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Intentions and Perceptions:
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Abstract

In recent years, organisations have been increasingly developing web systems as portals through which B2C or B2B eCommerce is conducted. Many such systems suffer from inadequacy in function, form and quality. While such deficiencies are quite commonly encountered in traditional software systems, in the case of web systems, the problems are magnified by the emerging gaps in designers' intentions and the expectation of a global, and frequently grossly misunderstood, user. In this paper we therefore present an approach to investigating the gaps in perceptions between web developer's intentions and end-users expectations and the subsequent use of web system features. Furthermore, we empirically investigated B2C web systems and determined several useful approaches to practical evaluation of the degree of cohesion between designer and user views of the system.

Keywords

Web developers, end-users, web system features, use, perceptions

INTRODUCTION

In recent years, organisations have been increasingly engaged in developing web systems as a means of satisfying business and customer needs (Christ et al., 2002; Martin and Martin, 2001; Ginige and Murugesan, 2001; Fraternali, 1999; D'Ambra, 2001). Such business web systems are commonly used as portals through which B2C or B2B eCommerce could be conducted, thus providing many services (features) that can fulfil their vital business needs (Chan and Swatman, 2002; Gellersen and Gaedke, 1999; Leffingwell and Widrig, 2000). For this reason, web systems are considered a significant business innovation and are being widely adopted as a new strategy to gain competitive advantage over competing organisations (Esichaikul and Chavananon, 2001; Ricca and Tonella, 2000; Barnes and Vidgen, 2000b).

With the large number of web systems being developed, determination of their success has become a topic of great interest to both research and practice. Many researchers suggest that web systems success relies on attracting and retaining customers (Christ et al., 2002; Martin and Martin, 2001; Zhang and Dran, 2001; D'Ambra, 2001; Van der Heijden, 2000). In fact, customer retention is deemed more critical than customer attraction, since the cost of attracting new customers is much higher than the cost of retaining them (Zhang and Dran, 2001). Some researchers point out that the key to customer retention can also be associated with the satisfaction of customers who are also direct users of these systems, which in turn can be achieved by first gaining good understanding of their expectations, and then developing web systems in accordance with these expectations (Barnes and Vidgen, 2002, 2003; Zhang and Dran, 2001).

Even though organisations may successfully deliver fully operational web systems, the systems can still be perceived by their users as unsuccessful, simply because of the mismatch between end-users' experience in using the systems and their vision of what the system should do and how (Cutter Consortium 2000; Kidra et al., 2001). This is further coumpounded by the fact that many web systems are indeed poor in quality and difficult to use (Fisher et al., 2002; Schubert and Dettling, 2001; Warren et al., 1999). In fact, as investigated by the Cutter Consortium (2000), up to 53% of web systems are found to be in this unacceptable quality category. There are a number of reasons for this situation:

- End-users become frustrated when the design, quality and useability of the web system is poor (Fisher et al., 2002).

- Poor quality and usability negatively influence customer retention (Van der Heijden, 2000).
- Forrester Research (1999) accounted two thirds of purchases on web systems were abandoned because end-users were not satisfied with their experience (Kuan et al., 2003).
- Boston Consulting Group (2000) reported 28% of purchases on web systems failed, and four out of five end-users that purchase online, experience at least one failure (Kuan et al., 2003).
- End-users are not likely to use the web system after an unfavourable experience (Kuan et al., 2003; Fisher, 2002).
- End-users can easily move to other similar web systems if they are not satisfied with their experience (Fisher, 2002).
- Organisations with poor web systems due to usability problems will project a poor image (Barnes and Vidgen, 2002; Barnes and Vidgen, 2000b).

