E-government HCI: a genuine research field?

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ABSTRACT
This papers aims at surveying current issues regarding e-government through the literature in order to assess current state and research avenues concerning e-government HCI research as a genuine research field. Included are the needs for efficient software tools for mass-production of e-government software, for security and trust, for personal information management, and for internationalization.

Keywords
E-government, HCI, usability, research

INTRODUCTION
The goal of this paper is to establish some grounds, after looking at available scientific literature, to discuss the question: is e-government HCI a genuine and specific research field? This attempt being in the form of a position paper, the opinions presented are to be viewed as material for stimulating the discussions, and, hopefully, for helping to establish a research agenda for e-gov. HCI research. For assessing whether e-gov. HCI is a field of research or another application domain, a number of issues should be discussed, including:

- What are the characteristics of e-gov.?

- What are the specifics of e-gov. HCI, particularly for research?

- Which salient topics can be selected in e-gov. HCI as part of a genuine and specific research domain?

- And what are potential specific research topics for the future?

This paper, after looking at definitions of e-gov., attempts to provide initial answers to these questions, and discusses implications for future research.

DEFINITIONS OF E.GOV.
"e-Government (short for electronic government, also known as e-gov, digital government, online government or transformational government) is a diffused neologism used to refer to the use of information and communication technology to provide and improve government services, transactions and interactions with citizens, businesses, and other arms of government". http://en.wikipedia.org/wiki/E-Government .

"**e-Government:** refers to the use of new information and communication technologies (ICTs) by governments as applied to the full range of government functions. In particular, the networking potential offered by the Internet and related technologies has the potential to transform the structures and operation of government" http://web.worldbank.org/.

So far, it sounds very much like an application domain for existing technologies. However, let us look further at what are the main characteristics of e-gov. studies.

It must be also noted that, even though current applications are mainly on internet, further developments may be envisioned for a larger set of devices including phones (with or without "smart cards"), kiosks, interactive voice response, etc.

CHARACTERISTICS OF E.GOV. IN THE LITERATURE
When surveying the topic "e-gov" on internet, on bibliographical databases, and in papers co-referencing, the domain appears to be rather recent (< 10 years), but also the contributions seem multifaceted (e.g. http://www.1105govinfo.com/events/), crossing various scientific topics. However, some dedicated conferences do exist (e.g., EGOV which has its 8th. Conference in 2009; ePart - International Conference on eParticipation; International Conference on Electronic Democracy), as well as journals (e.g., International Journal of Electronic Governance (IJEG); Electronic Government, an International Journal (EG); International Journal of Electronic Government Research (IJEGR) ; Journal of

Information Technology & Politics ; Electronic Journal of e-Government).

There are, of course, many studies on e-gov. that concern important topics beyond the purpose of this paper, for instance: legal and policy matters, democracy, governance, economics, social and organizational issues, etc.

On the more technical side, several topics are investigated, for instance: various statistics, software architectures, case studies, ontologies, digital preservation, etc. (e.g., [1] , [2], [3], [4]).

Often mentioned characteristics (e.g., [5]) are: lots of stakeholders (final users/ clients/ design team), as many jargons and viewpoints. While it may be true, it is not that specific compared to other domains in HCI.

What are the types of HCI-related studies in the literature?

Many "local" studies, focusing on a regional or national state of things regarding surveys, standards, successes and pitfalls of e-government, e.g. [6], [7], [8], [9], [10], [11].

E-GOV. HCI STUDIES

Overall, (including local studies) very little is found specifically in HCI (for instance, only 20 papers retrieved when checking HCI bib: http://hcibib.org/).

HCI studies identified deal mainly with:

- User needs and accessibility, e.g. [12], [13], [14], [15], [16], [17], [18]. Accessibility seems indeed to be the main topic in current literature on e-gov. HCI, including studies on older people.

- The applicability of HCI results to e-gov., e.g. [19],

- Ad hoc interaction novelties, e.g. animated faces [20]; ad hoc methods, e.g. [21], [22], on document exchange and scenario planning.

- Overall user involvement, and requirements, e.g. [23], [24], [25], [26]; user acceptance, e.g. [27],

- Patterns, e.g. [28], [29].

DISCUSSION

Very little, so far, seems to be really specific to e-government HCI.

Indeed, from a technical point of view, this field shares a lot with other well-established fields.

A view is that e-government HCI may not constitute currently a specific field of HCI, but simply another domain of application. For instance:

- Security issues are also key in other areas such as e-commerce or safety-critical systems;

- Safety issues are also key in other areas such as safety-critical systems, e.g., control rooms;

- HCI architectures, models are not very different from other areas of computer-based systems, including web.

Overall, it is similar for usability and accessibility issues:

- Usability for form-filling dialogues is well known, even standards do exist (see [30]; most ergonomic guidelines apply as well (e.g., Ergonomic Criteria [31], applied to a specific e-procedures tool: e-Citiz [32]).

- Accessibility is also well known and well documented (e.g., [33], [34]). Albeit issues may not be specific, they are crucial: not only such type of software will need to comply to national and international regulations, e.g [35], especially for government web sites, even though conformance demonstration and enforcement varies a lot, from one country to another.

