research methods, and we discussed the theoretical framework of the study. (See Chapter 1). In the second chapter, we applied the case-study method as a heuristic device. The project selected is a public park in Taiwan, designed with the participation of the local community. The case-study served to guide the development of the model. As seen in the case-study, methodological problems are due to four concepts: 1) the user-as-designer myth, 2) ill-structured information flow, 3) the result-oriented process, and 4) the paradigm of the two characterized groups. (See Chapter 2). We looked into the method applied in the case, and found that these problems have their origins in systematic feature of the method applied. There is also a body of literature which leads one to the similar conclusion of these problems. (See Chapter 3).

In this study, we have developed a new participatory design method. The method consists of three modules: 1) a group-reasoning model, 2) a
dialogical system and 3) a framework for participation-based design guidelines. The group-reasoning model formulates the process of knowledge acquisition, the learning and sharing of belief systems, the generation of design alternatives and design evaluations — in which reasoning takes place dialogically. (See Chapter 4). The dialogical system provides a clear description of how the information should be processed, to which aspects attention should be paid, the results that can be anticipated, and when and how to control the process. (See Chapter 5). The framework for participation-based design guidelines and structures the design process. It facilitates a reconstruction of the implicit cognitive structures, which underlie dialogue and are generated through the discussion of a group. (See Chapter 6). A design project in Amstelveen, the Netherlands, designed with the participation of people representing various interests, was been selected as a second case to test the produced design-supporting method. (See Chapter 7). The evaluation and potential development of the method is examined in the last chapter of the study. Moreover, in order to further explore the application of the dialogical model, two simple tools for structuring design dialogue are demonstrated. (See Chapter 8).

We trust that we have provided a convincing argument for the reader to accept our new participatory design method. We further trust this improvement will, in the long term, contribute to the improvement of the relationship between people, built environment and technology. We feel confident in saying that, in the foreseeable future, participatory design, with better understanding of social-cognitive activities and better computer technology, will be able to support more interactive, integrative, and intelligent architectural and urban design processes.
APPENDIX A

HOE-JU-WAE COMMUNITY DESIGN
A Dialogical Model for Participatory Design
三重後竹圍公園居民參與設計

PARTICIPATORY DESIGN PROJECT
IN SANCHUNG,
TAIWAN'S HOE-JU-WAE

台灣大學建築與城鄉研究所
Graduate Institute of Building and Planning

社區設計工作隊
Studio of community design

後竹圍公園
居民參與設計案

PARTICIPATORY DESIGN PROJECT IN
SANCHUNG,
TAIWAN'S HOE-JU-WAE
PARTICIPATORY DESIGN PROJECT
IN SANCHUNG,
TAIWAN'S HOU-JU-WAE

1 Background

The social significance of our project, the design of Hou-ju-wae community park, might be seen in the transformation of its name. Hou-ju-wae (which means "The Bamboo Garden out back") was a small peasant community founded by immigrants from the Chinese mainland during the Ch'ing dynasty. Near what is now Taipei, Taiwan. From that time and through the 50 year Japanese occupation of Taiwan, the community was distinguished locally by its temple [SLIDE 1], old buildings, patrilineal social life and the stand of bamboo on the margin. A new state, the Chinese Nationalists (KMT), arrived in 1945 and ruled under martial law for 40 years, continuing the Japanese policy of excluding ordinary people from decision making.

Professional Intervention

With the ending of martial law, new opportunities for local planning and design are created. People of the Hou-ju-wae neighborhood petitioned the new reform government of their city to clean up the eyesore that has displaced the original "bamboo garden out back." At that point, people who had taken the initiative in the community (here we refer simply to scale) made contact with activist professionals from the Graduate Institute of Building and Planning, National Taiwan University, beginning a process of collaboration, conflict, negotiation and re-definition of space, society, citizen and professional.

Site

The area is approximately one city block and the site which was full of garbage is situated between a community in place since the Ch'ing Dynasty and one only 30 years old. The concrete box flavor of the surrounding walk-up apartment complexes is muted by a green L shaped corridor leading into the park. A dilapidated old farmhouse has been the only building on the site since Ch'ing Dynasty. [SLIDE 3]
Since the period of Japanese occupation, San-Chung has been regarded as a much more poor, dirty and disordered place than any other areas of Taipei. For example, some sayings had expressed here in 1960s-1980s. There was an informal name of this place called "San-chung desa'ha" ("desa'ha" means university in Taiwanese). This is because there was a big dung hole located here for other neighboring area of Taipei at that time, and dung hole is named "asa'ha" in Taiwanese. So when they named their place "San-chung desa'ha" (an university), it means they joked themselves living in "San-chung asa'ha" (a big dung hole). This is a sense of place with self-deprecation constructed in the collective memory of past landscape.

