

Assessing the Role of GIS in e-Government: A Tale of e- Participation in Two Cities.

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Abstract

This paper will deal with the question of what the influence is Geographical Information Systems have on policy design in specific, and e-government and e-democracy in general. A conceptual model of policy design is used with which two case studies will be analyzed in which GIS was used to encourage participation of citizens in urban planning and redevelopment. It will become clear that the potential of e-government cannot be reached while governments, citizens and the institutional setting have not adapted to the reality of e-government as of yet. Demonstrated will be that certain groups stay excluded in the policy process and that e-government is limited by the risk averting behavior of governments. However it will also be shown that e-government can help bridge the gap between government and citizen and can lower the scope of conflict between the two.

1. Introduction

In the Dutch municipalities of Helmond and Tilburg plans were made to so some redevelopment of the urban centre. An e-government application was used to promote participation on the plans. A programme was created, named 'Virtuocity' in which the citizens could access the cities virtually and be informed and participate in the policy design process. The program 'Virtuocity' is a Geographical Information System (GIS) and has the features like the quality of visualization.

E-government can be described as the use of ICT by a public organization to support and redefine information, communication and transaction relations with citizens, companies and in the environment to create increased government access, better service delivery, internal efficiency, supporting public and political accountability, increased public participation. [2] Since e-government is becoming the norm more and more it becomes very relevant to research the influence the applications facilitating e-government could have, and therefore also the specific influence of GIS application in policy design and e-government and e-democracy. This is then the main question in this research: *"What is the influence of Geographical Information Systems on policy design and how does it shape the content, course and the outcome of this processes?"* Policy design is defined here as the process of defining, considering and accepting or rejecting options for political decision. [9] This paper then will aim to answer this question using the cases of the municipality of Helmond and Tilburg as case studies. In both cases the method of research chosen was qualitative in nature, interviews were conducted and documents were viewed. The cases of Helmond and Tilburg will be analyzed by using a conceptual model of policy design, made up out of insights from existing models of policy design. These insights and variables will form the building blocks of the conceptual model of policy design. Along the lines of these concepts the case studies will be analyzed.

The structure of the paper will be as follows, first an explanation will be given of what GIS entail and what their qualities and effects are. Next a conceptual model of policy design will be provided, on the basis of this model the cases will be analyzed. Third both cases, Helmond and Tilburg will be described and later the conceptual model of policy design will be applied. Finally in the conclusion an attempt to answer the research question will be made.

2. Geographical Information Systems

GIS are a form of ICT, they can order, manage and integrate large quantities of spatial data, they can also analyze this data and present it mostly in the form of a map. [16] But GIS has some features other ICT's do not. GIS makes it possible to visualize spatial distributions of social entities and their characteristics and combine these with geographic spread of other social entities and their characteristics. GIS can make it possible to visualize dynamics of

these entities and to establish correlations between them and can follow the accumulation in spatial terms of societal problems of opportunities. [21] GIS could, in this way, support policy design.

There are several qualities attributed to GIS that may have an effect on policy design. [3] First it is said that GIS serve a function of calculation, in this way different policy alternatives can be closely evaluated and costs and benefits can be predicted more accurately. Also predictions can be made.

A second quality of GIS is the function of control and discipline. This means that work procedures can be standardized and in this way the linking of different data sets of different organizations becomes possible. In this way information that was unavailable before can be generated. The standardization of work procedures also makes these procedures more controllable and more transparent.

GIS is said to increase transparency. GIS can structure work processes and data can be collected on the course of these processes, the process in itself becomes more transparent and this opens the possibility to adapt these processes. Next GIS can help approach different angles of a policy problem and in this way increase the accessibility and transparency of the problem. Since GIS can calculate large quantities of data and is able to visualize issues in a comprehensive manner a problem can become more clear. Fourth GIS can make, when on the web, policy proposals visible for people all over the world in this way proposals and decisions become transparent to many this could benefit e-government to a large degree. E-government can also benefit by an increase in transparency in the way they GIS are able to visualize the data. GIS can visualize complex data in a very simple way, so that one could right away understand a policy proposal.

