Cultural and Requirement Aspects on International E-commerce sites

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Abstract - This paper investigates issues on culture and websites design for e-commerce, and also relates them to advanced requirements engineering practices. E-commerce parishioners and users have different expects and preferences from a web site. Finding information on a web site is an important issue. We observe that cultural concerns may crosscut several base functionalities of a system, constraining and modifying them in different ways. This paper examines Australian, Singaporean, German and Brazilian sites and relates them to requirements of users from different countries by identifying the cultural differences that should be taken into account.

Kyewords: culture, e-commerce and requirement engineering

1.0 Introduction

Commonly, the e-commerce practitioners and providers try to present their web sites for a particular country users as well as international users. Also the e-commerce providers make assumptions in understanding user requirements as to how/what to present appropriate information for the target users. Generally, web sites can be used by a wide range of people from different countries. The e-commerce providers have clear ideas about the requirements for target users and their culture. Some information on the web can be obtained without comprehending its meaning and present it to people on the site.

Web design for international users is one of the increasing issues in Web-Based E-Commerce (WBEC). It is not only for providing Multilanguage sites, but also understanding users' requirements for the WBEC. This research focused on issues in the users' preferences in global sites, particularly in B2C e-commerce, including an understanding of current global web sites design. This investigation attempts to search for an understanding of the user preferences in global e-commerce sites. It was found in earlier studies, that web design elements such as navigation, images and color can provide different reactions from people in different cultures, resulting in varying responses [1]. Presentation of business information and services offered through the web are not only conveyed with developers' ideas but are also with users' perception of choices. Information on the web relies on both groups forming a common perception. In a global context, most web interfaces do not support effective usage due to the use of unsuitable tools for conveying information in a global context, as most of the information is presented on the web by icons, metaphors, shapes, colors of text and background, frame/text locations on screen, etc. which may

be relevant to the culture of origin but may be misinterpreted by the global audience.

Generally, web design features are directly translated into different languages and distributed to users internationally. In an international context, the web content features employed make a somewhat lesser impact in the variety of contexts as it is supposed to be effective, although they may be clear to a minor proportion of the population. Thus considering human factors in the design of a website for an international user base is an important factor in promoting effective usage of information presentation. These human factors, and, in particular, the cultural issues, should be modeled separately from the main system's functionalities (as they are scattered through the systems functionalities) in order to obtain a more adaptable and evolvable system. This particular separation of concerns is achieved by applying the principles of aspect-oriented software development (AOSD) [2], where crosscutting concerns, i.e. concerns (such as security, performance and usability,) that affect other concerns (such as systems functionalities), are separated for maintenance and evolution purposes, and then composed with those functionalities to have the complete system specification. Having evolution and maintenance facilitated is a key issue in web applications, in particular e-commerce ones. The purpose of this paper is to discuss how the crosscutting nature of cultural concerns is addressed using aspect-oriented concepts in a web application development. The paper is ordered as follows. Section 2.0 gives some background on cultural dimensions, social values and aspect-oriented requirements engineering. Section 3.0 summarizes the approach. Section 4.0 discusses the results. Finally, Section 5.0 draws some conclusions and limitations of the approach, and points directions to future work.

2.0 Culture and Global Environment

Literature on the impact of cultural differences on Information Systems (IS) development and the use of information demonstrates that understanding national culture is an important factor for successful IS development in the global environment. In IS studies in globalization, and cross-cultural study, cultural values are reported as a significant concern for system development in requirements engineering [3, 4]. There are several models of national culture suggested in the literature [7-9]. Particularly, Hofstede's framework has been widely accepted by many IS researchers attempting to understand cultural differences between nations, especially in management research [7, 10]. This study enquires into the cultural dimensions as a requirement engineering process, and structures behavior of people to be used in the requirements engineering process.

A small number of researchers have investigated how culture influences the use and development of information technology [11, 12]. Cultural differences affect individual personalities and behaviors. Each country has its own ways of expressing feelings, showing emotions, solving problems and constructing its society [12]. In a world with barriers to communication, information transfer and development of IS between countries, developers should consider information systems as they could be influenced by national culture.

We assumed that business companies and their business processes have objectives, and attempt to fulfill their requirements. The requirements vary in different countries, and business organizations belong to a specific culture group. Not only people in business organizations have affiliations to groups, but also developers have particular influences

in providing business processes. Therefore the study of understanding the characteristics of website will be valuable in IS.

