

Chapter XIX

The Challenges of Co-Design and the Case of e-ME

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ABSTRACT

Setting up co-design processes involving several stakeholders is a complex task. In this chapter the authors have looked upon experiences from involving 120 future users in a process of incrementally developing and deploying an electronic assistant for students. The vision is to develop an electronic assistant, an e-Me, that acts as a filter and an agent in the information society. By interviewing some of the future users we have managed to derive some different challenges associated with co-design processes. These challenges have been discussed related to the following categories; perceived usefulness, user involvement in the development process, learning process and critical factors for future development. The authors analyze the empirical data and derive suggestions for possible improvements.

INTRODUCTION

The idea behind the e-Me project (www.e-Me.se) is simple and challenging at the same time: To build an electronic assistant that helps students in organizing their life. This involves activities such as organizing the course schedule, buying or lending course books, planning public transport, managing study progress, and so on. So far students have to go to a number of places, both physically and virtually, to accomplish that. e-Me is supposed to turn that process around

(Albinsson et al, 2006b). The vision is that the students should not need to go to the information; the information rather comes to the students based on the active profile set by the student.

The project, that this paper reports experiences from, explores whether an e-Me acting both as an agent for individuals and as a filter in the information galaxy for desired information services would be of use for creating a better society (c.f. Albinsson et al, 2006ab). It takes as its starting point the individual and his/her life situation, instead of the

organization which is providing services to the individual. The project, which formally begun in 2005, has applied a co-design (Albinsson, 2005; Albinsson & Forsgren, 2005ab) approach starting from a vision about an electronic assistant as a solution to student self-administration. An important part of the vision was also that the e-Me should evolve over time with input from different stakeholders by letting them share and design their view of reality together with others. To ensure both open and reflective participants a student setting at University College of Borås has been chosen. The e-Me project is in part a governmentally funded Swedish research consortium consisting of representatives from Umeå University, the University college of Borås, the city of Stockholm as well as several partner companies like Intel, Microsoft, VISA, Telia, Mecenat, and smaller student oriented companies (Lind et al, 2007).

One condition for e-Me is that e-Me Student-related services become accessible. To identify the relevant services a number of co-design workshops together with students in Sweden and Spain were conducted resulting in ten different scenarios (Albinsson et al, 2006a). To ensure representative results the participants of this study had been selected from different environments (e.g. cities and small towns), age groups (20 to 35) and countries (Sweden and Spain) with an equal gender distribution. These scenarios covered eight situations the students want to improve, such as *apply to university and begin studies*, *Monday morning*, *You've got lots of mail*, *change of plans*, *form-filling and reviewing*, *the elective course*, *finding jobs*, *the purse chase*, and *co-buyer groups*. During the spring and summer of 2006 these scenarios were verified by sending a questionnaire to 16 000 students in Sweden which resulted in more than 3 200 responses (Lindell et al, 2006). The most relevant services were implemented in a prototype. This prototype is the object of the current study. Figure 1 shows one snap-shot from the user interface of the e-Me pilot.

The scenarios were also used to involve the above mentioned stakeholder organizations in a conversation about their roles in a world with existing e-Me's.

After this verification a pilot version of the e-Me concept was designed and built (Lind et al, 2007). A small group of students were involved in testing and evaluation during this phase. After three months the first prototype of e-Me was deployed for a group of approx. 120 students (January 2007) who became a part of the e-Me project group and co-designers. The students co-designed e-Me by trying out the prototype – both in order to identify shortcomings in the application and identify new situations, both within and beyond the school setting, when an e-Me would be of assistance (ibid).

The core of the e-Me consists of the following components (Lind et al, 2007):

- **Calendar management**, in which the user's calendar can be shared with other e-Me users' calendars. Different categories of bookings can be highlighted by using different colors.
- **Mood management**, in which it possible to set and manage in which mood the e-Me user is. Three possible moods have been implemented in the prototype so far; private, meeting and open.
- **Mail aggregation**, in which mail can be popped from different sources and distributed dependent on the mood that is set.
- **Contact Management**, in which contacts can be grouped into different categories and a status of the contact, can be set in relation to the possible moods.
- **Archives**, in which files (of different types) can be stored and shared with other e-Me users.
- **Assignment**, in which the user manages all tasks assigned to the e-Me. In the pilot version four assignments has been implemented. These are the possibility for e-Me to receive study results (from Ladok – a national system for reporting study results), get the schedule into the calendar (from NeverLost – the school's scheduling system), receive this weeks lunch menu, as well as matching desires

and needs of offers from organizations with students discounts (from Mecenat).

