Accessibility of Sustained eServices

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Abstract: Governments all around the world are taking quantum leaps towards the implementation of electronic self-services for citizens and businesses (eServices). Currently, most eServices are implemented as web-based solutions. Governmental and other eServices require careful accessibility design in order to be successful. Several accessibility standards and design guidelines exist and are widely applied on websites offering eServices. Time plays an essential role in the use of many eServices. In this paper we present a taxonomy and some examples of eServices according to the dimension of time. We propose seven design principles that will add accessibility to sustained eServices that are being used repeatedly and over time. These principles are: 1. Overview and general information. 2. Targeted and relevant information. 3. Safety and trust. 4. Support for multi-channel platform and "family resemblance". 5. Logical process and progression. 6. Storage and retrieval of information. 7. Timeline. We show how existing design principles from established sets of guidelines support the implementation of these principles, and thus increase the accessibility of sustained eServices.

Keywords: eGovernment, eServices, accessibility, sustained services, design principles

1. Introduction

Governments all around the world are taking quantum leaps towards the implementation of electronic self-services (i.e., eServices) for citizens and businesses. The eSociety strategies such as the i2010 of the European Union, the growth of internet access in general, and the development of eGovernment implementation plans in many countries have had a remarkable impact on the development of the information society. The i2010 strategy (EU 2005) is coming to a close, but clearly, it has borne fruits, and new electronic services to citizens and businesses keep evolving. Governments are offering a rapidly increasing number of on-line services to citizens and businesses, often on a so-called 24/7-basis (24 hours a day, 7 days a week).

Currently, most eServices are implemented as web-based solutions, neatly realizing the 24/7-goal of *availability*. Another important development is the electronic *accessibility* (or e-accessibility). This means the ease of use of ICTs by people with disabilities. For instance, web-sites and web-based electronic services must be presented so that disabled users can access the information and utilize the functionality of the web-site or the web-based e-service. The European Union has developed a policy (EU 2008) of accessibility and usability of ICT-based products and services for all (e-accessibility).

Usability and accessibility of eServices are, of course, of great importance to all citizens, but of crucial importance to people with special needs and requirements. Elderly people and people with cognitive disabilities are examples of e-service users who depend on excellent usability and high accessibility of the services. During the last years, a number of accessibility standards, guidelines, practices, as well as accessibility measurement methods and monitors, have been developed to promote and implement e-accessibility. Most European governments seem to follow accessibility guidelines when implementing new eServices.

A general understanding is that approximately 20 % of the population has some kind of disability. Many, although not all of these people, have disabilities that make it difficult for them to use ICTs in general or web-based eServices in particular. The major categories of disability, frequently used as a frame of reference for accessibility guidelines, are: Sensory impairments (visual, hearing), motor impairments and cognitive impairments (problems connected to learning, reading, writing, memory, concentration, focus, problem solving etc.). Each of these categories of disabilities must be taken into account in the design and implementation of web-based electronic services (i.e., the content and the functionality). Many governments internationally follow this obligation.

So far, so good. However, according to our research and practice, the current understanding of accessibility is insufficient in the context of electronic services which are used over time, thus gradually forming a "continuum". Current accessibility standards and guidelines are designed to increase the accessibility of situated eServices, or in other words, eServices that are used "here and now". To put it clearly, the aspect of *time* is inadequately treated by accessibility standards and guidelines, although time plays an essential role in the use of many eServices.

The remainder of this paper will treat this matter. We first present a taxonomy of eServices, including the cyclic character of these, which explains the role of time. We also give some examples. Second, we propose seven design considerations (principles) that will add accessibility to eServices that are being used repeatedly and over time (sustained eServices). Third, we show what kind of design principles from established sets of guidelines support the implementation of the proposed principles, and thus increase the accessibility of sustained eServices. Finally, we discuss the proposed approach.

