Achieving Usability Within E-Government Web Sites Illustrated by a Case Study Evaluation

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Abstract. Local government in the UK has made progress towards the delivery of services online. However individual local authorities do not necessarily have the experience or infrastructure to develop web sites that are usable and that can be maintained as content changes. This study used a three level model as a heuristic tool to evaluate a case study e-government web site. While the results were useful in proposing changes, barriers exist which slow down the process of making the changes. The paper proposes strategies that may be adopted to ease this process of web site development and change within local government environments and elsewhere.

Keywords: Web sites, heuristic evaluation, e-government, local government.

1 Introduction

Local government authorities have faced issues and challenges in meeting electronic delivery targets and in making their web services usable. These issues are highlighted via a 3-level model evaluation of a UK e-government web site. The study also provides the basis for a strategy to improve the usability of similar sites in the future.

Over the last 5 years there has been much development in the provision of electronic service delivery of both national and local government services in the UK. This has been driven by a central government agenda that is committed to making all services available on the Internet by the end of 2005 [2, 12]. To ensure successful take-up, these e-services need to be joined up in ways that make sense to the customer and be accessible to the widest range of users by being both accessible and usable. Although funding was allocated to these developments, the delivery of this strategy requires a great deal of work on back-end technology as well as the front end web sites. Making a Government organization's web site more usable has therefore to compete for resources with the other activities and projects undertaken to meet the overall e-government agenda. These include replacement of legacy systems, network infrastructure upgrades and integration with back office systems.

The case study web site discussed in this paper was for a local authority area located in the south east of England. The site offered information to its citizens about the local area, council services, leisure and tourism, community living (e.g. schools and hospitals, events), support for business, etc.

Typically for a Government organization developing a web site for the first time, the initial development occurred in an ad-hoc manner. It was also left to the public relations department. The emphasis was to get content online to meet the target. The structure and presentation of this content and the usability of the web site were not given a great deal of attention.

The design strategy for the site is summarized below in comparison with a recommended user-centered design process (see Table 1 below).

Table 1. Comparison of user-centered design process with local authority approach

Recommended user-centered design process	Pragmatic process adopted by local authority
Plan to adopt a user-centered approach and allocate resources with management support.	Users considered but not formally.
Identify user needs with stakeholder analysis and user needs survey.	Documentation of user needs but second hand based on personal knowledge of design team.
Draw upon user interface and usability expertise to assist in developing design in an evolutionary way.	Proceed using 'common sense' approach of design team. Central government requirement for e-government with deadline encouraged some rushed developments.
Evaluate with human factors experts and users.	Lack of resources required web site to be launched without planned user feedback.
On-going reviews from user perspective to maintain web site.	Expert evaluation of site identified issues but lack of planned resources for further development has slowed down change.

2 Evaluation Case study

It was decided then to perform a usability evaluation of the current facility at the time. This was an independent study by one of the authors, employed by the government authority, with responsibility for information systems strategy. The evaluator went through the web site utilizing an understanding of the organization's business as well as usability expertise and knowledge of similar web sites. Usability heuristics were also used and the evaluation also considered the purpose of the web site, the tasks to be supported, and the needs of the end user as well as typical scenarios of users accessing the site. The evaluator was also guided by a 3-level model of user interface design [1, 11]. The levels can be described as (1) Required functions to meet user goals, (2) Suitable information architecture supporting navigation, and (3) Effective page layout, design and accessibility (See Fig. 1). These are explained below.
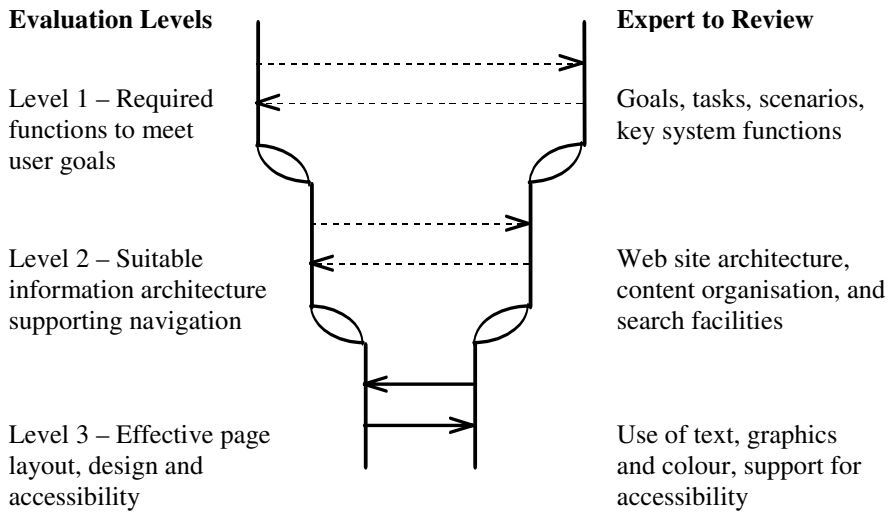
Evaluation Levels   **Expert to Review**

