Electronic and Mobile Participation in City Planning and Management

Experiences from IntelCities – an Integrated Project of the Sixth Framework Programme of the European Union

Cases
Helsinki, Tampere, Garðabær/Reykjavik and Frankfurt

VTT Technical Research Centre of Finland
City of Helsinki Economic and Planning Centre, Development Division and
City of Helsinki Urban Facts, Urban Research Unit

Edited by
Pekka Lahti,
Jonna Kangasoja and
Pekka Huovila

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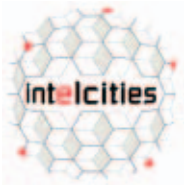

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Foreword

IntelCities (Intelligent Cities) was a research and technological development project combining advanced knowledge and experience of electronic government, planning systems and citizen participation from across Europe. IntelCities was one of the first Integrated Projects (IP) in European Union's Sixth Framework Programme (through the IST programme) and it brought together 74 European partners: 18 cities, 20 ICT companies (including Nokia, Microsoft and Cisco) and 36 research groups. The project started in 2004 and ended at the end of 2005 with a total budget of 11.7 M€.

This report is based on the experiences gained in one of the IntelCities work packages (WP2b) titled "e/m Participation". The work package focused on novel electronic and mobile participation concepts for e-governance. The following partners took part in the work package: VTT Technical Research Centre of Finland (WP leader), City of Helsinki, City of Tampere, UIAH University of Art and Design Helsinki / Future Home Institute and Media Centre Lume & Media Lab / Crucible Studio (together with ADC Art and Design City Helsinki and LTT Research in HIIT Helsinki Institute of Information Technology at Helsinki School of Economics), Nokia, GoPro from Iceland and Fraunhofer AIS from Germany. Previous reports on the work done in the work package 2b include user requirements and specifications on developed new products and services, e/m-participation concept with multimedia tools, test-bed results and software including preliminary evaluation and comparison of e/m-participation use cases.

The report begins by situating e-participation in the broader context of democracy development. Sections two to four present the cases from Helsinki, Tampere, Garðabær and Frankfurt. The cases are possible applications of new "e/m-participation" product and service concepts. The solutions are accessible by using both wired and wireless devices. All developed and tested applications are interoperable either via internet or special system architecture solutions directly connected to the "eCity-Platform" (eCP), which was one of the focuses of the IntelCities project. The cases and their performance have been evaluated and com-

pared to other European cases especially with regard to their capabilities to enhance participatory behaviour, to improve public service relevance and media properties. The final section draws conclusions and recommendations based on the cases.

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Helsinki February 2006
Pekka Lahti, Jonna Kangasoja and Pekka Huovila

1 Introduction

Democracy is throughout the world the most popular system of government, and it can be stated that the democratization of the states and the world community has moved forward since 1989 (Leggewie and Bieber 2003: 124, 127). Nevertheless, democracy as a system of government and democratic way of life is threatened by an inner erosion endangering the established democracies of Western European countries (Leggewie and Bieber 2003: 124) who argue that it is less the principle of democracy (polity) than the practice of democracy which is in crisis: citizens are increasingly sceptical regarding the ability of democratic governments to resolve the increasingly complex problems of modern society.

Furthermore, they are sceptical whether their voices are heard, being aware, at the same time that the influence of corporate non-legitimated (global) institutions like NGOs, pressure groups, associations, or alliances is increasing. Priddat (2002: 15) argues that this leads to a situation where the 1st-order-democracy, comprising the competitive market on electors' votes, is being devalued by the 2nd-order-democracy (ibidem), whereby the subsequent policy and policy realization process is characterized by electors' absence and non-transparent influence of non-democratic alliances ("asymmetric influence" – Priddat 2002: 17). Citizens, at least those who are willing to participate, the so called "critical citizens" (Norris 1999) are disappointed and frustrated , reflected by the pan-European problem of decreasing participation in the democratic process at all levels, and by the disengagement of the public from formal political processes such as voting, joining parties and following political news. In order to strengthen the democracy on the whole, the 2nd-order-democracy must be extended by increasing participation at all levels to enhance the influence of non-organized citizens on the policy realization process (Figure 1).

Governments are also interested to strengthen their own position against corporate structures by engaging with the "remainder of population" which is regularly the non-organized majority (Priddat 2002: 18). From this point of view, enhancing participation does not mean implementing direct democracy, but rather to realize direct bargaining with citizens, also

called direct representation or direct deliberation (Coleman 1999).

The term e-participation stands for procedures, in which decision makers consult with citizens in a communication process in order to prepare a decision. As a part of e-Government, e-participation represents an electronically supported mode of interaction between the political administrative system on the one hand, and the citizens and non-governmental organisations (NGOs) on the other hand (von Lucke and Reinermann 2000). E-participation is a part of e-Governance and is as thus defined by the Digital Governance organisation as following (www.digitalgovernance.org, see also (INTELCITIES 2004): In the digital Governance, citizens, associations, and community can directly participate in the decision-making process by exploiting the interactive base of network technologies. Forum, online polls, consultations or e-voting systems are technology solutions that increase the involvement of citizens and other players, in a rich virtual context in terms of information. Table 1 illustrates how participation in digital governance differs from participation in conventional government approaches.

In recent years realised and evaluated pilot projects revealed the deep socio-technical character of e-participation (Kubicek and Hagen 1999; Kubicek and Hagen 2000; Märker,

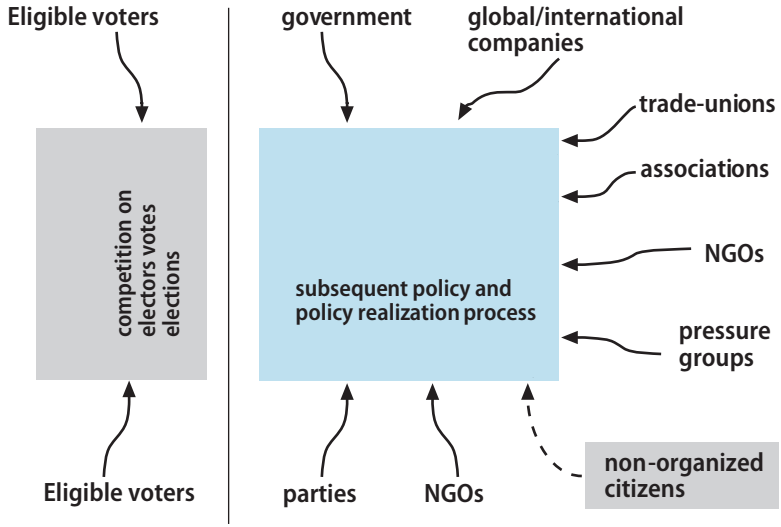

Figure 1: 1st and 2nd-order-democracy

Participation Indicators	Conventional Governance Models	Digital Governance Models
Mode of Participation	Representative	Individual / Collective
Domain of Participation	In-situ	Ex-situ
Approach to Participation	Passive / Reactive	Pro-active / Interactive
Impact of Participation	Indirect / Delayed	Direct / Immediate

Table 1: People-participation in Digital Governance vs. Conventional Governance Models (source: Digital Governance organisation)

Hagedorn et al. 2002; Märker, Hagedorn et al. 2002; Westholm 2003). To be successful, e-participation projects should base on a multi-dimensional socio-technical approach regarding their internal relevance, indicated by the quantitative and qualitative outcomes of the online-discourse, and their external relevance, which targets the probability on how deliberative produced knowledge is being heard and regarded by political actors. Mainly technology-driven approaches are characterized by absence of acceptance which leads to a lack of participation and thereby to a low level of productivity of the discourse on one side, and missing commitment by civil servants and political actors on the other side. The lesson learned so far is that e-participation should be adapted to the needs and skills of the users by a tailored mix of (for example) technologies, procedures, or methods embedded into the existing institutional structures including strategic considerations of the target groups or initiators.

In the following sections novel e-participation concepts developed in the IntelCities project's work package 2B are presented and evaluated. The cases are from Helsinki, Tampere, Garðabær and Frankfurt.

2 Electronic Bulletin Board and Profiling Tools (Finland)

The Helsinki/Arabianranta and the Tampere/Vuores cases highlight the importance of understanding the interrelationships of the three enabling and constraining structures within which the development of e-participation takes place; firstly the policy context, secondly the concrete technological structures and solutions, and thirdly the organizational and social structures sustaining e-participation on the municipal and the local level. The experience from Arabianranta/Helsinki shows that intermediary level organizations such as the local development agency Art and Design City Helsinki Ltd., residential associations, and active citizen groups, such as the voluntary e-moderators, are playing a very significant role in the development of the citizen's e-services.

2.1 The Arabianranta Test Bed (Helsinki)

Arabianranta is a new residential area built on a brown field of an earlier major porcelain and glassware industry (The Arabia factories). The area is under construction and will have around 10.000 inhabitants, 7.000 jobs and 6.000 students when completed around 2020 (figures 1–4). The area is provided with a fixed fibre optic cable network available for all houses. The main institutions situated in the area today include University of Art and Design Helsinki UIAH, Aralis Library and Information Centre, Pop & Jazz Institute, Arcada Polytechnic, Hackman Group and the Arabia porcelain factory, Arabiakeskus and Portaali Business Park. The local development company is Art and Design City Helsinki Ltd (ADC).

The City of Helsinki's development program for internet based citizen services (period 2003–2006) states both comprehensive development goals including the whole ICT infrastructure of the city, and goals for particular eServices that are developed in the sectoral fields. City of Helsinki follows carefully the developments in the Arabianranta district, which serves as a 'Helsinki Living Lab' in several respects, and uses the knowledge gained from there as the basis for planning and development work concerning new development areas, especially in the Eastern parts of the City. The possibilities to transfer certain technological so-

lutions of Arabianranta (the local area network, VPN-connections, City district portal with extranets) are currently examined in the Development Unit of the City Office.

Figure 2. Arabianranta plan when completed around 2020

Figure 3. The 14 km net of fiber optic cables built to Arabianranta

Local ICT solutions in Arabianranta are:

- Local area network (super-fast, 1 Gbps, data communication network available to all residents and companies at a low price, last mile owned by the local service company Arabian Palvelu (Arabia Service). The residents are the owners of the service company through the housing companies).
- Helsinki Virtual Village project (local service portal connecting residents and other actors in the area to a virtual community, managed by ADC).
- Each housing company (normally one house) has its own website and extranet discussion forum accessible through the portal, managed by a volunteer e-Moderator living in the house
- Public WLAN areas in the Aralis Library and Information Centre and in Portaali Business Park (opened in March 2004)

For the future development needs of the local ICT services a survey targeted at the whole population of Arabianranta was realised in March 2004 (D2b.1). The survey was made in the form of an e-questionnaire accessible through the local portal. Printed version of the questionnaire was distributed to all of the approximately 500 households in the area, covering all of the existing 5 apartment blocks (housing companies) in Arabianranta. The questionnaire comprised of three sets of questions, combining the focus areas of the partners:
1) participation needs
2) use of tools
3) interest towards new services.

Figure 4. Visualization of the area when completed.

Figure 5. Area in 2004 under construction.

A total of 150 filled questionnaires were received by the deadline, 14 March 2004. 87 of the responses were received through the Internet and 63 by mail. 113 residents living in Arabianranta responded from seven different housing projects. These represent five different types of categories: Rental buildings, privately owned flats, subsidized privately owned flats, student housing and public subsidized building.

Out of the respondents, the Internet penetration was some 92% and mobile terminal penetration some 96%. Usually Internet is shared by household and the mobile phone is personal. Most of the Internet enabled are competent or very competent users, only 5% were novice users. 81% had broadband access (minimum of adsl or cable with 512 kb/s) and almost 60% had fast broad band (beyond 4 Mb). Out of the mobile users less than 10% had a PDA or a Communicator and around 20% had a multimedia messaging capable terminal. Internet access was some 15% of mobile users. SMS capability and practice was close to 100% of mobile users. Average time spent on the Internet per week was around 350 minutes (almost seven hours), distribution being very wide. It was not specified whether the Internet usage happened at home or at work. Mobile phone users used some 50 minutes per week with also very broad distribution. Mobile users used SMS approximately 15 messages per week, however there were quite many super users who spent much more time on SMS than voice services. 15% of mobile users used multimedia services approximately five times a week.

The two e-/m-participation concepts (e-bulletin board and e-participation tool for citizen-to-city-authorities) developed in WP2b were supported by the results of the survey and were taken under closer consideration and iteration during the project. Interactive bulletin board could have a demand for increasing resident participation. User friendly ways to increase mobility services should be developed in integration with home page and portal which both still need promotion and development. P-to-P type mobile communication could offer ways that are difficult to implement in the internet (mobile mail, SMS/MMS and profile based identifications).

2.2 Image Frame in Arabianranta

The Image Frame is an Electronic Bulletin Board Service utilizing the MMS technology at the Nokia Image Frame devices, which were placed in the staircases of an apartment block in Arabianranta, Helsinki during the WP2b development and test period. Arabianranta area was used as a testbed to get some immediate user feedback from Image Frame. The test was preceded by an extensive user survey focused in end-user requirements followed by an in-depth

focus group interviews (D2b.1 and D2b.3).

The core element of the Image Frame is the electronic bulletin board, which all inhabitants, housing companies, local businesses and city authorities would be able to use, for instance, in order to make various announcements (public, official and others), reservations (e.g. for meeting rooms, saunas, etc.), to inform the users about local/city activities and happenings etc. In addition the service would offer opportunities to join various communication groups and participate in discussions that concern the immediate living environment.

The Digital Bulletin Board Service requires high penetration of MMS enabled mobile terminal, standard mobile terminal that supports SMS and MMS exchange, a local area portal and an e-Moderator as mediator. During the test period the content of the Digital Bulletin Board was updated twice a day and demonstrated for the WP2b members (figure 5).

The main objectives of the Digital Bulletin Board Service (see D2b.3) are to offer its users the ability to join decision-making groups and express their opinion that concerns local area matters. In addition this service would inform all the citizens for city level issues. As possible uses of the service, at least the following could be mentioned:

Figure 6. Image Frame installed in apartment block's staircase at Arabianranta (photo Pekka Huovila)

- Information on official announcements
- Reservations of common areas
- Information on local activities and happenings
- Participation at discussion groups
- Expression of personal opinions in issues that concern the immediate living environment
- Posting of commercial banners from local shops

The basic idea of the concept was thought to be fairly good (see D2b.3). However, some serious doubts were expressed about the relevance of the need for such service, its practical usability and possible business idea. Also the link with the local authorities was underdeveloped and remained weak. What extra value would the service really add in addition to the local area portal? Who would moderate and maintain the service? In order to function and engage the residents, the concept should be very well thought of, not necessarily dependent on the Image Frame device in its current non-interactive form.