3. A Conceptual Model of Policy Design

The underlying structure of the conceptual model is social constructivist in nature. This because first in this research GIS are regarded as socially constructed, using the approach of Social Construction of Technology. In this approach it is believed that society shapes technology. GIS are then a construct of society, the way GIS are designed and used determines the way it is seen in society, which in its turn accounts for the outcome. Therefore outcomes are not fixed or inevitable and technology is not seen as autonomous. [5] Where GIS can be seen by some as a means for participation it can be seen by others as a tool to exclude certain groups.

Secondly the existing models of policy design used to make up the conceptual model of policy design are all social constructivist in nature. All the models used assume that society and policy is constructed by the beliefs, values, actions and interactions humans conduct in. Policy is therefore not seen as autonomous or inevitable but as a social construct. Methodologically therefore, it is consistent to construct the conceptual model in a social constructivist manner as well.

Finally GIS are fairly new and this approach can explain how the shaping of these GIS came about. In other words, GIS are not just present; they underwent a process. [4, 22]

The conceptual model of policy design is, made up out of insights of existing models of policy design: the satisficing model, in which actors opt for a design that is satisfactory instead of optimal [20], incrementalism which holds that actors do not divert far from existing policy, [13], the normative optimum model, in which extra-rational components are added, like creativity, a good feeling or risk aversion, next to rational components [7], the mixed scanning model, which holds that policy is designed through different levels, first the scanning of alternatives very general, second looking at alternatives in detail [8] and the institutional analysis and development framework which assumes policy design is product

of interaction which in its turn is influenced by leading culture, rules of conduct and institutional features. [17]. The basic features of these models used for the conceptual model are listed below.

	Core Concepts	Analysis	Final Design based on
Satisficing Model	-bounded rationality -satisficing	Means- end analysis is used, actors act goal oriented, but analysis is limited by the bounds of rationality.	Matching the criteria to being satisfactory.
Incrementalism	-limited rationality -conflict of values -incremental decisions	Means and ends are not distinct and analysis is very limited, possible outcomes are neglected.	Degree of deviation from past policy.
Normative Optimum Model	-extrarational components -limited rationality -conflicting values -available means	Means are looked at before ends.	Availability of the means
Mixed Scanning	-limited rationality -conflict of values -power -available of means	Means en ends are not distinct. Analysis is divided into levels, in the first analysis is limited, in the second analysis is comprehensive.	Proving to be the best alternatives among the relevant alternatives and being backed with enough power.
Institutional Analysis and Development Framework	-institutions -culture -rules in use	Means – end analysis depends on the theory used within the framework.	Interaction between actors in the action arena, influenced by culture, rules of the game and the community.

Table 1: Basic features of the models used for the conceptual model.

From these five models those concepts were taken into the conceptual model that prove to be valuable in explaining the relation between GIS and policy design. These will form the building blocks of the conceptual model. Along these lines the case studies will be analyzed. Graphically the conceptual model will look as follows:

Conflict of Values and Power

Within the action arena several actors or groups of actors participate. They all have their own agenda and would like to come to a design of policy that fits their values. Within the action arena these groups might come into conflict with one another, while their values might conflict, trying to push their values and norms forward within the policy design. This is where power comes in. The group with a large deal of power is far more likely to see a large deal of his values and beliefs back into the proposal.

There are two additional things that must be mentioned before a final policy is designed and agreement of one or more groups on the design is found.

Bounded Rationality

The idea of bounded rationality holds that actors cannot account for all possible consequences, cost and alternatives, they are limited in the degree in which they can act rationally, it is therefore in this conceptual model not the case that actors base their decision on rational calculation.

Satisficing

That brings us to the second concept, namely satisficing. Agreement on what is optimal is hard to be found, time and resources are mostly lacking. Therefore in the conceptual model of policy design the groups will not aim for an optimal solution, they will aim for a satisfying solution.

Technology and thus GIS are placed outside of framework consisting of the action arena and the rules in use, culture and formal institutions. While technology is socially constructed, [5] it will influence the action arena, with its different groups and their relative power as well as the way they deal with information and different alternatives. The culture, rules in use and formal institutions that helped shape this technology are now to be influenced by it.