Level 1 – Required   Goals, tasks, scenarios,
functions to meet   key system functions
user goals

Level 2 – Suitable   Web site architecture,
information architecture   content organisation, and
supporting navigation   search facilities

Level 3 – Effective page   Use of text, graphics
layout, design and   and colour, support for
accessibility   accessibility

Fig. 1. Three level model used for evaluation

2.1   The Three Level Evaluation Model

Level 1 - Required Functions to Meet User Goals
A definition of usability according to Reddish [9] is that users can

- Find what they need,
- Understand what they find,
- Act appropriately on that understanding, and
- Do all that in the time and effort they think the task is worth

The web site must help the organization accomplish its business goals by helping users accomplish *their personal missions.* Users' goals will determine the functions that the web site will need to provide. Analysis and evaluation at this level will consider answers to the questions listed below and the scenarios developed based on user and task analysis [6].

- What are the main purposes of the web site?
- Who are the potential users?
- Why would they use the web site?
- What are their motivations and goals?
- What roles do they take?

These high level aspects were considered as part of the evaluation of the local government web site. Only by considering goals, tasks and scenarios could we ensure that the right content is provided. This is very important for such an information rich site serving a community of general public users.

Level 2 – Suitable Information Architecture Supporting Navigation

Having reviewed descriptions of the users, their goals and characteristics and determined the functions required to meet user goals, analysis and evaluation at this level are concerned with content organization, information architecture and navigation. In order for the web site to be learnable, effective, and efficient, the site structure must support user characteristics and cognitive abilities. Here we are concerned with site design in terms of the information architecture, content design, and navigation from the home page to other pages. Based on research into how people use the Web [7], web sites need to be skimmable and scannable to help users find the content that quickly answers their questions.

The evaluation examined the content for its relevance and appropriateness, the design of the home page, linking pages, and destination pages for effective navigation and content organization. Other web site features supporting navigation such as content map, search facilities, and A – Z directory lists were also evaluated.

Level 3 – Effective Page Layout, Design and Accessibility

The most important aspect of page layout and design is to design for the Web and avoid large chunks of text that are common in books and documents. Key questions to be asked are:

- Does the web site feature short sections with many headings or long scrollable pages?
- Does the web site feature effective use of space, bulleted lists and headings?
- Are the most important headings located in the right places on the web page?
- Do the visual cues enable appropriate chunking of the information contained on the web page?
- Does the text use an appropriate font, type size, and typeface?
- Does the color scheme enable adequate contrast between the foreground and the background?
- Is accessibility supported so that the web site can be easily viewed by people with impaired vision or by those using screen readers? If the site uses Flash™ content or PDF files, are they perceivable by people with visual impairment? Do the web page links make sense when read out of context as a list by a screen reader? Is there captioning for audio output for those people with impaired hearing.

Accessibility of web sites in the UK to people with disabilities is now a legal requirement upon web site developers [10]. Organizations are now realizing the social and financial benefits of making web sites accessible to people who are older or who have disabilities. Many local government sites include server side speech output facilities so that the many people without specialist screen reader technology can hear the content of the council's website easily.