2.1 Cultural Aspects

Hofstede (1980 and 1991) identified four dimensions of culture: power distance, uncertainty avoidance, individualism & collectivism and masculinity-femininity: Power Distance is the extent to which a member of a society usually accepts that power in institutions and organizations. It is related to the degree of centralization of decision making in organizations, with the higher power distance cultures accepting greater centralization than the lower power distance cultures [5, 6]. Uncertainty Avoidance is the degree where members in a society feel uncomfortable with uncertainty and ambiguity, which leads them to support beliefs promising certainty and to maintain institutions protecting conformity [5, 6]. Individualism & collectivism is the extent of the loyalty to the same culture group and an emphasis on looking out for themselves (Hofstede, 1991). Masculinity is the extent of the society's perception of being achievement oriented, assertive, and competitive, as opposed to femininity, which is the extent to which society values relationships, quality of life, and caring for others. Table 1 shows differences between individualism and collectivism from Hofstede's study.

Individualism	Collectivism
Everyone grows up to look afte him/herself and his/her immediate family only	People are born into extended families or other in groups which continue to protect them in exchange for loyalty
Identity is based on the individual	Identity is based on the social network to which one belongs
low-context communication	high-context communication
employee-employer relationshi is a contract supposed to be based on mutual advantage	employee-employer relationship is received in moral term, like a family link
management is management of individuals	management is management of groups

Table 1 Differences between individualism and collectivism from Hofstede's study in 1980 and 1991

2.2 Social Values and Aspect-Oriented Requirements

History-enriched background countries' websites make users more aware of each other and contributes to a social experience of the website [13]. In this context, the user interface issue in different cultures is important for international e-commerce users as well designers. Culture on the e-commerce sites has multiple facets even within some countries [14]. Also the user performance levels are different in different cultures [15]. Apparently, presentation of information layout, color, and visual images on the page may not effect equally to users. The web navigation, ideas, and valuable information on the site are not only personal value but also a cultural concern. This cultural concern actually is normally scattered and tangled throughout the requirements that describes the services of a web application. Therefore, if we want to adapt a web application to a different cultural context in order to turn this application more competitive in that context, this will be almost impossible to handle due to the amount of work to be spent on the task as we have to modify most part of the system. So, at

requirements modeling phase the ideal should be to separate (in a module, called an aspect) the cultural concern and then "weave" it with the functional requirements of a system through the definition of composition rules. Doing that if we want to modify the cultural concern we need only to change the respective aspect and associated composition rules and weave it again with the system's functionalities to obtain the new whole picture, now adapted to the new cultural context. Aspect-Oriented Software Development [2] has been dealing with the problem of crosscutting concerns since 1997 [16] in different areas such as database systems, middleware and distributed systems. We believe that the aspect-oriented principles can be applied to solve the problem of crosscutting cultural requirements, allowing more adaptable and evolvable systems. Figure 1 presents Meijas' interpretation of Hofstede's cultural dimensions as applied to cultures from different countries.

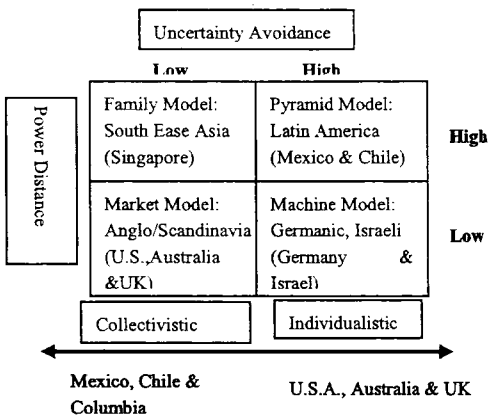


Figure1. Summary of Hofstede's Cultural Dimensions by Meijas [17]

3.0 Approaches

We have examined Australian, Singapore, German and Brazilian sites to identify information requirements in different countries. The study focused on presentation of information on the websites. The data collection and research methods are similar to many studies, were exploratory research method was used to examine about the web design sites [18-20]. This approach was found to be beneficial to confirm generalizations made in relation to users' requirements and to test the impact of cultural differences on web design. This research then attempted to formulate more precisely objectives for further research.

We selected common e-commerce sites in Australia and Brazil, and identified information requirements and design styles; page layout, communication channels and visual design elements. This research was conducted on pre-selected global e-commerce sites, which are based in Australia, Singapore, German and Brazil. The research questions were "what are design characteristics in different country sites?" and "what are popular design features for different country sites?". The questionnaire attempted to find out culture differences and the characteristics of design features. Observations were conducted to determine the different design categories that make up user requirements in four different countries. Also we investigated design features supporting users with usability, where some design effects were taking into consideration, such as color, images, menu layout, etc. Both, culture differences and design features (which are dependent on

the culture differences) can be modularized by the way of aspects. And depending on the cultural context, the appropriate module must be selected and woven into the functionalities of the web application.

