

From Small Scale to Large Scale User Participation: A Case Study of Participatory Design in E-government Systems

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ABSTRACT

Most experiments with participative design are with small scale, stand alone and not very strategic applications of ICT in organizations. However, modern ICT applications are increasingly based on complex and large scale network technologies. What PD issues arise in this type of projects? What methods can be used for user participation? And, what does this imply for PD strategies?

Categories and Subject Descriptors

K.6.1 [Project and People Management]: Systems analysis and design; K.4.1 [Public Policy Issues] Privacy, Regulation, Trans-border data flow.

General Terms

Management, Design, Experimentation, Standardization, Theory, Human Factors, Legal Aspects.

Keywords

Participatory design, user involvement, large technical systems, international e-government, democracy.

1. INTRODUCTION

Modern societies are increasingly becoming ‘network societies’. Trying to avoid technological determinism, Manuel Castells argues how ICT based communication networks form the material base of the emerging network society [3]. If this is the case, then we witness at present the social and technical shaping of the basic parameters for society and economy, which will have long term effects on all social domains, such as the organization of the economy, organizations, government, and the public services. Large technology development programs have been launched to

support the design and building of basic models, systems and infrastructures for (interactive) information, communication and transactional services that will gradually replace the traditional arrangements. In the dominant political discourse, these developments are advertised as the unavoidable route to a new technical infrastructure for sustained economic growth, for employment creation, and for improving the quality of the life: an ‘information society for all’ [7].¹

However, we know from technology studies that technology is not neutral, as it is characterized by design specific affordances and embodies specific scripts, through which the designers consciously or unconsciously try to configure users. At the same time, users may appropriate the new technologies in various and unexpected manners, and in these processes of diffusion the emerging socio-technical systems may change [1, 2, 27, 28]. In other words, we are not moving towards *the* e-society, based on e-business, e-commerce, and e-government, but we have to evaluate critically in what direction we are moving, what alternative options are possible, and what social choices can and have to be made.

In the last decade “... it has been recognized that an important characteristic of modern technology is the existence of complex and large technical systems – spatially extended and functionally integrated socio-technical networks such as electrical power, railroad, and telephone systems” [11]. Hughes’ seminal history of the electrification of the world shows how Large Technical Systems (LTS) operate as networks of many interacting technical and social components [11]. LTS have the following properties [8]: they are large scale, affecting many people and institutions. They are also complex: many political, administrative, organizational, legal, and technical issues are relevant in the design, development, implementation, maintenance, and use of these systems. Furthermore they are infrastructures, and face difficult issues of standardization. And finally large technical systems embody political ideas and ideologies.

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¹ The European program for this is – among others - the sequence of Information Society Technologies programs, as part of the European *Framework Programs*. The case study underlying this paper was part of a 5th Framework Program research project.

The old question posed by Langdon Winner ‘what do we do when making this technology work?’ is still very relevant [30], but increasingly on the level of large technical systems and ICT based infrastructures (ICTI’s). If technology is not neutral and a product of human action in a social context, can we use PD to democratize the development of the ICT’s in the information society? How to enable a variety of actors, interests, and criteria to play a role in the design process, and how can these interests and the outcomes be balanced?² Can we use lessons en methods from participatory design to include the variety of political views and social interests in the socio-technical shaping of future trajectories of ICTI’s?

2. FROM SMALL TO LARGE SCALE PD

In a previous article, we evaluated fifteen ‘best practice’ PD projects from the 1970s to the early 1990s. The general conclusion from all these projects is that under appropriate conditions, users are capable of participating actively and effectively in information systems development [4]. The evaluated projects differed in many respects, but also had some important common characteristics. One of the similarities was that most projects focused on small stand-alone applications of IT, indicating a low organizational complexity of the projects: “Since most projects have been relatively small, we do not yet have much experience on which to draw for participative approaches to develop large applications, integrating existing systems or creating technical and organizational infrastructures to support PC based “end-user computing” [4]. Comparing PD with other efforts of democratizing technological development we found that “participation in small-scale and micro-level technical development projects is relatively successful, whereas intervening in large-scale projects at company level or sectoral level generally is unsuccessful” [27]. Furthermore, most projects were led by a PD-researcher, who also provided the resources. And, the ‘political’ goal of the project generally was the improvement of the working conditions of employees, in negotiation with management. Much has changed within PD since then, but the projects are still predominantly small scale, stand alone, and researcher led.

From participation in the design and development of small scale isolated systems, we now move into the directions of participation in systems innovation [22] in the development of large technical systems. Is it possible to use PD methods in more complex environments? In infrastructural developments the number and variety of involved users is often very large. In the international e-government case we will describe below, we had to deal with many different user categories, coming from different countries with different cultural backgrounds, opinions, norms and values, all influencing the requirements, expectations, evaluation and acceptance of the new technology. Another issue is the nature of participation. In small scale projects, users can be engaged in directly shaping their own working or living conditions, in other words the relation between interests and design is rather direct.

