

Designing Urban Mediator

Joanna Saad-Sulonen (jsaadsu@uiah.fi)
Roman Susi (roman.suzi@uiah.fi)

University of Art and Design Helsinki UIAH
Hämeentie 135 C, 00560 Helsinki, Finland
Tel +358 9 7563 0411, fax +358 9 7563 0555

Abstract

This paper reflects on the steps taken so far by our multidisciplinary research team to address the design of what we have called "Urban Mediator"; an open framework and specific tools for building connections between citizens and city administrations, making all knowledge mutually accessible.

Taking Urban Mediator from the conceptual level into a tangible design solution is being done incrementally, following a co-design approach involving identified stakeholders, to the extend possible. This paper introduces the Urban Mediator concept and describes the co-design process so far (work on Urban Mediator is still in progress), presenting both the meta-level strategies that guide the whole work process, as well as the practical strategies used to maintain the co-design approach possible, particularly addressing the way they drive the software design.

INTRODUCTION

Urban Mediator has started as a concept idea for an open framework and specific tools for building connections between citizens and city administrations, making all knowledge mutually accessible (ICING DoW 2005). This concept is based on previous design research and proposal for addressing the possibilities presented by the interweaving of new digital technologies and urban space, for encouraging various forms of public participation on urban issues (Saad-Sulonen 2005).

The idea is not to create yet another interaction channel, like the various websites, portals or discussion forums, but rather come up with a system that would help citizens know of the existing channels and services and help them decide in what way they'd want to interact with the official city. Urban Mediator would make it possible for people to send information, questions, complaints, and remarks regarding their neighborhood, linking them to existing interaction channels, as well as receive both official and non-official information. Citizens, residents associations as well as various city administrations are plugged to the Urban Mediator, making it easier for them to reach the information they need regarding the city, when they want it and where they want it. The system would also permit them to organize themselves around issues of interest, in the way social software works.

Urban Mediator is currently being developed into a working prototype within the framework of the ICING project. ICING, an acronym for Innovative Cities for the Next Generation, is a 6th framework programme EU funded IST (Information Society Technologies) project, scheduled to run from January 2006 to June 2008. According to the project's official description of work, ICING's goal is to "research concepts of e-Government based on a multimodal, multi-access approach to a 'thin-skinned City' that is sensitive to the citizen and to the environment, using mobile devices, universal access gateways, social software and environmental sensors." (ICING DoW) The project partners include city councils, universities and telecom operators from Barcelona, Dublin and Helsinki. (<http://arki.uiah.fi/icing>)

Urban Mediator is the key concept to be developed in Helsinki's test-bed of Arabianranta. Within the ICING framework, Urban Mediator will act as one subsystem of the ICING platform, whose role will be to provide services and information that better connect the City with its constituency. Urban Mediator's role within the ICING platform would be to facilitate the citizen-driven possibilities for action.

Urban Mediator is however an independent system in itself and can exist in various frameworks. One of its important aspects is to offer possibilities for a variety of other systems to plug into it, creating the mediating potentials. The scope of this paper does not include the particular development work that engages the parallel process of collaborative work with ICING partners for integrating Urban Mediator into the ICING platform. The paper will focus on presenting a reflection on the co-design process involving stakeholders in the area of Arabianranta in Helsinki.

URBAN MEDIATOR CONCEPT

There are various sources producing different types of knowledge about a city. The most visible one is the formal knowledge that the City administration produces, and which is official and expert. There are also some other formal channels such as neighborhood or political activist organizations that collect and use knowledge of the city. Last but not the least, citizens also produce knowledge through their lived experience. This latter form of knowledge about the city is embodied in people's daily activities and communicated in informal and extremely diverse contexts. It is worth noting that some of these communications means are becoming digital, taking the form of personal and community blogs, contributions to discussion forums, and digital photo pools. Urban Mediator would try to create interfaces for making these different forms of knowledge mutually accessible to all the stakeholders.