One participant of the interviewed focus group stressed the fact that this kind of service should be both informative and entertaining. Examples of user profiles as avatar-type characters based on the opinions of the resident were thought of being potentially interesting but

Dimension	Criteria	Specification
Participatory aspects	Degree of participation	Information and consultation
	Target group	Homogeneous and heterogeneous
		Small scale and Large scale
		Closed and open
	Political impact	Transparency
Public service relevance	Thematic focus	Democracy, life area context
	Public service impact	New public service
	Process embedding	Input from joint processes
		Continuing process
Media	Accessibility	Registration needed
		Mobile phone and Image Frame devices
	Interaction	Facilitated, structured and open
		Given rules of interaction
	Operation	Usable by laity
		Stand-alone

Table 2: Image Frame evaluation table

difficult to read in relation to each other and the opinions they represent. An intermediate phase between the traditional bulletin board and more participatory service would be trying to reformulate the use of the physical bulletin board to meet different types of needs – e.g. offers for common orders could be found on a regular place reserved to them in the staircase.

Conclusions of the focus group interview (D2b.3) were as follows:

- Significant need to area level participation
- Unofficial communities & interest groups – grass-root level activity and social innovation as opposed to official, pre-described services
- Information and entertainment combined
- Digital Bulletin Board concept is relatively ok, device not
- Participation towards the city: finding right authority in the right time. Understanding planning processes
- Weak signal: young female user interested in mobile polling

In the WP2b evaluation (D2b.5) the Image Frame was regarded as rather unique system compared to others. While a typical case is a system for mainly information distribution, available for many types of people, having a large scale target group and being open and transparent, some of the cases are more specific and with individual characteristics in 1 or 2 aspects evaluated. Only one case (Image Frame) was exceptional in almost all (4 out 5) aspects.

2.3 Neighbourhood profiling tools (Helsinki and Tampere)

The "Neighbourhood profiling tool" concept was developed by UIAH Media Centre Lume, Crucible Studio in two phases: the Arkkikone community web application and, as a follow-up, the "In the Hood" neighbourhood profiling service. An introduction to both concepts follows.

The concept of "Community tool" that was used in earlier report (INTELCITIES D2b.4) stands for the "Neighbourhood profiling service" used in this report. The concept of "neighbourhood profiling service" describes more precisely what the service is about. Also, this clarification helps avoiding mixing the concept with the one used by GoPro in the "My Community" (see chapter 3). Finally in IntelCities market validation work plan both the GoPro's My Community service and Crucible Studio's Neigbourhood profiling service was commonly called as "Neighbourhood Tools and Community Narratives (NetCN)".

"Arkkikone" (Archengine) in the Tampere Vuores area

The "Arkkikone" web application was developed in collaboration with the City of Tampere. Based on both previous experiences from the Election Star[1] cross-media concept and research made in the IntelCities project, Arkkikone aims at enhancing a participative and inclusive role for citizens in city planning via more reliable city modelling, predictive planning, and advanced visualisation technologies. Arkkikone focuses on evaluating urban design in the district of Vuores in Tampere.

Vuores is a new planned area 7 km south of Tampere centre, located in an area belonging to two neighbouring municipalities, City of Tampere (2/3 of the area) and Lempäälä municipality (1/3 of the area). The area is currently unbuilt and according to current estimations will be constructed for 13,400 inhabitants.

In this first proto phase, the users of Arkkikone profile themselves and compare their own Vuores profile to those of the architectural competition candidates. As a result they get a best matching project of the six candidates chosen by the jury from some 30 entries.

Similarly to the Election Star produced for the Finnish municipal and European Parliament elections in 2004, Arkkikone is a helpful tool for matching complex issues to the user's opinions or profile and offers entertainment in the process. On the Arkkikone SOM (Self-Organising Map) map the location of competition candidates is changing in relation to user profiles. Combining user data and candidate data the solution forms a new map after each batch processing (e.g. each night). Additionally, the user is provided with various animated and narrative character profiles depending on his or her choices and orientations in the area's future development.

Arkkikone offers another type of visualisation to accompany the project maps and plans, and as such helps future citizens of the area and other interested parties to evaluate the planning. The future potential for the application is to develop into a tool for participating in the planning process, such as in the evaluation of architectural competitions at an early stage.

1. Election Star is an election engine constructed in the nationally financed project for the Finnish biggest commercial TV channel MTV3 together with Alma Media Interactive and Helsinki School of Economics CKIR in 2004 for both EU Parliament elections June 11th – 13th and the municipal elections in September 2004. The Election Star was tested in Arabianranta for finding best fitting local candidates with locally tailored questions (see INTELCITIES D2b.6 chapter 3.1)

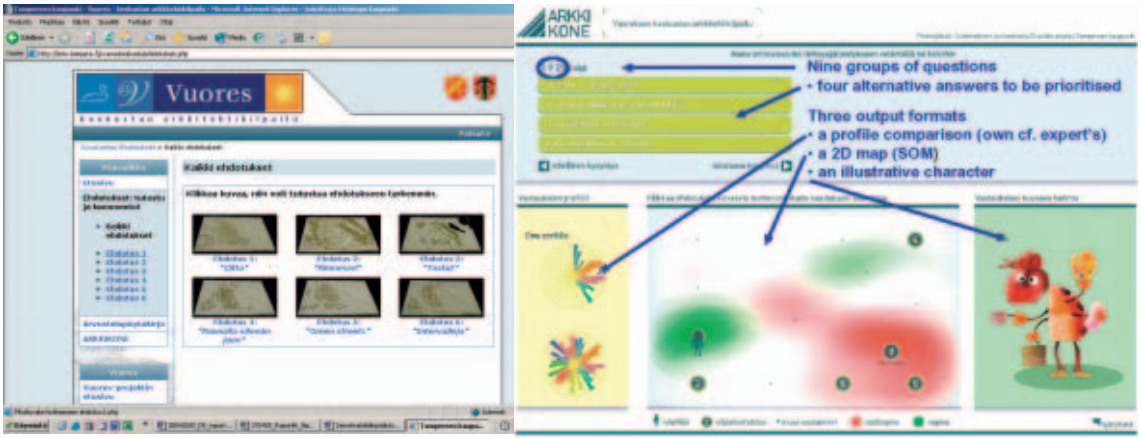

Figure 7. Screenshots from the City of Tampere's Vuores website with the six final design competition entries (left) and the Arkkikone's Profiling Tool (right). The six entries were evaluated by the user with nine questions with four alternative answers. The profile of the resulted view is presented in a SOM-type map (locating the six entries and your own profile in the same map), sector diagram comparing expert's and your own opinions and 3) an illustrative character synthesizing your opinion in one visual and entertaining figure.

"In the Hood in Arabianranta" as a new Neighbourhood Profiling Service

The inhabitant profiling, visualization and related urban simulation tools were further developed into the "In the Hood" neighbourhood profiling service. The address to the service prototype is http://www2.uiah.fi/~tomartti/kulmilla/.

"In the Hood in Arabianranta" neighbourhood profiling service provides the inhabitants and other actors of Arabinranta with a set of questions: "What is the "real" Arabianranta like? To which directions should the area be developed in the future? Who are the people living, working and studying in the area? What kinds of services are needed?"

This is done, similarly to the Arkkikone tool, by putting a set of pre-defined sentences into an order of preference. The themes used in Arabianranta are: lifestyles and cycles; urban environment; the neighbourhood's relationship to the surrounding city; traffic and mobility in the neighbourhood; services; the community and neighbours; Arabianranta as a data city; and Arabianranta Art and Design City (ADC). While reflecting on issues that the user per-

sonally finds important, he/she also tells others (for comparison, for voting etc) which kind of a neighbourhood Arabianranta is and wishes to become.

In the case of "In the Hood", the answers provide the user with a personal dynamic profile that is positioned on a four-dimensional character gallery consisting of the focus areas of citizens-workers-consumers-inhabitants (see Characters). At this stage, the answers can also be compared in a more general profile of each housing company in accordance with the Helsinki Virtual Village portal.

In the future, the dynamic, visualised modelling of urban design and neighbourhood profiling that uses character narration is to be further developed into ways of improving participative planning and local democracy. The idea is to enable inhabitant participation into ar-

Figure 8. The starting page of the "In the Hood in Arabianranta" entertaining neighbourhood-profiling service describes the four characters (both male and female). The service is both in English and Finnish, and can easily be translated to any other languages.

chitectural competitions in an early stage, as demoed in Vuores, or to participate in the development of areas that are still under construction, as demoed in Arabianranta. Thus, the future inhabitants, workers or users of the area can influence the planning process and/or choose areas that they find interesting for themselves via means of comparison.

Technology and interoperability

The implementation of the "In the Hood in Arabianranta" neighbourhood profiling service is at a functioning prototype phase. The service works in its own environment and serves as a proof of concept. This description is rather general, because the prototype's fundamental technical decisions have been made for the research of narration and entertainment in public services. There might be a need to rethink the technical base, if designing the "real" commercial product. SOM, Flash and PHP technologies have been used in the service. For SOM, SOM_PAK[2] was used, but the rest of the software was developed in this project.

General architecture

The UI (user interface) of the service is a Flash application, PHP was used as the server side scripting language (figure 8). The server side data is relatively simple and it's stored in text files because of interoperability between the development servers. MySQL or similar database would have been a more preferred solution. The service is implemented in the Helsinki Virtual Village[3] portal.

The data sending sequence includes four phases:

1. User (that is logged in to the Helsinki Virtual Village portal) selects that he/she wants to use the In the Hood service. New window with the service opens. The service gets information about the user from the Helsinki Virtual Village portal, the information includes username and the block of flats the he/she lives in.
2. The service asks the server for information about the similarity map, etc. The username of the user is used as a parameter in this request in order to get the saved answers from the user if he/she has already answered the questionnaire. The name of the block of flats is also delivered. The output of the request includes:

2. http://www.cis.hut.fi/research/som-research/nnrc-programs.shtml
3. http://www.helsinkivirtualvillage.fi/

– Similarity map (SOM)
– Other users and the block of flats positions in the similarity map
– User's saved answers to the questionnaire
– The figure gallery of the user's block of flats (counts for each character given to other users that live in the same block of flats as the user)

3. Finally, when the user has answered the questionnaire, his/her answers are stored for further use. If the user has already stored answers earlier, his/her earlier answer set is discarded.
4. In the end screen of the service, the user has an option to send feedback to the authors of the service.

In the figure 9 there are also two red lines named "eCp". If the service would be integrated into the e-City Platform, these are where the changes would happen. Basically, the Helsinki Virtual Village user registration would be changed to eCp's one and the web server would use eCp's interfaces for data storing and retrieving from the database.

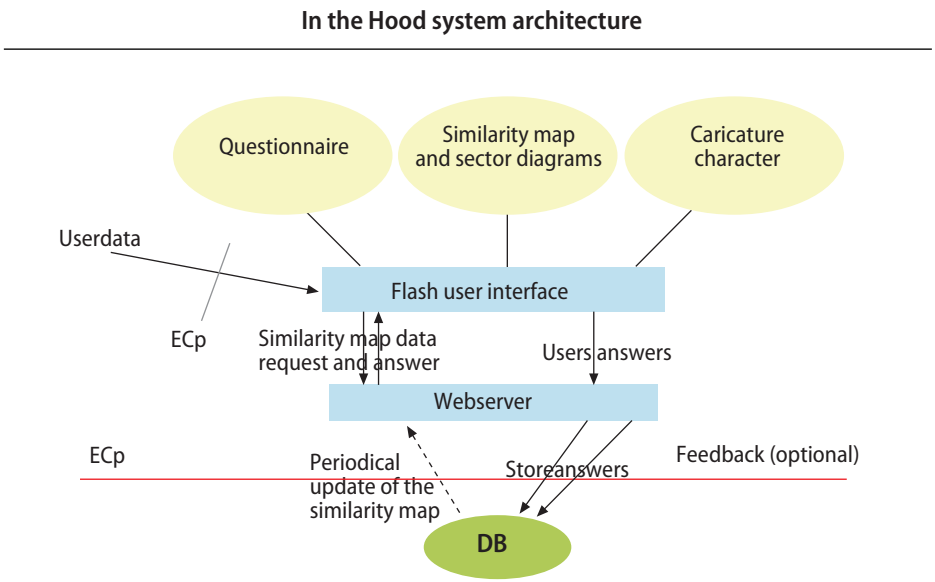

Figure 9. In the Hood System architecture.

User interface

There are three major sections in the user interface:

1. Selection boxes that are used to answer the questionnaire. The user has to arrange the arguments in order of importance (= personal preference).
2. Caricature character is generated from peaces according to user's answers and adds a personal element to the service.
3. Similarity map. The similarity map (self organizing map SOM) is used to compare user's answers to the average answer set of his/her block of flats and other blocks in his/her living area. Other users are also visible as blue dots in the map. The user can also choose the block of flats from the map and compare it (average from inhabitant's answers) with his/her own answers.

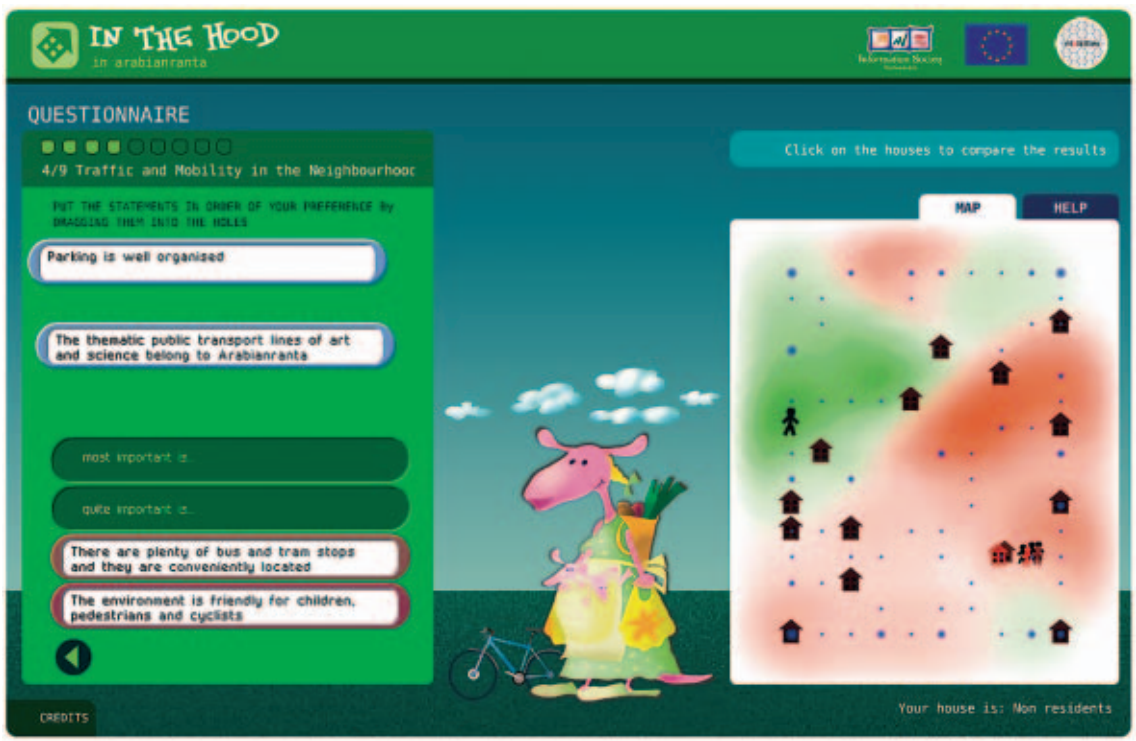

Figure 10. Service main screen.