In this study we set out to establish the gap between web developer's intentions with regard to web system features and end-users perceptions and use of these. This is important if organizations are going to reap the rewards of the Internet (Kuan et al., 2003). Our focus was web systems that support B2C eCommerce, because the B2C market has expanded rapidly and become an important source of "new" business (Barnes and Vidgen, 2000b). Also, in B2C system development, the gap between developer intentions and user perceptions is potentially larger than in B2B systems, as end-users are commonly globally distributed and casual. This largely makes them unidentifiable during web system development, thereby creating a challenge to understand and meet their expectations.

RESEARCH OBJECTIVE

The main objective of this research was to investigate and thoroughly understand the gaps that emerge between web developer's intentions and end-users perception and the subsequent use of various web system features. (Conceptually, this can be depicted as shown in Figure 1).
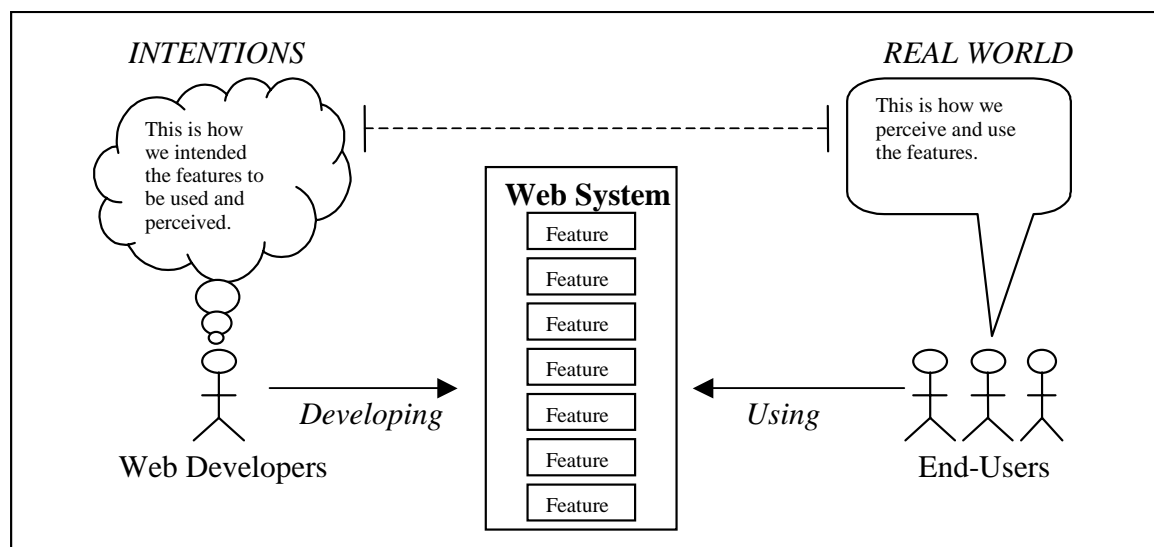

Figure 1: Illustration of the Problem

- The left side of the model illustrates the web developers' intentions about how they expect end-users to perceive and use the features of web systems while in development.
- The right side of the model illustrates end-users' perceptions of the features of web systems and the way they use these features when implemented in the real world.
- The top section of the model illustrates that there may be possible gaps or differences between web developer's intentions and end-users perceptions and use of web system features, which this study endeavours to explore.

WEB SYSTEMS DEVELOPMENT

Web systems development is still an evolving discipline, which is highlighted by web systems being developed in unsystematic way, using unreliable techniques, and unproven methods (Ginige, 2002; WebISM Research Group, 1998; Gellersen and Gaedke, 1999; Ginige and Murugesan, 2001; Carstensen and Vogelsang, 2001; Kirda et al., 2001). The immaturity of the industry and the lack of a standardised process in web systems

development often leads to web system failure in meeting the fundamental needs of end-users (Lowe and Eklund, 2002; Ginige and Murugesan, 2001).