Having said that, there seems to be some topic areas that may be viewed as specific to e-gov HCI research. It may be an excellent field for applying, testing, and improving some ideas, knowledge, models, and tools, for instance:

- Providing fast, efficient, and usable (including for non-specialists) software tools that will allow mass-production of software design of e-government procedures applications, quickly, efficiently, and reliably, in order to face the very large demand of dematerialization of administration paper. This has to do with the effort of providing new software tools (see, for instance: http://genibeans.com/cgi-bin/twiki/view/MyCitizSpace/PresentationDuProjet).

- Ensuring data protection, security, privacy, which has a strong impact on the users trust and therefore willingness to interact with such systems. In [11, op. cit.], it is clearly stated that, (although only a national survey) internet is not seen as an accountable channel. « *Users feel less comfortable with internet-based transactions where accountability and formal response is required. Excluding online payments, users feel that form submissions often appear to go 'into the ether', especially as most provide no way to track the request.* ». Sometimes, ensuring good old usability may help, such as sending immediate email confirmations, and providing receipts and reference numbers upon submission of forms.

- Other topics can benefit from the combined characteristics of the e-government context, for instance:

  o Improving users minimal actions (reducing the redundancy of form-filling operations) through the use of micro-formats, an approach that allows information intended for end-users (such as contact information, geographic

coordinates, calendar events, etc.) to also be automatically processed by software applications, see for instance: http://knowledge.wharton.upenn.edu/article.cfm?articleid=1247;

o   Providing new underlying models to allow combined modeling of tasks and workflow, e.g., [36];

o   With the increasing development of new platforms, of mobility, of ubiquity, plasticity, i.e., the capacity of an interactive system to withstand variations of context of use while preserving usability, will be of prime importance in the future dissemination of e-gov. procedures, e.g. [37];

o   With the widespread of e-gov services, (combined or not with non-government services), one can envision the possibility of creating personal citizen information spaces, which will require further progress on the personal information management systems (PIMs), term which refers to the research field addressing the way people manage their physical documents (books, notebooks, sheets, etc.) as well as their electronic documents (files, emails, Web pages, etc.) with the aim of designing tools that support the management of electronic documents (*PIM tools*), e.g., [38].

o   The demand of dematerialization, which started first locally and nationally (e.g. regions, countries), will eventually spread internationally, which will require lots of effort in the area of internationalization. This area goes beyond the usual linguistic questions, and includes: nationality issues: language; laws and regulations; systems of units and usual formats; collective and cultural aspects: technological environments in place; conditions of use; professional and social traditions; type of work organization; conventions, symbols and practices; modes of reading and writing; personal and cultural aspects: users' characteristics, in particular anthropometry, education, values, preferences, expectations, etc.

o   Going further, software applications for e-gov. systems could be more pro-active, which may trigger interesting research on recommender systems (e.g. [39]), and suggest, for instance, procedures for detecting eligibility from citizen, for

various e-gov. measures (e.g., social support).

In addition, for future research, our view is that the domain of e-government HCI has also some interesting research potential in the area of EUSI, acronym introduced here to mean End User Self Individualization. Indeed, it is not straight EUD or EUP (end-user design or programming) as the application types are sometimes quite simple and limited in their behavior, from the users' end. However, due to the extensive combinations resulting from both the large variations in e.gov. procedures (lots of different areas, administrations, taxes, health, education, professional, leisure, etc.) and the large variations in the users populations (age, skills, roles, etc.), one can forecast, in addition to system-generated users profiles, the possibility of user-driven individualization (also called tailoring, personalization, etc.), on limited aspects of the e-gov. user interfaces. This constitutes quite a challenge for future research to provide appropriate (i.e., useful, usable, and accessible) means for end users to perform their e-government interactions, with their own set-up. This will also make use of existing standards being developed, such as [40].

Another reason for that topic to be interesting and important is the view that sooner or later, end-users will own their personal data storage, shared partly with the providers (with, of course, the issues of privacy and trust). A complex issue will then concern the capability, for end-users, to ultimately being able to apply different roles in their interactions, in a "personal information space" context, for instance, dealing with several software applications with roles such as consumer, head of household, business transactions, leisure transactions, etc.

CONCLUSION

In this position paper, we have looked at existing literature on e-gov., focusing on HCI, with a user-centered perspective, attempting to answer the question: Is e-government HCI a genuine and specific research field?

In short, while many aspects are shared by other application domains, we feel e-gov. constitutes a genuine and specific HCI field as software application for e-gov. concentrate design and evaluation constraints, from a user-centered perspective, both concerning users population and software application characteristics.

-   The potential e-gov. users will eventually be all citizens. This will include the so-called "average user", but also span from a highly educated technical person to my grandmother in the countryside ... This is not a characteristic shared by all computer-based applications.
-   The nature of e-gov. interactions is rather simpler than others, which makes it similar in some way to the consumer products field, including walk-and-

use products (even though my grandmother has still trouble with her VCR user manual!).

- The potential market for e-gov software applications is huge, when considering eventually most governments and institutions will need support for their numerous requests towards the citizen. This advocates for efficient software tools that will allow mass-production of e-government procedures applications, quickly, efficiently, and reliably, in order to face the very large demand of dematerialization of administration paper.

Hopefully, these issues will stimulate workshop discussions. Another issue will also be to confront the various national and international experiences for a better understanding of both the practitioners' needs and the users' reported experiences in the area of e-government procedures.

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