Other elements include:

- Bars showing how much of a Citizen, Worker, Consumer and Inhabitant the user is according to his/her answers.
- Ability to see the gallery of characters living in the block of flats of the user.
- Ability to send feedback to the authors.

Logic of the elements

SOM is an algorithm that essentially reduces multidimensional spaces into 2-dimensional similarity maps. In plain English, it makes comparing multidimensional vectors with each other easier as it groups similar vectors together. As the SOM uses vectors for its similarity matching, the users' answers to the questionnaire have to be stored as vectors.

When the user has answered to the questionnaire, the answers are stored in to an answer vector (array of numbers). This vector has 36 dimensions (numbers), 1 for each statement. The vector is also divided in 9 logical subsets for each set of statements. In this subset of 4 statements, the one that the user has ranked as the most important gets the value of 1. The next one gets 0.66, next one 0.33 and the least important gets 0. One example of legal answer vector would be (dimensions delimited by space):

1 0.66 0 0.33 1 0 0.66 0.33 0 0.33 0.66 1 0.66 0 0.33 1 0.33 0.66 1 0 0 0.33 0.66 1 0.66 1 0.33 0 0.33 1 0.66 0 1 0.33 0.66 0

These answer vectors are then crunched by the SOM algorithm and similar answers sets are found.

The average set for blocks of houses uses a special weighting average function to avoid the situation where the values for all of the dimensions would be near to 0.5 and all houses grouped together in the map.

Caricature characters

The caricature character or avatar visualization consists of four different parts: the animal character, the hat, the vehicle and the background. Only the hat and the background (and the sex of the character) are user selectable and don't affect the logic in any way.

The logic for the composition of the dynamic parts of the character is based on the grouping of the statements. Each of the statements is thought to represent thinking of either citizen, consumer, inhabitant or worker. Each of the subsets of statements that the user has to

arrange in order consists exactly one statement for each of these archetypes. The archetypes are then given points according to how high they are in the preference list. The archetype that has most points gets to represent the user.

The adding and counting of points is done after each answered subset, so the the character might change during the answering of the questionnaire. One extra element of change is also the vehicle, which represents statement sets 3 & 4 (that don't affect the animal character). There are four vehicles representing the same archetypes as the animal character. In addition to this the size of the vehicle is dependent of how strongly the user has favoured the winning archetype.

Levels of Profiling

There are seven levels in the profiling system:

Personal level

The personal level is the basis for all the other levels. A member of the community puts the pre-defined statements or claims in the order of his/her choice.

Family or Household level

The family level builds up from the personal levels of the family or household members. It will be an average of them. The average is slightly misleading: if there is an utmost variety of characters inside the family it should be seen in the visualisation. For a person this will give an image weather or not he/she is similar to his/her family members. In the best case the core information of how the household is using electricity or water (compared to average in the city or house) could be used.

Staircase or apartment block level

The staircase or apartment block level will build up from the average of the family levels. Possibly the total consumption of energy, water, garbage production etc. could be added to the profile.

Neighbourhood level

The data of the behaviour in the local, national and other elections (election %, the mix of political parties etc.), the use of social services, the migration percentage, the average price of the houses compared to other areas in the city, etc. will be added to results of the question-

naire. The community tool will calculate how the typical neighbourhood person looks like. In other words where you live will affect your profile.

City level
The city level is quite similar to the neighbourhood level, but includes the citywide results of elections, littering, and migration. Additionally it can contain the consumption of medical services, and other services like public transportation, education, etc. The community tool will calculate the typical city person.

Nation/state level
Nation level is an average of the cities. Probably some additional statistics, like defence (Nato) activities, GDP, foreign policy, etc. could be somehow included in the system.

European level
The European level is average of the nations. There can be different ways to see the profiles; as an average, as variety of profiles, "look for the absolute best place to live in Europe for my profile", "look for the similar areas than ours", etc.

From the citizen point of view this project makes it possible to compare one self as a member of a neighbourhood, city or state and see other same or other kinds of citizens in Europe wide. When designing a new area can the profiling system help to look the possible inhabitants or if the character of the inhabitants is already known the profiles can help to identify the needs of the people moving in the area.

Characters in the Hood

The "In the Hood in Arabianranta" neighbourhood profiling tool visualizes the answers to the questions directed to the inhabitants of Arabianranta in two ways:

1. Self organizing map, the informative visualization, which tells us both the most like-minded and the most out of tune neighbour or block of flats in the area
2. Caricature characters, the entertaining visualization, what tells us visually what kind of persons we are.

The purpose of this set of caricature characters is to help the users of this service to chart the different opinions and to find their own place in the map of opinions. It also contributes to

bringing the whole issue of city planning closer to the inhabitants. The "In the Hood in Arabianranta" service is built to bring up the view of the inhabitants in the future planning of the area.

The caricature characters in In the Hood in Arabianranta service were created not only from the services' own requirements but also from previous work in which interactive character building has been developed. The predecessors of In the Hood -service have been Election Star -project and the Arkkikone-service (see chapter 2.3).

The earlier experience is used in the new service in several ways. The line-up of the characters is brought to the start of the service and captions have been added to make the changing of the character more interesting. Also the user has the possibility to make the picture more of his/her own by choosing a backdrop at the start of the questionnaire and the characters hat at the end of the questionnaire. Adding the decision of the characters' sex to the start has enhanced the narrative of the service. The users have been given the chance to save the created pictures for their own use. In the Hood-service is more interactive than its predecessors and the characters' cartoonish image is used in an emphasized way in the whole graphic image of the service.

Already in the Arkkikone-service four different expected user profiles were created. The profiles were The Inhabitant, The Citizen, The Consumer and The Worker. In the Arkkikone for the Inhabitant the image of a ladybug was chosen, the Citizen was an ant, the Consumer had the shape of a butterfly and the Worker was a bee.

b) The Inhabitant was profiled to be a person for which nature and ecological issues, comfort of living and the safety of light traffic were very important.
c) The prime values for The Citizen were accessibility of built environment and traffic, public safety and good communal services.
d) The Consumer emphasizes the visual and cultural quality of public spaces, underlines the urban character of the area and demands good commercial cervices.
e) The Worker in his entrepreneurial spirit expects an easy flow of traffic, good connections with the surrounding environment and the rest of the city and a functional urban structure.

Even though the themes on which the services were built were quite similar, it was decided that the characters would be different from the Arkkikone-project. The main reason for this is that the Arabianranta-service is hoped to be in use for a long time and so it should have a visual and functional form of its own. The aforementioned possibility to choose a characters'

Figure 11. In the Arkkikone for the Inhabitant the image of a ladybug was chosen, the Citizen was an ant, the Consumer had the shape of a butterfly and the Worker was a bee.

sex is also something new compared to the Arkkikone. This possibility changed the number of characters from four to eight, and it also added to the interactivity of the narration. Working with the male-female-pairs made the characters more tied with the present time and style of living: their clothes are not only theatrical props, which support the role, but they also comment and record our time.

Figure 12. The Citizen is a rhinoceros

The image of the Citizen is a rhinoceros. The Citizen still fights for accessibility, public safety and good public services and is in his/her rhinoceros-form depicted as an active and participating person. The form of a rhino emphasizes the characters firm mind and decisiveness, and the blue colour is a symbol of the characters no-nonsense attitude.

Figure 13. The inhabitant is a kangaroo.

The image of the Inhabitant is a kangaroo. The Inhabitant seemed the most likely to have a family, hence the young ones in the pictures. Ecological way of life, the comfort of living and importance of good light traffic routes are naturally close to The Inhabitants heart. The kangaroo defends soft values, the kangaroo is clothed in soft colours.

Figure 14. The Consumer is a lion.

The Consumer is a lion. The lion and the lioness value urbanity and high visual quality in city planning and building and they require good commercial services. The Consumers are depicted as middle-aged connoisseurs of culture, their colours the gold and red of the wealthy and cultured.

Figure 15. The Worker is an elephant

The Worker or The Entrepreneur is an elephant. Elephant-characters get things done, they are strong and hard working and they appreciate a functional city structure and an easy flow of all traffic. The male elephant is a combination of a traditional worker and an IT-expert, and the female character is a combination of a secretary and a powerful producer.

In the Hood in Arabianranta -service's predecessor Arkkikone was the first service of this kind to put the questions into groups in which the user had to put the comments in order of importance (the most important to the top). Each of these comments belonged either to the Inhabitant, the Citizen, the Consumer or to the Worker. The most important value got the most points, the second got fewer points, and the rest did not get any points. The character with most of the points was the central character of the image. The characters with the silver and bronze medals gave the image their props, e.g. the Worker-bee his toolcase or the Consumer-butterfly his/her shopping bag.

In the Hood in Arabianranta -service has approximately the same kind of logic. The biggest change compared to the Arkkikone is that the characters will get no props into their hands. There were two very good reasons for this. Firstly experience with users showed that the most important thing really was the character, and the props were of almost no importance. Secondly deleting the props caused that the characters was a lot easier to design divergent from each others. The props in the characters' hands forced them to be drawn into a similar posture, and without props the characters can lean any way their nature tells them to, and they can also be drawn in different positions like standing, walking or carrying timber, kids and mobile phones.

There are props in the In the Hood-service, however. The questionnaire includes several statements about traffic and connections, and according to the user's choice the character will get his/her own vehicle, placed behind the character. Bringing in the personal and recognizable vehicles strengthened the narrative, and this also helped to bring something new to a picture that is almost ready. The tram is a picture of public transport; the caterpillar is symbolizes the need for uncomplicated traffic arrangements. Light traffic has its bicycle and The Consumer-profile answers will get the user a sedan. The size of the vehicle is affected by the answers; those strongly in favour of light traffic will get a big bicycle and so on.

In the Hood in Arabianranta -web-service is a step forward in narrative use of characters. It leans on experience gathered from previous experiments and implements possibilities only sketched in earlier projects. A new service that will help both the future development of the area and the inhabitants has been created. Hopefully it will be the basis for many new services using some form of interactive storytelling.

The In the Hood in Arabianranta -service and the Arkkikone service promotes a participative role for local people in city planning through city modelling, predictive planning, and advanced visualization technologies. The users find the entertainment like services easier to understand. Communication from inhabitant to inhabitant, inhabitant to authority and vice versa have been found crucial according to the user need survey in Arabianranta area in Helsinki[4].

Objectives and how they were addressed during the project

According to the work plan of the IntelCities work package 2b had six objectives[5]. "In the Hood in Arabianranta" the entertaining neighbourhood profiling service addresses four of the six main goals (see table 3.).

2.4 Conclusions from Arabianranta Helsinki as a developing ICT environment

Arabianranta as a testbed was a favourable case, because new ICT solutions and infrastructure (fixed broadband network owned by the local housing companies, local development company ADC, local service portal Helsinki Virtual Village, voluntary network of local e-Moderators etc.) are available for all inhabitants, businesses and other stakeholders in the area. This infrastructure strongly supported the implementation of tests.

4. see INTELCITIES D2b.1
5. IntelCities contract Annex I "Description of the work" page 99
6. "Ota kantaa" (Make a Point) service has been described in INTELCITIES D2b.4

The objectives for WP2b	Of which "In the Hood in Arabianranta" addresses the following objectives
To develop and experiment wired and wireless (m) information and technologies (ICT) and services that enable and enhance interaction between individual citizens, local authorities and enterprises on different levels of decisions-making.	In cooperation with the Art and Design City Helsinki Ltd (ADC) service company for the Arabianranta area in Helsinki, Vuores project of the City of Tampere, and with Aralis public library, University of Art and Design UIAH developed and experimented services using both wireless and wired technologies. In the service "Ota kantaa" (Make a point) wireless technology was used as well. The service was done for encouraging neighbours to send multimedia messages through their cell phones to semi-public and public screens. "Arkkikone" was developed and experimented in Tampere Vuores architectural competition to find out the best matching design for the individual citizens. And finally second phase concept of "In the Hood in Arabianranta" neighbourhood profiling service was designed for Arabianranta inhabitants and workers in Helsinki. In the last two services wired technology was used but the concept is adaptable also for wireless technologies.
To broaden the utilisation of ICT to capture citizens' knowledge, e/m-Consultation, e/m-Voting towards enabling e/m-Participation in general and to find means towards new kind of neighbourhood, which is achieved through more common cultural and societal platforms.	To bring the concepts in local level near the people and using existing new technology, like mms messages what was used in earlier mentioned "Make a Point" service or Internet services ("Election Star", what was used at local level in Arabianranta asking the citizens candidates in the area), technology will be made common and utilised more broadly also in official occations. The "Arkkikone" service helped laypeople to evaluate complex city planning issue. "In the Hood in Arabianranta" service tracks from the area like-minded citizens and by that way it is possible to find (also) a virtual neighbourhood.
To increase the intelligibility, usability, effectiveness and attractiveness of new digital means of participation by the use of visual, context-, user- and situation-aware technologies and multimedia applications based on semantic encoding, navigable hypermedia databases, narratives, generic visualisation and games	Self organizing map (SOM) technology was utilised both in "Arkkikone" and "In the Hood in Arabianranta" services. SOM is a similarity algorithm by which it is possible to visualize and simplify multidimensional (e.g. 36 dimensions compare 3D) matters. In both service through a survey the similarities was tracked on the map and caricature character visualizations. The service forms a database for use of the city planning already for the use of the planning processes.
To develop modular and scalable solutions applicable in other European cities.	"In the Hood in Arabianranta" service is already multilingual (Finnish and English) and it is easy to translate into any language. The service was made as generic as possible, in the survey there are two kinds of statements: the generic and the local one. The generic statements can be used everywhere and for the local interests there is local statements, which has to be found from the local point of views. The technology itself is modular and can be put anywhere. It is using Flash user interface and PHP for transmitting the data from database to UI and vice versa.