4. Results

This study focused on cultural factors from Hofstede's [5, 6] study: uncertainty avoidance, power distance and individualistic & collectivist features, were examined. We assumed that airline business is one of the active e-commerce areas in many countries, and well-linked with people, as well as providing services through the website. We examined design elements that are page layout, communication channel, and visual elements from selected airline sites (refer to figure 2, 3, 4 and 5)

Figure 2. Brazil site ((a) www.tamairlines.com and (b) www.varig.com)

(a) Tram

(b) Varig

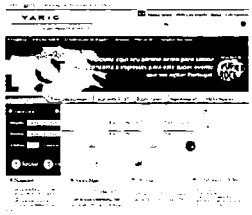


Figure 3. Germany site (www.lufthansa.com)

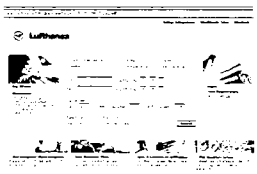


Figure 4. Singapore site (www.singaporeair.com)

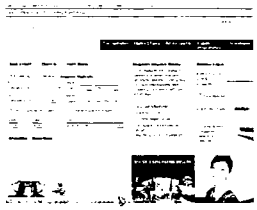
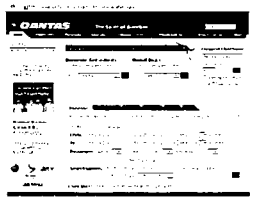
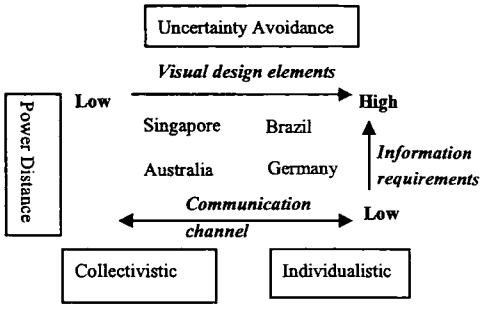


Figure 5. Australia site (www.qantas.com.au)



The study results show that web design illustrates characteristics typical of the four countries. The Australian website was found to be located in low uncertainty avoidance and close to collectivist cultures and the Brazilian sites are found to be located in high uncertainty avoidance and close to individualistic cultures. Additionally, we discovered that information was more detailed and focused on individual users in Brazilian sites. For example, information related with care such as explicit information for pregnant women, or carrying pets, is easily found on those sites. In contrast, the Australian sites contained more public based information for users and were not as detailed as the Brazilian sites. Singaporean and Australian sites provided more communication channels, and the users could directly purchase products via the web. The Brazilian sites didn't provide chances to get quotes or paying through the sites, and the users needed to contact the company for getting quotes or for purchasing goods or services. Figure 6 shows representation of Meijas' interpretation of Hofstede's model adapted to this study [5, 17].

Figure 6. Adaptation of Meijas interpretation of Hofstede's Cultural Dimensions to this study.



Moreover, Singaporean and Brazilian sites provided more detailed information for users compared to Australian and German sites. Communication channels are various in German and Brazil compared to Singaporean and Brazilian sites. Therefore, if a Singaporean website wants to conquer more clients from Brazil, for example, a modified website that incorporates Brazilian cultural issues must be built. And an effective way to do that is adopting aspect-orientation. In this example the Brazilian cultural concern is separated in a module and then woven with the essential functionalities of the original website (in this case the Singaporean site), by applying composition rules previously specified. These rules can take the form of the rules defined in [21]. The immediate consequence of this approach is that the adaptation to a new market with a different cultural context is achieved in a fast fashion, with less effort involved compared to what is done in current approaches.

5.0 Conclusion and Limitations

The limitations of this research are that we didn't go through with usability evaluations, usage of software, quality assurance testing and post-analysis. Also we need to adapt and apply AORE techniques to specify cultural concerns. But this adaptation will not be a problem as current AORE approaches [21-24] are general enough to specify any kind of crosscutting concern, including the cultural one. We can state that the advantages of our approach are twofold. Firstly, by using aspect-orientation to specify cultural issues separately and then weave them to the functionalities of a system, we will have more adaptable (and therefore, successful) systems. And this is crucial when we are referring to web applications that should be available to a global market where each slice of this market has a different cultural flavour. Secondly, the resulting systems will be easier to maintain and to evolve. This is accomplished by adding or modifying (aspectual) cultural concerns rapidly in a global dynamic world.

6.0 References

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