Web systems are commonly developed in an ad-hoc fashion, largely due to the dynamic nature of the World Wide Web, which fosters pressures to 'go live' quickly (Kirda et al., 2001). As a result, these systems are typically developed rapidly, undergoing continuous, uncontrollable evolution and modification (Ricca and Tonella, 2001; Zafiris et al., 2001; Warren et al., 1999). Many follow an evolutionary prototyping approach in development (Ricca and Tonella, 2001; Lowe and Eklund, 2002; Ginige, 2002; Vidgen, 2002; Fraternali, 1999).

Furthermore, the web development process, as practiced, lacks proper identification of the requirements of end-users. Requirements identification is complicated by the fact that web systems have a large number of non-homogenous users, all having distinct needs which are relatively unknown (D'Ambra, 2001). The requirements are therefore too complex to define and are often inadequately identified, or only emerge during and after the development process (D'Ambra, 2001; Lowe and Eklund, 2002). We could, perhaps, even go as far as saying the requirements elicitation process in web development is ad hoc in nature.

To cope with the rapid development of web systems, multidisciplinary teams with wide ranging knowledge and skills, for example graphic design, database design, programming and alike, are often deployed (Lowe and Eklund, 2002; Ginige, 2002; Carstensen and Vogelsang, 2001). These multidisciplinary teams further complicate the development process because the collaboration and interaction between the groups can be precarious (Carstensen and Vogelsang, 2001). Furthermore, the development and management of web systems rely heavily on the knowledge and experience of an individual or a group of developers and their practices, which is risky compared to using standard practices (Ginige, 2002; Vidgen, 2002; Gellersen and Gaedke, 1999).

In view of all of the problems inherent in web development, at least in the current state of the practice, methods of evaluating web system quality are urgently needed.

Approaches to Evaluating Web Systems

As our research interest is concerned with the identification and analysis of gaps in the perceptions of system features by web designers and users, we turned our focus to some prior, and well established, work on assessment and evaluation of (1) web systems usability, and (2) end-user's perception of the web systems features and their quality.

The notion of system usability has been defined by the Gartner Group as "the measure of how easily, efficiently and satisfactorily users can accomplish tasks toward specific goals" (Basu, 2003). Web usability usually includes two areas of study, i.e. methods of usability inspection and frameworks for measuring web usability.

As our study aims at gaining (deep) understanding of the investigated phenomena - the gaps - the majority of usability methods, which focus on measuring various aspects of user performance, were deemed as less appropriate for our research. At the same time, our investigation of heuristic and qualitative methods of usability assessment well correlated with indicative evidence emerging from our study of end-user perception of web system features - the second group of approaches to web evaluation.

Assessment of end-users perception of web systems quality (Baiverova et al., 2003) is commonly evaluated in terms of the system aesthetics, design, ease of use, accessibility, and interpretability (Kopsco et al., 2001). Similar system quality aspects are also being studied with the use of more substantive and systematic evaluation frameworks, some of which have been developed specifically for the investigation of web systems and others which are also used in assessment of other types of technology adoption aspects. The following five frameworks represent the most widely used approaches to web evaluation:

- WebQual instrument (Barnes and Vidgen, 2000a, 2000b, 2001, 2002, 2003);
- Extended Web Assessment Method (EWAM) (Schubert and Dettling, 2001);
- Technology Acceptance Model (TAM) (Van der Heijden, 2000, 2001);
- Zhang et al.'s Framework (2000); and
- Aladwani and Palvia's Framework (2002).

The detailed review of these models and approaches demonstrated to us that the quality evaluation frameworks share many commonalities in several important dimensions as related to the user perception of the web system, in particular, the web content and its presentation, navigation, usability, information and service quality, and the system usefulness and enjoyment in using the system (see Table 1). These web system dimensions provide some indicative evidence of the types of gaps that may exist between web developer's intentions and end-users perception of web system features.