Different namings strengthen or weaken different senses of place. Another example is the formal name of this place 'Hoe-ju-wa'. The NTU government changed the name. The present official name sounds the same as the traditional name "The Bamboo Garden out back", but the characters are different. The homonym is actually a political name chosen by the regime as an aid in changing the identity of the community. During the following 40 years, the new Hoe-ju-wa was amplified by the unplanned growth of Taipei and its attendant slumlike disorder of space, pollution, and alienation. The bamboo patch became a dividing line between the long standing residents and new coming migrants. It was destroyed gradually and the bamboo grove entered the 1950’s as a garbage dump. [SLIDE 2]

The social constructed self-depréciatory sense of place becomes a dynamic why these residents participate the park designing process so actively. They want to change the relatively social periphery and spatially marginal position in Taipei metropolitan area through an "Reviving action for old community". In the designing process, the re-creation of a new identity become an important goal.
An alternative space in this locality:
Beyond street and home space

Beyond the public and private space (such as street and home), there are some alternative spatial patterns produced here with some specific social relations back. These social/spatial patterns promote social interactions in daily life and condition the possibility of community participation.

**STREET/ALLEY CORNER**
- They put a big stone across the alley to block motors. This is a territory for neighborhood.
- A simple roof built at street corner for rest.

**TAIWANESE ARCADE**
- Residents dry their clothings.
- People sing karaoke (a singing activity, people sing songs free and publicly) with neighborhoods Taiwanese arcade. They watch song pictures on TV which is in the house, but they stand and sing with a microphone outside.
COMMUNITY TEMPLE AS A CENTER OF LIFE SPACE

* The drawings on wall
define the street as a
territory of the
temple. This is a place
for public meetings of
Hoe-ju-wae.

* We can take an axial
view from several
alleys to see the
temple.

* The temple is a
center of mobilization
in daily and yearly
rituals.

HOUSEFRONT

* Women usually work in
front of their houses
in order that they can
talk with neighbors and
take care of their kids
nearby.
2. Who/What is society and What is the responsibility to it?

As our slides, photos and video tapes will show, young people took the lead in spreading the word that the community could design the park with a parade (SLIDE 4) calling on people to join in the planning. The next step was an action to show the possibility of change, a cleanup of the site. Once again, young people from the local area and students/professionals did most of the clearing work (SLIDE 5). The public transformation of the site from dump to open space was observed by many, and the project was the subject of supportive conversation in both the older center and the bordering new community.

- A cleanup action of the site was initiated by residents from Hoe-ju-won and students/professionals from N.T.U.

- Baseball game attract young people to take part in afterward participation.

- Children in Hoe-ju-won

- Propaganda period
Activities appreciated by the residents, notably a karaoke singing program, were organised to make real the possible uses of the space (SLIDE 6). While the activities were organised collectively by the local core and people from the Graduate Institute, the success came through contact with the existing local organisations that defined "social" — the area council and the temple association. Once these men, the "insiders" from the Old Ch'ing Dynasty community, put out the word the residents joined in.

* Ball game, barbecuing and karaoke singing program make real the possible uses of the space.

* Children were drawing imaginative pictures of the future park.
3. Participatory Designing Process

Re-definition of community and society

The planning then began in earnest. The core group and the professionals faced two sorts of contradictions. As the karate event had shown, networks organized around long-term male residents could bring people into the process but tended to reproduce the patriarchal social relations that constituted their authority. Our definition of community and society included young people, newer residents, and women.

The other contradiction centered on the transacting of professional knowledge into social power. Residents felt that their lack of technical knowledge made nonparticipation in planning a natural outcome. We felt that it was a local manifestation of problems in the society at large. Our tentative solution was to mobilize all residents, both informally and through existing networks, into a process in which each person had an equal voice and professionals served to translate their felt needs into technical plans which everyone could understand.

* (left) A picture of A'an grandmother
* (right) A picture of little girls

* Elders were telling stories of Nae-ju-see.
Three activities were organized to prepare for the actual planning by tapping residents' senses of time in relation to social memory and daily routine. In one program, the elders of the community gathered in the future park space to tell stories of Hoe-ju-wa's past, not to a planning group but to everyone who cared to listen [SLIDE 7]. The core group members encouraged everyone to think of what that might mean for the space of the park itself. Another activity was called "A day in Hoe-ju-wa." [SLIDE 8] A time curve was drawn in a long sheet of paper. It was divided by hours of the day. Then residents drew scenes keyed to daily routine.

The last but most important activity was "All come together to make our park". Residents were divided into four groups according to their sex and age. They discussed their imagination with other people including us, and visualized their conclusions by making an easy model with sticks, straw, color clay...etc.

According to their outcomes, the majority of the final design is organized to provide for four different activities associated with the four different groups. A basketball court and softball field, likely to be used by older children and young adults, are at the end of the green entry way. A playground for younger children has been set in a space that is safe and easy to observe from the more adult-oriented spaces. Especially specific spaces, Healing Walking Path, has been designed by and for the woman of Hoe-ju-wa. The space which is for traditional Chinese exercises centers has to be moderately secluded because women are ashamed of their naked legs. The elderly, especially elder men are the likely users of a shaded area adjacent to the restored farmhouse, a space for chatting, drinking tea, or sitting in relatively quiet -- a rare experience in modern Taipei.

The remaining spaces are given over to activities that tend to bring all groups together. Elder men described a square usually appear in Taiwanese country. This is a place for community meeting, performance or karaoke singing activities. Besides, residents including young people proposed a rest image of bamboo as a symbol for creating a new community identity. Finally, a public garden occupies a corner of the park and suffers a particularly noisy street.

"All come together to make our park"
* Women group were talking about their design: Health Walking Path, exercise space, old farmhouses... etc.