Table 3. Evaluation of the objectives and how they were addressed in the 'In the Hood' project

Both of the e/m participation cases tested in Arabianranta area (Image Frame and Election Star/Arkkikone) were quite innovative and exceptional compared to any other known examples. The innovative character brings along higher risks as well. The technological development and user behaviour are often unpredictable and new solutions may outdate existing ones sometimes surprisingly fast. As new innovations generally are relatively unique, they may remain relatively isolated systems – in the initial phase at least. The serious integration to other existing ICT systems follows, naturally, after the innovation has proven its competitiveness at a sufficient level. However, as a natural prerequisite today, both of the new innovations tested in Helsinki were linked to either mobile telecommunication network or internet or both.

The experience from Image Frame showed that new local information channels (like electronic bulletin board available in a public space of an apartment block or in a library) are in a difficult market situation between a) traditional (physical) notice boards and advertisement stands and b) common and extremely popular electronic bulletin boards like internet. To be successful such new media should have some exceptionally appealing features in order to be competitive or even to be noticed. Image Frame as a device had certain limitations for semi-public use (small size, updating), but the feature of wirelessness of the device gave the Arabianranta development company ADC the idea of wireless, larger TV screens, that have since (April 2005) been taken into use in Arabianranta with locally produced content mainly from the media and art schools. There are currently 7 large TV screens located in public spaces inside the shopping center, educational institutions and in one of the office buildings.

The experience from Election Star/Arkkikone and In the Hood in Arabianranta showed that even very exotic and unusual ways to present differences between alternatives (like SOM-based 2D maps) can be accepted and become popular among ordinary citizen. The acceptance was most probably assisted by the two facts: a) elections themselves are a popular issue in Finland and b) there were three different simultaneous presentations of the vote results. Election Star was used during two last elections (EU Parliament and municipal elections) by thousands of citizens during a few weeks time. On the other hand using the same technology in a more demanding and complex case as assessing entries of a urban design competition needs clearly a lot more efforts to become accepted by both laypersons and professionals.

The applications tested in Arabianranta are by nature pilots or demos, which are valuable and useful as such, but there is a need for further development and user validation on both the citizen and the City side before the applications can prove use-value to eGovern-

ance needs of the City and gain wider acceptance. New initiatives need to be examined critically in the light of how the agenda setting phase is carried out, how the project will be integrated to the actual processes of the City. Otherwise there is the risk actions remain stand alone experiments, and the results do not integrate in the existing decision making and planning practices.

The analysis of the Helsinki/Arabianranta case highlights the importance of understanding the interrelationships of the three enabling and constraining structures within which the development of e-participation takes place; firstly the policy context, secondly the concrete technological structures and solutions, and thirdly the organizational and social structures sustaining e-participation on the municipal and the local level. The City of Helsinki's development program for internet based citizen services (period 2003–2006) states both comprehensive development goals including the whole ICT infrastructure of the city, and goals for particular eServices that are developed in the sectoral fields. Many of the goals are similar to the components and applications being developed in the IntelCities project. However, as the City's own development work precedes IntelCities-project and is based on existing trusted partnerships between Helsinki and private service providers, it creates a potential conflict in the adoption of the IntelCities applications.

City of Helsinki follows carefully the developments in the Arabianranta district, which serves as a 'Helsinki Living Lab' in several respects, and uses the knowledge gained from there as the basis for planning and development work concerning new development areas, especially in the Eastern parts of the City. The possibilities to transfer certain technological solutions of Arabianranta (the local area network, VPN-connections, City district portal with extranets) are currently examined in the Development Unit of the City Office. The role of intermediary organizations, such as the Art and Design City Helsinki Ltd. in Arabianranta owned jointly by the City, local stakeholders and the state, and third sector organizations, such as residential associations and the union of city district associations (HELKA) will play a very significant role in the development of the future services.

Helsinki will continue the development of electronic and mobile participation also in the European context. The City is a partner in a consortium called 'Intelligent Cities for the Next Generation' (ICING) together with partners from Dublin and Barcelona. The consortium has received STREP funding from the 6th Framework program. The focus of the project is on ambient technologies and GIS-based citizen services. Arabianranta will continue to be one of the pilot areas together with other city districts to be chosen later in the Helsinki area.

3 My Community in Garðabær (Iceland)

The town of Garðabær, Iceland, with 9,000 inhabitants and 95 % internet access, is establishing a fully comprehensive eGovernance system for its inhabitants, councillors and employees. This system uses the Stakeholder Profiling Registry (SPR), which is a module providing a gateway to active, on-line participation and policy-making processes (INTELCITIES D2b.2). The Stakeholder Profiling Registry controls the access of participants to on-going processes such as eConsultation, surveys, polls, discussion groups, and petitions. Additionally it enables the stakeholders to start cases and follow up on case processes. The Registry holds an account of all named users based on data transferred from a local or national registry. All users are issued with a user name and password. Upon log-in they select areas of special interest, define their profile and establish various communities of interest.

The main actors and stakeholders that are involved in the use of the service are the following:

- The City policy makers and
- The citizens and/or other registered stakeholders.

The SPR module provides a gateway to linking back- and front-office solutions for personalised information provision, active on-line participation and policy-making by controlling the access of participants. The citizen's "My Community" is seen as the equivalent of an internet community bank – every citizen and other stakeholders are given and authenticated web space enabling access to all services and democratic activities available within the community. The SPR forms the backbone of the system connecting various front-office solutions to back-office systems such as case-management. The SPR enables the system to give each user access to information according to role; e.g. a City councillor, public official or an inhabitant as defined in the Stakeholder registry.

The SPR provides policy-makers such as administrations, planners, designers and politicians with a simple tool to select target groups for participation in their Policy Proposal and Data Gathering Processes (e.g. by age, gender and postcode). By monitoring the access of

citizens/stakeholders, the Stakeholder Registry Module also provides important information on participation, enhanced by valuable demographical classification of various types. The Stakeholder Registry keeps track of all the possible participants and users of the system: citizens of all ages, organisations/industries, non-governmental organisations and administration (civil servants, politicians).

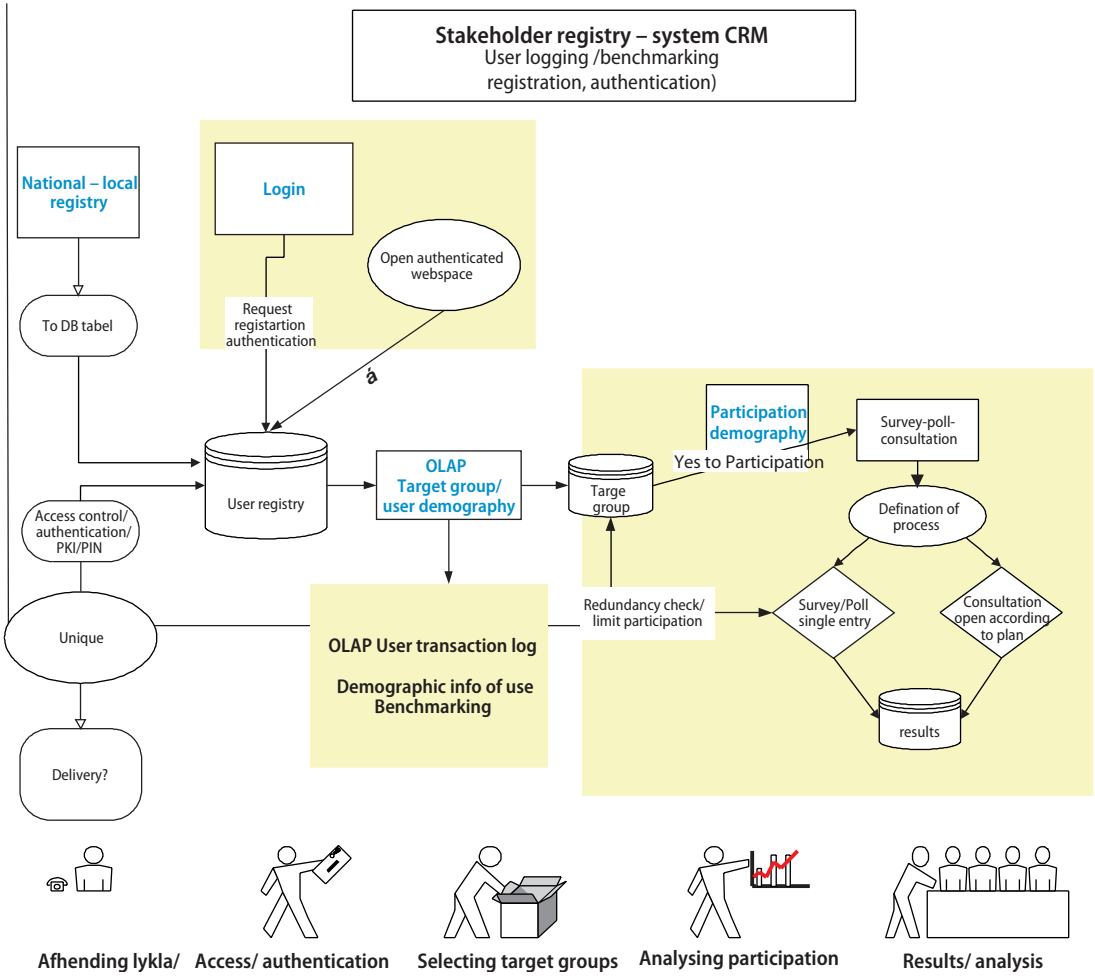

Figure 16. Selecting target groups, participating and analytical processing of data.

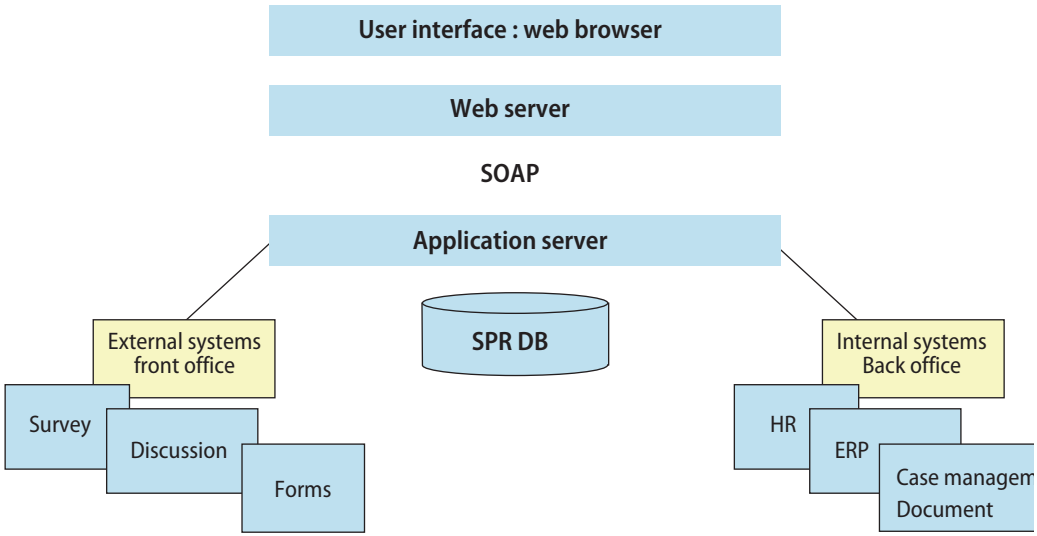

Figure 17. Stakeholder Profile Registry (SPR) prototype architecture.

The stakeholder profiler enables the community's caseworker to select target groups and monitor participation based on geographical information through a connection to 3rd party software. The aim is also to enable integration to GIS software such the module produced in WP4 using the eCP to enable automatic information flow to the stakeholders based on their geographical position, and simultaneously enable them to view simulation, based on their location and/ or interest areas.

The SPR unit is based on Dot.Net technology using web services. It is a database keeping a record of all users and their access. The solution is based on open standards to ensure interoperability and integration:

- The web interface is designed in NET-X to ensure consistency in design
- It must connect to the access control or authentication system
- Must be able to receive data from other data sources using a data transfer system.

In order to use "My Community" services an internet access is required. This service is going to be used daily, 24 hours per day.

The main objective of the "My Community" service is to give to every citizen and stakeholder that uses it, the chance to access many other services and democratic activities available within the community. Every Citizen that uses the "My Community" service must be able to have access to pre-populated service requests and send formal "signed" letters to the council that feed directly into the town hall's back office systems for full electronic case handling. The whole system must give each user access to information according to role; e.g. a City councillor, public official or an inhabitant as defined in the Stakeholder registry. Addi-

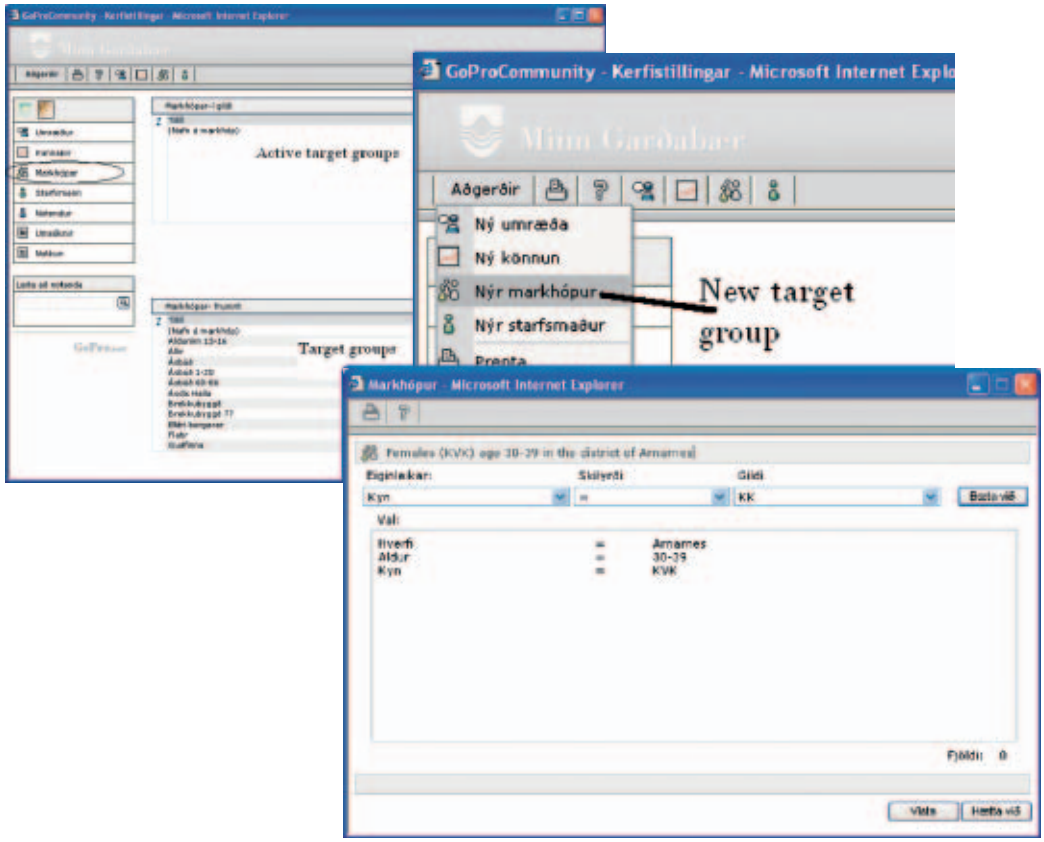

Figure 18. Creation of target groups. Example of creating a target group for females age 30–39 in one of the districts in the city of Garðabær.

tionally, this service aims to offer to various city-policy-makers the opportunity to select target groups of citizens and registered stakeholders, for participation in their Policy Proposals and Data Gathering Processes.