Table 1: Summary of the Dimensions of the Frameworks used to assess Web System Quality

		Approaches				
		WebQual	EWAM	TAM	Zhang's	Aladwani and Palvia's
Dimensions / Feature Groups	**Content**					Specific Content
	Presentation			Perceived Visual Attractiveness	Presentation	Appearance
	Navigation & Search				Navigation	Technical Adequacy
	Information Quality	Information Quality			Quality	Content Quality
	Service Quality	Service Interaction Quality	Trust			
	Usability	Usability	Ease of Use	Perceived Ease of Use		
	Usefulness		Perceived Usefulness	Perceived Usefulness		
	Enjoyment			Perceived Enjoyment		

Features of Web Systems

Our investigation of the gaps between designer intentions and user perception and use of the web systems focussed on the individual system features, which ideally should be defined in such a way so that they could be identified and subsequently studied in isolation from the complex relationships and dependencies of a multi-feature/multi-function system. The dimensions identified in the analysis of five web system quality frameworks helped us to further explore the range and richness of system features that various researchers consider as significant in determining system quality.

In fact, web systems contain numerous features and the importance of these features is ranked differently across distinct web domains (Zhang and Dran, 2001). The presence of selected features also varies significantly between the different types of web systems (Zhang et al., 2000). As this study focused on investigating web systems in the B2C eCommerce domain, we largely adopted and extended a framework developed by Elliot (2000), who identifies factors and facilities required to support typical B2C web systems. His framework identifies six categories, each comprising five elements. More recent literature revealed further features of B2C that substantiated and extended Elliot's framework (see Table 2, which also lists sources of literature that extends Elliot's original model).

By focusing on the features identified in the resulting framework of web system quality dimensions, we were able to conduct an empirical study that led to exploration and subsequent understanding of the nature of major and minor gaps in perception between web developer's intentions and end-users perceptions.

RESEARCH APPROACH AND DESIGN

In this study we sought to empirically test web systems aspects captured in the framework presented above (see Table 2). As a result, we conducted two case studies to accumulate issues and insights across multiple web systems, their designers and users, with the ultimate intention of deriving the preliminary theoretical model (Benbasat et al., 1989) of web user perception.

Web-bookstores represent one of the earliest applications in the B2C eCommerce domain that have subsequently matured to become a relatively stable and large market (Barnes and Vidgen, 2002). For this reason, web-bookstores were selected to become the predominant focus in our study. For convenience, bookstores were narrowed to Australian bookstores, with web development operations in Melbourne, but targeting a national audience. Based on these criteria, six bookstores were identified, contacted via email, and subsequently two of which expressed interest in participating in this research.

The Sample

In both bookstores (Bookstore A and B), the principle web developer was interviewed to elicit general insights into their intentions with regard to the features on the bookstores web system. Likewise, users perceptions and use of features of these web systems were elicited via interviews with three independent end-users, who were considered representative of the intended user group. The use of three end-users was based on recommendations from Nielsen (2000b). In a bid to remove bias in the evaluation process, different end-users were used to evaluate each bookstore (Barnes and Vidgen, 2002).