² In this paper we do not develop a theoretical perspective on the development of ICTI’s. Elsewhere we analyze the development of ICTI’s in terms of social learning and based actor-network theory [9]. In this way also the temporal dimension of PD (sustainability) can be taken into account.

This holds for the *end users* (workers, citizens) and for the (operational) *managers* of the systems. However, in the design and development of ICTI, participants have different roles, focusing on political and strategic issues. In other words here also *citizens*, *decision makers*, and *politicians* are involved. This has important implications for organizing PD, as many PD techniques are based on the direct interaction of the user with the technology, in a more or less real life context. In ICTI design, this generally cannot be done. For parts of the system, like the more operational aspects of the infrastructure, it may be an option to build prototypes for experimentation, or to do ethnographic observations of technology use in context. However the more general political and normative dimensions, as well as indirect and long term effects, cannot be accounted for in this way; nevertheless they should be reflected in the design.³ To do this, we need other approaches to complement traditional PD methods. In this way PD becomes a part of a larger techno-political agenda, as PD (alone) is not the answer to every design or assessment problem [13].

In this paper we present one of the case studies⁴ in which we tried to involve users in the design and development of a prototype of an infrastructural system, by combining PD approaches with approaches developed in the technology assessment tradition [27]. More specifically, we combine local involvement of users in design and development activities, using a variety of PD methods, with researching the potential long term effects of the systems proposed. And both inform social choice in design, development and social integration of the new technology.

3. THE CASE: THE FASME PROJECT

The FASME project aimed at designing and building an internet and smart card based system to support mobile Europeans with administrative transactions between countries.⁵ The case is typically an ICT based infrastructure, as it is complex, international, involves many different users, institutions and regulations, and the system embodies the political ideology of a

³ We cannot go into detail here, but technological development is also a long term process. During use and diffusion the technology develops further. For this the term ‘innofusion’ has been coined, as a combination of inno(vation) and (dif)fusion. [9]

⁴ The case is part of a larger research program on the role of users in the design of large technical systems. [9, 18, 25, 26]

⁵ The EU funded FASME (Facilitating Administrative Services for Mobile Europeans) project consisted of seven European cities and municipalities, three University based (applied) computer science departments, a University based social informatics department, and two consulting companies. The partners came from Germany (4), the UK (3), Netherlands (2), Belgium (1), Denmark (1), Italy (1), and Switzerland (1). The project ran for about two years. The project team consisted of four computer scientists, specializing in network security and systems architecture, two applied computer scientists specializing in business systems, some fifteen representatives of the various municipalities, four representatives of the two consulting firms, and two social informatics researchers. The latter two had the task of – among others – representing the end users: the citizen.

unified Europe. Millions of EU citizens reside in other member states, and this number is expected to increase considerably in the future. Mobile Europeans have to deal with many time-consuming administrative procedures, which differ between the various European countries [16]. When moving to another EU country, people often have to queue for hours to provide information, show their passport, hand over formal documents, and complete forms. One has to find one's way through many different departments and agencies, and this can be very hard. Foreigners generally need to visit a multitude of departments more than once to get things arranged. The project assumed that, in order to facilitate the European citizens' mobility, one needs to streamline a lot of the current bureaucratic obstacles. Especially a flexible way of getting the required documents from one country to another over the internet, was seen as an important step in the right direction. The basic idea the project started out with was to create a system that would enable the citizen to download the required information on the smart card, and to use this electronic document to arrange things in the new country. In order to realize such a system many problems had to be solved, as the information provided should be *authentic*, *current*, relevant, and referring to the person that uses the information (*identification*). The citizen on the other hand wants to be certain about *privacy*, which means that the municipality cannot read other information from the card than the citizen wants to show. Thirdly, the system should be *reliable* and not vulnerable to breakdowns or hackers, as the expatriate citizen heavily depends on it. This, by the way, did not only hold for the smart card, but also for the intended biometric identification technology. How good and reliable is a PKI based fingerprint system? Finally, the system should link many different administrative systems in various countries. As the legacy systems in the participating municipalities are very different, a *middleware* problem had to be solved: the interface between the local systems and the FASME system.

Another problem the project aimed at addressing is the exploding number of cards people carry with them. Quite a few of those are only used on an incidental basis. As a consequence, one is not able to find the correct card at the scarce moments one wants to use it, or cannot remember the password. The project saw the FASME card as a multifunctional card, which could replace various single function cards. In this way, the card would be attractive for many people, and therefore cheaper to produce. On the other hand, a multifunctional card creates new problems. Firstly, current storage capacity on a smart card is restricted, given the standardized size of the card (it has to fit in standardized card readers). To work around this capacity problem, a programmable smart card was proposed for the transport of a variety of personal documents in digital form [20], based on JavaCard technology. In contrast to common chip card technology, JavaCards are more flexible with respect to business process and software re-engineering, and they provide more support for high level data access control. Moreover, the JavaCard language was expected to become one of the more popular programming languages in the near future, and this made the technology attractive for the designers and programmers in the project team. The advantage of a programmable card for the user would be that he or she may change the applications on the card, depending on what is needed. Of course, this may require technology and skills at the users' side, but that problem was postponed to later.

