SERIOUS GAMING AS A TOOL TO COMMUNICATE PLANNING SUPPORT SYSTEMS: THE CASE OF RESOURCE POTENTIAL MAPPING IN AIRPORT REGIONS

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Abstract

Due to the growth of cities and airports, regional planning becomes increasingly important in airport regions. As major resource consumers, these regions have to become more sustainable to consolidate their competitive position amongst global cities. In the Amsterdam-Schiphol region, stakeholders are searching for new governance arrangements to address these new planning issues. However, stakeholders seem to favour arrangements of a similar style and with a similar focus as the present ones. This makes it difficult for novel arrangements, using other types of planning support information, to enter the agenda. In the case of the Amsterdam airport region, interviews with stakeholders showed that they do not easily recognize the relevance of a potential new planning support system based on resource planning. 'Resource potential maps' are based on an analysis of resource flows in a particular area, and of the opportunities to minimize these flows, close loops and make them more sustainable. We have developed a serious game to let stakeholders experience this resource perspective on airport region planning. In this paper we report on the first experiences with this game that has been played with stakeholders from the Amsterdam-Schiphol region.

Keywords: resource potential mapping, airport regions, serious game

1. Introduction

Due to the growth of cities and airports, regional planning increasingly becomes important in airport regions (Freestone, 2009). The reciprocal relationships between airport and the surrounding, often strongly urbanised areas need careful planning. Planning efforts tend to focus especially on managing conflicts between airport growth and urban growth, most notably in the field of noise, and on economic development of the region at the cost of nature and environmental values. Also in the Amsterdam-Schiphol region, these issues play an important role in the planning of the airport region. The planning takes place in changing coalitions of actors, addressing issues with ad hoc, loosely institutionalised arrangements (Van Buuren et al., 2012). From the 1980's onwards, a number of such governance arrangements have been established in this region (Kasarda and Lindsay, 2011). The focus and geographical scope of these arrangements often overlap, resulting in a considerable overlap of participating stakeholders as well. By 2013, these structures are being reconsidered by key stakeholders (RLI, 2013). The overlapping arrangements and memberships contribute to a feeling of an overcrowded governance arena lacking efficiency and effectiveness.

However, in their search for new governance arrangements, stakeholders seem to favour arrangements similar to the ones that they no longer consider appropriate (Van Wijk, Van Bueren and Te Brömmelstroet, forthcoming). Moreover, they prioritize the issues that feature prominently on the agenda of these arrangements, such as noise and economic development, over other issues, including sustainable resource use. This indicates that perhaps not the temporary governance arrangements themselves, but rather the approach of establishing such arrangements has more strongly

institutionalised than acknowledged (ibid.). This makes it difficult for novel approaches, which often make use of other types of planning support information, to enter the agenda.

In this paper we report on the experiences within the Better Airport Regions project, funded by the Dutch National Science Foundation and knowledge institute Platform31. In the project, a novel approach to regional planning was explored: resource potential mapping. 'Resource potential maps' are based on an analysis of resource flows such as energy, water, and materials in a particular area, and of the opportunities to minimize these flows, to close loops and to replace non-renewables by renewables, resulting in the identification of planning opportunities to improve sustainable resource use in that area (Geldermans et al., forthcoming). As major resource consumers, airports and nearby cities might have considerable opportunities for resource exchange, for closing loops and for the replacement of non-renewables by renewables. Instead of focusing on appeasing the inherent conflicts between airport and cities, such a resource perspective offers the opportunity to focus on mutual gains, on potential synergies that can be achieved in the region.

We have developed a serious game to explore the assumption that a resource perspective on airport region planning can lead to a change of focus of actors and their interests, giving rise to new agendas and coalitions and breaking through persisting stalemates in planning. From 19 interviews with stakeholders in the Amsterdam-Schiphol region, in which we asked them to prioritize arguments, we concluded that most stakeholders did not consider resource use and sustainability issues a priority, despite their sympathy for the topics (Van Wijk, Van Bueren and Te Brömmelstroet, forthcoming).