GoPro.net, including the stakeholder registry, has been deployed at the City of Garðabær and has been running as a production system since April 2005. he user interface is two ASP.NET applications, one for the community users and one for the system administrators. he stakeholder registry part of the application, which is one of the subsystems, allows the administrators to generate target groups based on metadata stored in the registry.

New target groups (figure 17) are created by going through a wizard which allows the administrator to select community users according to the metadata stored in the registry. The target groups can be used for consultation within the municipality. The community user logs on to the community system (figure 16) where he/she has access to different news, consultation etc based on his/her registry information from the stakeholder registry.

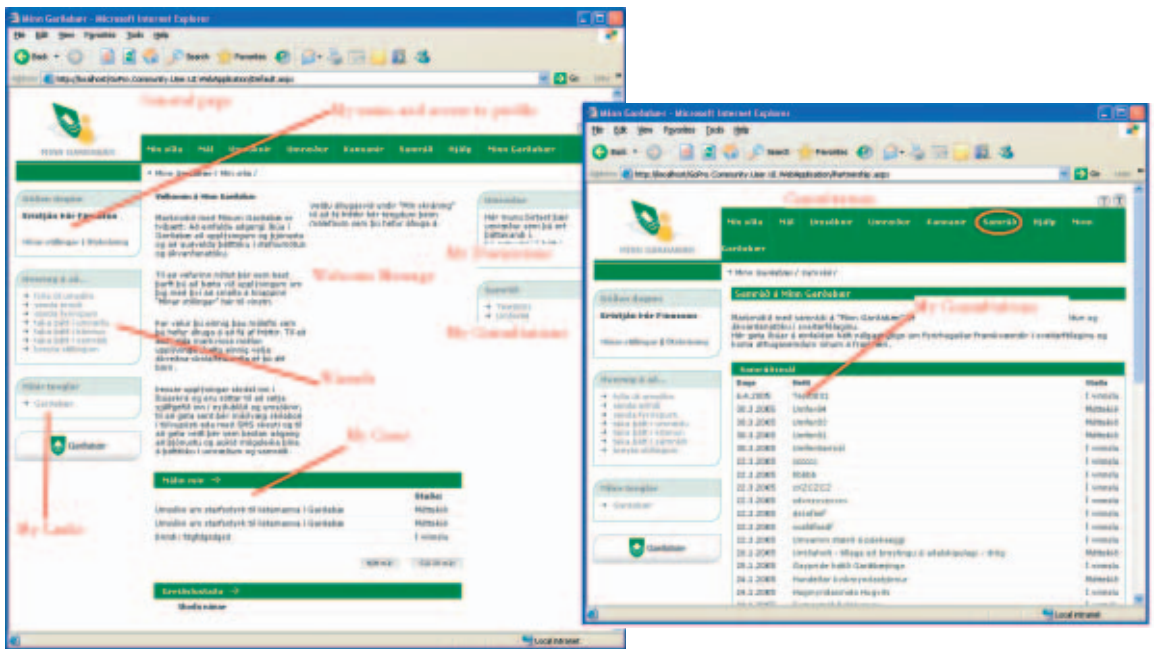

Figure 19. The general page for community user and My Consultation.

In the WP2b evaluation (INTELCITIES D2b.5) My Community/Stakeholder Profile Registry was regarded as rather "typical" system compared to others, at least in relation to aspects

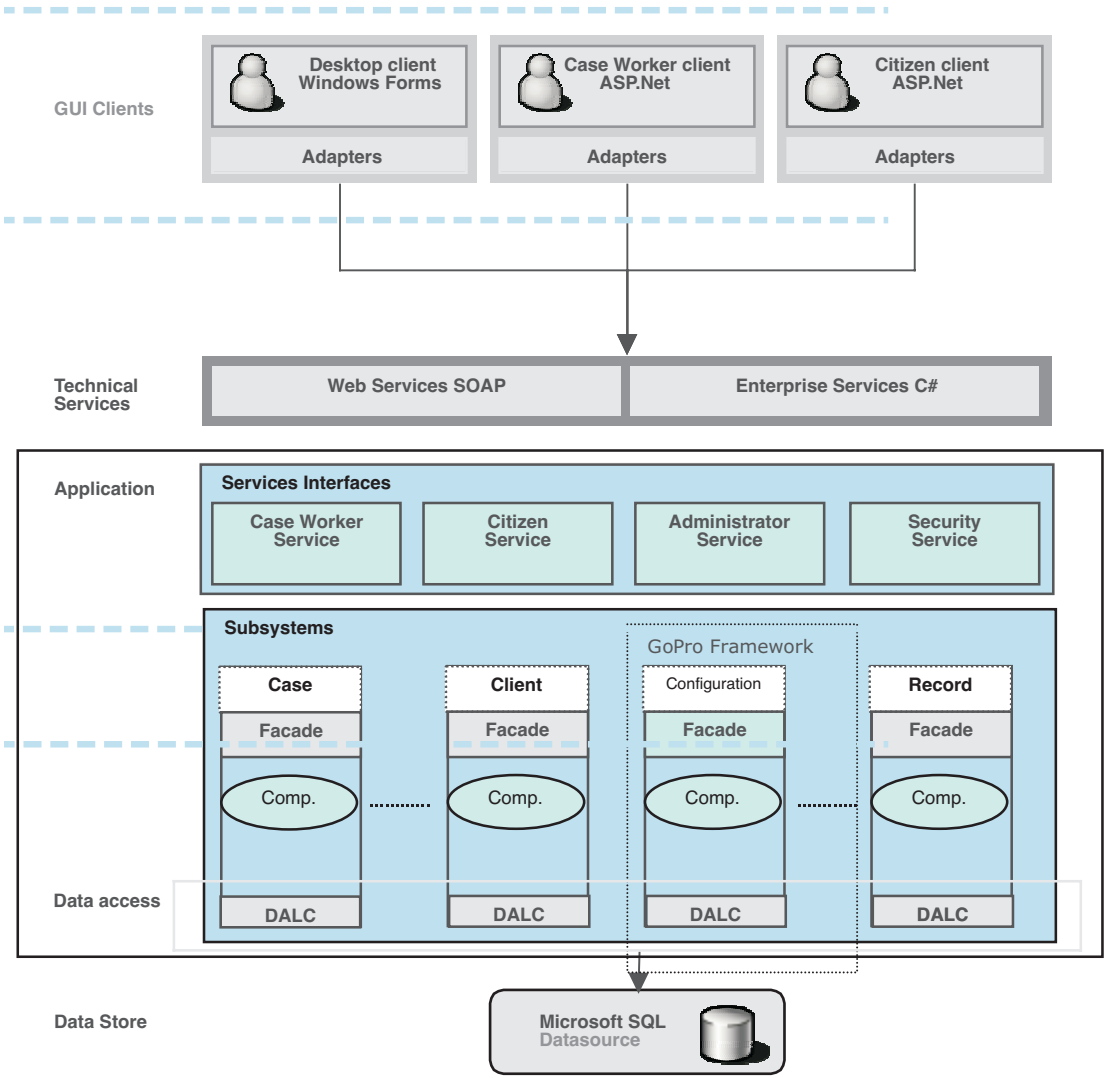

Figure 20. The architecture of My Community service.

Dimension	Criteria	Specification
Participatory aspects	Degree of participation	Information
	Target group	Heterogeneous
		Small scale and Large scale
		Open
	Political impact	Transparency
Public service relevance	Thematic focus	Democracy, administration, and life area context
	Public service impact	Complementation of offline services and new public service
	Process embedding	Input and output to joint processes
		Continuing process
Media	Accessibility	Registration needed
		No devices needed
	Interaction	Structured
		Given rules of interaction
	Operation	Usable by laity
		Embedded

Table 4: Stakeholder Registry evaluation table.

of participation and public service relevance (Appendix I). From media perspective it was a bit exceptional because of its embeddedness, while others are mostly stand-alone systems.

4 Spatial Discourse e-Participation tool in Frankfurt (Germany)

The Frankfurt regional planning participation service (INTELCITIES D2b.5) has shown that it is advantageous to let citizens participate in planning and decision processes through the means of a web-based discussion forum. The regional planning process regards specific geographical circumstances. Thus, the e-participation process would highly benefit from an additional module for spatial discourse, which extends the discussion forum and allows for map-referenced / geo-referenced contributions.

The newly developed system for spatial discourse in the Frankfurt e-participation process is based on the forum software Dito, which was used. It has been extended through the integration of an open source webGIS ('deegree'). The system was tested in a simulation, which is thematically related to the regional planning process of the former Frankfurt e-participation.

The integrated system for spatial discourse was tested in an experimental environment that is similar to an "online communication laboratory". The aim was to experience the factors at work in a real situation but without facing potential problems or consequences. An experiment was accomplished to investigate requirements for the integrated groupware GIS system. The experiment was conducted according to the "role-play" action-research approach (Whyte 1991), in which the researchers participate directly in a role play, in order to analyse the system at work. This approach serves the purpose of investigating not only the process model for the participatory procedure, but also for testing the software system.

The evaluation analyses the new spatial discourse e-participation process and discusses it on the basis of traditional process. The evaluation was arranged to answer the following research questions in the areas quality, time-frame, costs, method, and tools:

Quality

- How does geo-referencing of contributions enhance the quality of individual contributions?
- How does geo-referencing of contributions enhance the quality of the discussion?
- How does geo-referencing of contributions enhance the quality of the outcome?

Time-frame

- How can the decision process be accelerated?
- How is the negotiation process abbreviated during formal objections?

Costs

- Is it possible to minimize the general risks through a dynamic visualization of objection areas?
- Is it possible to minimize the general risks through consensus effects?
- How does the early consultation about objections save consideration efforts in the planning phase?

Method

- How can the traditional regional planning and the e-participation procedure be integrated? (Focus on level of procedure)

Tools

- How are the Planning tool (GIS) and the communication tool (forum) integrated? (Focus on level of usability)

One of the more obvious characteristics of online discussion fora is that 'threads' of conversation are available for analysis. Rather than being paraphrased by a facilitator or reporter, the 'threads' of conversation are visible and contributions are made in participants own words. All relevant data for the qualitative comparison are being documented in the system throughout the experiment.

According to the research questions, the subsequent comparison of the traditional and the experimental process, and the lessons learned throughout the experiment, advantages and disadvantages of geo-referenced spatial discussion shall be illustrated.

The tool was tested in a case of locating wind farm areas. The aim is to specify areas for wind farms, which meet the demands and constraints of all concerned actors, in order to minimize the conflict potential of building wind power plants in the future.

The participation was realized with the new internet-based e-participation system for spatial discourse. The e-participation provides information and consultation elements. The process was simulated in a role play lasting over four weeks and was moderated by a neutral third party, along the lines of an 'environmental mediation' procedure.

Through the consultation several areas were identified, in which wind power plants could be located in the future. For this, the non-fitting areas, such as housing or industry areas and ecological preservation areas were excluded, and the discussion was firstly focused in the exclusion of sites due interest conflicts, and secondly in the investigation of the most fitting areas for wind farms or single wind power plants.

The role-play followed certain paradigms which were given to the participants in advance. The role play instructions were different for each role, and were given only to the respective player of the role. They include the role description and a communication strategy, which should be applied throughout the play. The role descriptions were fictional and did not reflect the attitudes of the persons or groups in reality. The characters have been prepared to demonstrate the applicability of the PPGIS system and to find out further requirements for the online discourse platform. The roles which are included in this role-play are:

- Moderator
- Regional planner
- Local politician
- Energy provider
- Investor
- Resident citizen
- Citizens' initiative
- Landlord
- NABU nature protection association
- Greenpeace

The process is designed as a fully web-based, moderated process. The moderator decides on the workflow, especially on the start and the conclusion of an individual phase, and is responsible for keeping the discussion goal oriented in each phase. Not only the guidelines for mediation, but also non-mediated previous pilot projects and evaluation reports emphasise moderation as a fundamental success factor for internet-based cooperation-, and participation processes (Märker et al. 2003), (Acland 2003), (Clift 2002) and (Coleman and Gøtze 2001). Moderation by a neutral third party guarantees the trust of the participants, and seems to have a strong impact on their motivation (Clift 2002), (Bremer 2003).

In the experiment, an active moderation style was applied, which means that the moderator actively shapes the communication process, phrases opening questions and responds to

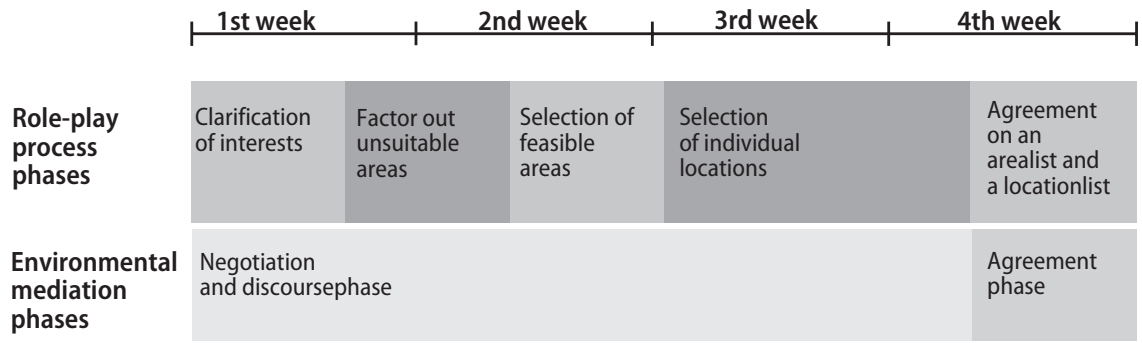

Table 5. Process phases.

contributions. The moderator has also an editorial function and is responsible for forwarding technical questions about the budget or municipal structures to the relevant municipal representatives and to retrieve and edit their responses (this function applies rather to real-world processes, but is considered during the experiment). This makes sure all information is compiled in user-friendly form and stored in the online library of the forum.