Apart from technical problems, producing a multifunctional smart card also faces a variety of contextual problems. Introducing a smart card generally requires the users to adapt their business processes, and therefore it may be difficult to convince them to participate. Besides that, a multifunctional card has to cope with a variety of legal requirements, different for the different functions. As a consequence, the logistics of producing (and replacing) the card becomes complex, with long lead times. Finally, the process of reaching an agreement about the card may be rather difficult, and many actors with different views and interests are involved in the development [6, 9, 16].

When the project started, the technical and business partners proposed to develop and implement a model for international e-government for three predefined services, as a learning process. In a later phase the concept could be extended to more services. The first two services were decided immediately: registering a person and registering a car in a new (foreign) place of residence. The model would be based on the existing legal and administrative procedures in seven European cities: Antwerp (Belgium), Belfast (Northern Ireland), Cologne (Germany), Grosseto (Italy), The Hague (Netherlands), Neastved (Denmark) and Newcastle-upon-Tyne (UK). The initial idea was to use the JavaCard for downloading relevant documents through the internet and then storing them on the card, using biometric (fingerprint) identification and authorization techniques.

Two types of users were defined at this moment in the project. In the first place, the designers needed the input from the municipalities to understand the administrative processes, and especially the legal regulations. Secondly, the question was whether mobile European citizens would accept the technology. Social research was planned into the factors that might influence acceptance, as support for marketing the technology. However, the social researchers first focused on user needs, and on technology assessment issues, and postponed the acceptance issue to a later phase.

4. THE STAKEHOLDERS

We started with analyzing the social context of international e-government technology. The first thing to do was determining the relevant stakeholders. The most obvious were the municipalities, as the system was intended to integrate local municipal information systems. The municipalities were extensively represented in the project. However, a closer look showed that the municipalities form a layered set of users themselves. First of all, the management of the services addressed by the system, and the clerks working with the existing information systems, are two groups of relevant users, as the new technology will interfere with their practices and interests. And, the project of course depended on their knowledge of administrative procedures and regulations. Another category of important stakeholders is the political leadership and strategic management. In the participating cities they did have a strategic perspective on e-government, and this is not necessary in line with the views of operational management or clerks. Thirdly, local public services are embedded in – but not necessary completely dependent on – national regulations and procedures. Therefore changes on the local level and the national level may interfere with each other. A debate about e-government policies and about related intergovernmental relationships is very

different from a (participatory) design discourse on the operational level of development and implementation of systems. Nevertheless it has to be taken into account when developing e-government technologies. The main second group of intended users is of course the citizens. But this group is also very heterogeneous, as citizens differ in needs, opinions, and resources.

We distinguished the following classes of users:

- The end user of the services (client). This is a heterogeneous class in terms of age, gender, family status, main activity, education, language skills, nationality, country of destination, etc.
- The end user as citizen with political opinions about mobility, migration, international cooperation, and about technology, security, privacy and trust in e-government systems.
- The clerk using the new systems in changed work arrangements.
- The administrative management responsible for the way the services are organized and operated. As more services could be implemented on one smart card, this group may be heterogeneous too.
- Technical management, involved in shaping the technical infrastructure, and the coupling of heterogeneous databases and protocols.
- The strategic management and politicians, engaged in the legal and political deliberations about regulations and their translation into administrative procedures. Also this is a heterogeneous group, as visions and interests may differ, depending on the political point of view, the administrative sector involved, and depending on their position in the governmental system (local or national).
- The producers/and providers of the smart card, who may be different from the administrative bodies using the card.
- Other parties that may use the multifunctional card, such as providers of other public or private services.

These potential users all have a different relation to the proposed ICT infrastructure, resulting in different interests, opinions, and requirements, depending on their diverging positions and perspectives. Can all these perspectives be made explicit, and in what way? Can we introduce the different perspective into the design process? Is it possible to combine the results from the (technology) assessment of indirect and long term effects, with participatory design strategies and methods?⁶

5. ORGANIZING USER PARTICIPATION

As stated above, we have used a number of techniques and tools within our project to involve the different categories of users. We studied literature, of course. We also interviewed representatives from the various user groups and other involved parties. We used group discussions and scenario workshops to clarify existing procedures and to test the developed prototypes. In what follows, we briefly describe our approach and methods, and in the next section we will discuss what the user involvement meant for the users, and for the project. Learning occurred on two levels. First of all we learned about the possibilities and problems when organizing PD in complex systems design. Secondly, we learned

about the risks and opportunities of e-government systems, and how they are related with the design of the system. The analysis presented here covers the first 18 months period, which included a study of user needs, an interactive design process with the intended users, and an evaluation of the first testable prototype by various user groups.

