



Vrije Universiteit Brussel

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## Towards Designing Localized Websites

Thesis submitted in partial fulfilment of the requirements for the award of  
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## **Abstract**

Website users around the world belong to different cultures. Members of a particular culture share a common lifestyle, and to some extent they have their own way of viewing, thinking, understanding and doing things. To some extent this diversity of lifestyle affects how website users understand and interact with a website. Thus website localization is proposed as a way to adapt a website to a specific culture by making it culturally acceptable for its target audience.

The idea and motivation for the research described in this thesis was inspired by a one-year project called “MultiWeb” performed by the WISE research group of the Vrije Universiteit Brussel (VUB) and the research group TTK of the Erasmus Hogeschool Brussel (EhB). The aim of the project was to identify the issues that need to be considered when designing localized websites. To achieve the project goal, several research studies were conducted. However, the main goal of the project was not achieved, as it turned out to be more complex than expected. Rather, the research results led to an additional research question being explored, namely the question of whether localization of websites is still needed, and if so to what extent? The departure point for this thesis is this unexpected result. More specifically, the main objectives of this thesis are: (1) to study and examine the influences of the culture of the website user on understanding the content and the interfaces of websites, (2) to propose guidelines for the localization of websites, and (3) to provide a localized website design advisor tool.

The research work was divided into two main phases. The first phase dealt with culture and cross-cultural evaluation. This phase focussed on evaluating the impact of culture on designing localized websites. Thus several research studies were performed with the aim of understanding the relationship between website design and the user’s culture. Moreover, they were intended to identify the anthropological cultural models, cultural markers and issues that should be taken into consideration when designing localized websites. From the research studies in this phase it was concluded that identifying absolute and clear-cut cultural markers or using a dedicated anthropological cultural model for designing localized website is not possible. Moreover, we found that the culture of Web users changes and shifts with their understanding of the Web, and that the Web is an environment with its own culture.

The second phase dealt with website localization in practice. The results of this phase describe the practical contributions of the research to supporting the design of localized websites. It is built upon the results obtained from the first phase. Five different groups of anthropological dimensions of culture and cultural markers are proposed: E-culture, Stable, Broad, Variable, and Vista. The five groups are organized as levels in a pyramid, and in this way they allow for different degrees of website localization: from 1 (little localization) to 5 (full localization). Next, this pyramid is formally represented in a conceptual data model, the “Cultural Conceptual Model (C2M)”, using Object Role Modelling (ORM).

Based on the findings of this thesis, a software tool called the Localized Website Design Advisor, or “LWDA”, was built to dynamically generate localized website specifications and guidelines. The tool takes as input a target country, a language, a website domain, and the localization level required (1 to 5) and returns as output a set of guidelines for localizing the website.

The research described in this PhD thesis provides insight into the design of user cultural centred websites, as well as concrete guidelines.

## **Samenvatting**

Computer en internetgebruikers over de hele wereld hebben verschillende culturele achtergronden. Leden van eenzelfde cultuur delen dezelfde levenswijze en hebben tot op zekere hoogte dezelfde, cultureel bepaalde, visie, denkwijze, begrip en manier van omgaan met de dingen. Deze verscheidenheid aan denkwijzen en levensvisies zal een impact hebben op de manier waarop internetgebruikers wereldwijd websites lezen, interpreteren en gebruiken. Website lokalisatie is een manier om een website aan te passen en cultureel aanvaardbaar te maken voor een welbepaalde doelgroep.

De achterliggende idee en motivatie voor het onderzoek van dit proefschrift is geïnspireerd door het project “MultiWeb”, uitgevoerd door de onderzoeksgroep WISE van de Vrije universiteit Brussel in samenwerking met de onderzoeksgroep TTK van de Erasmus Hogeschool Brussel. De bedoeling van dit project was een overzicht te geven van de belangrijkste behoeften en noden om gelokaliseerde websites te ontwerpen. Om hier een beter inzicht in te krijgen werden verschillende studies uitgevoerd. Het hoofddoel van het project werd echter uiteindelijk niet gerealiseerd omdat dit moeilijker bleek te zijn dan gedacht. De resultaten leidden ons immers naar de vraag of website lokalisatie nog steeds nodig was? Uit dit onverwacht resultaat is dit proefschrift ontstaan.