2.2 Study Outcome

The evaluation revealed several usability problems and suggested areas of development. A summary of the evaluation findings for the three different levels is given in Table 2.

Table 2. Main Findings from the Evaluation Study

Evaluation Model	Summary findings
Level 1	Key information seeking and transactional services pertaining to properties and locations are not provided. Examples: • View the Council Tax rate for customer's property • Check account balance, make payment using secure web site • Search for planning applications approved for this location and neighboring locations
Level 2	Although the content is relevant and interesting the following problems were noted: • Poor search facility • No A – Z directory listing • Too many navigation options from the home page • Navigation from the home page, linking and destination pages can be improved • Clickable images contributed to inconsistency by introducing an additional and unnecessary navigation style
Level 3	• Simple design and good accessibility implemented (good points) • Text display was restricted to a central frame that caused unnecessary scrolling • Many web pages were based on print versions that should be redesigned for the web with bullets and short text

A report of the evaluation findings and recommendations was produced and presented to the government authority. The author's view was that based on the findings, there was a need for a radical redesign of the web site; one that is best undertaken by a specialist agency where a synthesis of good design and usability knowledge will lead to a greatly improved product.

For an organization with limited resources, and where no investment was planned in usability testing, the evaluation was extremely valuable in identifying problems and contributing to improvements, as the system is further developed. The most important finding of the evaluation was the need to provide information and transactions relevant to users' situations and locations. Steady progress has been made on this and to date all Level 1 issues have been either partially or fully addressed. With Levels 2 and 3, many improvements have been made to the web site subsequent to the initial revisions (See Fig. 2 for the new home page).

Several factors have however slowed down the progress of this development:

- Limited knowledge of user interface and usability issues within the team responsible for the development of the web site
- The redesign of the web site, though important, has to wait for its turn according to corporate prioritization of projects
- 'Who is in charge of, and makes decisions on the web site' is an organizational and political decision not necessarily based on existing skill sets.
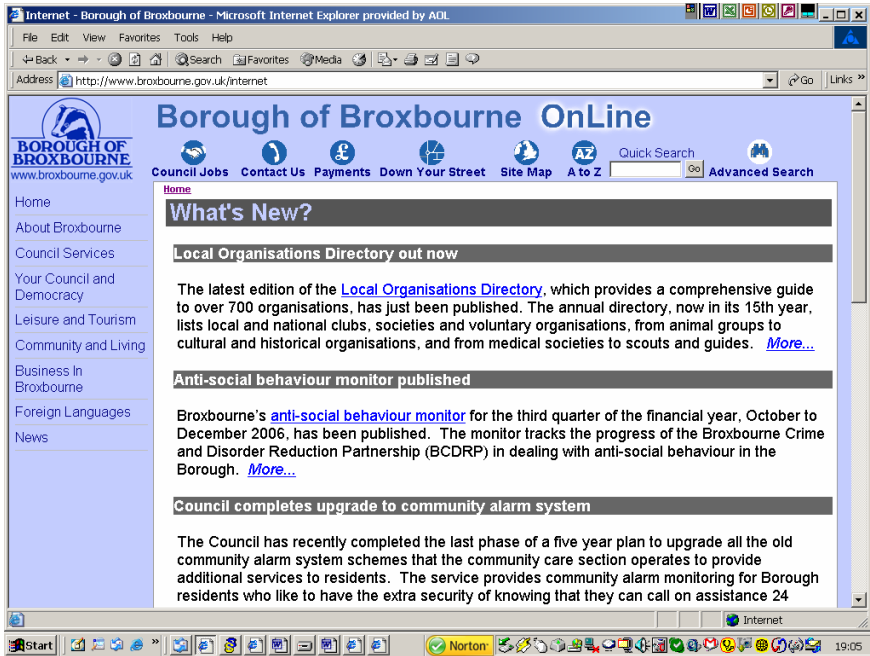
Fig. 2. The new home page for the Borough of Broxbourne

3   Discussion

The results of the local authority web site evaluation became a statement of 'what' needs to be done and 'why'. The course of action that was followed was that where it was easy to make the change, this was passed on to the development team to implement and this produced some improvements. Changes included navigational improvements, doing away with the initial awkward clickable images, and an A – Z list. What was needed, however, was more than just a tinkering with the existing web site (there was a need to provide certain types of information and support transactions) and this required the organization to answer many questions. When should this be tackled? How much should be spent? Who is going to be in charge of it? Should we do it in-house or outsource it?

