

Adaptive Municipal e-forms

P.M. Kuiper, E.M.A.G van Dijk, A.K. Boerma

University of Twente, eMAXX B.V., The Netherlands,
p.m.kuiper@student.utwente.nl, bvdijk@ewi.utwente.nl, a.boerma@emaxx.nl

Abstract. Adaptation of electronic forms seems to be a step forward to reduce the burden for people who fill in forms. Municipalities more and more offer e-forms online that can be used to request a municipal product or service. To create adaptive e-forms that satisfy the need of end-users, involvement of those users in design activities and evaluation is necessary. This paper describes the design of adaptive municipal e-forms and the way user-groups were involved in the design activities and will be involved in evaluation.

1 Introduction

This paper describes how users have been involved in the design activities of adaptive municipal e-forms; forms offered through a municipal website/portal used by citizens to place a request for a municipal product/service or by municipal employees to place a request on behalf of a citizen. The form can automatically adjust to the background, knowledge, interests, goals and restrictions of the user (personalization). The user can also adjust the form to his/her own needs (customization). Adaptive municipal e-forms can be used for different purposes, e.g. to make an appointment, to announce a change of address, or to request a passport or building permit.

2 Overview of Adaptation

Adaptation deals with the ability of an application to collect user information, to analyze this information, and to adapt the application to the needs of the user based on the analysis [4]. Figure 1 shows an overview of adaptation.

Personalization and customization can occur simultaneously. Customization is based on explicit data, i.e. a user can adapt the applications' data or layout. Personalization is handled by the system and is based on implicit data, e.g. user behavior, and/or explicit data, e.g. information entered in a form. Hereby an application can adapt to an individual or a group. For personalization three types of models are used: user models describe personal information or presumptions about the user, surroundings models describe the users' software, hardware and location, and usage models describe the users' behavior by looking at user actions. Usage models contain data acquired implicitly by the system; the other two models contain explicit and implicit data. To create a more elaborated model, the data in these models

must be analyzed using various data analysis methods, which will not be discussed in this paper. Adaptation based on these models can be performed in three ways: adaptation of content, presentation, and navigation, which can appear in combination. Adaptation of content can take the form of e.g. ‘adaptive stretchtext’ to explain terms that can be “unfolded” by the user, or ‘fragment coloring’ to mark elements as being important or irrelevant using colors. With adaptation of presentation the content stays the same but the layout changes, e.g. text changes into audio (poor eyesight). Adaptation of navigation can take the form of e.g. ‘adaptive link annotation’ to annotate links using different colors, font types, sizes, or pictograms, or ‘adaptive link removal/addition’ to add or remove the link of non-contextual links as a whole. [4] [5]

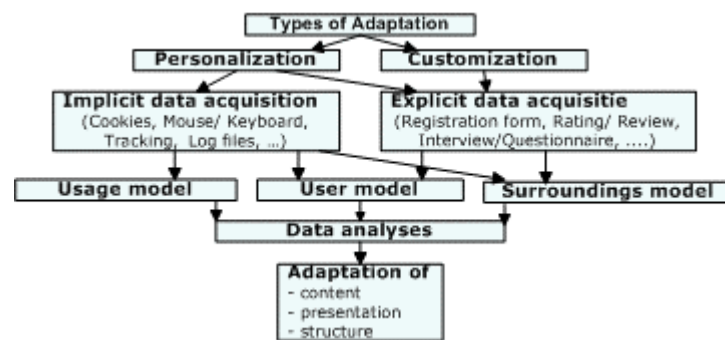


Fig. 1. An overview of adaptation

Adaptive systems can lead to usability problems that potentially outweigh the benefits. The usability principles ‘predictability’, ‘transparency’, ‘controllability’ and ‘unobtrusiveness’ are principles that can easily be violated by adaptive systems, as well as the principles ‘privacy’ and ‘breadth of experience’. People may become concerned about the possibility that their data will be used inappropriately. When the user completely delegates a task to the system or the system relies excessively on an incomplete user model the consequence might be that the adaptive system does not work as it should. The user should have the possibility to choose between complete control over a task and complete delegation of it. [1]

2.1 Adaptation in e-forms

The following adaptation techniques can be used in e-forms [3], [4], [5]:

- *active fields*; corresponds to formulas linked to a cell used in spreadsheet programs
- *adaptive link hiding/disabling*; hides the visual indicator of a link or disables the functionality of a link
- *built-in checklists*; use colors to make sure no obligatory fields are forgotten and guide user to perform tasks (form of *adaptive link annotation/fragment coloring*)
- *dynamic visibility of fields*; adds/removes fields (*adaptive link removal/addition*)
- *personalized direct guidance*; dynamically determined destination of ‘next’-button
- *personalized maps*; helps users to understand the content and structure of the form

- *page variants*; one page consists of two or more variants representing information on a different level or style
- *fragment variants*; refinement of *page variants*. One page is divided in different fragments consisting of two or more variants representing different user groups
- *frame-based*; creates alternative descriptions for different users where slots of a frame can be linked with other frames (corresponds to *adaptive natural-language*)
- *nested forms*; the content of a window is organized in sections and subsections that the user or system can open and close (form of *adaptive stretchtext*)
- *sorting*; corresponds to link sorting but also aims at text, fields, and sections

To prevent the user from being exposed to unnecessary items, *dynamic visibility of fields* can be used. This is especially important for complex forms, such as a request for a building permit. In Figure 2 the spouse/registered partner and children fields are skipped since the user has indicated that she will live independent on the new address. Figure 3 uses fragment variants to create optional field explanations for novice and expert users (left: full explanation, right: partial explanation). [3], [4]

<p>Inhabits new address: <input type="radio"/> Independent <input type="radio"/> Resident at: <input type="text"/></p> <p>Has moved: Spouse/ Registered partner</p> <p>First name <input type="text"/> Last name <input type="text"/> Date of birth <input type="text"/><input type="text"/><input type="text"/> Gender <input type="radio"/> man <input type="radio"/> woman</p> <p>Children</p> <p>First name: <input type="text"/> Last name: <input type="text"/> </p>	<p>Inhabits new address: <input checked="" type="radio"/> Independent <input type="radio"/> Resident at: <input type="text"/></p> <p>Authorisation</p> <p>Social security number <input type="text"/></p> <p>Type of legitimation <input type="radio"/> passport <input type="radio"/> driving licence <input type="radio"/> european ID <input type="radio"/> foreigner document</p> <p>Legitimation characteristic <input type="text"/></p> <p>Completion <input type="button" value="clear"/> <input type="button" value="send"/></p>
--	---

Fig. 2. Example of Dynamic visibility of fields -Adaptation of navigation

<p>Announcement of a change of address The obligatory fields are marked with a star *</p> <p>Personal information</p> <p>Initials <input type="text"/> * min 1 character obligatory First name <input type="text"/> * All official names as indicated on your id Last name <input type="text"/> * e.g. Great, the Date of birth <input type="text"/><input type="text"/><input type="text"/> * mm-dd-yy Place of birth <input type="text"/> * Place of birth as indicated on your id</p>	<p>Announcement of a change of address The obligatory fields are marked with a star *</p> <p>Personal information</p> <p>Initials <input type="text"/> * min 1 character obligatory First name <input type="text"/> * All official names as indicated on your id Last name <input type="text"/> * Date of birth <input type="text"/><input type="text"/><input type="text"/> * Place of birth <input type="text"/> *</p>
---	---

Fig. 3. Example of fragment variants – Adaptation of content

3 Adaptive Municipal e-forms

A lot of governments replace their paper forms with online e-forms. There are four main choices that are important when dealing with adaptation: the choice between personalization, customization or a combination, between adaptation to an individual

or a group, between implicit, explicit acquisition, or a combination, and between adaptation of content, presentation, navigation, or a combination. These options must correspond to the needs of citizens, municipal employees and municipalities. To discover the needs of these user-groups three online questionnaires were created. Municipalities (clients of eMAXX) were personally approached by email (response 26% of 53 persons). Citizens were approached by a posting (Computable forum) and by email (response 69% of 78 persons) including the request to send it on to others. The effect of posting and sending on is not known but from personal experience it can be said that an indirect or impersonal approach leads to little response. Municipal employees were approached in a newsletter of eMAXX (response <1%), with a request to the municipalities to send the email on to employees (response <1%), and by emailing all municipalities in the Netherlands (response 11% of 483 persons).