Summarizing this means that there is an action arena, in which interaction is influenced by formal institutions, rules in use and culture, and in which several groups try to push their values, which could conflict with values held by other groups, forward in order to come towards a policy design matching their values. Groups with a large amount of power have a bigger chance of seeing their values back in the final design than groups with less power. All actors are limited in the degree of rationality they can demonstrate. They will aim for a satisficing solution; first because time and resources are scarce, second because they know they cannot all have it their way. Finally agreement will be reached and one alternative will be chosen as the alternative that will constitute for the policy design.

On the basis of this conceptual model some expectations can be made regarding the case studies. First it is expected that GIS influences the rules in use while new groups of actors could become involved, therefore these rules must be adjusted. GIS could also make things possible that were impossible before which asks for an adaptation of the rules. Secondly it can be expected that GIS will attribute to the confliction of values, again while new groups of actors might come into play. The existing balance of power therefore might change. Thirdly bounds of rationality might be lessened. It is to be expected that GIS could have a profound impact on policy design by its calculation functions. Therefore the bounds of rationality could be limited. Fourthly it can be expected that because of the ruling culture the usage of GIS will not reach its full potential.

Research Strategy

The conceptual model as described above will be used to analyze the cases of Tilburg and Helmond. In both cases the method of research chosen was qualitative in nature, interviews were conducted and documents were viewed. The choice for these two cases is in the first place because of their similarity; they both deal with the same GIS application used for visualization and participation in the field of urban redevelopment. Second these cases are unique in their kind in the Netherlands. Helmond was the first municipality dealing with urban redevelopment through GIS using citizen participation and visualization, for Tilburg the same is the case with the addition that there was actually the chance to vote, this being completely unique in urban redevelopment in the Netherlands.

4. The Tale of Two Cities: Helmond and Tilburg

In the municipality of Helmond in the Netherlands plans for some urban redevelopment were made. In 2004 it was decided not to do so in a conventional fashion but to invest in e-government and therefore link this to the redevelopment of the urban centre.

Features of Virtuocity in Helmond

In 2006 the municipality launched a website in which the new urban centre was to be visualized through a three-dimensional technique, developed together with CEBRA. On this website citizens were able to log on from their computer at home. This all without any form of identification, however the programme had to be downloaded on ones computer. In this programme, named Virtuocity, with a username and an avatar one could virtually walk through the new urban centre of Helmond, just like in a gaming situation. Additionally there was also a possibility for citizens to react to the plans for the redevelopment on a forum. Furthermore there were fixed times on which citizens could chat with the aldermen to give their opinion or to ask questions.

The process of implementing Virtuocity in Helmond

At first the city council hesitated to implement Virtuocity, there was fear that citizens would protest against every new building on the site, especially since all became so clear in a detailed virtual environment. The city made it a top priority to make sure the website was accessible for as many people as possible, for people with older personal computers, and it had to be simple and easy to use. CEBRA made sure this came about and also installed a helpdesk. Before launching the website CEBRA together with the city of Helmond asked a test panel to test the website so they could still change some of its features. The test panel, made up out of citizens decided that the technology worked perfect although it seemed a little dull. Therefore CEBRA included sound into the site.

Plans to actually have people vote for policy proposals failed even before they reached the city council. The municipality of Helmond did not wish to do so out of fear that citizens would decide on something the city would like to see otherwise.

The outcome of Virtuocity in Helmond

People felt so much informed and taken seriously that there were almost no complaints on the redevelopment plans. It now is the belief that most objections against plans come from insecurity of citizens, when citizens are informed are able to see what is going to happen to their city they are less likely to complain. The chat and the forum proved to grow out to not only a place where citizens could share their opinion but also became a social gathering place in which each day thirty to forty people meet up. This became to function as a bridge between the citizen and the government. Opinions of citizens were actually taken into

account when a playground was designed, here citizens could, through means of a poll, inform the city council on what their preferred idea would be for the playground. Based on the outcomes of the poll the city council decided upon the plan for the playground. Although while launching the project there were not significant discussions or arguments against it in the city council, genuine e-democracy was not possible. It is claimed that public administration is not ready for these kinds of risks.

It is the city's opinion that Virtuocity made communication with citizens much easier since plans are more appropriately visualized they can be made clear more easily without any ambiguity of the intention of the plan, policy becomes more transparent which in the city's viewpoint makes communication easier. Citizens again feel more involved, can actually participate and feel taken seriously.