5.1 The Citizens

As described, the project quite early selected specific services to focus on. This was done without any interaction with the intended user. Nevertheless, during the first phase of the project we set out to establish the user needs. For this we held in-depth interviews with expatriates from various countries, in order to catalogue the problems they encountered, and in which circumstances. To get a more general overview of the problems migrating European citizens encounter, and of the (non-electronic) solutions already available, we also interviewed several intermediaries, who are engaged in transporting and supporting international migrants. These intermediaries assist migrating citizens with all aspects of official documentation and accompany them for registration with the foreign police, the town hall, the tax office, and so on. They also assist migrants with customs clearance and with acquiring driving licenses and car registration papers. They explain the new countries health, financial and public transport systems. In addition to the migrants themselves, these professionals were a main source of information. Finally, we contacted organizations of expatriates.

Limited resources forced us to do our interviews in the Netherlands only. As it is not at all necessary that migration problems are similar everywhere, we did set up an online survey to check whether the findings from the interviews cover the problems mobile Europeans encounter in an adequate way. The respondents form a self selected sample, but we were more interested in the variety of problems mobile Europeans encounter, than in a representative picture.

5.2 The Municipalities

Throughout the project, we organized five workshops in Cologne, Grosseto, Newcastle, Belfast, and Amsterdam, with intensive group discussions between administrative experts from the municipalities, and the technology designers from the project. The experts from the different countries described the actual administrative processes that European citizens are faced with when they move to another country, in order to give the technical designers of the system a detailed picture of the procedures. We also conducted in-depth interviews with civil servants from the seven participating municipalities, to learn about contextual issues relevant for the design of the system. In the workshops also the potential solutions were discussed with the specialists from the participating municipalities, to obtain feedback about the possibilities and problems these solutions could encounter in the various countries.

During the workshops and interviews it became clear how the proposed system related to the larger national contexts, and therefore we conducted a series of interviews with other, more strategically and politically informed specialists, about the political, legal and administrative issues of administrative

⁶ Elsewhere, we have focused on these differences and the different user needs that are related to characteristics of users. [17].

services, relevant for the design of e-government systems.

5.3 Technology Assessment Studies

Parallel to this, we conducted several studies to improve our understanding of the dynamics of smart card technologies in e-government. Among others, we studied privacy regulation in various countries, and we did several case studies to find out about the dynamics, results and effects of earlier smart card projects. As these projects turned out to have many similarities with each other, and with the FASME project, the case studies were an important source of information for the design of the FASME system [9, 16, 17].

5.4 Testing the Prototype

By month 15, the developers had put together the first prototype, in interaction with citizens, civil servants, and social scientists that had done the user studies and the TA studies on the social implications of complex e-government systems.

We designed a series of evaluation sessions, in order to inform the designers of how to continue. The same categories of users that were involved in the user needs analysis, participated in the evaluation: a variety of citizens, clerks, operational administrative management, executive management and service providers (both public and private sector). The data gathered during the evaluation sessions were twofold: protocols from focus-group-like discussions and survey data. First, we held demonstration sessions of the prototype with end-users in a focus-group setting. We investigated the usefulness of the approach, and the problems to be encountered in a next development phase. We organized similar focus-group-like discussions with clerks, operational administrative management, executive management and service providers from the seven cities involved in the project in order to confront the concept of the system with the cities' perspectives. Does it work; can it be implemented in real life situations, and with which consequences?

We chose this data collection technique because it is less formal and does not create such a strong 'us and them' distinction between evaluators and users, which doesn't preclude access to information about informal and situated use of the technology [19]. During all focus group sessions, we had in depth discussions, resulting in a list of critical issues and questions, and in many suggestions for the further development of the concept and for the implementation.

After the focus groups, we asked the five different categories of users to answer lists of questions. The questions were related to requirement dimensions that were identified earlier on in the project: usability, availability, performance, security and impacts/effects.

6. THE RESULTS

In this section we discuss the most prominent issues that came out of the participation of the various categories of users. We will not go into the details as far as the exchange of detailed information of administrative procedures and technical solutions is concerned, because that has been reported elsewhere [20, 21]. Therefore, we will address these only where more general and political issues were implied – as that is the focus of this paper.