2. The role of time in sustained eServices

Electronic services for citizens and businesses become more and more numerous and increasingly sophisticated. There are different eServices available in many life-situations. Some of these occur once in a lifetime, others are used frequently or several times during a person's lifetime. Some of these services are "unavoidable", i.e., the use of the e-service is based on legal provision. Other services are voluntary to use. Below, we illustrate the many dimensions of current (e-)services connected to life situations (according to Nordic practice):

Mandatory, (semi-)automatically initiated services on a once-in-a-lifetime basis:

- Personal identification or social security number (within few weeks after birth).

- Choice of name (within few months after birth).

- School enrolment (normally at the age of 5-6 years).

- Activation of national pensions scheme (normally at the age of 67 years).

Mandatory, cyclic services on regular basis (e.g. yearly):

- Income tax declaration.

- Electoral register.

Mandatory services on an irregular basis (occasionally):

- National census(es).

Voluntary services on a regular or cyclic basis:

- Participation in elections (voting in near future).

- EU-control of vehicles.

Voluntary services on an irregular basis:

- Change of name.

- Passport application.

- Vaccination scheme.

- Driver's licence (including renewals).

As we can see, the aspect of *time* is essential. Some services are used repeatedly although irregularly, while others are cyclic in nature. When these basic services are implemented as eServices, accessibility will be challenged. We claim that the current accessibility standards and guidelines mainly focus on situated use, whilst they are weak in treating the accessibility of the users' dialogue with sustained services (Figure 1).

3. Accessibility principles for sustained eServices

Citizens and businesses meet electronic services in a number of different situations. In the case of citizens, we call these 'life situations'. Moreover, the services are delivered on a number of different platforms – most often on the web, but also on self-service kiosks, digital TV and mobile phones. (Figure 2).
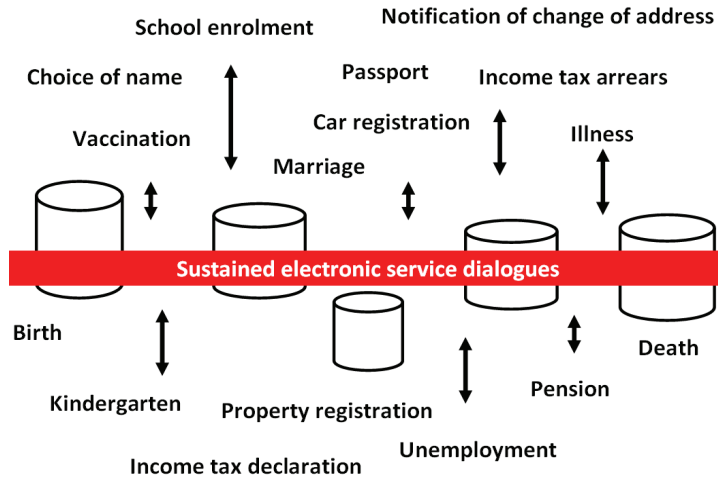
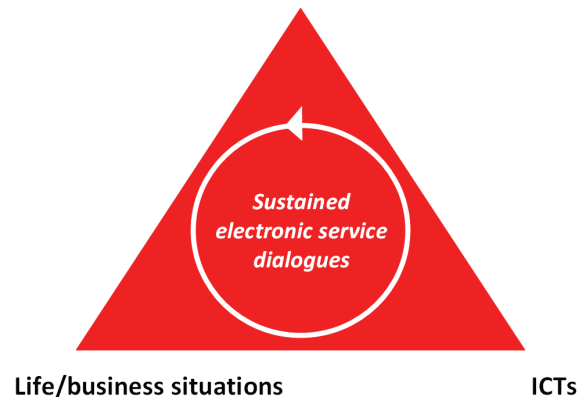**Figure 1:** The myriad of life situations and (e-)services for the citizen

Figure 2: Sustained electronic service dialogues in the use context

In order to increase the accessibility of the user's dialogue with sustained eServices on any platform (i.e., those that are accessed and used even at years intervals), we propose a set of principles to be considered together with established accessibility guidelines. These principles are:

- Overview and general information.

