Situating the transient user: overcoming challenges in the design of e-government systems

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Abstract. e-Government systems present new challenges for user involvement in the design process. Existing user-centred and participatory design methodologies were mainly developed for situations where a user is in the workplace. In e-government applications the user population is heterogeneous and numerous; the increasing ubiquity of e-government systems also questions the concept of "the interface". This paper presents the results of a study of discourses of e-government users in two cases studies of interaction with new information systems in transport, which illuminate usability problems arising from a failure to prioritise users' needs at all stages. An approach is proposed which accounts for the values as well as the goals of users, appropriating stakeholder analysis and ideas from Soft Systems Methodology while recognising that the routine actions of users in the real world are situated and contingent.

1   Introduction

Electronic Government was originally understood as the online provision of existing services, as, for example, in the UK Government's 2005 target for all services to be online [3]. However, e-government plays a crucial role not only in the delivery of existing services, but also in making available new public policy options, in a mutual shaping of technology and society. A more inclusive definition of e-government is as the adoption of electronics to mediate interactions between government and citizens, business, or other governmental organisations [7]. Transactions may be complex and distributed; ownership and responsibilities may be distributed between government, citizens, and third parties such as commercial software developers or service providers. The resulting complexity makes it harder for users to understand the systems they are interacting with, and for developers to address usability throughout the design process.

2   Conceptions of the user in e-government

There is a lack of research into the user in e-government. In a short article, Flak, Moe, and Sæbø [5] raise the need for more research into the user side to balance the primacy of increased efficiency as a driver of e-government. An HCI approach goes beyond this, though, aiming for a deep understanding of the users' *needs and practices* and of their *values*; such a view, as Friedman, Kahn, and Borning [6] argue, requires influence in the design of technology from the earliest stages and continuing through the process.

2.1 Who is the user?

Much of the existing research into involvement of the user in the design process assumes that the user is typically an employee in the workplace, but in e-government, *the user* is not within an organisation but is both a customer of a service and a citizen. At the same time, public sector employees, who traditionally have performed some of the tasks which electronic systems enable citizens to do for themselves [5], are also users of the system. What is needed is a perspective on the overall *system*, which does not make assumptions about the users but rather attempts to identify the "clients", as well as various other kinds of stakeholders.

2.2 What is the computer?

The category of computer is no longer a single machine, either a classic mainframe or a personal computer on a desktop; not only the machine itself, but the bounded set of functions it performs is "*multiplying and dissolving*" [1]. The systems, too, within which the computers are situated, are not bounded by the particulars of the technology, and in the case of e-government are part of a much wider system, driven by policy needs.

2.3 What is the interface?

Whether using techniques of cognitive psychology, ethnography, or sociology, the traditions focus of HCI has been the *interface*. Sometimes, as in Suchman's [10] ground-breaking study, a study of the interface illuminates usability problems whose origin lies elsewhere; as computers become increasingly ubiquitous, though, it is increasingly the case that users' interactions are not at a single interface or, indeed, that they may "interact" without being consciously aware of the interaction.

3 Embodying Values, Ensuring Usability: an Analysis of Users' Discourses

For this paper, discourse analysis was applied to qualitative data from two studies on user interaction with technology in the transport sector. The discourses of users are used to throw light on their situated interactions with e-government as encountered in daily life. These interactions are encountered in different situations and across multiple interfaces, including but certainly not limited to web pages: ticket machines, card readers, and mobile phones for both voice and SMS, amongst other interfaces, are implicated in these interactions.

3.1 Some illustrations from e-government in transport

Two case studies of of e-government in support of transport policy in London illustrate these usability issues in a multi-interface environment: Web sites are just one example of interfaces which also include ticket barriers, automated cameras, ticket machines of several kinds, and mobile phones for both voice and SMS messages.

As a locus for investigation, an urban transport system has characteristics which make it especially appropriate to throw into relief some of these questions, as a *system* which is encountered frequently and routinely by large numbers of people who are not particularly interested in "interacting" with it or the computer systems which support it, but simply in moving from one place to another as easily as possible.

The Oyster card is a contactless transport smartcard which can store period tickets as well as *Pre-Pay* value which can be used to pay for individual fares; it has the potential to encourage public transport use through reducing barriers to access, improve bus journey times, and free staff from the ticket office, as well as providing an integrated ticket across all modes[1]. **The Central London Congestion Charge** is a road charging scheme aimed primarily at reducing congestion by encouraging people to choose other forms of transport than private vehicles; revenues for the scheme are used to fund public transport. This study focussed on usability in *payment* for the Congestion Charge, the area with which users interact most often and most directly.

For both case studies, a rich dataset included interviews[2] and focus groups with a total of eighty users of the e-government services, interviews with twenty-five senior managers, policy researchers, trade union officers, transport campaigners, and other staff, observations, and analysis of published policy documentation in the form of strategy documents and minutes of meetings. The interviews were voice-recorded and transcribed for discourse analysis.

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[1] Pre-Pay is not currently accepted on some rail services run by Train Operating Companies

[2] A large amount of this data from charge payers was collected by undergraduate students at UCL as part of a final-year project, and the authors of this paper gratefully acknowledge their contribution.