Features of Virtuocity in Tilburg

The municipality of Tilburg used the same programme, Virtuocity in 2006, this for the redevelopment of a square named 'the Heuvel'. As for Helmond this version of Virtuocity, also developed together with CEBRA, had the features of a gaming situation in which one could walk around the square, also the chat and the forum were there even though initially this was not the plan. But the city of Tilburg took Virtuocity a little further. It made it a tool with which people could vote for what the square should look like.

The process of implementing Virtuocity in Tilburg

On the basis of a competition in which citizens could show what they believe the square should look like eight different architects were invited to make a design of this square. A jury of experts picked out three designs; these together with the current situation were placed on Virtuocity. Citizens could thus walk through four designs and in the end vote for the design they appreciated most. The aldermen committed themselves to take over the advice of the citizens and thus chose the design with the popular vote. The municipality of Tilburg in the process of launching Virtuocity was very much afraid whether opposition in the council would not complain about the vote not being representative, while only voting through means of the internet was possible. Another point was how to prevent fraud, since nobody had to log on. The fraud problem was partly solved by filtering out IP-addresses which held more than one vote. For the problem of representation there was no solution found, initially a plan was made to impose a minimum vote for the vote to be valid but this plan was never executed. In order to enable as many citizens as possible to vote computers were placed in several public places where help was available.

The outcome of Virtuocity in Tilburg

In the end of the voting period, there were 115.000 visits to the site and over 4000 votes for one of the designs. The reactions in Tilburg were slightly less positive than in Helmond. In the first place citizens were upset that not all computers could run this programme, secondly citizens were not pleased with the fact that they had to download something on their computer in order to use Virtuocity. Citizens were also sceptical towards the municipality of Tilburg while some did not believe that their vote would actually be listened to.

Again there were no significant problems to get this plan through the city council. The city claims though that society is not ready for this type of voting yet, conventional means should also be used, next to the digital possibilities.

Architects were pleased with the idea of a virtual space for their design but were sceptic as well. They claim that Virtuocity makes the idea of a design more clear but they also claim that the way their design was projected was not the way they wanted it to look. Additionally an architect in this way cannot show the underlying vision of a design.

For both cities it can be said that the municipality as well as citizens hold the opinion that Virtuocity accounts for an experience, a virtual journey. Furthermore it can be said that Virtuocity, while it was initially intended to serve as a tool of visualization became a mean for communication, between citizens but also between citizens and government, a mean for transparency and a mean for participation. The decision to use Virtuocity in both cities was not based on a rational cost benefit analysis, but on feelings of creativity and need for innovation. Due to the idea that consequences could not be calculated both cities did not choose for an optimal alternative.

5. Assessing the Role of Geographical Information Systems

When assessing the role of the programme Virtuocity in the cases of Helmond and Tilburg using the conceptual model of policy design we must start with the action arena. Several actors can be distinguished between, the citizen, the governments of the two cities, the designer of Virtuocity CEBRA and in the case of Tilburg also the architects. These are the groups interacting in the action arena.

Institutional Features

We can clearly see here that of course the government is bound to the law, in Tilburg the voting did not have the character of a formal referendum since this would legally be very difficult. If the vote had the character of a formal referendum groups would be excluded, which would make the process not democratically legitimate, also the means to detect fraud were not available, therefore a formal referendum was out of order. Additionally it is seen in Helmond that attempts made to achieve a situation in which voting was in order failed because of opposition. This demonstrates that in these cases the institutional setting, government in terms of know-how as well as citizens are not ready for e-participation. The potential of e-participation cannot be reached as long as the parties involved are not able to use their means to this potential. [10]

