

Between coherence and specificity. How to maintain the usability when users access to a web sites from a PDA

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Abstract

Following the User-Centred Design, this paper presents a process aimed at assessing whether the web de facto standards do affect expectations and usability while the users move from PC desktop to PDA and vice versa. Activity was articulated into two steps. The first one consisted of analyzing fourteen web sites related to mobility general needs. The aim has been to identify and rank the de facto standards referred to navigation among the site, called here *meta-functions*. The second step, named *Co-Design Experiment*, consisted of controlled design sessions, in which potential users were involved with the aim to collect systems' information and to get a sketch of the expected navigation structure. The results confirm that the meta-functions are key elements to improve not only the usability of web based in general but also the multi-platform interfaces, and especially to support users in shifting from a PC to a PDA.

Keywords: PDA Interface Design; User Centred Design; De Facto Standards.

1 Introduction

When users download web sites and/or other web-based services on a Portable Data Assistant (PDA), the risk to display something poor in terms of usability is high. The authors of this study tested this experience when they tried to download on a PDA a traffic information site, using a software aimed at automatically adapt the sites for small screens. In the web site displayed on the standard Personal Computer (PC), traffic jams were labelled as red while green was used for normal traffic conditions. As soon as this web site was sized for the PDA, the red information was displayed as green and vice versa, compromising dramatically the understandability of the final information.

This and many other experiences witnessed that a mere re-sizing of web-based information into PDA is not the right approach, at least if the information given in

small screens would be kept usable and effective. A more convincing approach is the one labelled behind the acronym MUI that stands for Multiple User Interface. According to this approach, a web-based site could be downloaded from many different devices, both fixed and portable. Nevertheless, not all the information has to be always displayed, but only the ones needed per each specific context of use [6]. Other studies have revealed that users' have consolidated expectations on how a web site can be navigated; for instance, according to some experiments, more than 98% of users expect to find the home button in the left-high corner of the web [1, 3]. These expectations are called *de facto standards*.

Merging these two approaches, and following the User-Centred Design (UCD) [5], this paper presents a process aimed at assessing whether the web *de facto standards* do affect expectations and usability while the users move from PC desktop to PDA and vice versa.

Activity was articulated into two steps. The first one consisted of analyzing fourteen web sites offering telematic services, selected on the basis of their pertinence to users' mobility general needs. The aim has been to identify and rank the *de facto standards* referred to navigation among the site: a *de facto standard* is here intended as a so dominant standard that everybody seems to follow it like an authorized standard

In fact, these standards has been considered more relevant and general for users' expectations that the content-dependent and more specific ones. These types of *de facto standards* have been here called *meta-functions* (for instance, "link to homepage" was considered as a meta-function whereas "find Point of Interest" was considered as a content-specific function). The second step, named "Co-Design Experiment", consisted of controlled design sessions, in which potential users were involved with the aim to collect systems' information and to get a sketch of the expected navigation structure.

The results of this analysis confirm that the meta-functions can be seen as key elements to improve not only the usability of web based in general but also in multi-platform interfaces, and especially to support users in shifting from a PC to a PDA and vice versa.

2 Decomposition of a Sample of web sites and meta-function identification

Fourteen sample sites were selected among best known and most accessed providers of information for people mobility (e.g.: public transports and traffic news). Four categories were considered. All the websites analyzed in the research are in Italian language. Four main categories of web sites were chosen (list of the web site is placed in the Appendix).

The aim of the analysis was to locate functional elements both on single web pages and inside the overall site structure. Four analysts conducted separated analysis of the websites' user interfaces, breaking them down to basic elements following a functional criterion. Particular attention was paid to isolating navigational functions (i.e. functions related to in-site and to-sites navigation). These elements (above

defined *meta-functions*) were considered more relevant with respect to general users' expectations and less content-dependent than more specific elements.

The interface decomposition was performed by superimposing an 80 squares-grid (10 centimetres width, 8 centimetres height) to the websites' screenshots and allocating each function- or meta-function-related element to a specific area.