3.1 User involvement in design activities

It was necessary to find out which options listed above should be used in adaptive municipal e-forms and which products/services could be improved with adaptation. The questionnaires were designed to be understandable for everyone, since they aimed at different people, e.g. men/women, young/old people, people with different educational levels. The main problem was how to ask things of which the user has no knowledge. To do this the questionnaires used examples of announcing a change of address, where the use of adaptation was described by approaching different users in a different way when filling in the form. The questionnaires also used pictures based on this example to explain items, e.g. adaptation of content (see Figure 2) or personalization (see Figure 3). The user was explicitly asked to indicate his/her preference, e.g. personalization, customization, or a combination.

3.2 Questionnaire results

According to the results citizens (82%), municipal employees (67%) and municipalities (62%) favor the use of adaptation with municipal e-forms. They prefer adaptation to an individual, personalization, a combination of explicit and implicit acquisition, adaptation of content and navigation. Citizens also prefer a combination of personalization and customization, municipal employees also prefer explicit acquisition and municipalities also prefer adaptation to a group. At the time of the workshop more results will be presented.

According to the feedback the questionnaire was complex for some people. Seven citizens and one municipality employee mentioned that the questionnaire (e.g. <http://www.emaxx.nl/web/Burgers>) was 'too academic' or difficult. Terms used, e.g. customization, personalization were seen as difficult even though their definitions were explained. They suggested to avoid these terms and use more everyday words. Two citizens mentioned that the questionnaire was too long (24 questions). Three citizens (≥ 50 years) mentioned that it took more time to read and understand the explanatory text than indicated (15 minutes). Two citizens said the questionnaire looked too complicated. One of them didn't fill it in at all and the other quit after the

first example, when she tried to fill in a screen shot since she thought it was an actual form. One municipality employee mentioned that the questions were quite difficult. The questionnaire also used some personalization; if a user indicated that he/she had no experience with municipal e-forms, the question about the kind of municipal e-forms filled in so far was skipped (this was added after the feedback of three citizens).

3.3 User involvement in evaluation

According to the questionnaire results and theory studied the prototypes 'building permit' and 'announcement of a change of address' will be designed and evaluated. They benefit the most from the use of adaptation as indicated by the user-groups. The prototypes will be evaluated in a face-to-face evaluation where the user can give feedback while interacting with the prototype. This feedback will be used to adjust the prototypes. At the time of the workshop more can be presented on the prototypes designed and the evaluation process. 37% of the citizens, 40% of the municipal employees, and all municipalities are prepared to do a follow up evaluation.

4 Conclusion

The main problem is how to ask things of which the user has no knowledge. This can be done by the use of one example where the description is based on, example pictures, easy explanation of terms and simplification when possible, a direct and/or personal approach of users, personalization e.g. skipping irrelevant questions, and a reduction of the number of questions. From the questionnaire results it can be concluded that citizens, municipal employees and municipalities are in favor of the use of adaptation with municipal e-forms. But clearly adaptation can only be successful when it is implemented carefully and no incorrect adaptation takes place.

References

1. Anthony Jameson, Adaptive Interfaces and Agents, In J. Jacko & A. Sears (Eds.), Human-computer Interaction Handbook (pp. 305-330), Mahwah, NJ: Erlbaum., 2003
2. Froschl C., User Modeling and User Profiling in Adaptive E-Learning Systems, An approach for a service-based personalization solution for the research project AdeLe, Institute for Information Systems and Computer Media (ICM), Faculty of Computer Science, Graz University of Technology, Austria, 2005
3. Girgensohn A. e.a., Dynamic forms: An enhanced interaction abstraction based on forms. In Proceedings of Interact '95, Fifth IFIP Conference on Human-Computer Interaction, pages 362-367. Chapman & Hall (London, England), 1995
4. Kobsa A., e.a., Personalized hypermedia presentation techniques for improving online customer relationships, The knowledge Engineering Review, Vol. 16:2, 111-115, 2001
5. Serengul Guven Smith, A., Application of Machine Learning Algorithms in Adaptive Web-based Information Systems, Chapter 4 Adaptive Hypertext, CS-00-01, School of Computing Science Technical Report Series, ISSN 1462-0871, 2000