- Targeted and relevant information.

- Safety and trust.

- Support for multi-channel platform and "family resemblance".

- Logical process and progression.

- Storage and retrieval of information.

- Time-line.

Below, we give an account of each of these. In order to approach a concrete implementation of these principles, we have departed from existing accessibility and usability guidelines (Center for Universal Design 1997, Difi 2008, NBT 2008, Nielsen 1990, Shneiderman and Plaisant 2005, Tognazzini 2003, Teknologirådet 2006, WebAim 2010). We have surveyed these and other guidelines and extracted pieces of advice that support the principles above. There is, of course, a need for refinement of advice within each category – this overview in intended only as a starting point.

3.1 Overview and general information

The first step of using any (e-)service is locating the service. For this purpose, information about available services should be collected and disseminated so that easy access is possible. Portal solutions seem obvious. This information should also include information about the scope and purpose of the e-service, and about access methods (username, password etc.).

3.2 Targeted and relevant information

Users of eServices should get updated information about the service, descriptions of the service itself, access methods, and the methods of use of the service. In particular, if eServices are accessed rarely, such as those in category B (cyclic services on a yearly basis), it is important to ensure that the user – to begin with - finds the service, and that s/he recalls the method of use.

- Give necessary guidance to the user immediately, and also make the guidance available globally in the service.

- Assist the user appropriately. Contextual help should be adjusted to the actual request: Short answers to short questions, and more voluminous answers to more complicated questions. So-called "screen-casts" for user guidance represent a good alternative in many cases.

- Provide quick access to different parts of the service. Alphabetic lists or detailed site-maps are appropriate alternatives.

- Pay special attention to clear and understandable language.

3.3 Security and trust

Security and privacy are central themes in the context of accessibility. Security and trust are also essential for sustained eServices. In particular, storing information for years in a secure manner is crucial. Users need to trust that personal information is safe and that relevant processes can be accessed again. Both the presentation of security and the actual security and privacy mechanisms have to correspond with the users' expectations.

In the following, we give examples of accessibility and usability guidelines that may promote security and trust in sustained electronic services:

- Sufficient authentication mechanisms, but do not "overkill".

- Provide possibility to print documents, web pages and so on.

- Provide contact information to user support.

- Provide access to post and case records etc.

- Provide information about self-service option before the user has to log on to the e-service.

- Provide clear, understandable information on security needs and risks all over the service or the site.

- Provide immediate error messages or warnings in the actual context in understandable language, and advice on how to recover.

- Provide status information to the user throughout the work process and also in latent periods.

- Make it easy to stay connected, to perform reversal actions (undo) and to quit. Provide an overview (receipt) of completed work.

3.4 Support for multi-channel platform and "family resemblance"

Sustained eServices for citizens will in the future be delivered on several technology platforms. Already today, web-based applications can often be accessed from a PC or a mobile phone. This supports the idea of platform independence; the user may start the work process on one platform, quit,

and continue on the other, such as switching between PC and mobile phone. Here it is important that the user can recognize the application on all relevant platforms, i.e., that a certain "family resemblance" exists. In order to do this:

- Provide alternative modalities.

- Provide options to adjust audio and visual information, e.g. font size, sound volume etc.

- Take care of consistency of appearance; that is how objects in the user interface etc. look (colour scheme, icons etc.).

- Take care of a minimum level of design conventions, e.g. placement of visual elements (logo), functionality (search field), navigation, contact information etc.

3.5 Logical process and progression

Logical process and progression means that the user's work process is organized and supported so that s/he has the opportunity:

- To make real progress,

- To know where in the work process s/he is,

- To receive acknowledgements of successful actions, and

- To receive meaningful, process-related notifications of failure.

These requirements should apply also for eServices which are used at longer intervals, or when the current use session can be ended and continued later.