In the next sections of this paper we will discuss resource perspectives on urban planning and design and their relevance for urban decision-making, choice for a game, the game design, and the results from playing the game with stakeholders from the Amsterdam-Schiphol region, followed by a preliminary analysis and conclusion.

2. A resource perspective on planning

As major consumers and polluters, cities are considered as source and key to many sustainability problems. Cities are considered as polluters since they contribute to more than 80% of all greenhouse gas emissions if all production-and consumption-based emissions that result from lifestyle and purchasing habits are included (Hoornweg, Sugar, and Trejos Gómez, 2011). However, some critics have rightfully pointed out that this allocation of emissions to 'cities' is not fair. Per capita, a citizen emits less in the city than in the countryside (Dodman, 2009). A more detailed analysis of cities' per capita greenhouse gas emissions showed that there are big differences, ranging from cities with less than half a tonne of carbon dioxide equivalent (tCO2e) to cities with more than 15 tonnes (Satterthwaite, 2011). Per capita emission levels in Dhaka, Bangladesh are 0.63 tCO2e, in Tokyo they are 4.89 tCO2e, in New York 10.5 tCO2e and in Rotterdam they are 29.8 tCO2e (ibid.). Major differences between Dhaka and the other three can be explained by income, but what explains the differences between Tokyo, New York and Rotterdam? Apparently, there are other factors at work that increase or reduce emission levels, such as compactness and the availability of public transport. For example, in US cities, carbon emissions are higher in suburbs than in city centers (Glaeser and Kahn, 2010). This suggests that the way cities are designed and operated can have a significant impact on its environmental performance. With a concentration of citizens and economic activity cities are considered may provide a key to sustainable development.

The conception of cities as major resource consumers has inspired scholars from a variety of disciplines in designing solutions to make cities more sustainable. In recent years, especially resource-oriented perspectives are becoming increasingly popular amongst scientists and local politicians (Monstadt, 2009). Whereas local administrations used to focus on the planning and provision of places to work, live and recreate and the delivery of public services, local policy makers have become aware

of the many resources, food, water, energy, and materials needed for a city's daily operation. These resources cannot be produced, extracted or processed within the city borders, and thus affect the ever growing hinterland of cities (Haughton, 1997). Conceiving cities as urban systems emphasizes the connectivity and reciprocity between the many parts of the different subsystems constituting the city. It also discloses the externalization of effects of urban consumption, affecting the hinterland and far beyond (ibid.). This system perspective emphasizes that urban development, especially in ageing societies, can perhaps be considered more as a co-evolutionary development of several subsystems, than as the result of intended planning and design.

Amongst systems' perspectives, urban metabolism has become one of the more popular metaphors to communicate the need for resource oriented urban planning and design (Kennedy, Pincetl, and Bunje, 2010). Urban metabolism is defined as the stocks and flows of energy and materials in cities and their relationship with urban infrastructure (Kennedy, Baker, Dhakal, and Ramaswami, 2012). This metaphor conceives the city as a living organism, which needs water, food, energy, and materials to stay alive. Resources are digested and the excrement is known as waste. By mapping the resource flows the present status of resources and their demand can be understood. Closing loops and making more efficient use of flows is also at the heart of comparable resource oriented perspectives, as cradle to cradle, the natural step, the ecological footprint and circular economy. They are based on the analysis of flows of water, energy, materials and nutrients that run through cities, are used and discharged. Controlling, reducing and reusing these flows will contribute to the realization of urban sustainability.

Considering the city as a living organism is a strong frame. It immediately invokes an image of contemporary urban problems and how they will accumulate to even worse unsustainable futures, leading some to follow the metaphor even further and speak of obesity and addictions. However, the urban metabolism metaphor helps to diagnose the condition of cities, but does it also offer guidance to address the problems? Or, in to phrase it Ernest Alexander's words: *to what extent and how is the urban metabolism perspective frame-setting – does it invoke a frame of reference for future decision-making?* (Alexander, 2005).