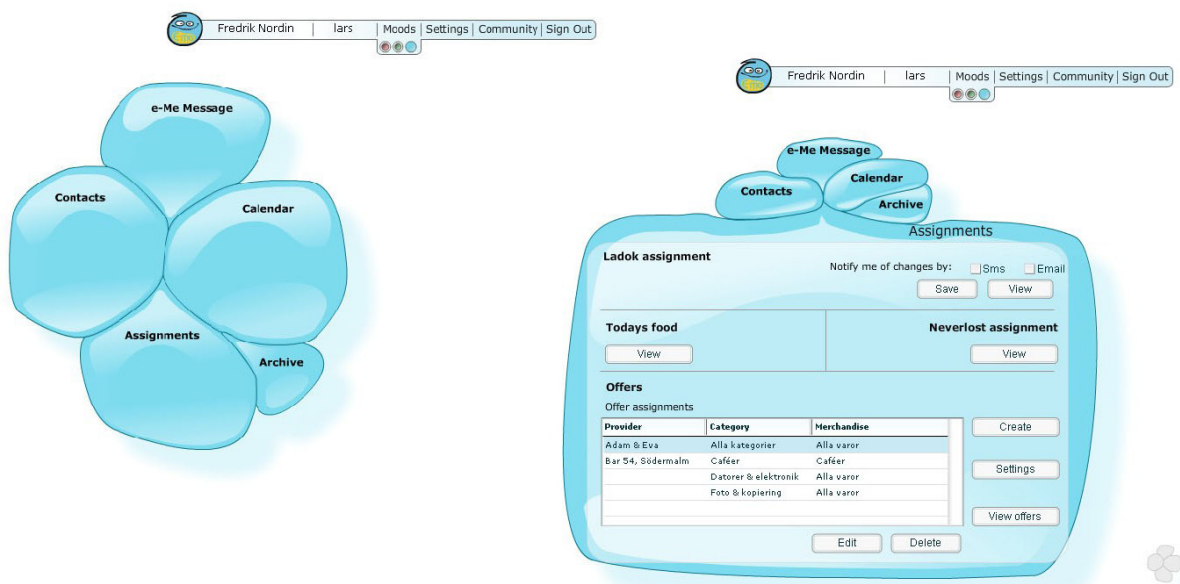
- **Community**, where the stakeholders; users, developers, e-Me project management and service providers can discuss the e-Me, suggest improvements/additional services and share experiences.

In the left part of Figure 1 different “blobs” (views) of the e-Me is depicted. In the right part of the same figure one of the blobs (the assignment blob) is expanded. e-Me also supports device independency in the sense that e-Me gives a possibility for the user to interact with his/her e-Me via a web-browser or his/her mobile phone. This aspect of mobility also means that the e-Me could notify the user concerning different events (such as emails from contacts with the right mood, changes in schedule, matched offers, changes in the study results etc.).

But the purpose of the e-Me project is not only to develop a student assistant. At the same time it was desired to explore new ways of developing an information system. The development of e-Me was inspired by the philosophy of co-design (Albinsson, 2005; Albinsson & Forsgren, 2005ab). The term

co-design is used in different ways. In the context of our study it refers to an idea that was elaborated in (Forsgren, 1991) where it was still called co-construction. It has its roots in “systems thinking” as established by (Churchman, 1968). His principal idea was that we can design an unlimited number of views on reality. They may differ in their granularity (level of detail), their perspective, their level of abstraction, and so on. But from Churchman’s point of view this is not sufficient. We must also “calibrate” the viewing instrument (or measurement scale) to arrive at (or agree on) a view that is supposed to be implemented. The necessity to agree upon some common design for a system has also been put attention on by other scholars (c.f. Liu et al, 2002). This collective process of designing views and choosing the best one is called co-design. It has shaped the way we look at social systems in general and information systems in particular (Ackoff, 1981; Checkland, 1988; Mitroff and Mason, 1981). The notion of co-design is considered to go beyond the notion of participatory design (Mumford, 1983) in the sense of admitting and letting *several* views of reality shape and drive several complementary design processes.

Figure 1. The e-Me User Interface (c.f. Lind et al, 2007)



The purpose of this paper is to analyze experiences developed by some users involved in the stage of the e-Me project when 120 students were invited to participate in order to make some reflections over different dimensions of co-design processes as such. Even though that the e-Me galaxy is an arena letting several stakeholders, where one of them are clients (in our case students), we will in this paper just explore experiences derived from the student's participation in the proof-of-concept phase of the e-Me project. Following this section the research method adopted in this paper is described by starting out discussing in what ways students, as clients of an innovative artifact, could be seen as and involved as co-designers. In this section the procedures and results of the data collection made in the paper is also put forward. This is followed by an analysis of the empirical data in order to reflect upon perceived usefulness by the students, the development process as a co-design process, the learning process for the students as well as future development of e-Me. Before the conclusions we reflect upon how the co-design process could be supported even better, e.g. by different kinds of tools.

RESEARCH METHOD

Co-Design as a Way to Involve Clients in the Design, Deployment and Test of e-Me

A core idea in the co-design, which is both a scientific approach as well as a development approach, is that there is a close relation between innovative product/service development and knowledge creation (Forsgren, 1995; Lind et al, 2007). Businesses and organizations constantly try to capture knowledge about ideal situations for customers or clients, which they match with knowledge about resources they have or can create. Successful businesses/organizations are able to constantly developing their knowledge about customer ideals and their own matching resources. Customers or clients on the other hand constantly try to imagine

and find out knowledge about their own ideal situations and look for affordable resources, which can make it possible for them to come closer to ideal situations. In this view, researchers ideally collaborate with businesses and organizations as well as customers in discovering the lacking knowledge. The researchers place themselves in between the organization(s) and the customers trying to manage the design in order to come to agreements among the different stakeholders. The dynamic interplay between these actors and processes constitutes the core of the co-design knowledge creation process (Grönlund, 2000). All the way through this process there is also a constantly ongoing inspiration communication flow. The involved actors try to get inspiration from the knowledge creation in other relevant projects as well as they try to get others inspired by their work.