The improvements that were made were also enabled by technology developments and in particular the use of a content management system (CMS) and through the integration of the web site with back end systems. The CMS could not only enable information to be updated quickly but also allowed templates to be set up where menu bars, logos and news areas could be placed in consistent areas throughout the site so users would learn where to find them easily. Without the CMS, the growth of the content could not be effectively managed. Without proper integration with back end systems, the key transactional and information services identified in Level 1 could not be provided.

Yet achieving this ideal within public sector projects and usability in e-government is not straightforward for the following reasons:

- In general, decisions on contracts and contractors take longer in the public sector following standards and procedures for supplier selection.
- Although conformance with accessibility standards has been prescribed by legislation, there were no clear and explicit requirements for usability testing, leading to inconsistent approaches amongst UK local authorities.
- The importance given to the availability of transactional services as a mark of maturity has encouraged authorities to work more on providing functional and transactional services on their web sites rather than focus on their end users.

This case study development of the web site can therefore be seen as an illustration of the need for a more workable strategy for e-government sites generally if they are to meet citizen needs in terms of functionality and usability. Initially a big effort was made to get content online. This served to meet the initial target and introduced the department and citizens to online information and information management. Following the usability evaluation, work has been done to identify user needs more fully and to fix the main usability problems. This can then be seen as a success. But what are the lessons to be learned?

By recognizing that many web sites will not get it right first time but will improve in a gradual evolutionary fashion, this is a recommended stance for a government department with many constraints on resources. Strategies may then be adopted to make the redevelopment work more effective, efficient, and planned. These are:

- Just produce a simple site to start with that attracts users (citizens), meets the needs of a limited set of user goals well, and opens the way to further development.
- Perform a usability review early on to address the main problems first (achieve quick wins) and refine the development plan.
- Plan out changes over time so that they can be made when skills and resources are available.
- Have regular expert and user reviews thereafter to see where the web site is failing and to steer it on course. This is best achieved through a user steering committee with representation from users and usability experts.

The experience of the Stockport Metropolitan Borough Council [5] who had to rebuild its web site is similar in some respects. This council needed a more robust, streamlined and "future proof" web site which was also more accessible. A key element of their new design was to purchase a content management system. The redesign was completed in 10 weeks and following launch there was an increase in visitors of 21%, and a 68% increase in returning visitors. The use of the CMS provided a base for relatively easy further development that suited the needs of the local council with limited resources.

Another way to address the scarcity of resources for development, adopted by Salford City Council [3], was to involve more members of Council staff in new content development. This was also facilitated by use of a content management system which staff were trained to use to make their contributions. Staff were encouraged to stretch their imaginations to produce information that is dynamic and interesting to the local citizens i.e. the users of Salford's web site. This approach is

not only efficient in the use of resources but also created a buzz among members of staff for making contributions. This is reflected in the number of pages on the site rising from approximately 3,000 to 12,000.

4 Conclusions

This study has illustrated the challenges and complexities local government authorities face in developing usable web services. A three level model that supports heuristic evaluation has been used in a case study evaluation and subsequent redevelopment of a Government authority's web site. The three level model was shown to be extremely valuable in identifying problems and areas for improvements.

Together with the evaluation model, an evolutionary strategy for web site development with frequent expert reviews has been advocated. Such an approach is compatible with the limitations of a local government organization. At the same time, by showing gradual improvements in the site and increasing user appreciation of it, this will help drive usability work higher up the priority list.

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