On the one hand one can argue that urban systems' perspectives with a focus on resources are highly applicable for urban decision-makers. They seem to offer the vocabulary and methods to realize political ambitions with regards to sustainability, often labeled with tempting names as smart city, eco-city, low carbon city, green city, resilient city, etc. Scientists and practitioners often work side by side to collaborate on the operationalization of this concept. For example, from a resource efficiency point of view there are several guidelines that are usually applied to make the flows more efficient. The so-called three step strategy is a commonly used one (Itard, 2012), consisting of three steps of action: first, reduce use/demand, second, use renewables as much as possible, and three, use non-renewables to supply the remaining demand. In recent years, an additional step has been inserted (Tillie et al., 2009). After reducing the demand the idea is than to reuse flows as much as possible to meet demand, after which the remaining demand is filled in first and foremost with renewables and second with non-renewables. The assumption is that the use of non-renewables is still needed during the transition towards a closed-loop or all renewable economy, but can be phased out eventually. Rules of thumb like these have become popular amongst planners and urban designers, offering a framework for analysis and (re)design.

On the other hand there seems to be a gap between the popularity of these resource perspectives and decision-making context in which they need to be applied. First, despite its popularity, also amongst scientists it has not become mainstream yet. In scientific journals, more and more articles are published that address urban sustainability from a systems point of view. For example, the popularity of the metabolic frame has risen considerably. Even though Wolman already introduced the concept in

1965, it has taken a long time for the concept to be picked up. A quick search in Scopus (June 2, 2014) shows that the first article appeared in 1981 in this database, the next articles did not appear until 1994. In sum, 208 articles with 'urban metabolism' in the title, abstract or keywords have been registered in Scopus from 1960-2014. 138 of these articles have been published in the period 2010-2014. In 2012 the Journal of Cleaner Production published a special issue on urban metabolism. In the opening article, the editors tell about the different approaches to urban metabolism that have evolved over the years, pointing to methods to analyze the stocks and flows, such as Material Flow Analysis and Life Cycle Analysis, aiming to identify opportunities to make resource use more efficient and sustainable by closing loops, reducing input and output while prolonging the throughput, or to match supply and demand (ibid.).

Second, an exploratory study showed a low usability of regional or local energy visions for local policy makers in the Netherlands (Van Bueren and Steenhuisen, 2013). These energy visions were often of a highly technical nature, paying attention to the technical opportunities for matching supply and demand with renewables. Attention for non-technical factors such as costs, political feasibility and social acceptance get much less attention, if addressed at all. Moreover, most energy visions studied were made by a technical consultancy firm. The commissioning municipalities did not have knowledge or capacity to make such visions themselves, nor did they a responsible unit or department who could readily use the information. If 'energy' was a municipal affair at all – local government had explicitly retreated from this field under influence of liberalization and privatization of the energy market in the 1990's - it was part of the unit concerned with operational decisions concerning management and maintenance, not of the department preparing strategic spatial-economic policies and plans (ibid.). This also touches upon Broto, Allen and Rapoport's (2012) argument that urban metabolism models are value laden, while the consultants hired to make the plans approached the identification of energy potentials as a purely technical, value neutral task (Van Bueren and Steenhuisen, 2013).

To turn back to Alexander's question, one can conclude that the urban system or urban resources perspectives still have difficulty to offer a concrete frame of reference for urban decision-makers. The two worlds still have difficulty to connect. The conclusion of Alberti et al. (2003) that it is difficult to integrate human perspectives in urban ecology apparently still holds. They argue that decision-making from an integrated system's perspective is difficult. This is also underlined in a more recent publication of Blaschke et al. (2012) on 'energy landscapes' in which they observe that spatial planning and energy modeling are still treated as separate domains. In their opening article of a special issue on urban system approaches, Kennedy et al. (2012) conclude that: "Translating such integrative interdisciplinary research to practitioners (such as city staff and elected officials) and nongovernmental organizations will be the next frontier, generating real-world impacts on cities worldwide."