This e-Me project shows how researchers in collaboration with different stakeholders have created a new type of arena, e-Me, where the customers, in this case the students, can develop their ideals into a profile, which govern e-Me as an electronic assistant and filter (bodyguard). From the service providing companies perspective e-Me can serve as input for new service development activities, as well as it gives a relevant and high precision channel for marketing and service delivery. In this project the aim was to continuously involve students as clients in the development process. At different stages in this process this was done by involving:

1. a smaller group of students (approx. 50) to be active in the process of ideal-oriented design of scenarios where e-Me would be of support to them (Albinsson et al, 2006ab)
2. a larger group of students (approx. 16 000) to both quantitative and qualitative evaluate generated scenarios (3200 answers) (Lindell et al, 2006)
3. a key group of students (approx 10) as test group for refining requirements, testing and evaluating the continuous growth of e-Me as an artifact towards the development of the first

version. These students were highly involved in pinpointing micro-scenarios for different (thought) usage situations of the artifact. These students also became ambassadors and coordinator of the student involvement in the next stage.

4. a group of students (approx 120) as early users and evaluators in the pilot implementation of e-Me (c.f. Lind et al, 2007). This evaluation was made both in terms of functionality and usability. This evaluation also meant that situations when e-Me would be of support were identified and shared among the users. This process also triggered the students to identify new situations where e-Me would help out in finding new areas of application in which it would be of support the life situation of the student. The different ideas for refinements put forward by the students were handled by the development team. Several deployments were made of refined versions of the e-Me during the 3.5 months when the e-Me was up and running for this pilot group.

In terms of co-design this means that students were involved in many different stages of the development process of e-Me, which has been true for a variety of other stakeholders also. The results so far is a proof-of-concept of the e-Me as an artifact as well as requirements when e-Me is developed and deployed, as a full-scale application, for many users. It is important to note that e-Me relies on letting both many users, and many service providers take part in the same galaxy. For the different stakeholders value is created through the existence of many actors.

This means that the users' comments and design proposals have been of different characteristics throughout the e-Me project. In the last stage these comments served as essential parts of the communication going on between different stakeholders involved in the project. The arenas for this communication were a virtual community, interaction with student ambassadors and

by workshops involving several stakeholders. In this sense the notion of co-design is conceived as an approach spanning all the way from taking different stakeholders insights and ideas for development into account in the knowledge creation process to involving several parties in the phase of design and realization of IT-based artifacts. Several roles were involved such as evaluators, designers, programmers etc, where the students mainly served as evaluators and in principal as designers.

The purpose of this paper is to qualitatively analyze some experiences developed by a few users involved in the last stage of the process described above.

Data Collection and Procedures for Analysis

As one part of the project we collected the empirical data with the help of semi-structured interviews. Other collections of empirical data were made during the project such as:

- statements made by different stakeholders in the (virtual) community space that was created as a part of e-Me. In this space interaction between different stakeholders, such as the project management, researchers, designers, service providers, the programming team, and the students as users could take place. The goal was to create an on-going dialogue between the various stakeholders in order to improve the design and the understanding of the concept of an electronic assistant (Lind et al, 2007).
- logbooks from different meetings with student coordinators reflecting the current state of concern as well as decisions made for advancing the refinement of the prototype
- intermediary workshops evaluating the students experiences from using e-Me involving other stakeholders to investigate their concerns (Lind et al, 2007).

In this paper we adopt an individual perspective of the user by the semi-structured interviews. This analysis is to be seen as a complement to other evaluations made as described above. Out of the group of the 120 pilot students who tested the e-Me system 3 enthusiastic students (student A, B, and C in the table below) who use the system on a regular basis were chosen. The perspective of the disappointed student was also chosen (student DISS in the table below). This perspective was derived by letting the student coordinator of the e-Me project formulate answers that would be given by a disappointed student based on impressions derived during the pilot period. The questions and the answers of these users are summarized in Table 1.

The empirical data has been analyzed on qualitative basis taking the four core categories used in the semi-structured interviews. Within each category similarities and differences in the answers given by the respondents were identified. Results captured in other evaluations, as described above, has been related to this division when needed to complement

the analysis made of the empirical data put forward in this paper.

ANALYSIS OF EMPIRICAL DATA

We have divided the analysis into four areas of concern: perceived usefulness of e-Me, the development process as a co-design process, learning process, and future development of e-Me. The reason for this is that we wanted to study the development process as a co-design process which means that we must look at the development process itself, but also at the product of this process and the individual learning processes of the people involved.