The outcome of the discussion is a list of the selected feasible areas and locations is formally agreed on, and will serve as the input to be considered in the development of the regional plan.

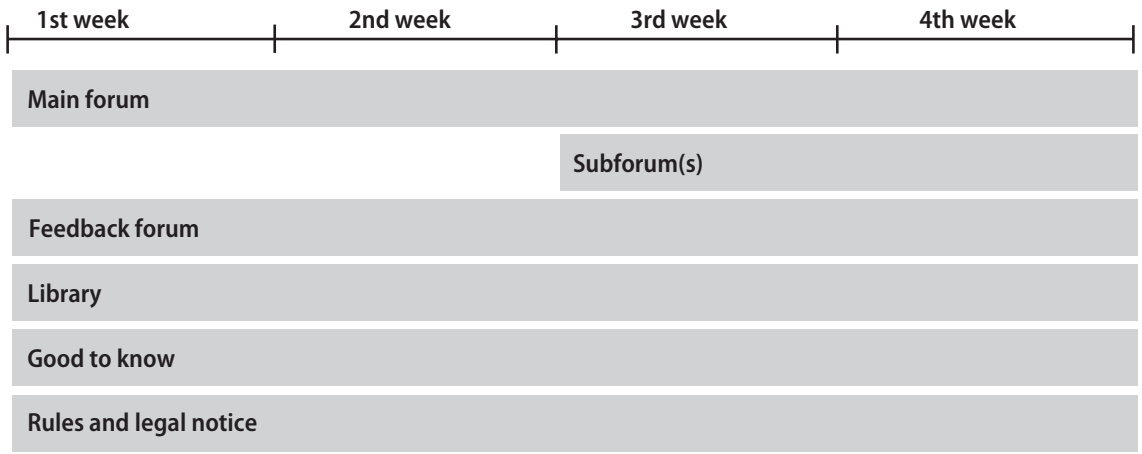

Table 6. Forum sections.

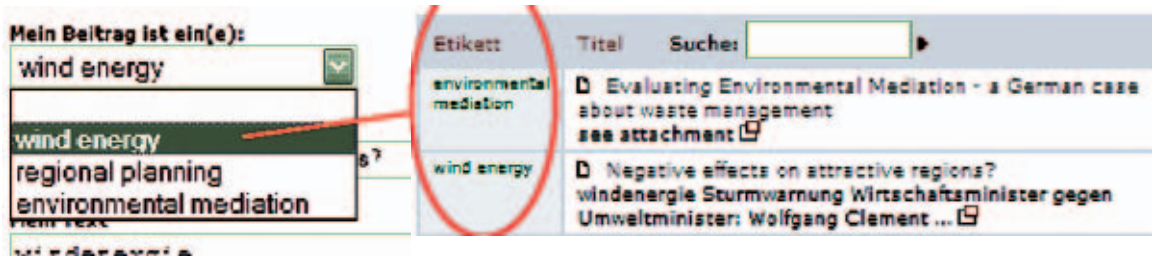

Figure 21. Contribution labels.

The configuration of the spatial discourse system includes the creation and configuration of the discussion space and the preparation of the GIS and the corresponding labels and icons. The discussion space is divided into the main forum, which provides access to possible thematic sub forums, to the library, the feedback forum, the good to know section, and the rules and legal notice (see table 5).

These sections have to be configured according to their intent. The geo-referencing module is needed for the main forum and the respective thematic sub forums that may be installed during the process. Each of the sections has to be provided with a section note, which indicates the aim of the section with a short text. The spatial discourse system provides also the feature to define contribution labels and moderator labels. The labels are selected according to an experience-based ontology, which was gained through the implementation and analysis of other discussion processes (Roeder and Tautges 2004; Roeder et al. 2005; Roeder et al. 2005). A label can be selected in a pull-down menu, when a contribution is composed (see figure 20).

If special topics rise during the discussion, it is possible for the moderator to create sub forums, in which the theme of the topic can be discussed independently from the main discussion.

The maps with their different layers have to be chosen and embedded into the system. It is possible to use either raster data or vector data. For the role-play, the current regional land use plan, a climate map and a city map were chosen. These maps would give sufficient background information on the locations. The maps are based on raster data.

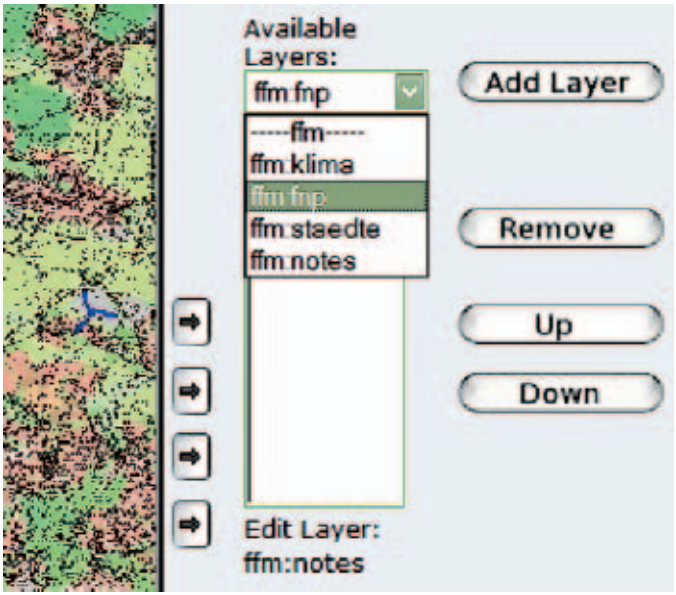

Figure 22. The GIS component provides several maps (climate, regional land use plan, cities and notes).

Three icons were developed: A blue windmill indicates wind parks and corresponds to the label 'areas' in the respective contribution, a black windmill indicates single wind power plants and corresponds to the label 'location' in the discussion forum, and an exclamation mark appears for geo-referencing contributions with any other label.

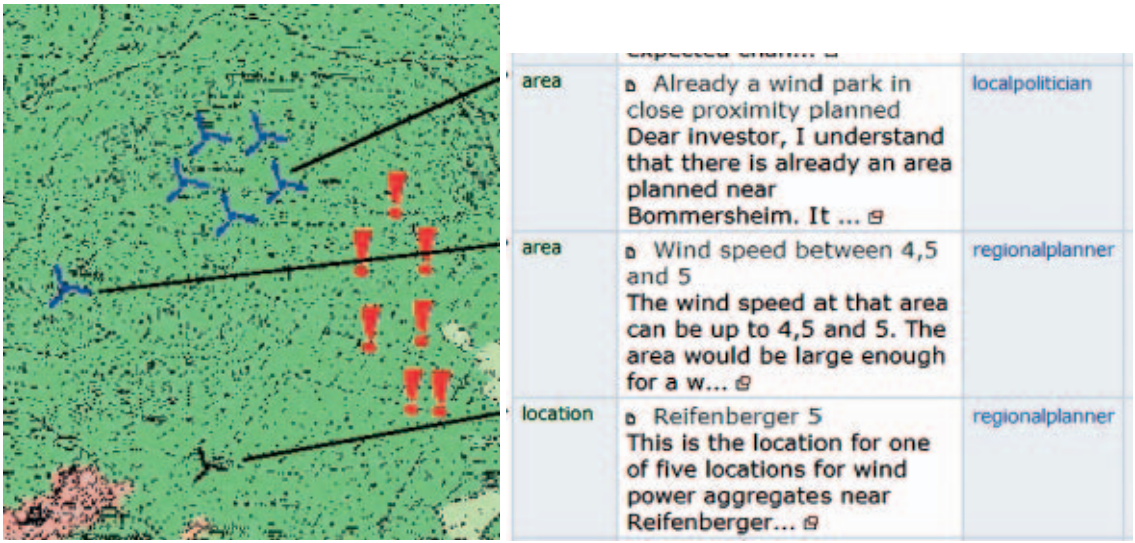

Figure 23. Corresponding labels and icons

How to geo-reference a contribution?
(Start the map by clicking the button 'Map' if not yet done.)
1. Add your statement in the forum in Dito.
2. Put your contribution into the buffer by clicking the 'link to map'-Button on the right.

Figure 24. How to geo-reference a contribution, steps 1–2.

3. Choose the radio button 'Edit' on the top and click onto the map to perform this action.
4. Your selected contributions appear. Select the one you want to place onto the map.
5. Select the edit-Button again and click into the map to perform your action.

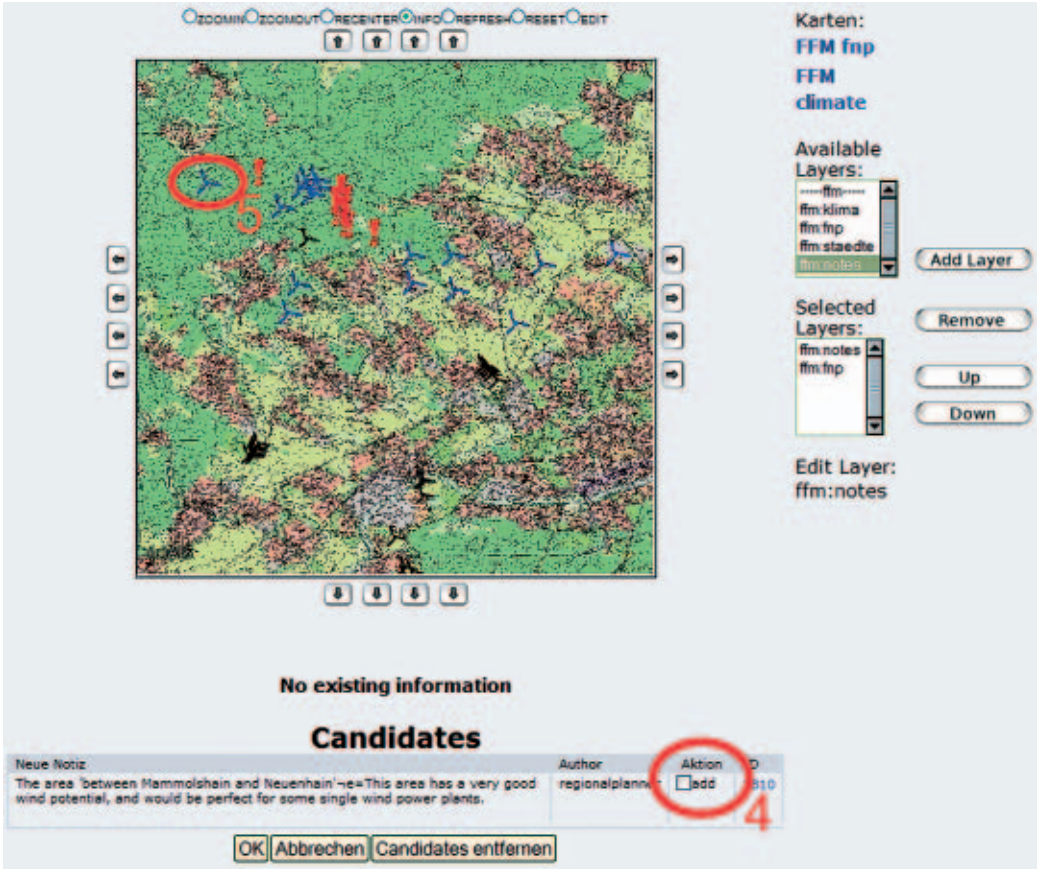

Figure 25. How to geo-reference a contribution, steps 3–5.

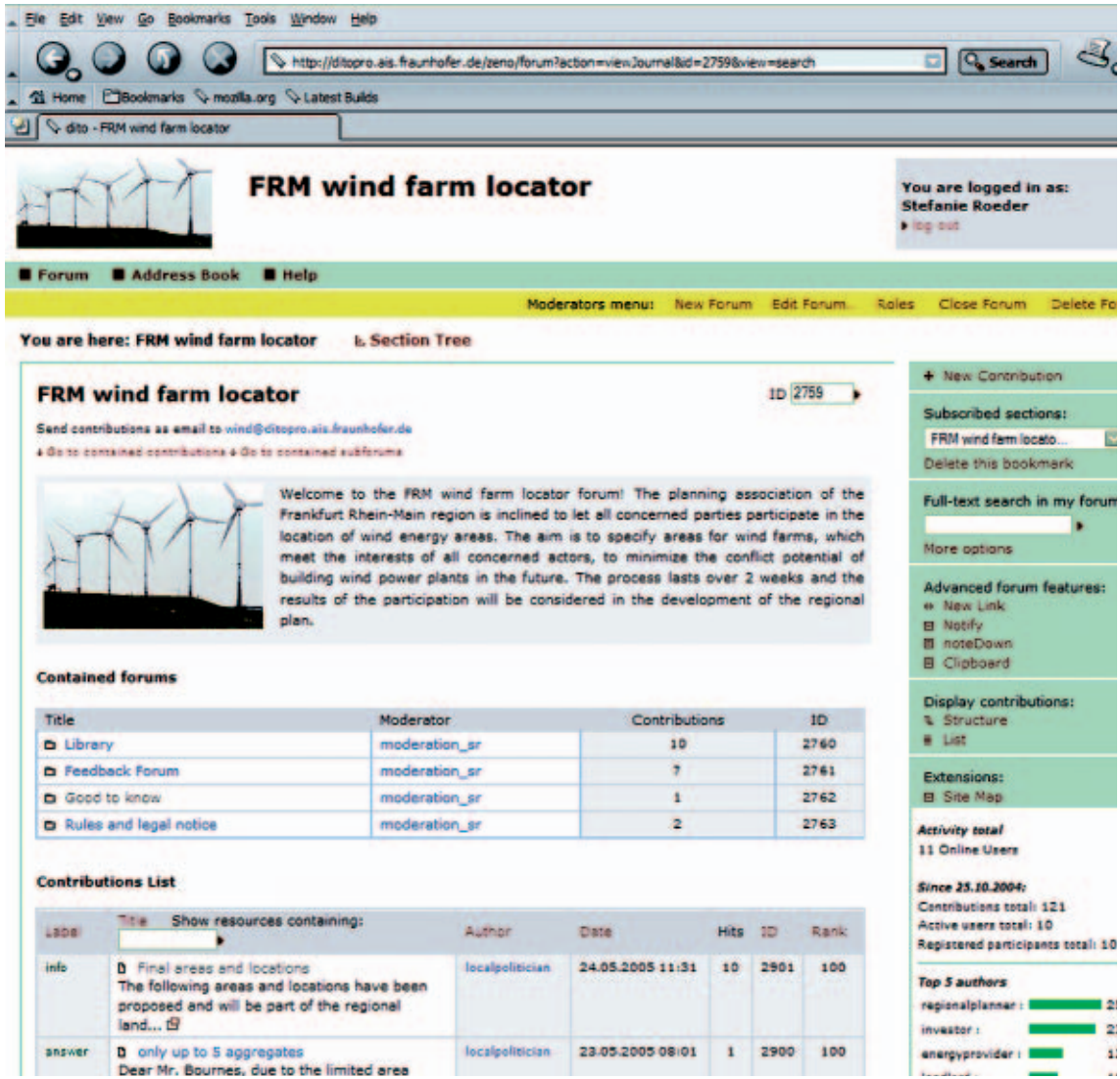

Figure 26. Main page of the discussion forum.