3. The potential for resource potential planning in the Schiphol region

Within the Better Airport Region project, several studies on the resource potentials of the airport regions in Frankfurt, Zurich and Amsterdam have been made, prepared by the participating teams from TU Munich, ETH Zurich, Delft University of Technology and University of Amsterdam. For particular parts in the Amsterdam Schiphol region, 'resource potential maps' were made. These maps are based on an analysis of resource flows such as energy, water, and materials in a particular area, and of the opportunities to minimize these flows and replace non-renewable parts by renewable ones, resulting in the identification of planning opportunities to improve sustainable resource use in that area (Geldermans et al., forthcoming). These maps showed that there were several opportunities to improve the sustainability of this region from a resource perspective. Also the experiences with resource

management and closing loops at other airport regions showed that there were several opportunities for improvement.

As stated, the relevance of these analyses to decision-makers in airport regions is not straightforward. In the case of the Amsterdam airport region, interviews with stakeholders showed that they do not easily recognize the relevance of a potential new planning support system based on resource planning. 41 respondents have been asked to rank statements regarding all sorts of policy issues, including spatial-economic developments, zoning, models of inter-governmental collaboration at local/regional/national level, and sustainability issues. These sustainability issues included topics as reduction of noise and pollution from airplanes, the use of local farming products for airport catering, the local processing of airport related waste streams, and the participation of environment and nature groups in governance arrangements. Even though many of the respondents proclaimed that sustainability issues as these were important and should receive more attention and priority, they did not consider these issues to be on the top of their agenda. Issues that were more closely related to their prime interests, often of an economic or political nature, dominated (Van Wijk et al., in progress).

To bring the worlds of the resource potential planning and the world of the stakeholders involved in decision-making on the Amsterdam Schiphol airport region together, we have developed a serious game. Gaming offers a pleasant and interactive environment in which participants feel safe to explore new grounds and to test new ideas. Serious gaming has become a popular method to support physical planning. The roots of serious gaming can be traced back to the US military testing new strategies and tactics under different scenarios. Gaming is called serious to underline the purposeful educational function, and to distinguish it from entertainment games. Nevertheless, serious games might be fun as well. Serious games intend to offer a fun and especially safe environment in which players should feel free to learn and explore and test new ideas, concepts, strategies etc. In the game, an environment is created that – in a simplified way- resembles the complex world of the players (Mayer and Veeneman, 2002).

For the participants, the learning goals of the game were (1) to get inspired by novel ideas and concepts based on resource potential planning to make airport regions more sustainable, and (2) to commonly explore opportunities to implement these ideas and concepts. For the research team involved the learning goals were (1) to get feedback from stakeholders on the ideas and concepts developed by them, which could be used for improvement, and (2) to develop a first understanding of the feasibility of the ideas and concepts.

The assignment given to the participants in the three groups was: the Amsterdam/Schiphol region is invited to participate in the Horizon 2020 innovation programme of the European Commission, by creating a plan and implementation strategy for a sustainable and integrated airport region, making use of resource potential maps provided by the game supervisors. These resource potential maps are 30 cards with policy suggestions and explanations of the suggestions for a more sustainable and resilient airport region, drawn from research results of the Better Airport Region programme. The serious game has two rounds. In the first round of an hour groups have to select four to six resource potential maps based on which they develop a plan, describe strengths and weaknesses, and prepare a two minutes pitch. In the one-hour second round groups are asked to develop an implementation strategy based on the question: what can the actors do themselves and what other actors do they need to implement the proposed strategy? In the plenary sessions after rounds 1 and 2, the three groups present their results and submit a blind vote for the winning plan and winning strategy. Groups have to organize themselves with appointing a group leader and group presenter. The serious game organizers have the role of time-keepers, facilitators and take minutes for research purposes.

Table 1 shows an overview of the cards used during the game.