6.1 The Citizens

We started the project by trying to establish an inventory of the issues that formed real obstacles for migrating Europeans. Interviewing over a dozen of migrants provided us with a clear overview of the *types* of informational, administrative, and other problems mobile Europeans are de facto confronted with. What public services do citizens use when they move to another country? What are the most important administrative tasks for them? What kind of problems do they encounter? Would the JavaCard infrastructure be helpful in solving these problems? From the interviews it became clear that five issues are especially important to the participants. First of all, the respondents had big problems with administrative services because of the amount of time they take. People have to queue for hours to provide information, show their passport and submit forms. Most administrative services require the citizen to visit the offices in person, sometimes more than once. "It took three visits to the Foreign Police office to get registered. I was advised to get there early in the morning and join the queue. When the doors are opened a certain number are allowed in and the rest is told to come back tomorrow. First time – too late; second time - I should have registered first at the town hall; the third time was finally successful." Secondly, the interviews showed that many of the administrative problems came up in the *private* sector, and not with public authorities. For instance, people experience problems with telephone companies: "I was not registered in Sweden and therefore needed a guarantor before I was allowed a phone. My boss became my guarantor" and "The telephone company requires a six months bill statement from the bank, but I have just arrived here." Getting car insurance is also problematic: "If you are a foreigner and you move to England you won't be able to get any car insurance, unless you have been driving in the UK for two years. The first two years you pay a very high price." Banking isn't always easy either: "Generally you need a cheque guarantee card. When you buy something in the store you have to show them this card. If you don't have an account in the UK already, you won't be able to get a card like this for six months." For FASME to be successful, it seems of crucial importance to acknowledge the role of the private sector as an information supplier and user. Banks, car insurance companies, etc., provide and require information that is at least as important as 'official' information. But especially in the private sector a JavaCard might encounter acceptability problems, as many smart cards are already used in the private sector. A third issue is that migrating people have many difficulties in finding out how the local system they are migrating to works. All the interviewees emphasized this. They were all aware that the information generally is available, but that it was quite a task to find out where. In practice, friends or colleagues provide support: "I had very few problems moving here because the girlfriend I had then helped me out with everything. Under different circumstances, like being on my own, practically not speaking German, and not knowing how things worked, my experience would have been much more difficult." Thus it is mainly the social network that helps people to find their way in a new country. This finding actually influenced the design of the prototype with a third service, an information system helping to find one's way through the local environment. Fourthly, several of the respondents remarked that rules and regulations seemed to change frequently. Even for relocation consultants it is difficult to keep informed about legislation and

changes in law: “There are websites, we look it up. We have very good relationships with the employment office, the Ministry of Justice, the foreign police, but we can still hardly keep up. The law changes very quickly. And there are other things that drive us crazy. How you register a foreigner in Haarlem is completely different to The Hague. How you register in The Hague is completely different from Amsterdam. So although you still need a birth certificate and things... you need those wherever you go, the way of processing the people is very different.” Finally, the various national systems work differently, and even within countries different rules seem to apply to different cities: “Some of the administrative problems are recurrent and cause confusion. For example, in Italy, the Health Insurance card has to be renewed each year for non-Italian citizens in Turin, although strangely not in Ivrea. And depending on where you live, a residence permit needs to be renewed between every 5 to 10 years.” This is also a problem FASME has to cope with.

We used the findings of the interviews to design a questionnaire. This was used to get more information about how frequent mobile Europeans are confronted with the various problems, about existing help structures, and about cross-national variation. The sample consisted of 45.1 percent females and 52% males (2.9% did not indicate their gender). The most popular age group for both genders is the 25-34 age bracket, accounting for 65% of the total sample. The majority of the sample is employed on full-time basis (73.5%). There is no obvious gender difference relating to this. Nearly 12 per cent of the respondents are student. Work is the primary reason to travel abroad for most respondents, followed by study (Table 1). We can see that women travel more often to be with their partner, while men travel more often abroad for work reasons.

Table 1. Primary reason to travel abroad

Reason of travel	Female	Male
Missing	2.2	7.5
To be with partner	19.6	1.9
Study	21.7	18.9
Work	52.2	67.9
Other	4.3	3.8
Total	N = 46	N = 53

The results of the online questionnaire support the findings from the interviews with mobile Europeans. First of all, the time issue also comes up in the questionnaire. Most people find dealing with administrative tasks very tedious and run into a number of time-consuming problems. From our data we learned that about 46% of the respondents encounter 1 to 3 different problems. Slightly more than 25% has not one single problem at all moving from one EU country to another and some 8% per cent of the respondents experience more than 6 problems. Secondly, the survey – like the interviews – showed that many of the problems associated with administrative procedures actually took place in the private sector e.g. banking, housing and health insurance, and not with public authorities.

Table 2 gives an overview of the 15 different administration categories. From this we can see in a glance that housing, banking

and tax constitute the three main problem areas for mobile citizens. Thirdly, the questionnaire underlines the fact that government is often not very helpful when problems concern government administration. Private institutions are in average more helpful than public institutions to create help and to solve problems. We found that friends and colleagues are very helpful in some problem categories. Friends help to translate forms, make a lot of phone calls and drive people to the right offices. Understandably, family and partners are less helpful, as they generally are foreigners themselves. Finally, the problems mentioned differ per country of origin and country of destination. Unfortunately we were not able to cover all countries in our user studies, but these results show the necessity to do this.