* Children were finding their homes in a big map.

* Two elders were disputing if the park needs a toilet.

* Residents were presenting their design.
The Comparisons of 4 groups' to the final design

- The Design of Young people group
- The Design of Men group
- The Design of Women group
- The Final Design
- The Design of Children group
A SQUARE FOR COMMUNITY MEETING, KARAOKE SINGING & PERFORMANCE

RESTORE OLD FARMHOUSE

PLAYGROUND

PUBLIC VEGETABLE GARDEN (Residents reject it because they could not cope with that and the suggested tool shed was rejected as looking too much like the ubiquitous little shrines to the earth god.)

BAMBOO

POND

BASKETBALL COURT

SPACE FOR CHATTING, DRINKING TEA UNDER THE TREES

GRASS HILL

HEALTHY WALKING PATH
The Final Design Proposal and Beyond

During the final stage in planning, we, the professionals and residents, agreed that the community participation and social empowerment meant recognizing that social power within the community was as important as a resource. The final planning was therefore conducted in separate groups containing residents of the Ch'ing Dynasty community and the newer immigrants—women, older men, middle-aged and young men, and children. Each group produced a plan; the role of the professional was to help materialize their wishes on paper. We could include these residents into the presentation. All the groups were brought together and their final discussion was mediated by the core group. Eventually, all parties gave a little and took a little. Women had wanted the dilapidated house as a historical site in the view of older men—torn down but gave way. The professionals and students pushed for a vegetable garden, a site for collective responsibility. In the end, the residents could cope with that. This was too connected with peasant labor, individualized and hardly appropriate for a leisure space. The suggested tool shed was rejected as having too much like the ubiquitous little shrines to the earth god.

We transformed the consensus design into a more formal model [BLIDE 16-17] and presented it to another open meeting for ratification [BLIDE 18]. We and the core then proceeded to negotiate with the local administration for permits and funding. At 9 Oct., 1992, the local administration permitted the Hsin-Ju-wen Park project, and will be constructed at Jan. 1993. After some newspaper reporting the story of Hsin-Ju-wen park, it interests local government of Taipei county. A larger project of 10 community parks in Taipei county will be continued in the same process. It is right time of participatory design in Taiwan.

In this project, both we and the core residents and activists redefined ourselves and our role for the meaning of society and being responsible to it. To empower people requires recognising the divisions within a social structure, and within the local area. To the degree that we were able to facilitate the whole community against an externally imposed degradation, participation in the planning was surprisingly widespread. On the basis of that success however, we all had to find ways—dividing the final planning groups into 4, spreading word through women's networks, relying on the enthusiasm of children, and linking the male dominated temple association to the larger question of what kind of society Taiwan was to and ought to be. There were various ideas, however, such as the hierarchical limits of gender, age and class which the residents cannot help but come across.

Finally, we learned that part of empowerment and social responsibility was working to share and use professional skill while working to understand its status as cultural, social and political capital that calls on people to become more proactive. That brings us back to the question of name, the end of this process. The government's political name for Hsin-Ju-wen had been replaced. For every participating resident, the name had turned back into the pre-dictatorship name—"The Bamboo Grove out back."
APPENDIX B

ARTHUR ANDERSEN PROJECT
A Dialogical Model for Participatory Design
Multi vastgoed bv
Hanzeweg 14
2803 MC Gouda
Tel.: 01820-78900
Fax.: 01820-58805

T+T Design
Hanzeweg 14
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Fax: 01820-71691

Colofon
Multi vastgoed / T+T design / © Gouda 1995
Aan: deelnemers workshop  
Van: J.B.Jutte  
Kopie:  
Dossier: K1685-01-001  
Project: Definitiefase kantoorgebouw Arthur Andersen  
Datum: 12 januari 1995  
Betreft: verslag bijeenkomst 4 januari 1995  
Ons kenmerk: IMI/MTB-774  
Groep: E (Energie)  
1e sessie: John Borga (DHV), Ronald de Gans (DHV)  
2e sessie: Ebbe van Wijngaarden (Multi), Jan-Bart Jutte (DHV, verslag)  

(Sessie 1)

Streven is een een zero-energy concept:

- vraag naar fossiele brandstoffen zo mogelijk tot nul reduceren
- energievraag zo veel mogelijk invullen met de duurzame energiebronnen

<table>
<thead>
<tr>
<th>functioneel</th>
<th>doelstelling/proces</th>
<th>concepten</th>
</tr>
</thead>
</table>
| 1. duurzame energie | > houd duurzame energie | * maximale benutting zonne-energie  
- elect.: PV  
- verwarming: passieve zonne-energie  
- warm water: zonne boiler  
* indien kruising nodig  
- kondo-opslag  
- absorptieve kouding  
- toepassing |
| 2. energie-natuur | zero-energy concept  
EPN J-15% noodzaak | * beperken vraag  
* optimalisatie  
- beperken schilferien  
- optimalisatie benutting |

(Sessie 2)