Rules in Use

It is seen in both Tilburg and Helmond that the rules in use in this matter require citizens to participate in the redevelopment of their city. Another point that falls under the rules in use in this situation was interactive policy design. This is done because it is said to close the gap between government and citizen, it creates acceptance for certain policy proposals and finally it enlarges the quality of policy because the proposal can be looked at from different angles. With this interactive policy design there are some features that are most important, firstly openness, which means that all groups must be able to participate, secondly equality of different groups of actors, thirdly dialogue must proceed in a reasonable fashion, fourthly everybody should have that opportunity to exert influence in the matter and finally communication must proceed through different channels. [1] It becomes clear here that GIS can demonstrate a large potential for interactive policy design. Through a web application citizens are able to participate. GIS and thus Virtuocity show that communication can proceed through different channels, not only a virtual meeting place but also a presentation of plans independent of place and time. The visualization function of GIS makes it easier to explain and demonstrate what plans entail. Clearly, following the line as for the institutional features, when the rules in use do not adapt to the current situation of e-government in terms of computer possession and computer use, e-government will not reach its full potential and therefore will be limited. [10]

Culture

Thirdly the culture comes in, leading values and norms show us two things, first that citizens do want to participate in the redevelopment of their city. With Virtuocity we see that citizens feel taken seriously, Virtuocity was able to demonstrate to people what the exact plan was going to be, for this reason, according to both cities, there were less complaints about the plan than usual. Secondly we see a culture in the government of risk aversion. Since GIS are fairly new, consequences of policy are not very easy to predict and influence by citizens can move out of control, the two cities therefore did not execute the complete plan because they fear the risks. In general this demonstrates that e-government, at least for these two cases, has two faces. Citizens are pleased to participate in the possibilities of e-government and this seems to invoke consensus and lessen conflict, bridge the gap so to say, between citizens and government. Virtuocity, like other ICT's seems to bring community interaction. [11] On the other hand, governments seem to be reluctant in using e-government applications while consequences are hard to predict, risk aversion here is the cause of why governments are reluctant to push e-government applications to their full potential as seen in other cases. [6]

Conflict of Values and Power

When looking at the relative power of the different groups we see in both cases that the most power stays with the government. This emphasizes what the reinforcement thesis claims, that those in power are only strengthened by the technology use and those without power benefit even less. [12] CEBRA also hold a large deal of power, influencing the government by pushing it forward to extend the web application. Citizens in both cases gained power compared to conventional ways of urban redevelopment. Conflicting values are clearly seen between CEBRA and the architects, where CEBRA must balance between a high resolution and an easy accessible programme for all people, the architect wants the resolution to be as high as possible,. CEBRA and the governments experience the same clash, where CEBRA balances, the governments want the accessibility to be the highest priority. Citizens also complain about accessibility and exclusion but large conflicts of value between citizens and government seen not to have appeared this most likely because most citizens felt empowered and taken seriously; still, power remains largely with the government. Additionally citizens with no computer or no computer skills were completely left out of the process.

Bounded Rationality

This comes very much forward on the side of the government in the way that consequences cannot be calculated, the programme is too new to predict consequences and therefore a rational calculation cannot be made. Together with this bounded rationality we see risk aversion and a reliance on creativity and need for innovation instead of a rational actor approach. On the side of the citizens the opposite is the case, Virtuocity made plans comprehensible for citizens, therefore the limits to rationality they had before in terms of their ability to understand consequences and courses of a plan, decreased.

Satisficing

Finally the concept of satisficing, as stated above due to the idea that consequences could not be predicted the risks seemed very high, in a culture of risk aversion governments would rather go for a satisfactory alternative then for an optimal alternative. As said, risk aversion on the side of governments limits all possibilities of e-government applications to be explored.

6. Conclusion

Coming back to the expectations made we can see that regarding the first expectation the rules in use have changed, there emerges a new group of actors in the field, the designers of the programme, the public plays a larger role as well. The rules of interaction therefore had to be adapted shifting away autonomy from the governments towards the designers. While the governments have little knowledge on the working of programmes like Virtuocity the designer gets to decide a large deal of the course of the process.

Regarding the second expectation it can be stated that conflict in values has only lessened. This is mainly due to the way GIS is able to visualize the project, in this way the plans are more transparent to citizens. Citizens feel more secure about the plans. The possibility for them to participate diminishes conflict as well. They feel heard and are more willing to form consensus. Within politics the same goes, little critique was given to the plans because GIS made the plans so transparent they were clear to all parties. Insecurity diminished and therefore also conflict. For power another thing must be said. The governments had the fear, especially in Helmond, that they would lose power to citizens and therefore in Helmond the full potential of Virtuocity was not reached. Citizens were allowed to give their opinion but were not allowed to vote.