Table 1: 30 suggestions on cards for a Better Airport Region

#	Title	Category
1	Energetic business parks: harvesting the sun's	Resources
2	Heat hand cold energy exchange in the Schiphol triangle	
3	Energy exchange in the Schiphol logistics hub	
4	Urban mining/recycling of various types of plastics	
5	Diverse and accessible network of green public spaces	
6	Open surfaces for cooling urban areas	
7	Schiphol area's green space: from backyard to inner garden	
8	Park 21: Green garden	
9	Attracting knowledge-intensive firms by transport node development	
10	Green transferium: transit from A to Sustainable	
11	Create a joint energy network	
12	Local waste disposal	
13	Use the energy potential of fertilizers	
14	Develop Hoofddorp-Bornholm as KLM-Ciy	Projects
15	Densification of business park De Hoek	
16	Kruisweg: from airport tangent to airport boulevard	
17	Airport corridor as new urban space	
18	Airport Schiphol as production milieu for food and energy	
19	Regional connections by developing a tangential public transport system	
20	Recharging for truck parkers in the oasis	
21	INNOexchange: innovative hub for cargo and goods	
22	Better balance between airport growth and regional growth	Strategy
23	Broadening of topics on the governance agenda; beyond the growth machine	
24	Reduce fragmentation and redundancy in governance structures	
25	Governance: joint understanding on what to (dis)agree	
26	Towards a regional transport authority	
27	Investing in public transport for receiving high-density development rights	
28	Nature compensation in exchange for airport expansion	
29	Regional planning authority	
30	Connecting resource flows creates new interdependencies and reduces flexibility	

In the interactive game setting, stakeholders learned about the solutions presented on the cards and they discussed how these ideas could support them to explore, design and possibly try new governance arrangements for a more sustainable airport region.

In the preparation of the serious game we invited a wide range of about 70 stakeholders in the airport region, who had been interviewed or involved in the Better Airport research project before. These invitees are an accumulation of:

- 19 open stakeholder interviews for the collection of statements on governance in the airport region (the so-called Q-sort concourse),
- 41 respondents of the Q-sort that were used to frame current governance perspectives of the stakeholders, and
- over ten additional interviewees of specialists in the domain of resource potential mapping.

23 of the invited participants showed up after registration for the serious game, of which 22 joined the game. After introductions of the project, the results of research and the serious game, participants were divided into three groups. In order to learn from other stakeholders' perspectives, the group classification is based on diversity. Criteria for mixing participants in groups as applied by the organisers were (1) diversity in organisations and (2) diversity in hierarchy. This results in the classification in the groups as shown in the table 2.

Table 2: Overview of actors in the groups.

Group 1	Group 2	Group 3
Amsterdam, Executive Office	Amsterdam, Dept. Economic Affairs	Municipality of Haarlemmermeer
Schiphol Area Development Company	Schiphol Group	
		Farmers / sustainability representative
		Amsterdam, Dept. Urban Planning
Developer Greenpark Aalsmeer	Ministry of Economic Affairs	
Citizens representative	Municipality of Lelystad	
	Regional Confederation of Industry and Employers	
Municipality of Aalsmeer	Municipality of Amstelveen	
Ministry of Infrastructure and Environment	Municipality of Haarlemmermeer	Province of North-Holland
		Air Traffic Control Netherlands Rabobank Schiphol region SEO Aviation Consultancy
Amsterdam, Dept. Economic Affairs	Regional Waste Management Company	APPM Consultants

4. Insights and findings: the potential for resource potential planning in the Schiphol region

In this section we present the main research findings and insights. Two sources are used for this analysis. First, the minutes of the serious game organizers of the group and plenary sessions, including video recording of the final presentations. Second source for analysis is the filled-in individual and (possibly anonymous) evaluation forms of the participants. This evaluation consists of two parts: the role of the cards and the process of the serious game. All participants filled in the second part, but as the role of cards was diverse in the various groups, not all – but most - participants filled in the first part.

In brief, we will now discuss the processes within the three groups and their outcomes, the selected resource potential cards, and the plan / strategy developed.