Table 2: Quality Dimensions and the Features of B2C eCommerce Web Systems

Dimensions	Description	Features	Supporting Literature
Content & **Presentation** & **Navigation** Company information	This category includes features which establish a corporate identity in the eCommerce marketplace.	• Information on corporate ownership, such as company mission, and financial performance. • Operations and product/service areas. • Contact or distributors details. • Information for image building, such as company news, press releases). • Store locations. • Detailed company relevant functions, such as recruitment opportunities.	Elliot et al., 2000; Williams and Larson, 2000
Product & service information	This category includes features which provide information about the current and future products and services.	• General product/service group. • Detailed product/services specifications, usage instructions, and warranty information. • Product/Services pricing lists. • Listing of products/services on promotion. • Details on new or future services. • Product inventory • Detailed product photographs. • Expert quality ratings reviews written by customers.	Elliot et al., 2000; Barnes and Vidgen, 2002; Zhang et al., 2000; Williams and Larson, 2000; Doolin and Dillon, 2002; Zhang and Dran, 2001; Cenfetelli and Benbasat, 2002; Cheek and Quayle, 1998; Baiverova et al., 2003; Jewels and Trimbell, 2001
Identification & accessibility of information	This category includes features which allow information to be easily accessed and identified.	• Quick search engine. • Advanced search engine. • Results presentation and organisation. • Site map. • Path List. • Sibling List.	Zhang et al., 2000; Elliot et al., 2000; Brelage et al., 2002; Zhang and Dran, 2001; Barnes and Vidgen, 2002; Cheek and Quayle, 1998; Sabin-Kildiss, 2001; Baiverova et al., 2003
Information & **Service Quality** Customer services	This category includes features that provide assistance to the customer.	• Online help, for example FAQ's, email. • Customer policies, for example privacy policies, warranties, purchase exchanges. • After sales procedures, for example returns, repair, exchange, help, problem FAQ's. • Customized services, for example loyalty scheme, memberships, user clubs. • Broader customer services, for example links to other sites.	Elliot et al., 2000; Barnes and Vidgen, 2002; Zhang et al., 2000; Williams and Larson, 2000; Doolin and Dillon, 2002; Zhang and Dran, 2001; Cenfetelli and Benbasat, 2002; Cheek and Quayle, 1998
Transaction Processing	This category includes features which supports full transaction processing.	• Supports on-line purchasing. • Simplified process, for example shopping trolley, two-click purchasing. • Online payment with the capacity for alternative payments. • Details of full transaction cost • Order, billing and shipping confirmation	Elliot et al., 2000; Barnes and Vidgen, 2002; Williams and Larson, 2000; Doolin and Dillon, 2002; Zhang and Dran, 2001; Cenfetelli and Benbasat, 2002; Cheek and Quayle, 1998; Baiverova et al., 2003; Jewels and Trimbell, 2001
Usability, Usefulness & **Enjoyment**	This category includes those system features which enhance customer experience with the system.	• Customer service orders, for example decision support, order status, delivery tracking, flexibility in delivery after order. • Customer feedback, for example customer input, reviews. • Development of communities, for example games, quizzes, prizes, chat rooms. • Customisation. • Novel and effective use of multimedia, for example audio, video, animations.	Elliot et al., 2000; Barnes and Vidgen, 2002; Williams and Larson, 2000

End-users comprised university students who, as a matter of course, use bookstores and frequently also have experience in using the Internet. Convenience sampling was used to recruit students aged 20 to 30 years from different disciplines (Business and Law, Engineering and Information Systems).

Background to Bookstore A

An Australian organization established Bookstore A in 2002 as part of their principle objective to support organizational learning. The target audience was end-users from both academic and professional communities. Development of Bookstore A was outsourced to a Melbourne web developing company, which sells a range of standard software products.

The outsourcer's products include a suite of programs that perform specific stock and sales functions, which subsequently could be customised in their look and feel, to adhere with the corporate image. Bookstore A

implemented a subset of the overall suite of products, which included an Internet information and ordering system.

Background to Bookstore B

Bookstore B was established in 2003 by an Australian organisation that was traditionally a library supplier. The target audience caters for the ordering of books, electronic products, and serial subscriptions. Users are primarily from academic and professional communities. The IT department developed the bookstore in-house. The focus of this study was on the book ordering because it was Bookstore B's main means of generating traffic and revenue. Within the book ordering there were features that catered for larger users, such as libraries, that can only be accessed by authentication. Such features were excluded from this study because the overwhelming majority of users would not fall into this category.

Data Collection

In total, eight interviews were conducted over a five-week period (2 web developers and 6 end-users). The interviews were conducted using a laptop computer as this permitted participants to interact with the 'live' web systems. In each case, a program running in the background recorded the active screen and audio. Following the interviews, recordings were transcribed noting screen actions and dialogue.