The answer to the third expectation is two fold. First the bounds of rationality were lessened because of the visualization function of GIS. Where a maquette or sketch of the future urban design was not very comprehensible for a large group of people, Virtuocity made it possible to experience the future situation. The situation became more transparent and people were able to understand the end result. On the other hand the bound of rationality were not limited at all. The main reason for not using Virtuocity to its full possibilities was because of the fear of the consequences. They were not able to predict consequences of further use. It seems therefore, of course because the application was new, that the unpredictiveness of matters only increased.

Finally it can be said that indeed the potential of GIS is not reached because of the leading culture. Not everybody owns a computer or knows how to work it. A formal referendum was therefore not possible. In order to have citizens vote on questions of urban redevelopment additional to Virtuocity a conventional ballot would be needed. Citizens seem also unwilling and cautious to log on to programmes with personal information and to download a programme on their own computer. Governments are also not ready to deal with the possibilities of GIS; proper means to prevent fraud are not yet common in government. Coming back to the research question of this paper: *“What is the influence of Geographical Information Systems on policy design and how does it shape the content, course and the outcome of this processes?”* We can clearly see that GIS here enlarged transparency of policy, by demonstrating to citizens how the plans were being executed, it improved participation by creating a social and informative gathering place, improved communication between citizens but also between citizens and government and attempted to increase democracy when people were allowed to vote. On the one hand this corresponds with what advocates of interactive policy design claim, that democracy will be enlarged and the gap between citizens and governments can be closed. On the other hand, critics of interactive policy design claim that the requirements to join in for citizens are too high therefore some will be excluded, therefore interactive policy design will not lead to more democracy and will only have the opposite effect. [15] In the both cases it can be concluded that while citizens felt they were being heard in practice little extra democracy was added. Therefore the evidence in the cases does support the thesis that the cap could be lessened but not the thesis that democracy would increase. The question whether GIS and interactive policy

design will enlarge democracy cannot be answered here, even though advocates believe the potential is there, evidence from cases suggest otherwise.

The process of interactive policy design became easier in both cases because of the influence of GIS, participation was possible through different channels, plans were more clear and communication became easier. It was also demonstrated here that citizens do want this kind of influence that is easily to access and not dependent on time and place, contrary to what critics of interactive policy design believe [15]. But the other side shows that while the application is new governments might not want to use it to its full potential, this because consequences are unpredictable and they want to avoid risks. In terms of power it becomes clear that while government still holds the largest part of the power the relative power of the designer of the application increases, to the point where it can influence government. Relating this to the reinforcement hypothesis [11] in both cases indeed the status quo is reinforced. The elite in power decides what can be decided on by citizens and the way in which citizens are allowed to do so, and in this way the elite only strengthens their power. The governments did not lose power towards citizens. In this way the situation in the cases described supports the reinforcement hypothesis to a certain degree, but not completely. It must be mentioned here that the hypothesis that through the use of computers power will flow from governments to technocrats [23] is supported by the cases of Tilburg and Helmond. CEBRA had a lot of influence in which technology to use and how to use it. Therefore it can be concluded that while the reinforcement hypothesis stands its ground in the relation between government and citizens this cannot be said in the relation between the government and the designers of the technology, government loses power here. Concluding it can be stated that while the reinforcement hypothesis cannot be completely disregarded, in the cases described it does not live up to its full promise.

Taken broader we see that the full potential of e-government cannot be reached as long as the parties involved are not able to use their means to this potential. When citizens do not own a computer or do not have the know-how to work a computer, when governments do not have the knowledge to solve problems coming forward in e-government questions and are reluctant to take risks, and when the institutional setting does not make steps towards incorporating matters of e-government into the setting, the potential of e-government as well as e-democracy will not reach its potential.