Perceived Usefulness of e-Me

All students have initially thought of e-me as a relevant and important contribution to their life by helping the student in his/her administrative and daily chores. This seems to indicate that there

Table 1. Answers of the regular users

Question	A	B	C	DISS	
Perceived usefulness					
What was your first thought when you heard about e-Me?	Innovative	Useful	Interesting	Hard to understand what e-Me was	
What made you decide to try e-Me?	Need for that software and being part of the test group	To help out with testing	Because it seemed useful	Everybody else was trying it	
How often did/do you use e-Me:	In the beginning?	1-2/day	4/week	2/day	A lot
	After having understood the software?	2-3/day	8/week	2/day	Much less since I got tired of the bugs
	Currently?	2-3/day	2-3/day	2/week	No
What is your major reason for using e-Me?	Email is tied to it	Calendar, email is tied to it	I use e-Me seldom because of email problems	Inventive GUI, nice integration	
Which functionality are you using most?	Email	Email	Calendar, student admission & documentation system	Calendar integration with NeverLost, SMS notification	
Which functionalities do you not use and why?	Lunch menu (bring own lunch)	Lunch menu (bring own lunch)	Email (forwarding & attachments are unreliable), lunch menu (bring my own lunch)	Email (since it did not work perfectly) and offers (the content did not match my desires)	

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Table 1. Continued

Question	A	B	C	DISS
What change or new feature would make you consider a more frequent use?	Better GUI & functionality of email	Integration of bus schedule	Reliable email attachments & forwarding, integration of e-learning platform	More (user-decided) notification via SMS and connection to existing web-applications
Development process				
Which bugs have you reported and were they fixed?	Email attachments are lost (partly solved)	Moods always red (solved)	Email attachments and forwarded emails are lost, (not solved)	Problems with the e-Me message application (solved)
Which improvements/new features have you suggested and were they implemented?	Printouts available on site, integration of library services, bus schedule, loyalty cards and menus from other restaurants (none implemented)	Integration of bus schedule (not implemented)	Integration of e-learning platform (not implemented)	---
Do you feel that you have an impact on the development?	Yes, at the early stages.	Yes, strongly.	Not directly.	Not directly
What impact did you make?	Layout of the GUI	Calendar design, integration of student discount card	I hope that my suggestions are considered for the next version.	I hope that my suggestions are considered for the next version.
What would make you assume a more active role as a co-designer?	Personal feedback from the developers	Don't know	Higher usability of e-Me, regular meetings with face-to-face discussions $\geq 1/\text{month}$	---
Learning process				
How did you learn how to use e-Me?	Introduction & self-learning	Introduction & self-learning	Self-learning	Self-learning
Was it hard to understand?	Some parts (e.g. the calendar)	No, only the date format	No	A bit difficult to learn the GUI
Which learning method would you have preferred?	Personal tutoring & self-learning	Manual & self-learning	Self-learning	Computer-based tutorial integrated personal tutoring
How would you judge your computer literacy on a percentage scale?	80 – 95 %	90 – 95 %	80 – 90 %	80 %
Future development				
Which other software do you use for a functionality covered by e-me and why?	Other email clients in addition to e-Me (because they offer more functionality and because some mail providers do not support pop free of charge)	Other email clients in addition to e-Me (because they are more reliable and because some mail providers do not support pop free of charge)	Other email clients instead of e-Me (because email is not reliable in e-Me)	Other email clients instead of e-Me (because some of the functionality of e-Me is provided by other email clients)
How much of your vision of a student assistant is available in the prototype?	50 %	40 %	10 – 20 %	10 – 20 %
What are the major features missing with respect to that vision?	Full-fledged email & calendar, integration of library services	Full-fledged email & calendar, integration of bus schedule	Full-fledged email & calendar, integration of e-learning platform	More connections with other software that is used in everyday life

is indeed a demand for an integrated solution for students and that students are missing something in existing solutions used by them today. The regular users have mostly begun to use the system hesitantly but made frequent use of it after having become acquainted to it. There is one notable exception though of a student who complained early about problems with lost email attachments. Because this problem was never completely solved this student ceased to use the email functionality of e-Me and reverted to the use of other email clients. As email is a central component of e-Me this implies that the respective student is hardly using the system anymore and perceives very little usefulness.

The students however found that the idea about email aggregation, from many different sources, governed by contacts and mood had a lot potential. It has been found that students have 3-4 email addresses and that the e-Me email client is supposed to meet a demand of the students by making it possible to aggregate emails from several email clients. So – from a pilot perspective of e-Me one can, even if there were some bugs reported, claim that an important requirement for a full-scale e-Me is an email client that can handle aggregation based on mood and contacts from several email sources. Most users indicate that the email component is one driving force for them to use the e-Me system. This is not because the students perceive this component as well-designed (the contrary is true) but because, besides that the e-Me email client solves a problem, their mailbox is tied to the e-Me mail client and it would require some effort to change it back to some other client. This is interesting because it shows that simple technical measures such as default settings/installations can be enough to make a user continue using a system (similar to the Internet Explorer in Windows systems). This mechanism can therefore be used to sustain the interest of the pilot users of a prototypical and innovative system beyond the point where the software becomes sufficiently mature to be really useful. The ambitions from the management team of e-Me was to ensure transaction-intensive components in e-Me for driving the students to continuously use the e-Me. Especially the email and calendar components fulfilled such goal.