The concept of Urban Mediator aims at increasing the level of democratic involvement, in particular eParticipation, by providing an example of a "mediator" environment where these different kinds of knowledge are mutually accessible, making it possible for citizens to interact with each other as well as with city authorities. Furthermore, linking to that the possibilities for computer-mediated interaction in the space of the city itself (mobile technologies, Wi-Fi, GPS etc.) expands possibilities for information sharing and taking action into the street, the everyday context of the experience of the city.

The Urban Mediator concept is that of a software and related services that will enable users (citizens and city administration) to obtain and share information about a city neighborhood. This interaction can happen in situ, in the physical space of the city, using mobile devices, or

it can happen using any computer with Internet access. The shared information can be official information, as provided by the various city administrations and offices, or information provided by citizens directly to Urban Mediator or already existing on the web. The use of interactive maps facilitates the visualization of such location-related information. In its final implementation stage, Urban Mediator would also provide a set of tools that would facilitate the creation of projects or discussions related to a local issue of interest.

URBAN MEDIATOR CURRENT STAGE

Urban Mediator's development has started in June 2006 and is planned to last until December 2007. The areas of development of Urban Mediator were at first defined in a way that reflects both the framework of the ICING project – an IST project addressing objectives of Priority 2.4.9 ICT research for Innovative Government [1] - and the research and design interests of the research team - understanding how 'social' factors as well extending the interface for citizen participation and involvement to the everyday experience of urban life could invigorate eGovernment services and eParticipation. The areas of design development have then, through research and co-design work, crystallized to the following: in-situ access and contribution to information, harvesting existing relevant online information, and providing tools for citizens to organize themselves around issues.

At the time of writing this paper, Urban Mediator already exists in the form of UM Stage 1 prototype, which allows users to annotate points on a map of the area they live in. Points can be commented and are accessible through different navigation strategies. The views provided are a map view with points, a most recent comments view, a "tag cloud" view to navigate with keywords and other views.

Urban Mediator Stage 1 software has client-server architecture. Any graphical web-browser can serve as a client, making it possible to test using not only computers, but also 3G mobile phones. Mobile clients with GPS device can make use of the special Python (S60) application to provide UM with geographical coordinates. A Geofeed from UM allows the use the map server of the City of Helsinki for map portrayal.

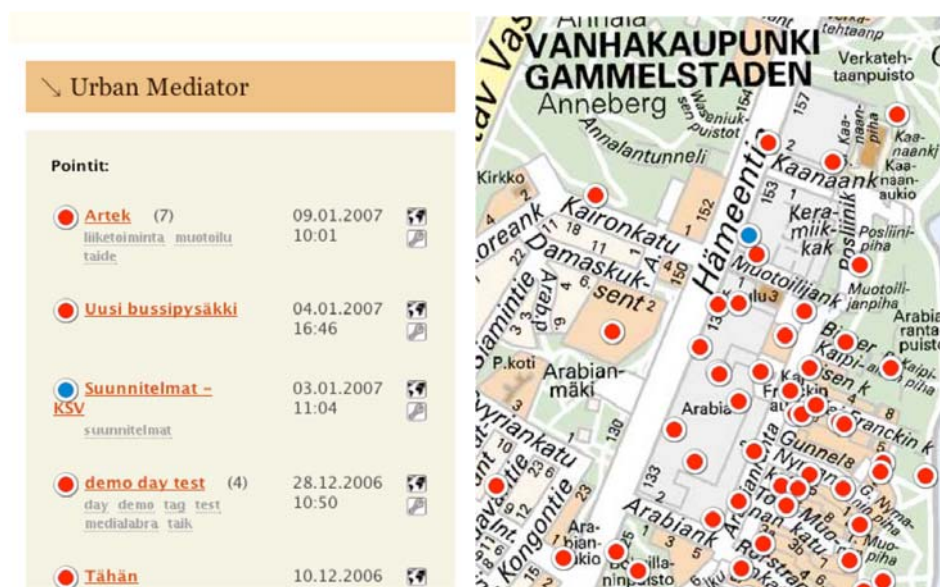


Fig. 1 shows two screenshots of the Urban Mediator prototype. The user interface, the same for mobile and desktop use, is still very rough.