The decomposition activity was aimed at inferring the criteria, according to which functions and meta-functions were allocated to specific areas of each interface level and along the overall website structure. Moreover, interest was put in individuating which meta-functions were shared by different websites. Many analogies have been found among the web sites and a unique list of meta-functions has been found (see Table 1). The meta-functions showed below are the most common used among the analyzed web-site. Some of them (e.g. Zoom, Log-in) are specifically adopted in web site for travelling information (e.g. the zoom function is usually present in a web site with a map tool).

Table 1. Meta-functions list

Meta-functions
Home page link
Help
F.A.Q. Link
Language selection
Search Engine text box
Advanced Search Engine link
Search button
Add to favourites
Site map
Personalized function access
Breadcrumbs (e.g.: "Home → Menu 1 → SubMenu 2")
Export page/element function
Log-in
Internal link block
External link block
Zoom (e.g.: map)
Content
Select visualization mode (e.g. change results order)

3. Co-Design

Breaking down sample websites to their basic meta-functional elements have been the basis for the following phase, which was aimed at getting the users' expectations towards PDA websites' navigational structure. Particularly, attention was focused onto the homepage structure, and to the screen areas on which the participants would have expected to find the most common meta-functions on both desktop PCs and PDAs.

As introduced above, the underlying question was: do general expectations based on the interaction with desktop PC websites affect expectations towards PDA websites? In order to answer these questions, a co-design experiment was put up, in which participants were required to allocate meta-functions to different areas of the website's grid.

3.1 Co-design sessions' setup

Nine participants were involved, with at least 3-year self-declared experience in web browsing. Each of them was involved in individual co-design sessions, seating in front of a desktop PC and being flanked by an experimenter. A Microsoft PowerPoint[®] file was open, showing a grid reproducing the screen space of a desktop PC or of a PDA and the list produced through the websites' decomposition. Participants were divided into three groups: participants assigned to the first one were asked to allocate meta-functions on a PC-desktop interface; those assigned to the second one were asked to do the same on a PDA interface; those assigned to the third one were asked to allocate meta-functions on both interfaces.

In the first step of the co-design session, participants were asked to fill in a brief questionnaire, in which they were required to evaluate the importance of each meta-function of the list.

In the second step they were asked to place meta-functions on a hierarchical scale, so assigning them with different degrees of priority. Then, they were asked to allocate the meta-functions on a grid reproducing, depending on the experimental group they had been assigned to, a desktop PC web browser window or a PDA (a similar procedure was followed by [3]).

Meta-functions were represented by rectangles of exactly the same dimensions: participants were made aware that they could freely re-size, re-shape and even exclude any of them. At the end of the reallocation activity, a short interview investigated the reasons which had led the users to place elements in a given position. As an output of the co-design sessions, 12 layouts were obtained (6 for the PC desktop version, 6 for the PDA version) and they were compared on two levels:

- on the one hand, analogies and regularities in meta-functions distribution were detected in each of the three co-design conditions, in order to assess the influence of de facto standards;
- on the other hand, layouts were compared to those of the websites analyzed in the decomposition phase, in order to assess whether any of the detected de facto standards was strong enough to affect the autonomous allocation of the meta-functions.

3.2 Co-design results

Appendix 2 shows the results of the co-design session; the values filled in Table 3 represent the absolute frequency of participants ranking the importance of each meta-function before and after the re-allocation (i.e. in the first and second step of the experiment). Some trends emerged clearly, e.g. the high priority assigned to some meta-functions as *Link to Homepage*, *Search engine box* (text box and the search button) and the *Export page/element function*. Other trends, at a lower degree of participants' agreement, can be identified in the high priority assigned to:

breadcrumbs, log-in, internal link and site map expendability. On the contrary, minimum priority has been assigned to *add to favourite* function.

In general, all the participants showed the need of a meta-function that helps in orienteering (internal links block, breadcrumbs and site map); however, no one put more than two of them at the same time. A strong result is related to the *Home page link*: it is always present and, in most cases, it's located in the high left corner of the screen (irrespective of the grid used, PC or PDA), thus confirming the results of research done by Bernard [3]. Functions to orient and help the navigation have been disposed mainly near the *Home page link (breadcrumbs, site map and internal link block)*. A minor agreement was observed in the arrangement of research meta-functions; however, those meta-functions have been mostly placed in the higher part of the grid.