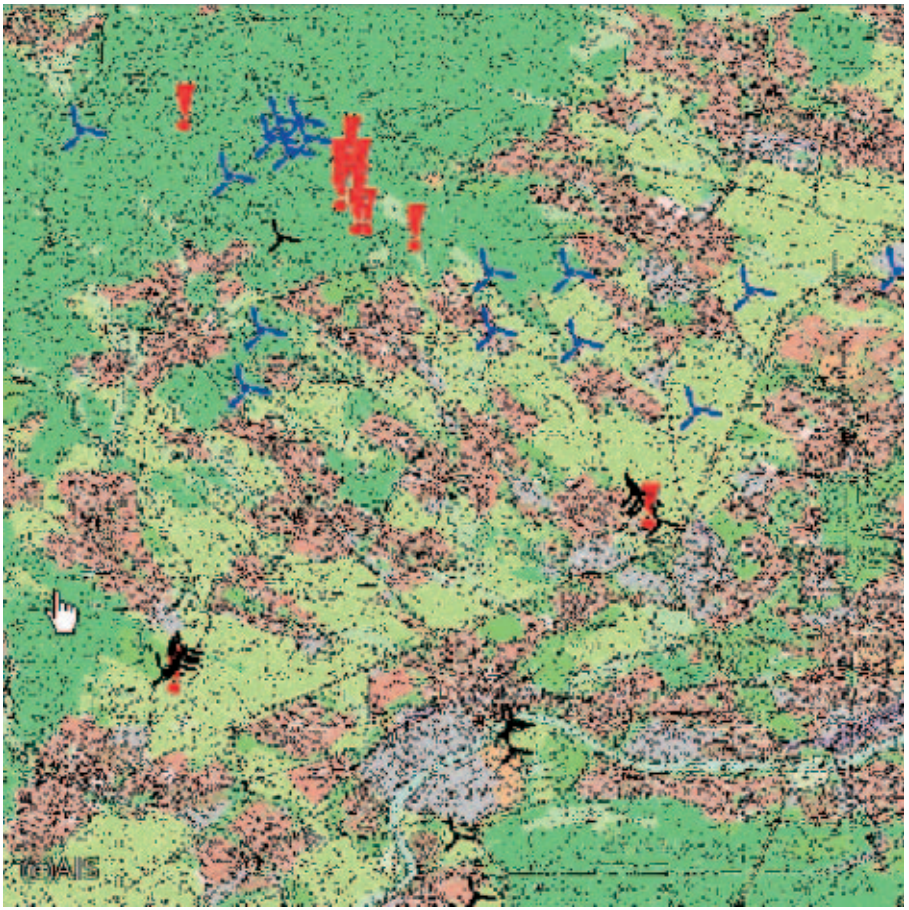

Figure 27. General Map in the maximum zoom level. Critical comments (marked with red colour) show where the positioning of wind power plants are quite near to the suggestions for wind farm location (blue icons).

FRM wind farm locator: the role-play

The role-play was realised as planned. In the following, the highlights of the process phases are summarized:

How does geo-referencing of contributions enhance the quality of individual contributions?
Individual contributions, as well as direct comments or answers, gain quality through geo-referencing. A more precise description of the corresponding location is possible. The visualisation leads to a shortening of the contribution texts. The described location is presented explicitly.

How does geo-referencing of contributions enhance the quality of discussion threads?
The contributions of the participants are more qualified, since they have access to background information through the map. The context of the contribution is more precise than it would be without the geo-reference, thus the discussion can be more focused on the actual topic of the discussion thread.

How does geo-referencing of contributions enhance the quality of the discussion in general?
The discussion can be more concrete and demonstrative through geo-referencing. The annotation of the map shows directly the focus points of the discussion. The summaries, which are contributed by the moderator, are linked to the corresponding areas on the map, and it is possible for the moderator to deduct, when a summary may be necessary for the further discussion. The discussion is more graphic, since the map shows the conflict potential or shows where many contributions indicate agreement (through the respective pro and contra icons).

How does geo-referencing of contributions enhance the quality of the outcome?
Compared to the traditional process, which consists mostly of an open council, the web-based process enables a more intense discourse between the participants. During their discussion learning and consensus effects take place. These effects lead to a higher degree of information for the participants. The visualisation of the geo-referenced discourse leads to a direct awareness of the results of the discussion or at least to an awareness of how close the discussion is to a desirable result.

How can the decision process be accelerated?
The map and the argumentation are continuously and simultaneously updated. Compared to traditional processes, where printed plans are shown to the participants, this method allows for a faster reaction to new facts and issues which have impact on the map.

How is the negotiation process during formal objections abbreviated?
Large amounts of background information regarding the locations are accessible through the map, since there are many information layers provided in the GIS. This helps to avoid time consuming information requests from participants to experts.

Since the evaluated process is only a role-play, the costs can not be assessed for real-world processes. Regardless, there can be provided some hints about cost saving measures for these procedures.

Is it possible to minimize the general risks through a dynamic visualization of objection areas?
The visualisation provides the possibility to locate conflict potential on the map. This enables the decision makers or executives to avoid conflicts at an early stage, and thus minimizes risk of cost intensive objections at a later stage.

Is it possible to minimize the general risks through consensus effects?
While conflicts can be identified relatively easy on the map, it is not really simple to identify consensus potential through visualisation. Here it is necessary for the participants to read all contributions and find the consensus potential from their own point of view. The discussion itself is mainly an effort to diverge the arguments into greater detail – the converging discourse, which would lead to a mutual decision is often not part of the participation processes, which makes use of the spatial discourse.

How does the early consultation about objections save consideration efforts in the planning phase?
The process enables a direct dialog between the stakeholders and the experts, who are responsible for the regional land use plan. All arguments and concerns are addressed during the discussion, and are discussed by the participants. This leads to a comprehensive view on the respective topic, and provides the experts with pro and contra arguments. During the formal consideration phase, they know about conflict situations and need not find arguments all over again, but can resort to the given arguments in the discussion, and thereby are able to shorten the consideration phase. The knowledge provided by the stakeholders and participants is also often more detailed about topics which concern them directly or are located in their neighbourhood.

Generally it can be said, that the web based process saves resources compared to the traditional process, especially regarding the digital offering of the plans and maps, regarding the reduction of work time because of the automatic continuous update of the maps, and regarding the reduced work time because of the automatic provision of background information through the maps, which lead to the autodidactic exploration of the contents of the discussion. Finally, the amount of costs could be reduced significantly, if the web-based process would completely replace the traditional process.

How can the traditional regional planning and the e-participation procedure be integrated?
The spatial discourse process is a pre-process to the formal planning procedure, which collects the concerns and ideas of the citizens and stakeholders in this case regarding the allocation of wind power areas in the new regional land use plan. The spatial discourse process enables the discussion of the ideas and concerns before they are given to the respective formal committees. This provides the chance to explore the arguments in detail, and thus to increase the degree of information which flows into the decision making. The spatial discourse process does not require more input from the experts and planners than the traditional process.

The process could be installed as a formal e-Government process, and the procedure could be adapted, so that all arguments of the discussion count as the formal contribution of concerns, which is required in the formal consideration phase of the planning process. By formalizing the process, the publication of plans could be provided only in digital form – the departments could install computer work stations instead of providing the printed plans on a table.

How are the Planning tool (GIS) and the communication tool (forum) integrated?
The use of a GIS in combination with a web-based forum is a bit advanced for users who use the computer and internet – or more precisely the standard software applications – only occasionally, while users who are familiar with the standard software have little problems in using the spatial discourse tool, because it was developed to match the standard applications' appearance and 'look and feel'.

The spatial discourse system is basically a PPGIS (Public Participation GIS), which offers a bi-directional link between a forum and a GIS based map. The map may offer additional background information through information layers and attributes of objects.

Lessons learned

The evaluation of the spatial discourse evaluation process led to a positive assessment concerning the quality of the discussion and the discussion results. The discussion was more precise, informed, focused and transparent in comparison to online discussions without the georeferencing feature. This outcome has to be assessed critically, because the role-play setting may have influenced the quality of the discussion in the sense that the participants might have avoided some conflicts in spite of their role descriptions. The structure of the discussion shows mainly information transactions and despite the conflict potential of some contributions they got no reaction at all. This may or may not be dedicated to the experimental setting, real-world discussions also can be implemented without open conflicts, especially if the forum is actively moderated and the discussion group had a welcome and get-to-know phase.

The discussion is precise, informed, focused, and transparent:
- Shortening of contribution texts
- More precise description of locations
- Explicit presentation of locations
- More graphic discussion

The discussion is informed:
- More concrete and demonstrative discussion
- Precise context
- Qualified contributions through background information
- Higher degree of information

The discussion is focused:
- More focused discussion
- Clear focus points in the discussion
- More intense discourse possible

The discussion is transparent:
- Conflict potential is visualized

- Learning and consensus effects are enabled
- Direct awareness of the results of the discussion
- Awareness of possible solutions

The evaluation of the time-frame resulted in the fact that the spatial discussion – especially the spatial resources such as maps and plans – is basically self-maintained as opposed to the time-consuming and high maintenance and costs of the traditional offering and adaptation of printed maps and plans through the planning departments. Time can in this case be seen as part of the costs of the process. While the municipalities save time through digital presentation of the maps, the participants have to invest a short time in getting to know the system. The evaluation showed that the costs can be generally reduced through the digital presentation of maps and information, but there are also possibilities to optimise the use of resources on other levels, such as maintenance, follow-up processes, and omission or shortening of later process phases.

The resources are self-maintained, follow-up costs can be avoided and resources can be saved. The resources are self-maintained:

- Simultaneous update of the map and the discussion
- Faster reaction to new facts and issues
- Time-consuming information requests cease

Follow-up costs can be avoided:

- Conflicts may be avoided or solved at an early stage
- Cost intensive objections at a later stage can be avoided

Resources can be saved:

- Experts are provided with arguments for the formal consideration phase
- The preparation of the consideration phase can be shortened

Although the spatial discourse e-participation process is only a pre-process advancing the formal planning process, it supplements the formal process very well and helps to save resources throughout the formal phase of the process.

The spatial discourse process supplements and optimises the traditional process. The pre-process enhances the formal procedure:

- E-participation (spatial discourse) is a pre-process
- Ideas and concerns are discussed before official committees start the formal process
- Details can be explored, which increases the degree of information
- If formalized, resources could be saved on several levels

The evaluation of the usability shows some possibilities to enhance the system. The following topics can be seen as recommendations for the further development of the spatial discourse module:

The geo-referencing itself should also include the referencing of areas/polygons in the map. Currently only points could be referenced, but the need for the referencing of areas came up during the phase of identifying areas, where no wind power aggregates should be installed. The bi-directional link could be more obvious. Currently, only the labelling of the contributions implies that the contribution is geo-referenced. There could be a special icon, which informs about the geo-reference, and could directly link to the geo-reference of the respective contribution.

The media-break between the forum and the GIS could be avoided completely, if both applications would be integrated in only one window. This has the advantage that it would be easier for the user to get an overview, but also would have disadvantages in the visualisation, because this would lead to a crowded screen with a smaller map.

The 'look and feel' resembles the appearance of standard applications, but some features are still missing, such as the zoom in via the mouse (zoom in was provided only by click on a button). The lack of these features had some users confused; they seemed to be frequent computer users, who are used to advanced features. A wizard could simplify the act of geo-referencing a contribution. Now it is necessary to first write the contribution and the mark it for geo-referencing. The wizard would ask during the contribution of a text, if it is intended to be geo-referenced.

Evaluation of the experiment

The research design allowed for a qualitative evaluation of the quality, time-frame, costs, method and tools. The role-play approach, which had the character of an experimental setting, helped to control some of the otherwise unpredictable aspects of the spatial discourse (e.g., the timing of the process to fit into the INTELCITIES project schedule, which would have been difficult to manage in a real-world setting, due to the restrictions of the munici-

pal departments and committees), participation of all relevant groups/stakeholders, continuity of contributions, information requests (about the thematic content) and handling, etc.). Still, it was a complete participation process and is in its general implementation comparable to real-world processes.

The role-play process simulated a consultation about the location of wind power plants, to be included into the regional land use plan, which was to be developed by the regional planning committee. Process phases were the clarification of interests, factor out unsuitable areas, selection of feasible areas, selection of individual locations and the agreement on an area list and a location list. Two areas for wind parks and four locations for 14 wind power aggregates were agreed on. The statistics have shown that the process had a significantly low demand for moderation input, which could be an indicator for a transparent and self-organizing discussion. A challenging result was that the geo-referenced contributions had significantly less read-access than not-geo-referenced contributions. This could be a result of a suboptimal usability of the system, since more mouse-clicks were needed to read the geo-referenced contributions.

The evaluation of the role-play illustrated, that the process advances with the use of the spatial discourse module. The discussion is more precise, informed, focused and transparent. The resources are self-maintained, follow-up costs can be avoided and resources can be saved. The spatial discourse process supplements and optimises the traditional process. The recommendations for the further development could be deducted from the evaluation, especially concerning the areas geo-referencing, the bi-directional link, media-breaks, the 'look and feel', and the additional development of a wizard for the geo-referencing of contributions.