1. gevelindeling orientatie-onafhankelijk
2. compacte bouwvorm (tevens gunstig voor materiaalgebruik)
3. thermische bouwmassa 85 kg/m3, conflict met beperken van materiaalgebruik (oplossen door toegankelijk maken massa (geen plafonds) en b.v. massieve binnenwanden)
4. natuurlijke beschaduwning: bomen
5. gebruikersgedrag beïnvloeden: b.v. trappen prominent aanwezig
6. slim meet- en regelsysteem
Bijlage

CHECKLIST MATERIALEN

materiaalstrategie:

1. zo weinig mogelijk gebruiken (ook weinig bouwafval produceren)
2. zo lang mogelijk gebruiken (ook onderhoudsarm)
3. herbruikbaar na eindgebruiksduur
4. geen materialen met ernstige milieubelasting

In het kader van punt 4. "geen materialen met ernstige milieubelasting" een beknopt overzicht van te vermijden en van voorkeursmaterialen:

te vermijden materialen:
  - lood, zink, koper
  - hardhout (met name binnen toepassingen)
  - schadelijke verduurzamingmiddelen
  - (H)CFK-houdende produkten
  - oplosmiddelen-houdende produkten

voorkeursmaterialen:
  - materialen gemaakt met vernieuwbare grondstoffen:
    * hout (duurzaam beheerde bossen)
  - materialen gemaakt met secundaire grondstoffen:
    * beton met secundaire grondstoffen
  - duurzame materialen met beperkte milieubelasting:
    * baksteen, keramische elementen
    * natuursteen
    * kalkzandsteen
Aan: deelnemers workshop
Van: J.A.Bergs
Kopie:
Dossier: K1685-01-001
Project: Definitiefase kantoorgebouw Arthur Andersen
Datum: 12 januari 1995
Betreft: verslag bijeenkomst 4 januari 1995
Ons kenmerk: JB/HvM/MC
Groep: M (Milieu, Bouwbestuurt, Regelgeving, Behoeder van Milieu & Gezondheid)
1e sessie: Leen Verraat (Multi), Ewald Zelvis (Multi), Paulus Jansen (DHV)
2e sessie: John Bergs (DHV, verslag), Ronald de Gans (DHV)

Functioneel
Er is een uitspraak nodig op het niveau van opdrachtgever/opdrachtnemer en gebruiker dat het te realiseren gebouw een M&M-kantoor moet zijn.

Opmerking: Er is en strategie/beleid van MVG nodig hoe als projectontwikkelaar in de markt hier mee om te gaan. Er moet een 'groenplan' ontwikkeld worden en een managementconcept (omgaan met markt, beleggers, overheid, PR etc.). Op dit moment wordt in een interne MVG Wergroep Milieu hier aan gewerkt.

Doelstelling/Prestatie
In een 'visiedocument' worden de voor dit project relevante thema's vastgesteld (lokatie, stedebouw, energie, materialen en constructies, water en groen, gezond bouwen, interne milieuzorg). Per thema worden ambities en doelstellingen geformuleerd en worden mogelijke middelen, concepten aangegeven waaraan gedacht kan worden. Voor de gedachtebepaling: zie bijlage 1. Belangrijk is dat ook de randvoorwaarden aangegeven worden: geld (toegestane verhoging investeringskosten in relatie tot exploitatiekosten), tijd (passend binnen normale planperiode (?)) en kwaliteit (andere kwaliteitsaspecten zoals uitstraling).

Concept
Er bestaat geen éénduidig M&M-totaal-concept, noch vergaande regelgeving die eenvormige concepten afdwingen (dit geldt voor architectuur, energie etc.). Per project zullen daarom optimale concepten ontwikkeld moeten worden. In de loop van de workshops worden deze concepten duidelijk. Aan het einde van de workshop moeten hieraan haalbare prestaties gevoegd worden en omschreven worden in een PvE.
MENS- EN MILIEUVRIENDELIJK BOUWEN
Visie en begripsomschrijving Multi Vastgoed

Afbakening Mens- en Milieuvriendelijk bouwen
Mens- en milieuvriendelijk bouwen (huisvesten) betekent een kwalitatief goed 'produkt' leveren dat in de verschillende levensfasen zo min mogelijk schade voor mens en milieu oplevert. Een produkt dat zo weinig mogelijk (fossiele) energie gebruikt, dat gezondheid en welzijn van mensen in het gebouw niet bedreigt maar bevordert en waarbij de kringloop van materialen zo zorgvuldig mogelijk wordt beheerd (gebruik van grondstoffen, mogelijkheden hergebruik, voorkomen afval, beperken watergebruik etc.).

De volgende thema's zijn daarbij (in zijn algemeenheid) van belang:
- integrale mens- en milieuvriendelijke bouw- en huisvestingsfilosofie
- lokatie
- energie
- water (en groen)
- materialen en constructies
- gezondheid, welzijn en comfort (de mens)
- interne milieuzorg (tijdens de bouw en tijdens het gebruik van de gebouwen).

Boven genoemde aspecten dienen op een integrale wijze in het proces (van initiële tot in gebruikna-
me) de aandacht te krijgen. Afhankelijk van de mogelijkheden van de lokatie, de aard en omvang
van het (bouw)project, het moment waarop DHV bij het proces betrokken wordt en het beschikbare
budget, kunnen een of meerdere aspecten meer nadruk krijgen.