Conclusions: desktop PC and PDA Layout

Comparisons between the layouts composed for PDA and PC allowed highlighting some analogies, which could be adopted as design anchors in developing a multi-platform interface.

A *"picture frame"-like* scheme can be noticed as general layout trend; this is based on: (i) the *Home page link* is always present, generally placed in the left upper corner and normally associated with orienteering functions (*breadcrumbs, map, internal link block*); (ii) *research function* (with typing) in the higher part of the screen, but the positioning is not unique; (iii) no more than two orienteering meta-functions; (iv) a common area dedicated to content visualization placed in the central area of the screen.

Analysing the questionnaires emerged that both the meta-function and the content area in PDA are considered critical from many users. Some recommendations suggest (i) to avoid or at least reduce any scrolling and/or hidden content up to the minimum, (ii) to adapt the font size so to kept the written text readable while moving, (iii) to include multimedia content (especially video) only if need and compliant with the context of use, etc.

The results of this analysis confirm that the *meta-functions* can be seen as key elements to improve not only the usability of web based in general, as stated in previous research [1, 3], but also in multi-platform interfaces, and especially to support users in shifting from a PC to a PDA and vice versa. Currently, the authors are implementing the *multi-platform meta-functions* into an ad-hoc browser for PDA, particular suitable for travellers and mobile users.

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Appendix 1: List of web site analyzed

In the table below, the list of the web site analyzed is reported.

Table 2. List of web site analyzed

News	Public services and traffic news	Maps/routes	Tourist information
ANSA.it (Italian press agency with a very high number of visits;	infotrafic.it (information service about traffic, both for Italian highways and main cities ring roads)	Viamichelin.com (it permits to locate places and to trace routes)	Alberghitalia.it (no more online, it was a site to find and book hotels in Italy).
AGL.it (Italian press agency with special attention to Italian affairs	radio.rai.it/cciss (information service about traffic provided by Italian public broadcast)	Mappe.virgilio.it (similar to viamichelin, but restricted to Italy).	Camping.it (information about camps in Italy)
Sole24Ore.com (website of the main Italian financial newspaper).	Walkie.it (information service on traffic, including also local traffic conditions).	Maporama.com (similar to viamichelin)	Agriturismo.it (to find and book farm which offers local or own produce for farm stay holidays).
	Tranitalia.com (official website of Italian railways, with train timetables and booking services).	Mapquest.com (specialized mainly on north-America).	

Appendix 2: Synopsis of the results regardless the meta-functions' ranking

A synopsis of the results regarding to the relevance given by the subjects to each Meta-function in the first and second step of the co-design session (respectively First allocation and Re-allocation) is reported in the table below.

Each number filled in the table represents the absolute frequency of the subject (e.g. in the First allocation, 4 participants out of 9 stated the Help Meta-function is "essential"). Bold numbers in the Re-allocation section show the differences between the subjects' ranking in the first and the second step.

Table 3. Co-Design results synopsis

Meta-function	First allocation			Re-allocations		
	essential	if needed	needless	essential	if needed	needless
Link to homepage	9	0	0	9	0	0
Help	4	3	2	5	2	2
Link to F.A.Q.	0	8	1	2	6	1
Language selection	2	7	0	2	7	0
Search (typing bar)	9	0	0	9	0	0
Link to advanced research	3	2	3	2	3	3
Confirm research	3	1	5	5	1	3
Add to bookmarks	3	1	5	3	1	5
Sitemap	1	6	2	1	6	2
Access to personalization	1	4	4	2	3	4
Breadcrumbs (e.g.: "Home > Menu1 > Menu2")	6	1	2	6	0	3
Export page or element (e.g.: download)	7	0	2	8	0	1
Log in	5	4	0	5	4	0
Internal links	3	4	2	3	2	4
External links	2	5	2	2	5	2
Zoom	7	0	2	7	0	2
Visualization modality	3	2	4	4	2	3