Work is also almost done on harvesting, which is a process of gathering existing relevant online information. Urban Mediator doesn't pretend to contain all information relevant to the urban environment and life. Instead, it leverages on the information available from numerous sources. It is quite common today that organizations and businesses have their news and events in the form of web feed. Urban Mediator may incorporate that information and present it in connection with given place and time. For example, student theatre with an RSS feed may advertise itself in the Urban Mediator according to spatial position of the user. In order for information to be available for the Urban Mediator, a properly described link should be given by the users. Gathered data, which is available for viewing and browsing, can be further refined by more accurate tagging, summarizing, moderation, recommendation, etc. Urban Mediator would also have regular feeds, like an official feed from the city council's web-portal or various city offices departments, as well as feeds from neighborhood and community websites.

A CO-DESIGN APPROACH

By co-design, we understand a collaborative design approach that includes development of strategies for active participation of various identified stakeholders throughout the design process and beyond it. The decision to follow a co-design approach stems first from the research group's interest in following and developing such an approach (Botero et al. 2003). Co-design is influenced among others by participatory design (Schuller and Namioka 1993), situated design (Greenbaum and Kyng 1992), and the Scandinavian research on system development (Bjerknes and Bratteteig 1995). It also includes the idea of extending the co-design of an initial outcome to be possible through its use by people.

In the case of Urban Mediator, the use of a co-design approach is particularly interesting as it gradually sets the ground for a possible future 'real' use of Urban Mediator in the neighborhood of Arabianranta where it is first set to be developed and tested. So, not only does the co-design approach offer the possibility to iteratively explore with stakeholders (in the case of Urban Mediator the stakeholders are potential users, information providers, authority figures, designers), what would be relevant features for the software and refining the service possibilities, but it also makes it possible to gradually populate the Urban Mediator working prototype with relevant content, preparing the prototype for future public use. This is important as it reflects the very nature of Urban Mediator as a system whose content is not pre-provided by any particular actor but is rather continuously provided by stakeholders, either directly, or through established feeds from various relevant sources.

Meta-strategies: developing common language and favoring a tool-based approach

Without some kind of a common language, it is impossible to draw together the stakeholders that would become involved in the co-design process. Communication indeed lies at the heart of collaborative design and the success of the design process depends upon the capability to create a shared understanding amongst all involved stakeholders (Erickson 1995). Designers (users-as-designers and professional designers) exchange technical design possibilities and design requirements and use cases. Effort is therefore put on producing the artifacts that would permit the common language, such as scenarios, sketches, reports, workshops and prototypes (Erickson 1995). Effort is also put in using appropriate naming for the key concepts of Urban Mediator so as these terms used mean roughly the same for all involved stakeholders

Taking co-design a step further also means designing systems that allow users to continue their (co-)design of the system, through use. This ties closely to Henderson and Kyng's understanding of "design as a process that is tightly coupled to use and that continues during the use of a system" (Henderson and Kyng 1991). This is very relevant for Urban Mediator as it helps address the possibility of creating tools for users rather than fixed solutions for encouraging public participation in urban issues. From a software design perspective, this also means that co-design approach sets the ground for flexibility and openness. In that sense, we can say that the essence of a system such as Urban Mediator is its open nature: it presents opportunities for mediation between various producers and seekers of information related to life in the city, citizens and officials alike. Moreover, an open system can support collaborative design and presents opportunities for being shaped through use. Addressing this issue in an article advocating the need for developing frameworks for end-user development of ICT based systems, Fisher and Giaccardi (2004) clearly articulate the benefits of open systems: "By creating the opportunities to shape the systems, the owners of the problems can be involved in the formulation and evolution of those problems through the system".