Interviews with the web developers followed an unstructured style as this offered "the advantage of being unbiased by any-preordained ideas of the interviewer and, theoretically, more truly reflects the world of the interview" (Cavana et al., 2001 p148). The interviews commenced with a broad open primary question (i.e. they were asked to explain how they intended end-users to perceive and use the web system features), followed by probing, which managed the process and direction of the interview (Cavana et al., 2001).

Conversely, interviews with the end-users followed a semi-structured style providing a framework to guide the interview, but also allowed for other thoughts and aspects to be investigated and captured (Coombes, 2001). Here, interviews began in an unstructured manner with a broad open question (i.e. demonstrate how you perceive and use the web system features) and then switched to planned questions based on pre-defined topics (Cavana et al., 2001). The planned questions were facilitated by a set of tasks, which were based on outcomes from the interviews with web developers. This ensured certain features were evaluated. Succinctly, the tasks detailed a description of the actions that must be taken without an explanation of how to achieve the actions in the web system (Nielsen, 1993). Whilst completing the tasks, users were asked to think out loud about their perception and use – a method adapted from usability engineering studies (Nielsen, 1993).

The interviewed Bookstore A's web developer was the Operations Manager in the web developing company, who was involved in the web development process. The developer liaised with the support and development team, and the sales and training team, to customise the product.

The interviewed Bookstore B's web developer was the Marketing Manager who was involved in the web development process, liaising with the development and marketing teams.

Data Analysis

The interviews with web developers have been analysed using the *feature condensation*, not unlike the popular *meaning condensation* (Kvale, 1996) method, which aims at the gradual transformation of transcribed and tabulated scenario protocols into a table of actions performed on the user-selected system features (Caruana, 2003). In the process, the feature condensation analysis lead to the identification of a variety of web system features, used differently by both the web system developers and the system users. To consolidate the findings, of which full discussion will be omitted for the sake of the paper's brevity, only those deemed critical by the web developer will be discussed (see Table 3 for a listing, note that "Not applicable" means the feature was not available at that bookstore).

Analysis of Findings

Findings from this study provided insight into the gaps between web developer's intentions and end-users perception and use of web system features. Before these are explained, some key terms need to be defined:

"Major"

        Indicates there was evidence of a major gap between the web developer's intention and end-users perceptions and use of the web system feature. The gap was considered major when the discrepancy between the feature intended and actual use occurred consistently across several observed use scenarios.

Table 3: Reported Features of the Two Cases

	Bookstore A	Bookstore B
Features	Catalogue	Catalogue
	Item Details	Item Details
	Shopping Cart	Shopping Cart
	Order Form	Order Form
	Confirmation	Confirmation
	Search	Search
	Not applicable	Search Advanced
	Search Result	Search Result
	Not applicable	Email Colleague

"Minor"

Indicates there was evidence of a minor gap between the web developer's intention and end-users perceptions and use of the web system feature. The gap was considered minor when the difference in the intended and actual feature use occurred only in the selected few observed use scenarios.

"No"

Indicates a gap did not exist between these two groups.

"Not Applicable"

Indicates the feature was not available for that bookstore.

Whilst the literature on typical features of B2C eCommerce web systems supported many of the features identified by the web developers, including:- Catalogue, Item Details, Shopping Cart, Order Form, Confirmation, Search, Search Advanced, and Search Result; the Email Colleague feature in Bookstore B was not supported.

The findings in Table 4 demonstrate major gaps in Bookstore A and B with respect to the following features:

♦ *Catalogue* in terms of user expectations as to the access, layout, content, and adding of items.

♦ *Shopping Cart* in terms of user expectations as to the access, content, deleting items, changing item quantities, adding order instructions, selecting freight method and help facilities.

♦ *Order Form* in terms of user expectations as to the layout, content, entering details and help facilities.

♦ *Confirmation* in terms of user expectations as to the content and printing facility.