Group 1

Group organization and process: the group's majority is middle-aged men and they propose the younger participant to lead the group, after she initiated to start of the game. The group leader proposes to use post-it's to select the preferred resource potential maps, discuss the selected maps and make a plan. In a later stage of the process the SADC-manager is asked to present the plan, as best-fit candidate. Participants were sometimes distracted by work-related conversations or incoming messages on mobile phones. According to the observer, there was however a group balance, with a person that returns focus on the discussion, a person that widens the discussion, a person that takes the lead and makes notes, and a listener.

Selected resource potential cards: The cards focussing on energy exchange as well as the card on a tangential regional public transportation system were three times selected by this group. Two times the cards for local garbage recycling, energetic business parks, airport corridor, airport boulevard were chosen. Out of the three groups, this group found the information on the cards most reliable and transparent (see figure 1), but scored moderate on usage of the cards. One of the group members commented that there is a mismatch between the level of abstraction at which the requested plan for the airport region had to be presented and the specific and detailed information on the cards.

Plan/Strategy: the slogan of group 1 for their plan is 'regionalize!' It presents their plan based upon a selection of 6 cards with a key focus on energy optimisation and neutralisation and nodal development. The plans show a vision of Schiphol being part of the larger metropolitan area – maybe even the current region is defined too small scaled. The focus should be on accessibility, identity,

urban land uses, trade and logistics. In the blind voting rounds, the plans and strategy end as second and third.

Group 2

Group organization and process: the group is a mixture of the Schiphol's 'old boys network' and younger professionals, joined by the alderman of Lelystad. According to the group, as a natural choice, the representative of Haarlemmermeer is appointed as chairman and accepts this role. According to the game organizers taking the minutes, Haarlemmermeer's policy view can often be recognised in the discussions. The representative of Amstelveen is asked by the chairman to present the plan, since 'this person and his position is 'relatively independent''.

Selected resource potential cards: Group 2 is enthusiastic about the resource maps, but also found them less integrated than expected – combinations of uses and circularity are limited. In the end, the group has difficulties to really make a final selection of cards. The cards are rather used as themes for discussion and principles. However, this does not lead to a comprehensive alternative approach of the assignment to make a plan and implementation strategy. This is also the main explanation that not all participants in this group filled in the evaluation form of the role of the cards in the serious game. Amongst the groups, group 2 was most enthusiastic about achieved cooperation and consensus during the game.

Plan/strategy: the slogan of group 2 was 'Win locally by connect regionally'. The plan has three pillars – mobility network, energy network and natural resource flows – that have to be organized in coherence on the regional level. The group did not select concrete ideas from the cards, but would like to make their own projects based upon the three pillars, for instance by setting up regional public mobility, energy and resource flows companies. In the blind voting rounds, group 2 plans and strategy ended as third and second.

Group 3

Group organization and process: the group was a mix of more and less experienced male professionals in the airport region, both public and private. The governance perspective 'sustainable change' is more present in this group than in other groups. The aviation consultant is appointed as a chair of the group. In the group the Amsterdam Urban Planning Department representative (also the presenter of the plans), the farmer / sustainable change initiator and the project management consultant played leading roles.

Selected resource potential cards: From the beginning, all group participants started to read the cards carefully. Then, a proposal that every duo select one card, was rejected – the coherence in vision might get lost, was the shared argument. Group 3 decided to make a distinction between candidate cards (energy-exchange, airport corridor, backyard garden, airport boulevard, local waste handling) and inspiration cards (urban mining, regional tangential public transport network, network of green public spaces). Amongst the groups, the cards played a significant larger role in group 3. Group members stated that the cards helped them to discuss their ideas with others and to build a joint plan (figure 2).

Plan/strategy: To present their plans, the group makes use of the whiteboard. The slogan of the group is 'Van hinder naar binder', roughly translated as 'From hindrance to connection'. In contrast to the physical resource flows dominating the cards, such as energy, water and waste, they focused on two other types of flows in the airport region: people and goods. These two need to be connected. Innovation and the availability of small, accessible places spurring creativity where dedicated individuals (not organisations) can meet and exchange ideas would play a key role to start projects making the airport regions more sustainable. In addition, besides these physical places, the open

sourcing of big data would help building innovative solutions. The plan and strategy developed by this group was voted both as winner of the game.