These meta-strategies provide a grounding focus for the design process and can be considered as what Nelson and Stolterman (2000) call the "guarantor of design", or the attempt to find some solid and dependable base for design actions. However, involving the stakeholders in design process is not easy. The effort in pursuing a co-design approach requires also more practical steps and strategies that are interweaved in the design and development process itself. These practical steps and strategies undertaken within this guiding focus are presented in the next sections.

CO-DESIGN STEPS

It is important to note how the co-design approach in the Urban Mediator case spans through the whole project timeframe, addressing the various aspects of development emphasized by the inter-disciplinary approach to design. (The team includes members with backgrounds in software design, industrial design, architecture, and at an initial stage, social scientists). Moreover, co-design activities have been set up in relation to the identified areas of development of Urban Mediator (see above) and has helped crystallizing them.

The phases of the co-design process are closely related to the stages of design articulated by Erickson (1995): Exploration, Refinement and Transition, but are not strictly delimited as such (see Table 1). In the case of Urban Mediator, it is important to also pinpoint the initial steps of setting the stage for co-design. The very first co-design steps have been to identify the relevant stakeholders for such a system as Urban Mediator. This is characterized by researching the context and establishing contact with various actors in that context. In the case of Arabianranta, key players such as the Art and Design Company [2], active residents and communities, as well as various representatives of the city authorities were contacted. Meetings were organized with these people where the idea of Urban Mediator, as well as the ICING project, were presented. As a result initial, the mapping of important stakeholders and possible co-design contacts from the different stakeholders groups were established. Furthermore, scenarios of Urban Mediator were created based on these initial findings and a short animation was made to explain them. The animation was then later used in future meetings and talks with stakeholders and constituted an initial step in setting a common language.

This initial phase is crucial in the case of Urban Mediator as beyond setting the stage for the exploratory and refinement stages, it also prepares the ground for establishing how Urban Mediator would exist once brought to public use and who would be the parties involved in using it, but also hosting it. In a way, in the case of Urban Mediator, this initial stage already interweaves with Erickson's third stage of design, that of Transition.

Further exploratory steps related to reaching an initial stepping stone into the development process have been to send a small questionnaire and devise a set of low-key workshops with active residents in an effort to identify potential use cases for Urban Mediator. The questionnaire was sent by email to members of the Arabianranta Residents and Parents association and members of the Arabianranta Moderators group [3], asking them where they get information regarding Arabianranta.

The two workshops were then organized: one with members of the Arabianranta Residents and Parents association, and one with members of the Arabianranta Moderators group. The workshop participants were asked to place on a paper map of Arabianranta, issues which they felt they'd need information about, and to discuss how and where they would get or would like to get such information.

The results of this initial phase, showed that it was clear that citizens needed information about construction sites, traffic issues, parking space, day care shortage, services, interesting places, routes etc. It was also clear that many city office employees would find it beneficial to have access to information produced by citizens, about their area and where especially interested in the idea of a map that would show this citizen-produced information as layers. These considerations have constituted the framework into which the iterative design and development work proceeds.

The next phase which we have recognized as being the interactive and iterative one, or Erickson's Exploratory stage, is that of user involvement and prototype building. This stage particularly addresses the practical strategies driving the software design and is explained in the following section.

	Design team	Residents	City Office	Others
Refinement Explorations Initial explorations Prototypes		Arabianranta Moderators (meeting) Arabianranta Moderators: Media Folder experiment (re-purposing software) Arabianranta Moderators (workshop) Questionnaire to residents Workshop with Residents' and Parents' Association members (paper and pen) Workshop with moderators (paper and pen)	Meetings/interviews with officials dealing with the physical environment Meetings/interviews with officials dealing with the social services Meeting with the Helsinki City Planning Department Meeting with the Public Works Department	Art and Design City (meetings) Arabianranta's workgroup (meetings)
	Prototypes			
	In-situ access and contribution to information		Urban Mediator Stage 1 (prototypes)	Trial with volunteers from City Youth Department (Prototype – no action) Arabia School (meeting – showing prototype) Public Works department (meeting – showing prototype)
Harvesting	Prototypes			Workshop with Art and Design City (discussing prototypes – adapting existing software)