Among all components provided by e-Me, regular users name email and calendar as the most important ones. The email receives the highest valuation and is perceived as important per se. The calendar is seen as the second most important component and considerable weight is attached to the integration of the calendar with the NeverLost course schedule management system. This allows students to see each class as an entry in the calendar and to synchronize their courses with other activities in a straightforward way. The possibility to share the calendar among other e-Me users were also identified as important by the users and implemented in the pilot during the pilot period. The component with the least perceived usefulness is the lunch menu of the student cafeteria because many students bring their own food. To be noted is that the lunch menu was not part of the initial scenarios. This was an initiative made by some of the pilot students. The evaluation reported upon in this paper shows that the lunch menu was not enough adopted by as many users as desired.

Interesting to note from this evaluation (see table one) is that there are some dimensions of the e-Me pilot that are not drawn attention towards. Some examples of this are the study results module and the offers module. We do however have other reports from the pilot period of the value of these two components (c.f. Lind et al, 2007).

All regular users stressed the importance of a professional email component for the continued use of e-Me. Beyond fixing the bugs already mentioned this means that the e-Me mail client should provide the same or similar functionality and user interface as others available on the market. In order to avoid such comparisons the ambition from the management team was to derive a user interface that not looked like other solutions of today. The uniqueness of the user interface did make many users of e-Me think that it was something else. After the pilot period the management team will however consider the possibility of exporting (filtered) data to existing calendar and email clients as an important complement/alternative to the existing email and calendar clients bound to the e-Me as such. In addition to this the students required a more convenient access

to printouts which currently have to be collected in a different building. It is also apparent from the students' comments that the existing features are not sufficient for an integrated student platform. Among the high-priority issues for a future release are the integration of library services, e-learning platform, bus schedule, loyalty cards, integration with the bank and menus from other restaurants. These requirements were possible to draw out when the e-Me concept became externalized in the form of a (pilot) artifact and the users started to use it and saw the potential. Besides that it also meant that the basic idea about personalization through mood management and the e-Me as a social proxy of the user (c.f. Albinsson et al, 2006ab) could be tried out and reflected upon. Besides the importance of creating an e-Me space in which a lot of different services, private and public, became integrated it also turned out that notification, when your e-Me tells you when something (as desired) has happened, was conceived as very useful and important.

Development Process as a Co-Design Process

The development process during the pilot period had the ambition to follow the principles of co-design. The goal of the co-design in this stage was to arrive at proof-of-concept and (hopefully) have several future users reflecting over existing and new usage situations, and thereby new services, for the e-Me. The first version of the e-Me consisted of some bugs, and users were able to report upon identified bugs interactively in the community space. The developers responded quickly to the bugs that were reported and fixed them as soon as possible. As a result the regular users were largely satisfied with the way their concerns were treated. The problem with the lost attachments was not completely solved, though, and remains an open issue. As the problem occurs only seldom now most users are nevertheless satisfied with the situation. But some users expect the email component to be 100 % reliable and they have therefore stopped using it. An important experience to draw upon is that it is important that if we expect users to continuously use and evaluate artifacts as

co-designers we need to be sensitive in the sense of ensuring enough quality so the users continue using it. As reported, most of the bugs were fixed quickly and most users were satisfied. It is however a risk that the goal of the co-design in this stage never would be reached if the users concentrate on finding bugs and complaining about the quality of the software instead of having a mindset oriented towards future improvements.

A different situation was encountered regarding suggestions of additional features (for details about them see section "Perceived Usefulness"). Due to budgetary restrictions some of these could not be considered for the current version although some of them were seen as highly desirable by the students. An important challenge that this situation unfolds is how to ensure a continuous use and evaluation of the artifact given the fact that some of the initiatives of improvement taken by the students were not possible to realize. In these cases the co-design process was put on hold in the sense that the knowledge creation was started, but not finalized in the due to that additional designs were implemented in the artifact. A co-design process could therefore not be observed in the later stages of the design process but only during the earlier stages of requirements gathering. A further investigation of this issue seems worthwhile as the design of new functionality provides a richer arena for the unfolding of creativity.

There was however other situations where some of the interviewed students were involved as co-designers from idea to implemented solution (during the pilot period). They helped in designing the layout of the user interface, a new version of the calendar and the integration of the offers module (Swedish student discount card) into the pilot. They thereby contributed substantially to the way the software looks and works. They did so in close collaboration with the developers and they felt that they had a real impact on the development. The majority of the test users were however during this stage of the project more actively involved in the early stages of the co-design process such as identifying requirements and in the design of new usage situations, but not in the specific development of the artifact. In a more open environment an ambition is

that users themselves would be able to also design and implement additional features (user-generated services). This is an ambition for the future, but in this stage of the project the goal was to arrive at proof-of-concept.

This raises a number of interesting questions concerning the feasibility of the co-design approach. The first could be phrased as: How can we stimulate people to participate in co-design? The study results show that the mere interest in the software is not enough for that. From this question we can see two important areas of concern. First of all we believe that the input made by co-designing users need to be taken seriously and followed up during the process. Secondly we need to pedagogically ensure that the user adopts a co-designing mindset. Potentially we believe that the virtual community was not enough to solve the whole situation – in some situations a user needs personal feedback from the developers and regular face-to-face meetings with them to discuss issues and possible solutions. Some needs in the co-design process could be taken care of through a virtual community, as e.g. informing others of what is happening etc., but some tasks might demand more direct contact between certain roles. Another area of concern is also what level of activity that key persons associated to the vision of the project should have in making statements in the community.