Figure 1: Average of statements on the use of cards for the serious game on Likert-scale, by group.

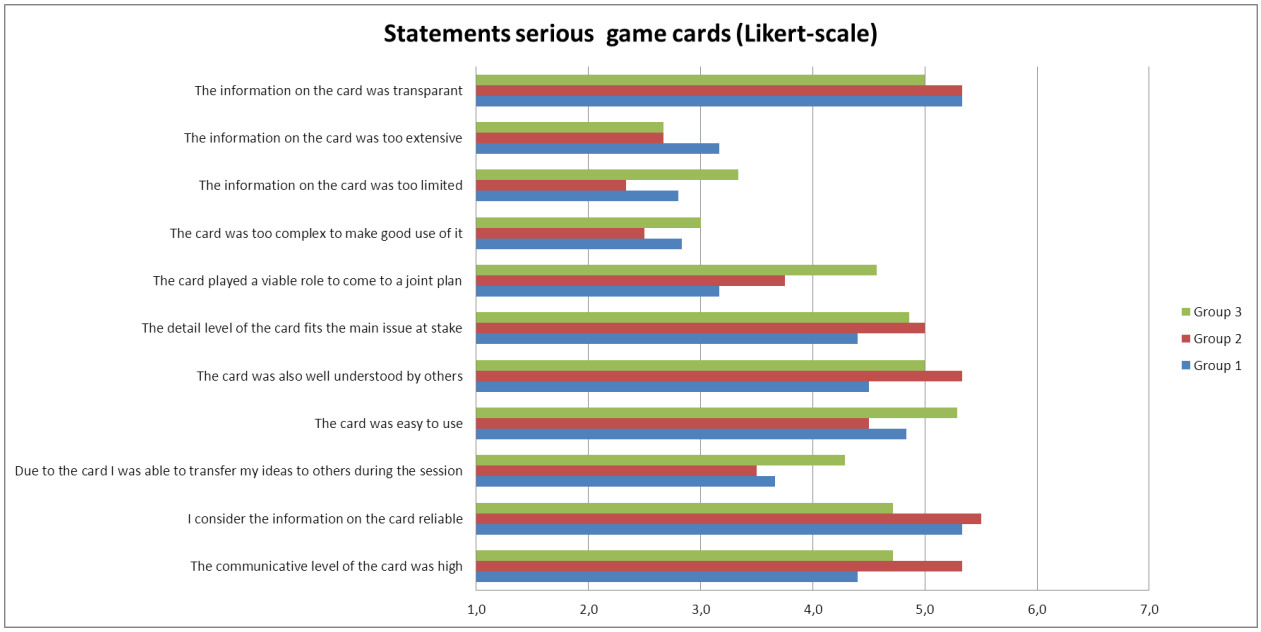
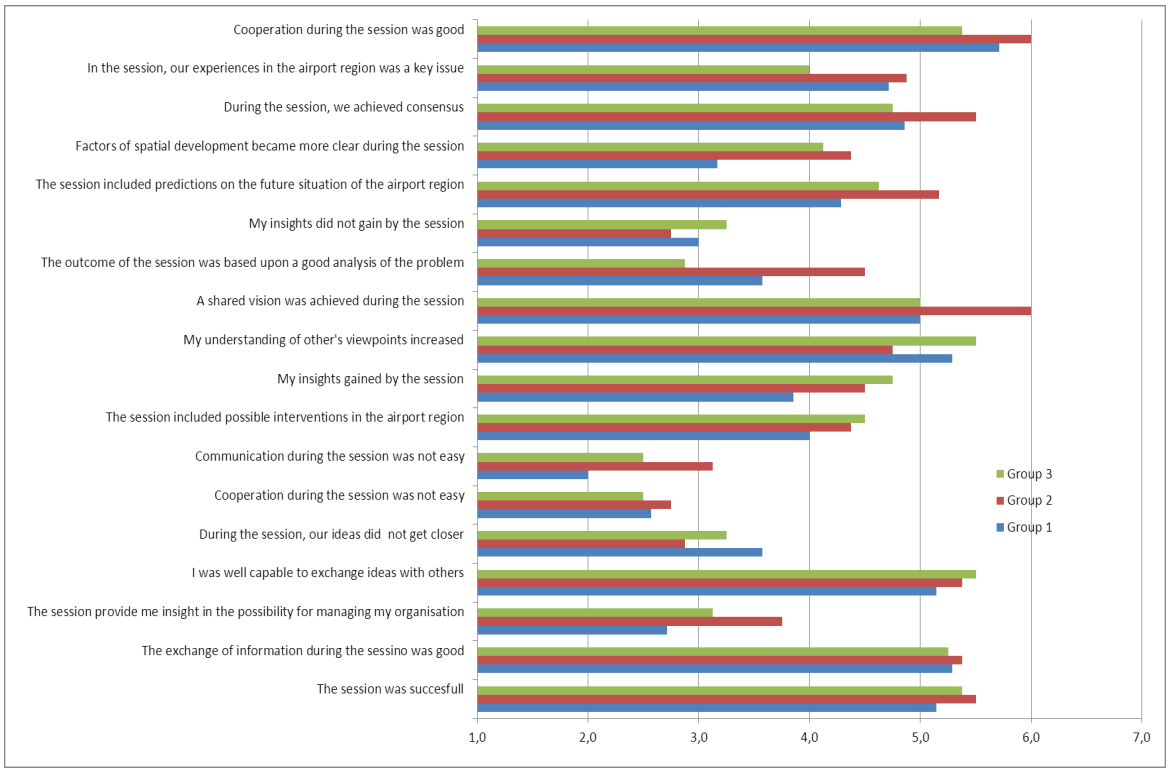