Table 1 shows the co-design steps taken so far

PRACTICAL STRATEGIES DRIVING THE SOFTWARE DESIGN

Following an iterative co-design approach means that we would not first gather all the requirements and then build software for the rest of the time. We decided that during Urban Mediator development quick changes and utmost flexibility will be needed. Software development tools we have chosen to build Urban Mediator are web.py (web framework written in Python) and MySQL database, and the way we decided to build software was through a series of lightweight prototypes. This approach is not a conventional way of building software solutions and actually it has discrepancies with "established" software engineering methodologies (such as having complete functional analysis and set of detailed use cases). Software co-design methodology however bears many similarities with agile methodologies, as reported in the online document Manifesto for Agile Software Development (<http://agilemanifesto.org/>). Agile methodologies especially value "customer collaboration" and "responding to change over following a plan", which are quite similar to the ideas of collaborative design and continuous design through use.

We present here three examples of practical strategies that have driven the software design and that are embodiments of the guiding meta-strategies presented earlier.

Accessible conceptualizations

Finding common language - concepts equally well understood by professional designers and other stakeholders - is crucial to the success of co-design as it allows all engaged stakeholders to see technical and social possibilities in the solution domain.

Urban Mediator is, among other things, dealing with facts. In the early stages of UM development we came up with simple fact representation model: What-Where-When-Why-Who contexts we refer to as W5. The model helps to comprehend the emerging design spaces of the Urban Mediator. While the "Where" context seem to be mentioned more often than others and is more used in the visualization of Urban Mediator data, other context are not ignored.

While somewhat oversimplified, viewing Urban Mediator as the index of points in multidimensional W5 space of facts helps to comprehend not only the design results, but the design process as well. For example, a user suggestion or feature request may be analyzed by projecting the information model, needed for the feature to work, into W5 space. If the feature requires more than just changing user interface, the underlying data model may be revised, and there are usually no problems to interpret additions according to W5.

The W5 model can be understood by all stakeholders: users and HCI specialists understand facts in terms of What, Where, When, Who and Why as their meaning in everyday language; software designers have no difficulties to translate those into aggregates of data structures. Finally, graphic designers also benefit from knowing that UI should reflect those contexts. As a concrete example, during UM development (user interface for adding new data point), it was easy for all stakeholders to refer to the sequence of data input actions in terms of W5, and changes could be directly made to it.

Another useful concept, which emerged through UM design, is that of “Point” (not as geometrical point but rather as the point in a discussion or dispute). In UM stage 1 "point of discussion" has been tied with point on the map and comments added to the point constituted discussion itself. It was beneficial at that time to have a good metaphor, so users were not at loss why what it means.

Re-purposing and adapting existing software

Re-purposing existing software makes it easier to quickly engage people in co-design activities and helps the software team to have head start in the project.

The first Urban Mediator prototype was code-named "UM Embryo" and has been built with the Media Folder (“Kori”) software of another project the research group was involved in. In a nutshell, a Media Folder is a folder for sharing media material among its users with ability to call other users. Images, sounds, text and videos can be put there. Media Folders could belong to a group of users (a family), and would then constitute a “Family Folder”. The process of creating new Media Folders inside Family Folder was easy. For a Media Folder to be adapted to represent a place to gather information, a special, simpler, version of Family Folder was build and called Community Folder. The re-purposing took nearly one man-day and the resulting solution has been used to demonstrate the idea of Urban Mediator to stakeholders and to quickly ask them to contribute to information regarding their neighborhood to what we had set up as an “Arabianranta” Media Folder. As a result of this exercise, we were able to quickly gather examples of what people find interesting to report to others, particularly by documenting through picture taking.

The Web 2.0 direction of WWW also shows a lot of examples how existing online software can be adapted to the needs of special-purpose designs. In the course of designing Urban Mediator constant attention has been made not to overlook existing online components that could complement and enrich UM functionality, or provide it with spare parts (Floyd 2006). One of the examples is Google maps (<http://maps.google.com/>), which with very little effort, can be used to create mashup of Urban Mediator data and Google maps map portrayal service. Mashups are very close to the idea of Urban Mediator itself, and therefore using them as prototypes gives concrete examples of certain features of Urban Mediator.