This takes us to the second question: How can the involvement of a potentially large number of co-designers be organized in an effective and efficient way? Each new feature has been suggested by many students. Can and should they all participate in all the phases of the co-design process concerning all features? Including additional co-designers involves the risk of duplication of effort if some of them come up with very similar solutions. By excluding them we run the risk of losing some important contribution. How do we determine a reasonable composition of the co-design team for the latter phases of the co-design process such as design and implementation? Our study cannot finally answer these questions but it indicates that a team should consist of the clients who are most committed to the particular feature, i.e. have a vital interest in seeing it implemented

and using it. This is typically a small group of two or three students that can be an effective co-design team complementing the development team. In the project the student ambassadors worked in close collaboration with the development team. On the other hand we must also avoid putting expectations on such users of being experts in software design, but they should, as super users, at least represent a wider group of users in their involvement in the knowledge creation process relying on collaboration between several stakeholders.

Another question is related to the treatment of conflicts. What do we do if some co-designers prefer incompatible solutions? A survey of a representative part of the student community could decide this conflict one way or the other. As such a survey would necessarily be hypothetical we cannot be sure that the respondents understand the implications of their choice for the use of the software. Another alternative is the implementation of conflicting solutions as configurable run-time options of the software. This result in more flexible software that can be adapted to the needs of a broader range of users but it also makes the system harder to maintain. So far the e-Me project did not exhibit problems of this kind.

Learning Process

Most of the students that participated in this study consider themselves as capable computer users. They prefer to learn about the use of software by themselves, possibly complemented by a manual or a short personal introduction. They all described e-Me as an application that is very easy to understand and get started with. They experienced only a few minor problems during the learning period. These problems were related to the calendar function and the entry of dates. The latter was rather a bug that has subsequently been fixed by the deployment of a new calendar during the pilot period.

Related to learning and getting users to work with the artifact is the question of how users could influence each other by telling each other of different configurations of their e-Me that were made in order to facilitate different situations when e-Me was of

value in their daily life. The experiences from the pilot period were that this task is tricky. It had to do with how such situation should be documented, how to get users engaged in telling such stories for each other, and how such information was supposed to be distributed among the participants. The virtual community was used for this purpose.

Future Development of e-Me

Asked about the use of other software for purposes covered by e-Me, most students answered that they use additional email clients or webmail agents. Partly this is related to the fact that a few free-of-charge email providers popular among students do not offer the POP protocol required by e-Me. But to a considerable extent it is due to the relatively simple functionality of e-Me's mail component as compared to common clients. Students have therefore come to expect a standard that cannot be achieved by a research prototype. But even for a commercial endeavor it seems hardly reasonable to invest money into building something that already exists in multitude. A more viable alternative for e-Me can consist in the integration of existing open-source email clients into the e-Me framework. Due to the fact that the students have several email clients the important thing is not to create a new e-Me email client – rather to ensure that e-Me filters out and distributes emails from several email clients based on mood and contacts.

Regarding the most important next steps in the development the students mention integration before high level of functionality on each component (c.f. Lind et al, 2007). Example of additional integration to e-Me are library services, e-learning platforms, public transport schedule, and financial management related to their bank accounts. They expect these features to be part of the next release. As information systems for these purposes already exist, the integration of these services into e-Me is primarily a question of suitable interfaces. It is interesting to observe, though, that many of the regular users consider that even the first prototype already contains almost half of the functionality of an envisioned

“ideal” system. This seems to indicate that the groundwork for e-Me has been done thoroughly and adequately with respect to the requirements of such a system. Further work is necessary though to involve a larger number of students as active users. A higher degree of robustness of the existing components is a key issue in this work.

This paper has been about reporting upon experiences that students as users and clients have found. Since the philosophy behind e-Me is to put the client in the centre and that e-Me as an artifact is much about integrating services from private and public service providers there is also a similar discussion to be held regarding these providing parties involvement in the co-design process. This is however not within the scope of this paper. One future issue concerning the development of the next version, towards a full-scale e-Me artifact, is also to develop a protocol and business model that encourage many new service providers to adopt their services to the e-Me galaxy.

ONE CHALLENGE OF CO-DESIGN: TOOLS FOR COLLABORATION

As identified in this paper, running co-design processes is a complex and challenging task. Especially when there are a lot of stakeholders involved. It is popular today to use different kinds of (virtual) tools for enhancing collaboration among different people. In the e-Me project an important step was taken by establishing a virtual community as an integrated part of the artifact as a complement to different kinds of physical and face-to-face meeting for stimulating interaction between the involved parties. Let us therefore reflect upon which role the virtual community had in this project and potentially come with some additional instruments to be tested in future applications.

The virtual community was implemented on share-point server technology. This community (as can be seen in figure 1) was an integrated part of e-Me. The purpose was for the different stakeholders in their appurtenant roles communicate with others.

The communication was about reporting upon bugs and refinements, identification of usage situations for the existing e-Me, as well as finding out new usage situations for the e-Me.