In order to realize this principle, existing accessibility and usability guidelines can be used as a point of departure. Examples of such are:

- Use navigation trails, or so-called "breadcrumbs", which usually appear horizontally across the top of a web-page.

- Visualize current position in the navigation bar(s).

- Acknowledge completed task or process.

- Anticipate the user's needs with respect to information and tools required for each task or step of the process. In particular, take care of consistency with respect to appearance of information and functionality.

- Keep status information up to date and easy to view for the user.

- Track the user's activities.

- Provide bookmarking.

- Provide shortcuts to frequent or expert users.

3.6 Easy storage and retrieval of information

During work processes, users usually need to find, retrieve and save information. Mechanisms that facilitate the management of information and enable the user to return to the task or process later on should be provided. Examples of accessibility and usability guidelines that can be used as a point of departure for the implementation of this principle are:

- Provide mechanisms that make it possible for the user to save documents (including interactive forms) permanently or temporarily, in different formats (e.g. html, doc, pdf, ocr). Also, it should be possible for the user to save unfinished work locally. The service should also take care of saving the user's work often enough in order to survive technical or other breakdowns.

- Use hypertext or links which bring the user to the intended document, web-page or task in the work process.

- Use time stamps in order to ease identification of updated information.

- Provide search functionality and adequate metadata to facilitate this.

- Use global navigation and global menu structures.

- Provide a table of contents that covers the whole web site.

3.7 Timeline

Last, but not least, visualizing temporal data and time-based events in the work process is essential for sustained electronic user dialogues. Since many services are used repeatedly it is important to add a timeline to the accessibility framework for eServices. Providing snapshots of historical events may be realized in a number of different ways. Timeline charts may be implemented as annotated lines which clearly visualize time and events on an axis, or the events may be ordered as lists. The main asset of a timeline must be that it is easy to read, it presents information in a logical manner, and that it supports the user in (re-)grasping the task or process even after a longer period of latency.

4. Discussion

Good, usable and accessible eServices have many characteristics, as shown in Figure 3. They are secure, and they can be accessed on different technology platforms. They may be compound services provided by a number of collaborating organizations, and still rendered seamlessly in a uniform manner during the user dialogue. They are accessible.
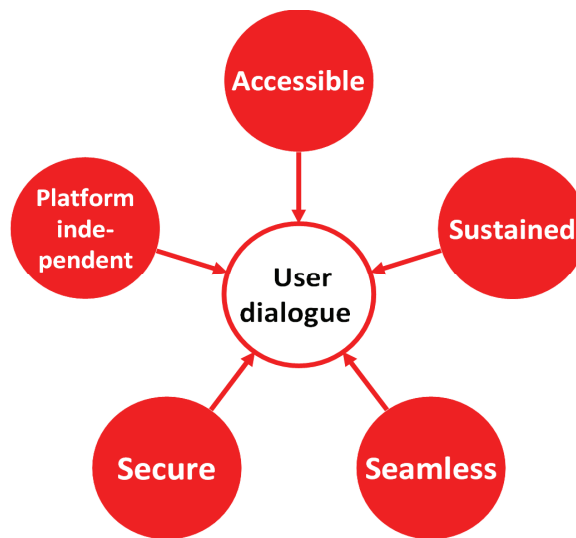

Figure 3: Features of usable eServices

Governmental and other eServices require careful accessibility design in order to be successful. In this paper we have proposed to add the dimension of *time* to accessibility considerations in an explicit manner, and we have shown how this can be approached. We regard the time dimension as central in the design of sustained eServices. The list of principles is a first attempt to systematize accessibility guidelines so that the aspect of time becomes clearly visible and is treated explicitly.

As we can see, the principles clearly focus on the cognitive aspects of accessibility. However, this presupposes such activities as understanding and remembering the location, appearance and use of the e-service over time – i.e., the sustained character of the e-service and the user dialogue. This becomes more and more relevant as governments implement services not only for situated service needs, but also eServices which build on the idea of continuous – i.e., sustained – service dialogues.