Another interesting example of is the use of Flickr (<http://www.flickr.com/>) web feeds powered by location information as a way of describing the Harvesting features to stakeholders. It is easy to get feed from Flickr based on keywords and Urban Mediator can display feed entries on the map. It is not in itself something unique because Flickr has its own map engine. What is making it valuable is the ability to treat Flickr entries as points of Urban Mediator, for example, referring them in discussions. Web feeds from Flickr have been implemented to Urban Mediator prototype and showing them to particular stakeholders (those in charge of websites containing Arabianranta-relevant information), during a workshop on the harvesting theme, has helped them understand the notion of using web feeds to populate Urban Mediator with relevant information.

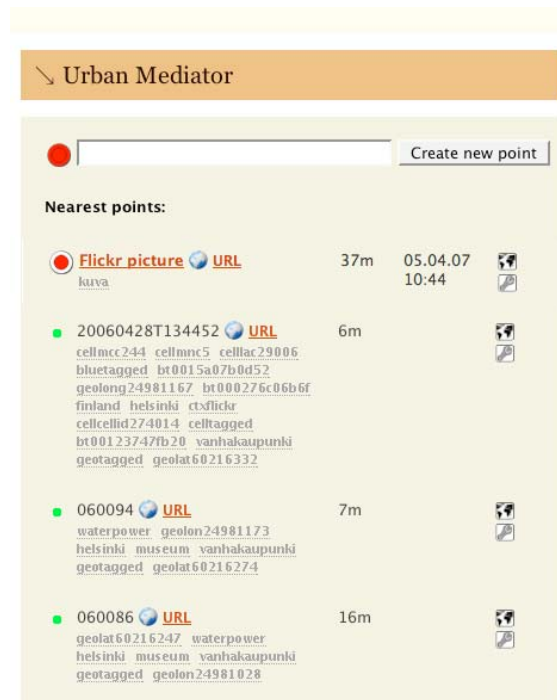


Fig. 2 shows a screenshot of experimentation with using webfeeds as a means of harvesting information about Arabianranta

Furthermore, consideration of adapting existing software made it simpler to consider what should not be part of Urban Mediator design. Namely, it was explicitly stated that Urban Mediator is not a system for annotating maps, it is not a discussion forum or a blog software: but all those components can be used to make Urban Mediator more useful. As a consequence, Urban Mediator domain logic is quite unique and focused to specific purpose. All “usual” features, expected by users, (e.g. photo sharing or storing bookmarks or discussing topics) can be linked to UM by users themselves.

Building software through lightweight prototypes

UM development is done through iterative rapid prototyping to ensure we can engage all stakeholders in the process. We advance in the understanding of the context and the domain (citizens’ lived experiences of the city) at the same time we advance with the software development. From a software engineering perspective this means we are incorporating elements of Agile methodologies (Cockburn 2002) that fit very well with our understanding of co-design.

After initial success of the prototype using re-purposed software (the Media Folder case) and getting real material from users, we first decided to devote two months to build prototypes, to test whether certain technology will work for us in the expected way and that there would be no surprises later.

The second prototype (called “tagging proto”) was a raw implementation of W5 described above. Each point has five fields (What, Where, When, Why, Who) capable of containing URL to some web-resource.

Another two prototypes were about Urban Mediator ontologies. The first one was completely theoretical and resulted in the definition of fact representation language. The other one was about utilizing that in a knowledge base and resulted in a Prolog program capable of resolving queries to W5 database. Questions used to populate database were borrowed from the above mentioned workshop materials.

Another prototype was about a special web interface, which made it easier to really add data into W5 data structure.

Building those prototypes helped software designers to “feel” how concrete software solutions will look like thus making sure that the Urban Mediator design is not driven by technology (which is very often the problem of new technologies), but that technology is selected to make desired solution possible. These trials set the ground for strating work on building an actual working prototype of Urban Mediator, which would be addressing the first are of development, mainly in-situ access and contribution to information.