Figure 2: Average of general opinions on group process in the serious game on Likert-scale, by group.



The role of the cards in the serious game played a different role in each group: even though group 3 did not directly use the concepts from the cards, the cards helped to focus the discussion and develop their own ideas on sustainability in the region. In group 1, the cards were given careful consideration, but – compared to the other groups - the cards had least influence on the discussion amongst the group members. Group 2 was most enthusiastic about consensus, cooperation and success of the session (figure x). Learning effects were considered highest in group 3, while group 1's individual ideas did not get closer as in the other groups. According to the evaluations, the plan and strategy developed by group 2 was most relevant to the airport region, while the ideas developed by group 3 were considered to be less directly related to airport related activities in the region.

5. Conclusions and discussion

The game intended to bridge the gap between technical ideas, concepts and solutions for making airport regions more sustainable – based on an urban systems approach focusing on sustainable resource use and closing of loops – and the everyday world of stakeholders involved in decision-making on the airport region, including all the institutional barriers and lock-ins that hamper change. With the game, we intended to create a setting in which stakeholders could experience what kind of plans and strategies they could develop from a resource perspective, presented to them in the form of cards.

A preliminary analysis of the game results, as presented in this paper, show that:

- Working with resource potential cards seems to be a useful method that can help to bridge the gap between 'resource map makers' and 'policy makers'.
- The game set-up was especially useful for supporting the creation of a joint plan, less for developing an implementation strategy.
- The group that used the cards most succeeded to deliver the best plans, in the sense that they were voted as winners. The cards were generally considered usable and reliable.
- In the groups the cards did in general not play a big role in the making of the plan, however, in the debriefing of the session participants stated that they considered it a very good method to focus the discussion on sustainability issues from a resource/systems perspective.
- Groups were most enthusiastic about internal communication, consensus, shared vision and overall success of the game.
- The game did not provide many new insights for the participants to manage their own organization.
- In the plenary evaluation session, participants commented they would like to have a more radical game assignment and stricter rules of the game from the organizers. The open approach and the fact that participants know each other('s position) well in advance is likely to lead to a repetition of recent discussions.

All in all, the game showed to be able to contribute to communicating the relevance of resource potential mapping, a tool that could help decision-makers in urban areas, to decision-makers and is worth further exploration, development and testing.

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