Table 2. Problems related to % sample and gender specific

Administration Category	% of sample that had a problem	Female %	Male %
Welfare Benefits	16	15	17
Passport	15	16	14
Police	12	11	12
Housing	30	44	21
Utilities e.g. electricity	11	15	8
Medical Care	19	28	11
Health Insurance	15	22	9
Banking	33	30	36
Driving Licenses	14	17	9
Car Registration	10	11	9
Car Insurance	13	17	8
Tax	27	24	30
Pension	13	7	18
Telephone	11	15	8
Municipality Services	12	9	15
Other	6	2	9

6.2 The Municipalities

The administrative users confirmed some of the issues that were mentioned by the citizens. Apart from that, the interviews and workshops with administrative users showed the complexity of large-scale e-government projects. First of all, different countries apply different e-government strategies, and projects need to fit into these partly diverging strategies. For cross-national infrastructures this creates a set of often contradictory requirements. As we have seen, mobile Europeans stressed that rules were very different in the various national systems and that these rules seemed to change frequently. The administrative users did indeed point out that there are strong differences in civil services and public culture to be encountered in Europe. For instance, while registration of residence is mandatory in Germany or in Italy, there is nothing like registration of residence in the UK. In the UK the citizens will use their utility bills to provide evidence of their living place.

During the interviews and workshops with the civil servants we looked closer at existing infrastructures in European municipalities. This revealed that the implementations of the principals of data protection differ strongly for different countries. The heterogeneous situation with respect to data protection is strongly shaped by legacies and local traditions, and it partially

contradicts data protection rules on the European level.

In the workshops, the problem of international administrative transactions was translated into the technical problem to map a document set about a person in country A into a different but 'equivalent' document set valid in country B. It was decided to use XML and an 'ontology' for this. The system architecture required the municipality providing documents to translate its own data into an XML format, using the common ontology. On the other side of the transaction, the municipality receiving documents has to translate the intermediary XML-format to its local format [20]. Interestingly enough, examples of this already exist in the 'paper-based world', and a representative of one of the participating cities put this forward to the design team. The system designers then borrowed the 'template principle' and the underlying 'ontology' of the paper-based system [20, 21, 16, 17].

After this, we investigated the process of introducing this paper based procedure, with an important result. The basic agreement about the introduction of the paper templates was reached on September 8, 1976. Between 1982 and 1994, twelve European countries have implemented it, which is a remarkable slow process. Why does it take so long? Germany, for example, is still not using it, although the government intends to join the agreement. However, this will require legal changes, which generally are a difficult process as laws are interrelated and changes in one law affect many others. Therefore it was decided to postpone the agreement on the templates until the next general revision of German laws, which was not expected to start before 2004. Consequently, in Germany the agreement will not come into effect before the end of the decade [17]. Designing and introducing e-government systems will of course face similar problems as the paper-based procedures, and this radically puts the optimistic promises of e-government technologies into perspective.

Not only administrative rules and principles of data protection differ between European countries, the concepts and classifications are also not the same. Administrations are basically classifications of people and the concepts used within administrations differ radically between countries. Consequently, cultural heterogeneity may become problematic in an increasing number of cases [17]. Take, for example, the concept of 'father'. In the Netherlands, one is only the father of an extramarital child after formally 'recognizing' the child. In the UK, this concept of 'recognition' does not exist. Thus, after moving to the Netherlands, an unmarried English father may not be acknowledged as father in formal situations. Another example is the concept of marriage, which always appeared to be very straightforward. The definition of marriage has recently changed in the Netherlands by an enactment of the law in 1998 to open up marriage for persons of the same sex. The law came into effect in April 2001. Because of the possibility of homosexual marriages there is no longer a legal distinction between father and mother: both are addressed as 'parent' by the law. Same-sex couples may get married, but after moving to another country they may face complex problems as their legal situation becomes unclear.

These classification problems have implications for the design of the system, as it should enable a flexible mapping of administrative categories. Originally, the JavaCard would be able to authenticate the cardholder with biometric fingerprint

techniques, to encrypt and decrypt the personal data, to transform the data according to the requirements of the receiving country and to record the registered data as produced by civil servants at the new destination. The civil servants pointed out that, because of the different classifications and concepts used throughout Europe, it would be very difficult to realize this architecture.

6.3 Evaluation of the Prototype

This first evaluation of the prototype was influenced by a set of contextual factors, such as the time available to do the evaluation, availability of equipment, access to users, and so on. Because the development of a usable prototype took longer than planned, the time for the evaluation was restricted. There were also some problems with the equipment. Only one functioning demonstration kit could be set up, and it had to travel from evaluation site to evaluation site, making simultaneous evaluation sessions impossible. Consequently this put even more time pressure on the evaluation sessions. Despite these constraints, useful evaluation sessions were carried out in the cities of Amsterdam, Belfast, Cologne, Grosseto and Newcastle.

The user interface, that is "those aspects of the system that the user comes in contact with" [14], is a very important aspect of any system. But usability has not been given first priority during the early stages of the development of the system. Nevertheless, from the focus group discussions we learned that the system is relatively easy to understand and easy to use for most users. However, some level of IT literacy was needed, and this may cause problems especially for older people – a possible important user group, as retired people increasingly migrate to other countries.