In October 2006, Urban Mediator Stage 1 prototype trials started with four volunteers, residents of Arabianranta, who were asked to act as citizen-reporters. They were given Symbian S 60 mobile phones with Internet access and Bluetooth-enabled GPS receivers. A small mobile application made it possible for them to launch the web browser where a clickable map centered on the spot they were in would appear. They were asked to mark on this map points to which they would link any kind of comments they feel relevant. At that point, the information gathered also contained the geographical coordinates of the location to which they were referring to (via the GPS or the map), the time of creation, and the username freely chosen by the participants. People were told to put into the Urban Mediator everything they think is valuable for other people and city officials to know. As a result of these field trials a collection of 70 points was gathered.

Initial Urban Mediator content and practice descriptions by users allowed to see the design space people would like to deal with. Gathered content provided insights for domain model of the Urban Mediator and description of user activities helped with user interface and interaction styles.

CONCLUSIONS AND FURTHER PLANS

During co-design a dialog should happen between stakeholders. Software and even paper prototypes facilitates this process, because potential users and interested parties can express their idea with the common language of such prototypes. On the other hand, users try (as in case of Urban Mediator) to express their needs by filling system with content. Obvious workarounds are visible to the HCI and software designers as unexpected ways to use the system.

However, user input of all kinds (both in the form of static content, observations of practices, analysis of similar projects and practices behind them) is not to be understood in a literal sense. Many suggestions were analyzed and the planned implementation of new features is not done automatically. We tried to understand if the suggested feature is really a glimpse of some greater need, which can be satisfied in a more general way. Software designers are specialists in building information models of any problem domains and that ability may lead to more streamlined designs. Likewise, HCI specialists possess practical knowledge on

making better interfaces. It means, that feature requests by the user are not handled one by one but as representatives of underlying integral model.

Collaboration with members of the Moderators group, of the residents' and parents' association, and with the Art and Design City company has been relatively successful as the co-design work has helped us advance in developing features for Urban Mediator. Some failed attempts at collaborative work have also brought unexpected results, such as the case of a meeting with schoolteachers, which was supposed to trigger prototype workshops with students but never took off. During the meeting however the important issue of the need for some kind of moderation for the system came up and helped our team better articulate the need for a feature that was then implemented and permits users to flag content as inappropriate.

Our initial plans for co-design also included involving representatives of city authorities in workshops and testing activities, as they had also been recognized as key stakeholders. This however has not been successfully achieved until now. We can speculate that one reason is that Urban Mediator is not being developed as a tailor-made solution for cities, but is rather an open system and tools for a variety of stakeholders, particularly citizens. Because of that, engaging in exploratory workshops or testing prototypes that are very obviously of an unfinished nature can be seen as a waste of time for them. An exception to that is the City Survey department, an official partner in the ICING consortium, with whom we are collaborating in an effort to use the online Helsinki maps for Urban Mediator.

However, the fact that a public trial of Urban Mediator in Arabianranta is planned, and the possible interest from one city administration office to participate in it, might trigger more collaboration for the next phases of Urban Mediator development. Moreover, the fact that we are moving to the development area of tools for encouraging participation might provide us with more concrete collaboration possibilities for us to propose the city administrations.

Once again, engaging stakeholders in a collaborative design process is not easy, particularly when it is not always clear for them how they can benefit from such an effort. It would be important to remember that the design stage that Erickson labels as "design evangelism" – in other words defending the project, and in that case defending the need for co-design with the identified stakeholders – should be addressed early on in the project.

Notes

[1] The focuses of Priority 2.4.9 that ICING addresses are: 1) Innovative ICTs for democratic involvement, in particular eParticipation, 2) Intelligent, inclusive and personalized eGovernment services, 3) Adaptive and proactive eGovernment support systems (Information Society Technologies portal 2004)

[2] The Art and Design Company serves the area of Arabianranta in Helsinki and is owned by the City of Helsinki, Ministry of Trade and Industry, University of Art and Design, University of Helsinki, Arcada Polytechnic, Pop and Jazz conservatory, the Arabianpalvelu (Arabia services) company and the Iittala glass manufacturing company.