Integrale (huisvestings)filosofie
Mens- en milieuvriendelijk bouwen is méér dan alleen een groen dak op een energiezuinige gebouw,
méér dan het toepassen van voorkeurs- of verbodlijstjes van materialen, méér dan een samenraap
sel van losse maatregelen. Voor werkelijk milieuvriendelijk huisvesten is het nodig te beschikken over
een (huisvestings)filosofie. Dit begint met inventariseren en analyseren van strategische en taktische
kriteren en het primaire en secundaire proces van de betrokken organisatie. Deze gegevens moeten
verwerkt worden in een 'M&M visiedocument' en uiteindelijk in een Programma van Eisen.

Lokatie en stedebouw
Er wordt een onderscheid gemaakt tussen aandachtspunten/kriteria voorde lokale keuze en het
stedebouwkundige ontwerp voor een gekozen lokatie. Algemene doelstellingen in de vorm van
prestatie-eisen zijn moeilijk te formuleren. Voor een aantal van de op de volgende pagina genoemde
specifieke aspecten is dit wel het geval.
Lokatie(kenze)
De volgende aandachtspunten zijn van belang:
- afwezigheid van bodemverontreiniging en ongunstige radiesthetische factoren
- goede bereikbaarheid met openbaar vervoer en, afhankelijk van de te huisvesten organisatie, met de auto
- goede voorzieningen in de omgeving: groen, water, winkels, banken
- geen windhinder
- goede mogelijkheden voor bezopping
- lage geluidsluistering
- geen luchtverontreiniging
- geen spiegelingen van aanwezige bebouwing.
Voor nagenoeg alle genoemde aspecten zijn prestatie-eisen te geven.

Stedebouwkundige aspecten
Bij het stedebouwkundig ontwerp zijn de volgende aandachtspunten van belang.
- ecologische structuren gebruiken (ontwerp aansluiten op bodemgesteldheid)
- zo min mogelijk ophogingen, geen verontreinigd op hoogzand gebruiken.
- minimalisering verhard oppervlak
- milieu-effecten materiaalgebruik (verharding, beschoeiing, riolerings etc.)
- reinigingsvijvers voor afvalwater van (meerdere) kantoorgebouwen (geen riool-
aanlating)
- oriëntatie richten op (passieve of actieve) zonne-energie, wind en geluid
- benutten mogelijkheden stadsverwarming, gezamenlijke voorzieningen met andere
  kantoorgebouwen (koude-opslag, reinigingsvijvers, inrichting etc.)
- creëren van veilige loop- en fietstroutes
- een visueel aantrekkelijk gebied maken met o.a. de elementen: water, waterspeel-
  plaats, park, paden, groen, (fruit)bomen, struiken etc.
- voorkomen van spiegelingen en schaduw voor aanwezige gebouwen.

Energie
Met name vanwege de stimulering door de overheid (vermindering emissies CO₂ en NOₓ) zijn er op het gebied van energie-extensivering verschillende concepten en technieken ontwikkeld en toegepast in de praktijk. Genoemd kunnen worden actieve en passieve zonne-energie, warmte-kracht koppel-
ing, warmte en koude opslag in de bodem, aardwarmte (warmtepomp) en optimalisaties zoals HR
systemen, warmteterugwinning, optimalisatie daglicht/kunstlicht, translucence (doorzichtige)
isolatiematerialen en 'lichtenkglas' (houdt hoge zon tegen, laat lage zon door).
Energiebesparing begint echter al bij de stedebouwkundige opzet en is van invloed op optimale
toepassingen van passieve zonne-energie, zie lokatie.
Bij een duurzame ontwerp-strategie wordt allereerst de energievraag zo veel mogelijk beperkt. Dit
kan gerealiseerd worden door toepassing van zoveel mogelijk duurzame energiebronnen (zonne-
energie), efficiënt gebruik van niet-duurzame energie, optimale klimatologische inpassing van gebouw in de omgeving, efficiënt gebruik van het gebouw en een optimaal regelsysteem van
energievragende installaties.
Wat betreft het gebouwontwerp spelen een rol: gebouwmassa (compact), zonering in het gebouw,
glasoverdekte buffellijstjes, zo mogelijk natuurlijke klimatisering (te openen ramen, buiten-zonwe-
ring, inpassing in omgeving, bevochtiging en koeling met water en planten), isolatie en accumulatie,
warmteterugwinning uit ventilatiezuurstof, afvalwarmte en afvalwater.
Algemene doelstelling: minimum als is voldoen aan EPN - 10; wenselijk ware een betere prestatie
met als ideaal 'zero energy building'.
worden in beschouwing genomen. Gebouwkenmerken zoals te openen ramen, natuurlijke ventilatie versus airconditioning, zonwering glas, materiaalgebruik (afwerking) en hygroskopische eigenschappen komen hierbij aan de orde. Dit alles in relatie tot het inrichtingsconcept.

Algemene doelstelling: het ontwerp van het gebouw is zodanig dat in het gebruik niet meer dan 2% (gezondheids)klachten zal opleveren.
Groen en water
Toepassing van (grootschalig) groen in gebouwen wist langzaam maar zeker te eten, vaak in combinatie met water. Wellicht houdt dit verband met toepassing van grote overdekte binnenuimten (serres), al dan niet in combinatie met passieve zonne-energie. Hoewel nog niet vast staat dat de kwaliteit van de binnenlucht fysiek (meetbaar) door planten verbeterd wordt, staat inmiddels wel vast dat de beleving van de kwaliteit door de bewoners wel degelijk verbeterd wordt door groen in gebouwen.