We involved the various users in the evaluation, and found some interesting differences between them, actually reflecting the different perspectives and roles of the various user categories. The citizens and clerks view the system more from a usability perspective, whereas management was more interested in the safety, and in the integration with existing systems and organizational structures and procedures. The clerks generally rated the system more critically than the other groups, and this may reflect the fact that the system most directly influences their positions. Citizens and clerks, e.g. the people that will have to really deal with the system, were more in doubt about the *usability* of the system than the administrative management, the executive management, and the service providers. There was quite a significant difference in their rating. The clerks expected the system to be rather vulnerable to technical break downs, and that this would seriously decline the permanent *availability* of the system. In this dimension they were more skeptical than the other respondents. More generally, the opinions of the various users were less positive with respect to those dimensions that are most directly important to them, and this is especially true for end-users and clerks. The other dimensions are rated higher. This is an interesting lesson, as it shows that average scores generally may be too optimistic, and that it is better to focus on the more critical parts of the evaluation. Doing that, one learns much more about required improvements, and that is what the evaluation of the prototype tried to accomplish.

From the group discussions and the questionnaire we not only learned about the performance of the system, but also about

contextual and social issues. The idea of the project to be an innovation in (public) service provision was recognized by the participants in the evaluation session. They realized that following this path would require traditional services to be changed, and that it may also lead to possibilities for new services.⁷ A main problem pointed out by clerks and by operational and technical management was the proposed system requires adaptations in existing systems, procedures and organizations. Several aspects of this were discussed. Firstly, there is a need of middleware between the proposed system and the legacy systems operating at the level of the municipalities. As these legacy systems differ from each other, there is not one solution and this middleware needs to be produced for every individual participant. Costs may be a real issue here, especially for smaller municipalities. Secondly, the proposed system fits well in general e-government strategies and one-stop-government initiatives. However, to make these initiatives and strategies work, organizational procedures have to be changed, and even more important, required skill levels and career possibilities of clerks may change considerably. E-government experiences show that clerks with high and general skills are needed, instead of the traditional specialized clerk who starts on a low level, and gradually becomes more expert in a specific field. In one of the participating municipalities, this already had led to a strategy of replacing traditional clerks with part time university students⁸. The latter are highly skilled and flexible, and do not require any career options, as they generally leave the municipality after graduating. For the traditional lower educated clerk, it is much more difficult to be the interface between the citizen and the city hall for a large number of services. Also from this perspective, e-government has important social implications.

Other more general issues that came up were related to the security of the system, and to privacy protection. Here the citizens were more critical than the other user groups. In answer to questions like: "I trust the FASME kiosk in that my privacy is protected", and "Losing the card is not dangerous, because of the fingerprint technology", respondents state that the system is not as secure as they would like it to be. However, at the same time the majority of the respondents felt that "this type of systems can be made reliable". The same ambiguity was found with respect to biometrics. Finally, the participants saw a danger of total control over citizens' movements by tracking systems. A suggested solution was to design the card in such a way that no personal information can be transferred without explicit permission by the citizen.

7. LESSONS

7.1 Participation by End Users

The involvement of citizens differed from traditional approaches. Firstly, as the project was in an initial and experimental phase, motivation to participate could not be based on the immediate

⁷ See [16] for a more general discussion of this issue.

⁸ The main constraining factor mentioned were the legal regulations that make organizational change in the public services rather difficult.

effects the systems would have on the citizen. Secondly, participation took place through representation; not by peers, but by the social researchers who functioned as an intermediary between the citizen and the design team. Nevertheless, all the mobile citizens we approached were willing to give us their time for extensive interviewing about problems they had faced, and often still were facing while living in other EU countries. They were actually very motivated to tell us in detail what the problems were, and how they solved them or worked around them. The interviewees all expressed that support systems would be highly appreciated.

7.2 Participation by the Municipalities

The representatives of the seven municipalities participated in a different way, as they were part of the project team, and were aware of the important role they had. In the beginning they had some problems to define their role in the project, and it took a while for them to sort this out. When asked, the administrative users said they felt that their opinions were valued and more importantly, they also felt that their input had influenced the design of the system, which is indeed the case, as we described above. They had the feeling that the technical partners and the social scientists in the project listened to their comments and feedback. We found that this is very important to keep users motivated. "Let me say that our duty in the project has been mostly to produce input: national laws, how the services work, technical platform, data base etc. We have the feeling that particularly regarding our technical structure we were listened to and have influenced the design of the system in that respect".

The administrative users also found their involvement in the project useful for their work at the municipality. Among other things, they gained insight in the business processes of administrative services in other countries and cities. "Participating in this project has been very useful for us. Speaking in general we learned how to work together with other partners with very different national laws." Their involvement furthermore gave them an increased awareness of identity, identification and cardholder verification issues, and about biometrics and protection issues. Finally, being involved in high tech projects was also seen as PR in the direction of citizens and the press.