[3] A moderator is a resident of a building that voluntarily takes up the job of moderating the buildings web pages. There are 20 residential buildings in Arabianranta that have a moderator moderating their building's own web pages.

Acknowledgements

Thanks to Andrea Botero Cabrera for proposing the writing of the article and for support during the process as well as providing valuable comments and suggestions. Thanks also go to all those who have contributed to the development of the Urban Mediator concept and implementation work: Kari-Hans Kommonen, Taina Rajanti, Iina Oilinki, Tommi Raivio and Mika Myller.

The authors acknowledge the support for ICING provided by the European Commission through FP6 contract number FP6-IST-2004-4 26665.

REFERENCES

Bjerknes, G., & Bratteteig, T. (1995). *User participation and democracy: A discussion of Scandinavian research on system development*. Scandinavian Journal of Information Systems, 7, 1, 73-98

Botero, A., Kommonen, K., Koskijoki M., Oilinki I. (2003) *Co-designing Visions, Uses and Applications*, presented at the 5th European Academy of Design Conference. <http://www.ub.es/5ead/PDF/1/BoteroCabrera.pdf>

Cockburn, A. (2002). *Agile Software Development*. Addison-Wesley.

Ficher, G. & Giaccardi, E. (2004) *Meta-Design: A Framework for the Future of End-User Development*. In Lieberman, H., Paterno, F., Wulf, V. (Eds) *End User Development – Empowering People to Flexibly Employ Advanced Information and Communication Technology*, Kuwer Academic Publishers, The Netherlands.

Erickson, T. (1995) *Notes on Design Practice: Stories and Prototypes as Catalysts for Communication*. In Carroll, J.M. (Ed) *Scenario-based design: envisioning work and technology in system development*. New York, NY: John Wiley & Sons, pp 37-58

Floyd, I (2006) *Using Mashups for End-user rapid and responsive prototyping in collaborative environments*. Presented at the 20th ACM Conference on Computer Supported Cooperative Work. Banff, Alberta, Canada. 04-08 November, 2006. Proceedings available at http://mashworks.net/wiki/CSCW_workshop_papers

Greenbaum, J., Kyng, M. (Eds.) (1992) *Design at work: cooperative design of computer systems*. Lawrence Erlbaum Associates, Inc. Mahwah, NJ, USA

Henderson A. & Kyng M. (1991). *There is no place like home - continuing design in use*. In J. Greenbaum & M. Kyng (Eds.). *Design at Work: Cooperative Design of Computer Systems*, Lawrence Erlbaum, Hillsdale, New Jersey, pp. 219-240.

ICING Document of Works (2005). Sixth Framework Programme
Priority [2] , Information Society Technologies. Contract number FP6-IST-2004-4 26665

Information Society Technologies portal (2004) 2.4.9 *ICT research for innovative
Government* [online]
http://www.cordis.lu/ist/workprogramme/wp0506_en/2_4_9.htm, accessed 25.04.2006

Manifesto for Agile Software Development: <http://agilemanifesto.org/>

Nelson, H., Stolterman, E. (2000) *The Guarantor of Design (g.o.d.)*. In 23rd Annual
Conference, Information Systems Research in Scandinavia (IRIS), Aug 12-15, 2000, Frystad,
Sweden.

Saad-Sulonen, J. (2005) *Mediaattori – Urban Mediator: a hybrid infrastructure for
neighborhoods*. Master of Arts Thesis in New Media, University of Art and Design Helsinki,
May 2005 (<http://www2.uiah.fi/~jsaadsu/thesis.html>)

Schuler, D. & Namioka, A. (Eds.) (1993). *Participatory design: Principles and practices*.
Hillsdale, NJ: Lawrence Erlbaum Associates.