3.2 Beyond heuristics: usability in situated action

It is not within the scope of this paper to develop a theoretical understanding of the concept of usability; to ground the analysis of usability issues some well-known usability heuristics [8] are appropriate, using a broad interpretation adapted to these situated interactions.

Nielsen's heuristic: *Match between system and the real world* is interpreted here to include extra-linguistic communication with the user where the interface is not necessarily a Web site or other screen-based interface. The following examples illustrate usability problems arising from policy and from the technical design of the system.

3.2.1   Policy constraint

A good example of a failure of a system to match the users' world is the non-availability of *Pre-Pay* on Overground services run by the Train Operating Companies. For the user, this means a complex and confusing situation in which some Oyster tickets, for example period travelcards, are available for use on TOC services, and some National Rail stations have Oyster readers, but other fare options, such as prepay, are only available at a limited subset of stations:

> *I get off at .. somewhere where I can only get out with a valid ticket ... , so sometimes I've just waved a prepay .. card, and sometimes ... they let me out, and sometimes they let me go and buy a ticket once I get out – Oyster user*

Essentially this *usability* problem arises from policy issues related to the separate organisation of TOC services, and their different fare structure.

3.2.2   Technical constraint

Another example of the mismatch between expectations and delivery is the online purchase of Oyster tickets. Oyster users can buy a period ticket or add prepay value via the Internet, which is then loaded to their card at a nominated Tube (London Underground) station. However, this is constrained by the technical architecture of the system. Downloading of a ticket or stored value, ordered earlier on the Internet, onto the chip held on the Oyster card can only be done by passing through a gate or using a "validator" machine at a Tube station; there are no facilities for downloading stored value elsewhere:

> *Oh, yeah, and if you live in Hackney, which doesn't have a close Tube station, what are you going to do? – Focus group participant*

The restriction which requires physical presence in order to download data to the card is inherent in the architecture based on RFID technology; the point here, though, is that the requirement to pass through a ticket gate at an Underground station is not a match with the real world of the users travelling by bus, train, or some other mode of transport.

3.2.3 Normal, natural troubles

The capability of the system to handle "*normal, natural troubles*", to use the phrase that Randall and Hughes [9:148] have borrowed from Garfinkel, is related to a broad interpretation of Nielsen's heuristic : *user control and freedom.*

The Congestion Charging payment system provides some good examples of failure to allow for contingencies. Although the system provides both traditional and electronic payment channels, interviewees cited events such as being unable to find a shop to pay in, not being sure in advance whether they will need to pay, arriving home late, or being forced to drive into the charging zone by some incident such as a diversion:

> *sometimes it's hard to find a shop. They don't have the shops all around the, you know, …*

Sometimes users simply forget, but this, too, is a "*normal, natural trouble*":

> *… sometimes, you just, it slips your mind, it's so easy, and then you think at midnight you think, oh, damn, I haven't paid the congestion charge, and you know you're going to get a … fine or something – Congestion Charge payer*

4 Reaching the Transient e-Government User

In moving towards a proposed *approach*, rather than a methodology, for involving users with the aim of improving usability in situated, ubiquitous e-government systems, it is useful to appropriate ideas from existing practices such as Soft Systems Methodology [4] in terms of modeling and understanding a situation from the viewpoint of many stakeholders. The "*purposeful action*" which SSM takes as its basis needs, however, to be qualified with the understanding that the moment-by-moment interactions with technological systems in real-life situations are contingent and are "*not adequately explained by … preconceived cognitive schema*" [10:179]. Such an analysis must also take into account the *values* of its heterogeneous *users* as well as their goals in using the systems, and these must be reflected not only in the system implementation, but in the public policies with it embodies.

If not articulated as cognitive plans, how, then, can the values and goals of users, and in particular the tensions between their values and goals and their interactions with the system, be understood? It should be clear from this discussion that a variety of approaches is needed, but in identifying usability issues an analysis of the discourses of the users has illuminated some "breakdowns", or mismatches between the users' world and the computer world.

Heuristics, as understood in the HCI tradition, have their place, as pointers to usability issues; but heuristics developed for usability evaluation of web pages (for example, [8]) can only provide some general guidelines; as these few examples illustrate, existing heuristics widely used in usability studies need to be substantially broadened and adapted if they are to be suitable for the situated interactions of e-government.

5   Conclusions

This analysis of the discourses of e-government users has shown that usability problems for these two application areas were not in the interfaces themselves, but in the wider context of the transactions as a whole, and in the policies which they implement. In e-government, though, there are further constraints not only on the users, but on the designers and the implementers, of public policy imperatives. Usability is one of a number of competing considerations and trade-offs; usability problems arise from a complex interplay of policies, which have a significant impact on the interactions experienced by the service user.

Overcoming the "*great divide*" [2] between the social and technical sciences means not only that implementers of electronic systems have to be aware of the social aspects, but also that policy-makers have to be aware of the implementation, and the usability impacts, of policies as they are embodied electronically. This awareness, too, must be an iterative process, or rather continuous, as new understandings of the users are gained, and as the systems constantly develop and mature.

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