5 Conclusions and Recommendations

The following main conclusions and recommendations are offered:

A. The use of various information tools and services is becoming an integral aspect of all functions of local governance

- Local governments need strategies, resources and involvement of the top management in guiding the development of these tools and infrastructures to a chosen direction.
- It is likely that the development of services and applications will continue to be in nature emergent, dispersed, taking place in various projects and organized by changing constellations of partnerships.
- Open architectures and standards ensure that development efforts produce sustainable and cumulating results that can be easily shared among cities.
- Both wired and wireless communication tools are needed.

B. The municipal systems and practices of planning and decision making need to be actively developed hand in hand with the user applications

- Citizen feedback and contribution by various channels does not happen by adding technology but by transforming existing practices.
- This transformation requires strategic decisions, and concrete resources for the practitioners for training and working with the participating citizens.

C. Residents are willing and capable to create and participate

- Residents and other users are prepared and willing to create common contents or services.
- Users can increase their interactive behaviour if they feel that they are part of a trusted network for their own goods and benefits.
- Local news, information contents and services have a clear market potential but residents and other users need to see value benefits for their own community.

D. New business models for service providers are needed

- From the industrial point of view the service provider must have a vision of potential business opportunities, i.e. the there has to be enough consumers willing to pay for the available e/m-participation services.
- Without such vision the industrial players cannot justify the necessary investment for relevant R&D.
- Large, all-inclusive new information systems for urban participation replacing all old ones seem at the moment too distant to form a realistic base for current product development initiatives. The industry will, instead, utilise creatively existing systems, networks and platforms and utilise their capabilities as efficiently as possible.

E. User interface, design and introduction of new systems are important

- The implementations (both soft- and hardware) must be carefully designed and well tested from the usability perspective and before "live" Living Lab tests.
- The users should easily recognise their role and input as an active or passive partner of city development.
- New services should be well introduced and supported by the local actors ("e-Moderator" was a new and successful social innovation in Arabianranta).
- New e/m-participation services may be more successful when the user interface has elements which are aesthetically attractive or otherwise audio-visually or intellectually interesting or even highly entertaining.
- The outlook and layout design may provoke new insights to old contents and procedures.
- Innovativeness and exoticism can contribute to attractiveness but are not necessary as such.

F. Bottom-up social innovations (like e-Moderators) are useful and necessary

- Voluntary, bottom-up and local types of social and business innovations (like e-moderators or local service company ADC in Arabianranta) could be more broadly introduced within different parts of participation procedures.
- Small local business models have to be created to support sustainable service creation.
- Top-down generic services are not meeting specific local needs.
- Connected localness would offer a model to exchange small business models and innovations and would create more feasible ways for content and service creation.

G. Innovative e/m-participation concepts and service models have a clear market potential

- The experience from this work package confirmed the prevalent conventional wisdom concerning adaptability, accessibility and acceptability of participation tools.
- e-participation should be adapted to the needs and skills of the users by a tailored mix of technologies, procedures, or methods embedded into the existing institutional structures including strategic considerations of the target groups or initiators.

H. Users need to see the benefits and get relevant feedback

- The first customer attraction may dissolve rapidly if the use of the new and attractive system does not produce any real benefits to users.
- The more transparent and evident the beneficial impact is, the more probably the service is getting popularity and success.
- The customer feedback (of the benefits) is becoming more and more important.
- Residents should feel ownership to last mile access and service platform in order to commit for co-design and co-development for shared service creation.

I. New technological innovations need to be developed for supporting innovation sharing

- Mobile participation services (for instance with a mobile handset) can include the same services as the "old" location-fixed services, but (because of the current technological restrictions) cannot usually offer large variety of options, amounts of descriptive information or personal assistance. Instead, the mobile service is rapid, independent of place and service hours and cost-efficient.
- Mobile and wireless participation solutions (like polls or opinion profiling via mobile phones) are not replacing totally old wired or fixed systems, but rather act as complementary elements.
- Both wireless and wired solutions have their own market niches (economically and socially), but more integrative solutions will emerge as well.
- Peer-to-peer type of technologies would create interesting opportunities for inexpensive content and service innovation sharing

J. Promising future visions are justified

- The new e/m-participation concepts, services and tools can increase the citizen participation in all sectors of local decision making.
- Promising views concerning future possibilities of e/m-participation concepts and tools were identified.
- The market is still well underdeveloped and there is a lot of room for new initiatives.
- This justifies continuous and new endeavours in supporting development of new technological, economical and social innovations improving electronic and mobile participation in urban development.

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APPENDIX I. Comparative evaluation of cases (d2b.5)

Left column: evaluation Theme/ criteria	Middle column: evaluation results concerning intelcities WP2 cases	Right column: evaluation results concerning other European cases

Aspect 1: Participatory aspects

Criteria	Specification	Specification
	Image Frame (WP2b)	Federal Portal
Degree of participation	Information and consultation	Information
Target group	Homogeneous and heterogeneous	Heterogeneous
	Small scale and Large scale	Large scale
	Closed and open	Open
Political impact	Transparency	Transparency
	Election Star/Arkkikone (WP2b)	DanmarksDebatten
Degree of participation	Information	Consultation
Target group	Heterogeneous	Heterogeneous
	Large scale	Large scale
	Open	Open
Political impact	Transparency	Legitimation
	Stakeholder Registry (WP2b)	MISS
Degree of participation	Information	Information
Target group	Heterogeneous	Heterogeneous
	Small scale and Large scale	Large scale
	Open	Open
Political impact	Transparency	Transparency
	Frankfurt Reg. Planning Particip. (WP2b)	Mobile Government Infrastructure
Degree of participation	Consultation	Information
Target group	Heterogeneous	Heterogeneous
	Small scale and large scale	Large scale
	Open	Open
Political impact	Legitimation	Transparency
	Siena e-Inclusion (WP2a)	eVentspils
Degree of participation	Information	Information and consultation
Target group	Heterogeneous	Heterogeneous
	Large scale	Large scale
	Open	Open
Political impact	Transparency	Legitimation

Table I.1: Participatory aspects comparison table

Left column: evaluation Theme/ criteria	Middle column: evaluation results concerning intelcities WP2 cases	Right column: evaluation results concerning other European cases

Aspect 2: Public service relevance

Criteria	Specification	Specification
	Image Frame	Federal Portal
Thematic focus	Democracy, life area context	Administration
Public service impact	New public service	Substitution and complementation of offline services
Process embedding	No joint processes	No joint processes
	Continuing process	Continuing process
	Election Star/Arkkikone	DanmarksDebatten
Thematic focus	Democracy	Democracy, and life area context
Public service impact	New public service	Complementation of offline services
Process embedding	Output relevant for joint process	No Input/output from/to joint processes
	One-time event	One-time Event
	Stakeholder Registry	MISS
Thematic focus	Democracy, administration, and life area context	Administration, and life area context
Public service impact	Complementation of offline services and new public service	Complementation of offline services
Process embedding	Input and output to joint processes	No joint processes
	Continuing process	Continuing process
	Frankfurt Reg. Planning Particip.	Mobile Government Infrastructure
Thematic focus	Democracy and life area context	Administration
Public service impact	Complementation of offline services	Complementation of offline services and new public service
Process embedding	Input and output from/to joint processes	Gets input from joint processes
	One-time Event	Continuing process
	Siena e-Inclusion	eVentspils
Thematic focus	Democracy, administration, and life area context	Democracy and administration
Public service impact	Substitution and complementation of offline services and new public service	Complementation of offline services and new public service
Process embedding	Input and output to joint processes	Input and output from/to joint processes
	Continuing process	One-time events and continuing processes

Table I.2: Public service relevance comparison table

Left column: evaluation Theme/ criteria	Middle column: evaluation results concerning intelcities WP2 cases	Right column: evaluation results concerning other European cases

Aspect 3: Media

Criteria	Specification	Specification
	Image Frame	Federal Portal
Accessibility	Registration needed	Registration needed
	Mobile phone and Image Frame devices	Electronic ID card needed, multi-channel access possible
Interaction	Facilitated, structured and open	Structured
	Given rules of interaction	Given rules of interaction
Operation	Usable by laity	Usable by laity
	Stand-alone	Stand-alone
	Election Star/Arkkikone	DanmarksDebatten
Accessibility	No registration needed	Registration needed
	No devices needed	No devices needed
Interaction	Structured	Facilitated
	Given rules of interaction	Given rules of interaction
Operation	Usable by laity	Usable by laity
	Stand-alone	Stand-alone
	Stakeholder Registry	MISS
Accessibility	Registration needed	No registration needed
	No devices needed	No devices needed
Interaction	Structured	Open
	Given rules of interaction	Given rules of interaction
Operation	Usable by laity	Usable by laity
	Embedded	Stand-alone
	Frankfurt Reg. Planning Particip.	Mobile Government Infrastructure
Accessibility	Registration needed	Registration needed
	No Devices needed	Mobile phone needed
Interaction	Facilitated	Structured
	Given rules of interaction	Given rules of interaction
Operation	Usable by laity	Usable by laity
	Stand-alone	Embedded
	Siena e-Inclusion	eVentspils
Accessibility	No registration needed	No registration needed
	A 'SiBox' device is needed	No devices needed, a mobile phone can be used
Interaction	Open	Facilitated, structured and open
	Given rules of interaction	Given rules of interaction
Operation	Usable by laity	Usable by laity
	Embedded	Embedded

Table I.3: Media comparison table

Aspect 4: Relevance to e-City Platform

The relevance of the five e-participation cases of the INTELCITIES e-City Platform is shown in the following table:

e-participation case	Policy cycle embedding	Policy cycle stages	Relevance
Image Frame	Yes	Agenda setting, analysis, creating the policy	Very relevant
Election star/Arkkikone	Yes	Agenda setting	Relevant
Stakeholder Registry	Yes	Agenda setting, analysis, creating the policy	Very relevant
Frankfurt Regional Planning Participation	Yes	Agenda setting, analysis, creating the policy	Very relevant
Siena e-Inclusion	Yes	Agenda setting	Relevant

Table I.4: Relevance of the INTELCITIES e/m participation cases

Appendix II. Nokia and the INTELCITIES project

In this appendix, the representatives of the Nokia Corporation (Veli-Pekka Niitamo and Outi Vuorio) evaluate the IntelCities project from Nokia's perspective.

Nokia participated in IntelCities Project, in particular in the workpackage 2b. The main interest of Nokia in the WP2b was in the development of "Arkkikone" and as well as "In the Hoods" and other mobile applications in the Arabianranta Living Lab environment. And especially the interest was in how to enable e/m participation of the local community members.

Nokia is utilizing the end-user study results from Arabianranta with interesting findings in terms of prerequisites for acceptance of mobile solutions (e.g. trusted and secured service environment, easy user interface, possibility to control the information and right level of costs). Moreover, the user needs for mobile services will be taken into account in concept development within Nokia and the finding will be also utilized in the internal portal development. The learnings from Arabianranta also help us in showing the importance of change management and hands-on training in our internal mobility deployments.

Overall, we think that these kinds of research projects where the living lab testing also plays a role provide enterprises with very valuable results for further development work. In IntelCities project, we think there have been a lot of interesting research and development activity on-going and it has produced a lot of important results. Moreover, in addition to the current findings, we find it very important to continue this type of a research activity as we already identified quite a few new areas of research based on the findings in IntelCities: "How the current concepts of on-line services could be utilized in mobile", What are the services residents want to always have an access to", "How to ensure citizens can control the residential/governmental information they receive to avoid information overload", Business models and dynamics for citizen services (different perspectives)", "New access architectures related to WLAN, LAN, local access, sensor networks, closed VPN environment, IPDC-H, 2.5-4G .

As to the future of citizens services, there is definitely a strong demand for collaboration between different players in this arena to ensure seamless and easy-to-use services. The key elements of successful citizens service platform in our opinion belong among others open source and open standard technologies, scalability, replicability. We also see mobility as an

important enabler in the platform in terms of creating value-add in time critical services to which citizens need an access anytime and any place. Some examples of services that may benefit of mobility include such services that provide information that is critical while on the go, information that provides value add on a specific location.

Through e-city platform we (e.g. Nokia) can gain important understanding for user behavior and needs, how the services should be built, what the enabling network architecture is (LANs, WLANs, sensor networks, private virtual networks etc.)

Overall, we believe the lessons learnt from IntelCities will provide good insights into different parts of activities of Nokia:

- lessons learnt from user needs for mobile services (case Arabianranta and Vuores) → mobile device development
- User behaviour of elderly population and their needs in relation on-line services (case Siena) → mobile services for the elderly and related features in mobile devices
- User behaviour in using e-City Platform services
  - How the services should be built (on-line vs. mobile, push vs. pull) → what types of features mobile devices should have
  - What the business models are in this environment and how they relate to local, micro business models (e.g. local shop keeper advertising his/her products within local city area) → new business opportunities through ventures
- New business dynamics in terms of new content creators and sharers → new business opportunities through Nokia ventures
- Interactive internet site concept and utilizing it via mobile devices → further development of Arkkikone concept into mobile in co-operation with some cities

Nokia welcomes the further development and deployment plans of the e-City Platform. Only large scale deployments in big cities will bring application and service providers to develop mobile citizen services on top of e-city platform. Large dominant middleware hardware and software vendors have be brought in with their views on application architectures (Cisco, SAP likes).

Open architectures and standards will enable such mobile services to appear with 'thin client' integration (XML and Java enabled technologies). Developments in mobile terminals will move towards access technology agnostics (ambient) or multi-access enabled terminals in the PDA and Smart phone markets to fully utilize IP based mobility in interactive servic-

es. For this, ISP (Internet Service Provider) and telecom operator views and visions should be further acquired to understand which type of services and contents serve citizen needs in a business feasible way.

Large scale deployments in cities like Manchester and Siena would provide such Living Lab environments for operators, terminal vendors, local service and content providers to develop these applications.

Middleware development in this respect is not in the core area of Nokia but rather of companies like Oracle, Cisco, SAP. Therefore, we encourage continue the further development of the platform/middleware with such companies, meanwhile, it is important for Nokia to avoid getting into a conflict of interest with these current partners. However, the possible interest of Nokia in following the development of IntelCities lays in creating and testing applications together with ISP and operator partners in a true Living Lab environment. The most likely interest of Nokia in participating in IntelCities Alliance could be through DIMES and/or Living Lab SIG in AMY Community in which Nokia is already currently very actively participating.

Appendix III. INTELCITIES and WP2b poster

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(design Lauri Ahonen, UIAH)