Over de gehele wereld zijn steeds meer problemen met (de kwaliteit en de beschikbaarheid van drinkwater. In gebouwen en de gebouwde omgeving moet daarom aandacht aan deze problematiek besteed worden.

Op de eerste plaats moeten we zulniger omgaan met water. Dit betekent waterbesparende-technieken toepassen, zonder verlies aan comfort (besparingen tot 30%). Ten tweede kan daar waar geen drinkwater-kwaliteit nodig is (toiletspoeing, schoonmaken, besproeien van planten), met handhaving van hygiënische normen, gebruik gemaakt worden van gesifteerd regenwater en, indien de lokatie deze mogelijkheid biedt, middels zuiveringsvijvers of -moeaussen, gezuiverd afvalwater (afkomstig van douches en wasbakken). Integratie van zuiveringsmoerassen en -vijvers in de omgeving verhoogt niet alleen de beleidswaarde maar bepaal ook een aansluiting op het riet. Ten derde kan een meer natuurlijke waterkringloop bevorderd worden door vasthouden van regenwater (minder verhard oppervlak, groene daken) zodat minder water afgevoerd behoef te worden.

Ten slotte zal toepassing van water in en om gebouwen in een aantrekkelijke vormgeving de beleidswaarde verhogen, een aanstekelijk verblijfsgedrag voor mensen, planten en dieren verschaft en de mensen meer bewust maken van dit tot nu toe erg onderbelicht gebieden milieu-aspect.

Algemene doelstelling: tenminste 30% drinkwaterbesparing, groen 'teruggeven' dat aan de natuur ontnomen is. Wenselijk: geen bijdrage aan oppervlaktewaterbevulling (direct of indirect).

Materialen
Op het gebied van toepassing van minder milieubelaatende materialen in de bouw is de afgelopen jaren veel uitgezocht (ECobalans, BIM schaal, Life Cycle Analysis etc.). Ook is er op dit gebied regelgeving tot stand gekomen (asbest CFK's). Naast het opstellen van een lijst met materialen en hun milieupreferenties, zijn meer algemene uitgangspunten van belang en te formuleren zoals minimalisering van materiaalgebruik, vernieuwbare materialen (bout, rubber etc.), demontabe bouwen (gericht op hergebruik bouwmaterialen en bouwdelen, milieubewust slopen), minimaal gebruik van milieubelaatende materialen en bevorderen van gebruik van niet verontreinigde secundaire materialen.

Daarnaast hebben materialen ook invloed op het binnenmilieu (emissies, straling, hygroskopische eigenschappen) en op de beleving.

Ten slotte kan hier ook genoemd worden het omgaan met materialen op de bouwplaats (preventie, gescheiden inzameling).

Gezondheid, welzijn en comfort (de mens)
Gezond Bouwen ("Healthy Building") is sinds de ontdekking van het Sick Building Syndrome in opmars. Inmiddels zijn een groot aantal aanbevelingen, richtlijnen en normen bekend en is er(Arbo) wetgeving tot stand gekomen.

Bij gezond bouwen zijn de volgende aspecten van belang: thermisch comfort, luchtkwaltiteit, individuele controle werkomgeving, geluid, verlichting, daglicht en uitzicht, de inrichting van de werkplek (functieel en esthetisch), visueel comfort en privacy.

Ook gezondheidseffecten op langere termijn, zoals kanker tengevolge van vezels en straling (radon)
Aan : deelnemers workshop
Van : R.H. de Gans
Kopie :
Dossier : K1685-01-001
Project : Definitiefase kantoorgebouw Arthur Andersen
Datum : 12 januari 1995
Betreft : verslag bijeenkomst 4 januari 1995
Ons kenmerk : RdG/EvM/MC
Groep : G (Beheer, Gebruik, Management, Kosten, Opdrachtgever)
M (Milieu, Bouwbeleid, Regulering, Beheerder van Milieu & Gezondheid)
1e sessie : Leen Vermaat (Multi), Ewald Zeelis (Multi), Paulus Jansen (DHV)
2e sessie : John Berge (DHV), Ronald de Gans (DHV)

(1e sessie)

* Stichtingskosten per m² hangen direct af van huurnivo. Dit ligt vrijwel vast (door markt gedecideerd)

* Binnen bouwkosten is een vrije ruimte van ca. 20% waarbinnen men met de kosten kan schuiven. Hieruit moeten milieumaatregelen bekostigd worden.

* Bij de beperkte ruimte voor milieumaatregelen moet het accent liggen op milieumaatregelen die ook positieve effecten hebben op:
  - investeringskosten en/of
  - exploitatiekosten

* Voorbeelden van milieumaatregelen:
  - zuinig materiaalgebruik
  - sober materiaalgebruik
  - standaardisatie
  - verhoging flexibiliteit
  - eenvoudige installatie m.n. ventilatie/luchtbehandeling

(2e sessie)

Functioneel
Stelling: Er is markt voor een M&M-gebouw! Een stijging van woonlasten van 5-10% moet acceptabel zijn voor de huurder.
* Huurlasten en exploitatielasten vormen samen de woonlasten van de huurder.
* Multivastgoed moet bij Arthur Anderson nagaan hoeveel woonlasten zij over hebben voor een M&M-gebouw.