Bibliography

- [1] Bekkers, V.J.J.M., (2003) "*Interactieve beleidsvoering: kenmerken, voorwaarden en ervaringen*. In: Schoorl, A.H.A., Sprinkhuizen, A.M.M., Stevens, P.G.J.J., Veldheer, V.C., (eds.) (2003) *Handboek Lokaal Sociaal Beleid. D 4 Ineractieve beleidsvoering en burgerparticipatie*, Utrecht, pp. D-421 – 26.
- [2] Bekkers, V., (2003) "*E-government and the Emergence of Virtual Organizations in the Public Sector*." In: *Information Polity*. Vol. 8., No. 3/4., pp. 89-101.
- [3] Bekkers, V., Zuurmond, A., (2005) "*Achtergronden en eigenschappen van ICT*." In: Lips, M., Bekkers, V., Zuurmond, A., (red.) (2005) *ICT en openbaar bestuur. Implicaties en uitdagingen van technologische toepassingen voor de overheid*. Utrecht, Lemma BV. pp. 47-72.
- [4] Berger, P.L., Luckmann, T., (1967) "*The Social Construction of Reality. A Treatise in the Sociology of Knowledge*." New York, Anchor Books.
- [5] Bijker, W.E., (1995) "*Of Bicycles, Bakelites, and Bulbs. Toward a Theory of Sociotechnical Change*." Cambridge, MIT Press.
- [6] Carver, S., (2000) "*Accessing Geographic Information Systems over the World Wide Web: Improving public participation in environmental decision-making*." In: *Information Polity*. Vol. 6., pp. 157-170.
- [7] Dror, Y., (1968) "*Public Policy-Making Reexamined*." Scranton, Chandler Publishing Company.
- [8] Etzioni, A., (1967) "*Mixed-Scanning: A 'Third Approach' to Decision-Making*." In: *Public Administration Review*. No., 27. pp. 385-392.

- [9] Howlett, M., Ramesh, M., (1995) "Studying Public Policy. Policy Cycles and Policy Subsystems." New York, Oxford University Press.
- [10] Kingston, R., Cerver, S., Evans, A., Turton, I., (2000) "Web-based public participation geographical information systems: an aid to local environmental decision-making." In: Computers, Environment and Urban Systems. Vol. 24., pp. 109-125.
- [11] Komito, L., (2005) "e-Participation and Governance: Widening the net." In: The Electronic Journal of e-Government. Vol. 3., No. 1., pp. 39-48.
- [12] Kraemer, K.L., King, J.L., (1986) "Computing and Public Organization." In: Public Administration Review, Special Issue, Vol., 46., pp. 488-496.
- [13] Lindblom, C.E., (1959), "The Science of 'Muddling Through'" In: Public Administration Review. No. 19., pp. 79-88.
- [14] March, J.G., (1994) "A Primer on Decision Making. How Decisions Happen." New York, The Free Press.
- [15] Mayer, I., Edelenbos, J., Monnikhof, R., (2005) "Interactive Policy Development: Undermining of Sustaining Democracy." In: Public Administration. Vol. 83., No. 1., pp. 179-199.
- [16] Meijer, A., (2002) "Geographical Information Systems and Public Accountability." In: Information Policy. Vol. 7., pp. 39-47.
- [17] Ostrom, E., Gardner, R., Walker, J., (1994) "Rules, Games, & Common-Pool Resources." Ann Arbor, University of Michigan Press.
- [18] Ostrom, E., (1999) "Institutional Rational Choice. An Assessment of the Institutional Analysis and Development Framework." In: Sabatier, P.A., (eds.) (1999) Theories of the Policy Process. Theoretical Lenses on Public Policy. Boulder, Westview Press. pp. 35-71.
- [19] Simon, H.A., (1957) "Models of Man. Social and Rational. Mathematical Essays on Rational Human Behavior in a Social Setting." New York, John Wiley & Sons.
- [20] Simon, H.A., (1976) "Administrative Behavior. A Study of Decision-Making Processes in Administrative Organizations." New York, John Wiley & Sons.
- [21] Snellen, I.Th.M., (2000) "Territorialising Governance and the State: Policy Dimensions of Geographic Information Systems." In: Information Infrastructure and Policy. Vol. 6., pp. 131-138.
- [22] Weick, K.E., (2001) "Making Sense of the Organization." Oxford, Blackwell Publishers.
- [23] Winner, L., (1977) "Autonomous Technology. Technics-out-of-control as a Theme in Political Thought. Cambridge, MIT Press.