The design principles outlined in this paper will support all users of eServices. In particular, users with cognitive challenges will benefit from these. As the dimension of time clearly complicates the use of

eServices, focus on cognitive support is required. Developments point in this direction. Compound eServices for citizens are rapidly appearing (e.g. e-health services). When this really becomes the case, more research is needed to pave the way for increased accessibility of such solutions.

Acknowledgements

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Factors Affecting the Adoption of eGovernance by Teachers in Greece

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Abstract: One of the primary objectives of governments currently, is to improve the services rendered to citizens and to this end, governments invest in eGovernance services. However citizens' are not fully engaged in available eGovernance services. Moreover Greece falls back in adoption of eGovernance with regards to other EU countries. The degree to which governments invest in electronic services is based on their understanding of what citizens need and without taking into consideration the factors that increase the willingness of citizens to adopt eGovernment services. The purpose of this paper is to investigate factors influencing eGovernance acceptance in the field of education as teachers represent a percentage of 40.69% of the permanent civil servants. The Greek educational system is centralized and is characterized by intense bureaucracy, strict hierarchical structures, extensive legislation and formalism. Previous studies have shown that bureaucracy in an organization strongly affects adoption of eGovernance. The study analyzes the impact of trust and risk perceptions and user satisfaction on the intention of teachers to continue using an educational eGovernance website. Trust in eGovernance websites consists of disposition to trust, trust to Internet and trust in government. Primary and secondary education teachers responded to an online survey resulting to 230 questionnaires. LISREL is used to analyze the data. Model estimation is done using the maximum likelihood approach, with the item covariance matrix used as input. A SEM validation of the proposed model reveals that that trust, perceived risk and satisfaction are key research constructs influencing directly or indirectly intention to continue using eGovernance websites. Although a limited number of factors that influence eGovernance websites adoption by teachers were identified, the study could help policy makers in the public sector to develop and implement new eGovernance plans.

Keywords: eGovernance adoption, continuance intention, structural equation modeling, LISREL, education, trust, risk, satisfaction, Greece

1. Introduction

Nowadays, governments are moving forward in eGovernment development around the world (Panayis et al., 2008). Greece falls behind the other EU states (The Economist Intelligence Unit, 2009) and in global terms the United Nations (2008) eGovernment readiness report (2008) ranked Greece's eGovernment project as number 44 worldwide with an eGovernment readiness index 0.5718. The eGovernment readiness index is a composite index comprising the web measure index, the telecommunication infrastructure index and the human capital index. It should also be noted that Greece dropped from the 35th position in 2005, to the 44th in 2008. Governments' investment in electronic services is based on their understanding of what citizens' need, without measuring what increases their willingness to adopt eGovernment services. Trust issues (Belanger and Carter, 2008; Carter and Weerakkody, 2008; Colesca, 2009) risk issues (Belanger and Carter, 2008) and "digital divide'' (Mofleh and Wanous, 2008) can impact on adoption eGovernment services. Therefore, "governments must first understand variables that influence citizens' adoption of eGovernment in order to take them into account when delivering services online" (Mofleh and Wanous, 2008 p.1).

Given the above context and taking into consideration that a percentage of 40.69% of permanent civil servants and 16.38% of all civil servants in Greece (Ministry of Interior, http://www.ypes.gr) are teachers, it is interesting to investigate factors that affect adoption of educational eGovernance websites by them. The term "educational eGovernance websites" refers to the webpages of Greek School Network, the Ministry of Education, Lifelong Learning and Religious affairs and websites of Regional and Local Primary and Secondary Education Administrations.

This study uses an online survey to record teachers; opinions and attitudes. Colesca (2009, p32) wrote: "nonusers haven't favorable attitudes towards the use of electronic services in relation with the governmental agencies". Therefore, the research does not investigate people who are electronically incapable of accessing services and takes into consideration the intention to continue using