Incrementally this community was continuously filled with messages/comments of different kinds. At the end of the pilot period this virtual community was filled with the following categories of content:

- Messages (from the development team, the management team, and the researchers)
- Messages from the helpdesk
- Usage situations
- Existing functionality and proposals for improvement (for each existing component of e-Me)
- Proposals of improvement – new functions and usage situations
- Common discussions
- Documents (statistics, e-Me news etc)
- Latest

This virtual community, which also was called meta-community, was a first step towards inspiring dialogue among involved co-designers (project management, developers, designers, researchers, service providers, and students as users etc.). Besides the virtual community other face-to-face meetings such as management meetings involving student ambassadors, workshop involving different stakeholders etc. were arranged. Different incentives were also given to those who engaged themselves in a good way in the co-design process.

After the project period two reflections can be made regarding the use of the community – could the community be used even more actively? These two reflections are about how communication is performed and how structure can be given to some of the communication. First of all it is necessary to avoid that the community becomes an information storage. In this situation we can see a conflict *between* using a community in which the communication is directed to everyone *and* the desires of communicator's utterances to be directed to specified communicators. Such communicative dimensions

have been addressed a lot within language/action approaches to communication modeling (c.f. Dietz, 1999; Medina-Mora et al, 1992). The strength of the language/action perspective is that it is based on the idea that communication is not just transfer of information. When you communicate you also act (Searle, 1969).

The typical platform used for community-based communication is the whiteboard. A whiteboard is essentially a two-way storage where senders can store their messages and receivers can retrieve them. By its nature a whiteboard is therefore usually a platform for many-to-many communication. Direct one-to-one communication is hardly supported. For this type of communication Email is the preferred platform. Between these two extremes there is a range of communicative structures that is supported by neither platform in a direct way, e.g. a set of people wants to set up a communication link with another set of people for a limited time or purpose. Such coalitions might form spontaneously in a co-design situation for the purpose of discussing a certain design aspect or functionality between the users requiring this feature and the developers concerned in implementing it.

As indicated above part of the co-design process is the work of design. Such design work revolves around models. Architects and engineers draw blueprints, software developers build UML diagrams, fashion designer draw clothes designs and so on. Modeling is the language of design and design can hardly be done without modeling. The model serves as an artifact in itself that can be discussed and modified, but also as a blueprint for building prototypes and eventually products. This is especially true for a co-design process where a number of designers are involved that need some instrument for communicating design ideas. A large part of the co-design process is therefore a collaborative modeling process. We therefore conclude that tools for collaborative modeling are potentially useful for supporting some parts of the co-design process. Such tools would fulfill the needs of giving structure to such part of the co-design process in a better way than unspecific collaboration tools

such as community whiteboards. A promising tool in that area is the COMA tool (COLlaborative Modeling Architecture) that addresses many of the relevant concerns (see www.coma.nu). Using such a tool in the future development of e-Me would be interesting to explore as a complement to used processes (such as face-to-face meetings and the virtual community).

While COMA is suitable for structured collaboration, mainly negotiation of models, another tool, Compendium, has been devised for ill-structured problems, so-called wicked problems (Conklin et al, 2003). Compendium combines three different areas: meeting facilitation, graphical hypertext and conceptual frameworks. To make them work, facilitation is viewed as essential to remove the cognitive overhead for the group members, i.e., the necessity to develop hypertext literacy, which cannot be assumed in all participants. On the technology side, the critical elements are question-based templates, metadata and maps. They allow participants to move freely between different levels of abstraction and formalization as the need dictates. The question-based templates guide the process by supplying relevant questions, the answers to which will lead the group towards a better understanding of the problem and towards the development of appropriate solutions (e.g., models). The metadata is used to provide additional information that is also considered relevant but was not anticipated in the templates or lies at the intersection of templates. The maps have a hierarchical structure and the same concept can appear in different maps so that its use in different contexts can be understood. This feature is called transclusion.

CONCLUSION

This paper has been about exploring experiences derived by different users in the work of developing and trying out a personalized artifact acting as a filter and an agent in information society. The artifact as such is to be seen as a socio-technical instruments and the process as such has been embedded with both technical and social dimensions.

Technical in the sense that the artifact has been the topic for ongoing discussions and that the process has been supported by IT-based tools for enhancing the collaboration among different stakeholders. We understand the term social in the sense that the process of development, use, learning, and evaluation has been highly influenced by the interaction between different stakeholders.

A central issue in socio-technical system has been the involvement of the users in the development process of information systems. One of the pioneers of this field, Enid Mumford, introduced 3 levels of user participation: Consultative, representative and consensus participation (Mumford, 1983). Co-design strives for consensus participation but goes beyond that in addressing also the issue of how this consensus can be reached.

The analysis performed in this paper has made us identify some challenges associated with involving several people in co-design processes. These are:

- How to ensure that users of premature artifacts keep up their interest in continuously trying out the artifact in the design process?
- How to find a good balance between satisfying desires by users and priorities needed to make in order to meet financial conditions?
- How to ensure a mindset as co-designers among the different stakeholders?
- How to ensure that different users support themselves in identifying different usage situations based on available functionality of an artifact?
- How can the involvement of a potentially large number of co-designers be organized in an effective and efficient way?
- In which phases of the co-design process should users be involved / engaged?
- How do we determine a reasonable composition of the co-design team for the latter phases of the co-design process such as design and implementation?