7.3 Participation: the Process and the Effects

We have already pointed out that defining the users of the system is difficult, and "an unambiguous definition of user is impossible" [5]. Yet we have managed to incorporate the most important intended users. In this section we focus on the process dimension: How did the users and their representatives interact with the technical and business partners in the project? Various lessons can be learned.

First of all, not only users have their interests and opinions, so do the technicians! Apart from that, the system designers' control over their work is limited, as they are influenced by the standards of the field (*technical norms*). These norms are not a priori supportive of users' interests and often even in conflict with them. Other types of norms influencing the technicians work (technical as well as legal ones) can be found in the field of data security and data protection. These norms have the advantage that they can act as some kind of guarantee that minimal standards are taken into account [29], but they also create constraints. In the project, up to

date modeling and programming tools were applied, but the users were not familiar with them, and this hindered communication between developers and users. Secondly, conflicts between participants' values and norms, and opinions and interests may prevent the various stakeholders to compromise. Although not all conflicts will be resolved, we experienced in working with citizens, municipalities and other partners that careful operation in a project helps to reach acceptable compromises. Thirdly, disagreement is often based on misunderstandings. The more groups participate in a project, the larger the problem of interdisciplinary (mis)understanding becomes: the asymmetric relation between participants' knowledge and communicative practices makes mutual understanding between citizens, municipalities, technology designers, and social researchers extremely difficult. Everyday language leaves too much implicit and fuzzy, but the language of experts often is too specialized to be able to handle the subtle issues generated by users. "This is why participants have to engage in the long-term project of developing a *third field* which builds on both: general communicative competencies and a corpus of knowledge, techniques and visualization on which to build a shared understanding ..." [29]. Unfortunately the duration of the project was a bit short to realize such a 'third field'. Solutions to solve this problem of interdisciplinary understanding would be the allocation of more resources (time, money, education and assistance) to involving the different groups of users. Fourthly, practical constraints play a role too. In our case, the short duration of the project made it difficult to include all user needs as they emerged, as the main terms of reference for the project were already fixed. However, this also reflected the own interests of the technical partners in specific technologies.

As already emphasized, the participation of the different categories of users has been very useful for the project. Involving the users has drawn our attention to crucial issues that would have otherwise gone unnoticed. Initially, the user participation focused on the operational issues of the system, and we have described above the impact the users did have. Working in a concrete technology development project with an interdisciplinary team also gave rise to more fundamental and normative discussions about international e-government. During the PD process, users and developers moved away from a restricted functional perspective towards a more civic perspective on the social effects of e-government technologies, and the implications for design. To mention only one example: when discussing the operational and technical problem of how to map various forms, such as a birth certificate, the fundamental question came up how and why concepts used in these forms differ between countries. This then resulted in increased understanding of the cultural meaning of administrative databases [17]. Lack of space prevent us from describing more examples, but the growing shared understanding of the social, cultural and legal complexity of international e-government let to the decision not to continue the project after the first phase. Although the technical issues were more or less solved, the complex social and legal context asked for a radical rethinking of the strategies for facilitating mobile Europeans.

8. CONCLUSION AND DISCUSSION: INTEGRATING PD WITH POLITICS AND PUBLIC DEBATE

In the case study, we combined a variety of traditional PD tools (interviews, a survey, workshops and scenario based evaluation) with social research and technology assessment. This combination resulted in crucial input for the design of the system, as well as in discussions and a shared awareness about fundamental social dimensions of e-government systems, which were directly related to design options, and to the context of use. However, many of these bigger issues cannot be solved on the level of a single project, because they relate to the politics of public administration and public services.

In other words, the combination of technology assessment with PD practice can be successful, but is not enough. What else should be done, in order to stimulate social responsive technology development? First of all, we think our case was relatively unique in that PD and TA were substantial and influential parts of the project. This is generally not the case in technology development projects, even not in those funded with public money. Take for example the large *framework programs* of the European Commission, in which one finds a lot of talking about users, but we have the impression that despite this, user participation and technology assessment hardly plays any role in most of the projects. Therefore there is a need for an explicit technology policy, stimulating the integration of PD in technology development projects. Public technology policies should require PD and TA in all projects. If large technology programs would more strictly require PD, interdisciplinary collaboration in technology development could become the normal pattern, and technology development could become more socially responsive. This is especially important, because at this moment the ICT infrastructures and models are developed that will influence peoples lives in the decades to come. We have learned in this and in other projects that such an approach is possible, and that user participation does not hinder or slow down technology development at all, but that it actually enriches it.

Secondly, to convince policy makers to move into this direction, there is an urgent need for intensifying the public debate about ICT infrastructures, the required role of users in design and development, and the social values and interests involved. Only if public awareness about the possibilities and risks increases, these issues will enter the political agenda. Therefore there is a pressing need for a public debate about social responsible technology development, and the ways to organize this. Technology development should be combined with participatory design and with technology assessment, but also with a public deliberation about the political and normative issues related to ICT infrastructures.

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