Doelstelling/Prestatie
* Extra investeringen en lagere exploitatiekosten resulteren in de gewenste woonlasten. Uitgangspunt bij het berekenen van terugverdientijden van investeringen is de levensduur van de componenten.
Concept
Ten aanzien van energie- en milieubesparende maatregelen moet in de volgende volgorde gelden:

1. Pas alle maatregelen toe die geen extra geld kosten of zelfs geld opleveren. Voorbeelden:
   - minimale installaties
   - weglaten plafond: toegankelijkheid bouwmassa
   - functioneel materiaalgebruik

2. Pas maatregelen toe die op termijn geld opleveren. Bijvoorbeeld:
   - energiebesparende maatregelen
   - waterbesparendsconcept
   - onderhoudsarme materialen

3. Pas maatregelen toe die geld kosten en zich niet direct in geld laten terugverdienen maar wel andere baten hebben voor de gebruiker. Bijvoorbeeld:
   - maatregelen m.b.t. gezondheid en welzijn (vermindering ziekteverzuim, verhoging productiviteit)
   - milieuvriendelijke materialen die passen in het imago van de gebruikersgroep

4. Pas maatregelen toe die geld kosten en geen directe of indirecte baten hebben voor de gebruiker, maar wel maatschappelijke baten.

Uiteraard moet optimaal gebruik gemaakt worden van de subsidies die beschikbaar zijn!
Bijlage

PRAATSTUK: Wel of niet toepassen van verlaagde plafonds?

Consequenties:

Esthetica
- aanzicht plafond, kanalen, leidingen, kabelgoten, constructie

Akoestiek
- geluidnivo in ruimte (-)
- geluidsoverdracht naar andere ruimten (+)
- nagalmtijd (-)

Kosten
- afhankelijk van alternatief: verlaging of verhoging

Verlichting
- armaturen vrij in ruimte en niet meer in een verlaagd plafond te plaatsen
- reflectie van plafond

Ventilatie
- verlichtingswarmte direct in ruimte (-)
- bouwmassa plafond optimaal toegankelijk (+)
- eventuele kanalen en roosteraansluitingen in het zicht (-)
- meer volume om te ventileren (-) bij het handhaven van een bepaald ventilatievoud om een goede ruimtendoorspoeling te verkrijgen

Bouwkunde
- minder verdiepingshoogte en dus gebouwhoogte (+)

Alternatieren:
- ‘alles’ in het zicht
- meer gebruik maken van de gevel voor voorzieningen (electra, data en ventilatie)
- verhoogde vloerconstructie waarin eventueel electra, data en ventilatievoorzieningen zijn opgenomen

(-) = nadeel
(+) = voordeel

RdG/12 januari 1995.
Gebouw dient L-vormige plattegrond te hebben, waarbij het scharnierpunt zo dicht mogelijk bij de ideale locatie (uit Feng Shui oogpunt) is gelegen. Getrapte opbouw, met een accent aan de zuidzijde en het zwaartepunt in de korte poot van de L.

Bestaand 9 verv

\begin{center}
\includegraphics[width=0.8\textwidth]{image.png}
\end{center}
Voor de andere (noordelijke) locatie wordt de volgende vorm voorgesteld:

Verschillende ramen (afmetingen) per geveloriëntatie gebruiken; schakeling is vanuit Feng Shui oogpunt vrij.

Verschillende kleuraccenten toepassen per geveloriëntatie:
- rood (zuiden)
- blauw (westen)
- grijs/zwart (noorden)
- wit (oosten)
Het is voldoende als deze kleuraccenten voorkomen op het zwaarste deel van het gebouw (de korte poot van de L)

Materiaalgebruik:
- casco beton+staal (wapening)
- gevel baksteen
- ramen hout
- water.

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SUMMARY

In participatory design, design concepts are generated collectively through discussion, dialogical interactions, in which the interchange of normative and supporting factual descriptions builds a collective design discourse. The goal of this research is to develop a method for participatory design to support this collective, face-to-face design problem-solving, in order to increase the acceptability of the design product.

Since the mid-1960s, there has been an important movement towards increasing the participation of citizens in determining their built environment. At first, the movement was associated with social-political ideologies and rhetoric. By the end of the 1970s, participatory design had become an accepted component of professional practice. The objectives of the movement became more pragmatic and more modest — focusing on exchanging practical information, resolving conflicts, and supplementing design. Today, participatory design is in a new phase. Traditional participatory design methods are seen as insufficient to fulfil an increasing demand for dialogue. The point of departure of the study is the assumption that new information technologies can satisfy this demand.

The study focuses on the very early stages of the design process: the generation of design guidelines. It investigates the process of group planning and develops a computational model for further the realization of computer-based information systems to support that process. To develop this model, the study draws knowledge from cognitive science, argumentation theory, decision theory and artificial intelligence.