Since these major gaps emerged for both bookstores, it is plausible that such major gaps may exist with features of comparable web systems. The identification of major gaps with respect to these features would have significant implications on the business, as these features are critical to the purchasing process, and therefore to profits of an on-line business. As suggested in the literature, if web systems do not meet the expectations of their end-users, because such major gaps exist, the web system could lose customers and hence become unviable (Zhang and Dran, 2001). Web developers obviously need to focus on these features.

Bookstore B's web system also contained a unique "Email a Colleague" feature. As Table 4 shows, there was a major gap with respect to this feature in terms of layout, content, entering details, and help facilities.

Table 4 also highlights minor gaps in terms of access, layout and search procedures across Bookstore A and B with respect to the Search (Search and Advanced Search) feature. Again, as these minor gaps emerged for both bookstores, it is indicative that such minor gaps may exist with respect to these features on comparable web systems. Identification of these minor gaps has some implications for web-based business, given that searching is a significant aspect of all B2C e-Commerce web systems, permitting end-users to located goods and services they wish to purchase.

Interestingly, there were some minor gaps in Bookstore A with respect to the Search Result and Item Details features, but not in Bookstore B. Thus, whilst we can't draw any strong conclusion on whether these gaps could exist on comparable web systems, there are still some implications for caution to be taken by the similar on-line businesses.

Table 4: Research Findings Summary

Dimension & Category	Features	Gap	
		Bookstore A	Bookstore B
Product/service information & Promotion	Catalogue	Major gap in access, layout, content, and adding items	Major gap for access, and content
	Item Details	Minor gap in look and feel, layout, and content	No gap
Purchasing/Transaction Processing	Shopping Cart	Major gap in access, content, deleting items, changing item quantities, and selecting freight method	Major gap in changing item quantities, adding order instructions, and help facilities
	Order Form	Major gap in layout, and content	Major gap in layout, content, and help facilities
	Confirmation	Minor gap in content and printing facilities	Major gap in content
Search/Navigation	Search	Minor gap in search procedures and layout	No gap
	Advanced Search	Not Applicable	Minor gap for search procedure and access
	Search Result	Minor gap in layout, content, and adding items	No gap
Usability, Usefulness and Enjoyment	Email Colleague	Not Applicable	Major gap in layout, contents, entering details, and help facilities

Having identified the gaps between the developer intention and users perceptions, the gaps could subsequently be closed by referring the information on all detected misperceptions back to the web designers. The exact method of dealing with these gaps in the web system features could be further assisted by cross-referencing the feature dimensions, as described in the framework presented earlier (see Tables 2), with the heuristics employed to deal with the typical deficiencies in web systems in general. While domain-specific heuristics need to be developed and maintained by the concerned developers or their communities of practice, the usability heuristics can be readily applied to deal with many web system issues (Nielsen, 2000a). In the case of the investigated web-bookshops, the selected gaps were dealt quite effectively by directing employing the heuristics advocated by Nielsen (2000a) (the details of the recommended actions can be found elsewhere, see Caruana, 2003).

SUMMARY AND CONCLUSIONS

This paper argued the existence of gaps that commonly emerge in web systems between the designers' intentions and the users' perceptions. The presented framework of web system features provided a useful vehicle for the identification of such gaps in several dimensions of web systems' quality, i.e. their contents, presentation and navigation; information and service quality; and system usability, usefulness and enjoyment. A qualitative study of two web-bookstores was undertaken to empirically evaluate the effectiveness of the proposed framework. It was consequently found that the framework combined with the features condensation method allowed identification of several major and minor gaps existing in the commercial web sites, which highlights serious deficiencies in the commonly adopted web design methods. While the adopted two-case-study research method does not allow generalization of the presented findings across the web-development practice or the selected application domain, the proposed framework-method pair has proven a viable approach to determining serious discrepancies between developers' intentions in designing the web system features and the users perception and use of these features. Further work is required to integrate the proposed framework with the heuristics assisting web designers in rectifying the emerging quality problems.

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