As one part of the result is a proposal for further research concerns the exploration of the use of different tools for collaboration in such processes

involving several stakeholders. One important step was made in the e-Me project in which a share-point server based community was set up. For some parts of the co-design process aiming towards collaborative modeling it seems that such open community is not enough. In this paper we have therefore explored the possibility to complement the co-design process, such as the continuous deployment of an innovative artifact such as e-Me, with tools for collaborative modeling. This is especially important if the ambitions of deploying e-Me in a more open environment also giving users the possibility to develop and deploy user-generated services.

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REFERENCES

Ackoff, R. L. (1981). *Creating the corporate future*. New York: Wiley.

Albinsson, L. (2005). *Using Dramatised Scenarios to Co-Design eGovernment Services*. Paper accepted to the eChallenges 2005 in Ljubljana, Slovenia.

Albinsson, L., & Forsgren, O. (2005a). The Electronic Assistant e-Me – An Important Element in a Design Language for Co-Design. *Published in the Proceedings for Egov 05*, Denmark.

Albinsson, L., & Forsgren, O. (2005b). Co-Design Metaphors and Scenarios – Two Elements in a Design Language for Co-Design. *Published in the Proceedings of LAP 2005*, Sweden.

Albinsson L., Forsgren O., & Lind M. (2006a). *e-Me Stories & Scenarios - The Ideal Electronic Galaxy of the Student*, University College of Borås, Sweden

Albinsson, L., Forsgren O., Lind M., & Ozan, H. (2006b). *Turning the Internet Around – e-Me: The Students ideal e-Service*. Paper accepted to and presented at eChallenges 2006, Barcelona, Spain.

Checkland, P. B. (1988). Soft systems methodology: An overview. *J. of Applied Systems Analysis*, 15, 27-30.

Churchman, C. W. (1968). *The Systems Approach*. New York: Dell Publishing.

Conklin, J., Selvin, A., Buckingham Shum, S., & Sierhuis, M. (2003). Facilitated Hypertext for Collective Sensemaking: 15 Years on from gIBIS. In H. Weigand, G. Goldkuhl, & A. de Moor (Eds.), *Proceedings of the 8th International Working Conference on the Language-Action Perspective on Communication Modeling (LAP'03)*, Tilburg, The Netherlands

Dietz, J. L. G. (1999). Understanding and Modeling Business Processes with DEMO. *Proc. 18th International Conference on Conceptual Modeling (ER'99)*, Paris

Forsgren O. (1991) Co-constructive computer applications: Core ideas and some complementary strategies in the development of a humanistic computer science. In M. Bazewicz (Ed.), *Information systems architecture and technologies - ISAT'91*. Politechnika Wroclawska, Wroclaw, pp 45-53.

Forsgren, O. (2005). C West Churchman and the new world of co-design. In J.P. van Gigh and Janet McIntyre (Eds.), *Rescuing the Enlightenment from Itself*, Volume # 1 in Book Series Churchman's Legacy and Related Works, Springer/Kluwer

Grönlund Å (2000). *Managing electronic services: A Public Service Perspective*. London: Springer,

Lind, M., Albinsson, L., Forsgren, O., & Hedman, J. (2007). Integrated Development, Use and Learning in a Co-design Setting: Experiences from the Incremental Deployment of e-Me. *eChallenges e-2007*, The Hague, The Netherlands

Lindell, S., Lind, M., & Forsgren, O. (2006). Students as e-Citizens – Deriving Future Needs of

e-Services for Students. *Accepted to International Workshop on E-Services in Public Administration (WESPA2006)*, pp. 99-114, 31/10-2006, University College of Borås, Sweden.

Liu, K., Sun, L., & Bennett, K. (2002). Co-Design of Business and IT Systems. *Information Systems Frontiers*, 4(3), 251-256

Medina-Mora, R., Winograd, T., Flores, R., & Flores, F. (1992). The Action Workflow Approach to Workflow Management Technology, In Turner J., Kraut R. (Eds.), *Proceedings of the Conference on Computer-Supported Cooperative Work, CSCW'92*, ACM Press, New York

Mitroff, I. I., & Mason, R. O. (1981). Creating a dialectical social science. Dordrecht: Reidel.

Mumford, E. (1983). *Designing human systems, the ETHICS approach*. Manchester Business School, Manchester, UK

Searle J. R. (1969). *Speech Acts. An Essay in the Philosophy of Language*, Cambridge University Press, London

KEY TERMS

e-Me: An electronic self that acts on behalf of the user and provides him or her with desired services and information, i.e. pull instead of push.

Co-design: A method for system development that takes into account the multiple viewpoints of different stakeholders and tries to create a system that balances these partially conflicting views by enhancing mutual understanding and facilitating consensus achievement.

Scenario: A description of a potential usage situation of an information system on a general level in natural language, possibly supported by graphical means (e.g. comics) to facilitate communication about requirements between all types of stakeholders.

Community: A group of people that share a common problem or interest and that use an appropriate forum to discuss it, maybe supported by IT (blogs, newsgroups, etc.).

(User) involvement: The active participation of the user in the system development process to ensure that the system design meets the users' needs.

Collaborative modeling tool: A tool that supports a group of people in jointly elaborating a model of a prospective IT system.

Communication tool: A tool that supports a community in discussing topics of common interest.