The study uses the case-study as a heuristic device. The project selected is a public park in Taipei, Taiwan, designed through the participation of the local community. It serves to guide the development of the model. A design project in Amstelveen, the Netherlands, designed with the participation of people representing various interests, has been selected as a second case to test the produced design-supporting method.

The method includes 1) a group-reasoning model, 2) a dialogical system and 3) a framework for participation-based design guidelines.

The group-reasoning model formulates the process of knowledge acquisition, the learning and sharing of belief systems, the generation of design alternatives and design evaluations — by which reasoning takes place dialogically. The dialogical system provides a clear description of how the
information should be processed, what aspects should be paid attention to, what results can be anticipated, and when and how to control the process. The framework for participation-based design guidelines guides and structures the design process. It facilitates a reconstruction of the implicit cognitive structure which underlines dialogue and is generated through the discussion of a group.

The study makes a practical contribution to architecture and urban design processes in which participation occurs in the early stages. The method can also be used as a reflective tool for improving the understanding of the design process by professionals and users. The method can be applied to design problem-solving by human participants in a face-to-face situation. It can be extended to the development of computer-supported cooperative work among multi-disciplinary experts. It can even lead to the development of software to support concurrent problem-solving, in which through computer networks agents are in dialogue in different locations.
SAMENVATTING

Waar verschillende partijen gelijktijdig participeren in het ontwerpproces, zijn ontwerpideeën het resultaat van een onderlinge dialoog, waarbij de uitwisseling van beschrijvingen van normen en ondersteunende feiten eengemeenschappelijk discours oplevert. Het doel van dit onderzoek is de ontwikkeling van een methode ter ondersteuning van dit gezamenlijk oplossen van ontwerpproblemen, die de acceptatie van het uiteindelijkeontwerp product kan vergroten.

Vanaf het midden van de jaren zestig was er sprake van een invloedrijke beweging die streefde naar het vergroten van de participatie vanburgers in de bepaling van hun eigen gebouwde omgeving. Deze bewegingwas in eerste instantie verbonden met sociaal-politieke ideologieën enbijbehorende retoriek. Tegen het einde van de jaren zeventig werdparticipatie algemeen geaccepteerd in de professionele ontwerppraktijk. De doelstellingen van de beweging werden pragmatischer en bescheidener – de aandacht verschoof naar uitwisseling van praktische informatie, konfliktoplossing en ontwerpondersteuning. Meer recent is het participatiemodel in een nieuwe ontwikkelingsfase beland. Traditionele methoden worden als onvoldoende beschouwd om een toenemende behoefte aan onderlingedialog te vervullen. Dit onderzoek gaat uit van de aanname dat moderneinformatietechnologie in deze behoefte kan voorzien.

Het onderzoek concentreert zich op de vroegste fases in het ontwerpproces: de formulering van wensen en eisen. Het analyseert het proces vangezamenlijke planning en ontwikkelt een computationeel model dat moetleiden tot nieuwe gecomputeriseerde informatiesystemen ter ondersteuning van dat proces. Het onderzoek ontleent kennis aan de cognitievet wetenschap, de argumentatietheorie, de besliskunde en de kunstmatigeintelligentie.

Het maakt gebruik van het heuristische instrument van de case-study.Een eerste project betreft een openbaar park in Taipei (Taiwan) dat werdontworpen op basis van participatie door plaatselijke bewoners. Dit projectdient ter ondersteuning en illustratie van de uitwerking van hetcomputationele model. Een tweede project betreft participatie door uiteenlopende belangengroepen bij een ontwerp in Amstelveen (Nederland) – dit projectwordt gebruikt om de ontwikkelde ontwerpondersteunende methode te testen.
De methode omvat (1) een model van het kollektief redeneren, (2) een dialoogssysteem (3) een raamwerk voor de formulering van wensen en eisen.

Het model van het kollektief redeneren beschrijft het proces van kennisverwerving, het aanleren en delen van systemen van opvattingen ("geloofssystemen"), de totstandkoming van ontwerppvorselen en evaluaties – een proces waarin redeneringen ontstaan in onderlinge dialoog. Het dialoogssysteem biedt een heldere beschrijving van de manier waarop informatie verwerkt moet worden, van de aspecten waaraan aandacht besteed moet worden, van de resultaten, die te verwachten zijn, en van de momenten en de wijze waarop sturing van het proces moet plaatsvinden. Het raamwerk voor de formulering van wensen en eisen dient ter begeleiding en structurering van het ontwerproces. Dit maakt een reconstructie mogelijk van de impliciete cognitieve structuur van de dialoog.

Het onderzoek levert een praktische bijdrage aan bouwkundige en stedebouwkundige ontwerpprocessen waarin participatie al in een vroeg stadium plaatsvindt. Daarnaast kan de methode dienen als instrument ter verbetering van inzicht in het ontwerproces zowel bij de beroepspraktijk als bij de gebruiker. De methode kan toegespitst worden bij het oplossen van ontwerpproblemen door menselijke deelnemers in gezamenlijke aanwezigheid. De methode kan ook uitgebreid worden in het kader van computer-ondersteunde samenwerking door multidisciplinaire experts, en kan zelfs leiden tot de ontwikkeling van software ter ondersteuning via een computernetwerk van het gezamenlijk oplossen van ontwerpproblemen door deelnemers op verschillende plaatsen.
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