De belangrijkste objectieven van deze thesis zijn: (1) het bestuderen en onderzoeken van de invloed van de culturele achtergrond van internetgebruikers op hun begrip van de inhoud en interface van een website, (2) het uitwerken van richtlijnen voor website lokalisatie en (3) het voorzien van een “local webdesign advisor” tool “LDWA”.

Het onderzoek is opgesplitst in twee grote fases. De eerste fase bestaat uit een culturele en interculturele evaluatie. In dit deel ligt de focus op de invloed van cultuur op het ontwerp van gelokaliseerde websites. De verschillende onderzoeken zijn erop gericht een inzicht te krijgen van het verband tussen het ontwerp van de websites enerzijds en de cultuur van de websitegebruikers anderzijds. Bovendien ook om de culturele modellen opgesteld door antropologen, culturele kenmerken en behoeften te bepalen waarmee rekening gehouden dient te worden bij het ontwerpen van lokale website.

De resultaten van de onderzoeken in deze fase tonen aan dat het bepalen van absolute en vastomlijnde culturele kenmerken of het gebruik van een toegewijd antropologisch cultureel model voor het ontwerp van gelokaliseerde websites niet mogelijk is. Integendeel, vastgesteld wordt dat de cultuur van de websitegebruikers voortdurend mee verandert en verschuift met de evolutie van het Web. En dat het Web een omgeving is met een heel eigen cultuur.

De tweede fase van het onderzoek spitst zich toe op de praktijk van website lokalisatie. Dit deel behandelt de praktische bijdragen van het onderzoek ter ondersteuning van het ontwerpen van gelokaliseerde websites. De bevindingen zijn gebaseerd op de onderzoeksresultaten uit het eerste deel. Vijf verschillende groepen van culturele dimensies en culturele kenmerken worden voorgesteld: E-culture, Stable, Broad, Variable en Vista. Deze vijf groepen zijn georganiseerd als de trappen in een piramide. Op die manier kunnen vijf verschillende niveaus van website lokalisatie onderscheiden worden van 1 (weinig lokalisatie) tot 5 (volledige lokalisatie). Dan worden deze vijf groepen formeel beschreven in een conceptueel datamodel, nl. het “Cultural Conceptual Model (C2M)” gebruik makend van de Object Role Modelling (ORM) language.

Ter ondersteuning van dit proefschrift werd de tool “LWDA” of “Localized Website Design Advisor” ontworpen en gebouwd. Dit om specificaties en richtlijnen voor gelokaliseerde websites op een dynamische manier te genereren gebruik makend van “Domain Knowledge Ontology”. Deze tool neemt als input: doelland, doeltaal, website domein en lokalisatie niveau (1 tot 5) om de richtlijnen voor de specificaties van de gelokaliseerde website te genereren.

Met de resultaten van dit proefschrift hopen wij bij te dragen tot het brede veld van website lokalisatie voor academische en industriële omgevingen.

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## List of Acronyms

AJAX	Asynchronous JavaScript and XML
ASP	Active Server Pages
C2M	Cultural Conceptual Model
CLC	Collaborative Learning Centre
ER	Entity Relationship [modelling]
HCI	Human Computer Interaction
ISO	International Organization for Standardization
LISA	Localization Industry Standards Association
LWDA	Localized Website Design Advisor
NORMA	Natural ORM Architect
OIL	Ontology Inference Layer
OOHDM	Object-Oriented Hypermedia Design Model
ORM	Object Role Modelling
OT	Object Type
OWL	Web Ontology Language
RDF	Resource Description Framework
SQL	Structured Query Language
UI	User Interface
UML	Unified Modelling Language
W3C	World Wide Web Consortium
WebCT	Web Course Tool
WebML	Web Modelling Language
WISE	Web and Information System Engineering
WSDM	Web Semantic Design Method
XML	eXtensible Markup Language
XSD	XML Schema Definition
XSLT	eXtensible Stylesheet Language Transformations

# 1 Introduction

“There must be no barriers to freedom of inquiry. There is no place for dogma in science. The scientist is free, and must be free to ask any question, to doubt any assertion, to seek for any evidence, to correct any errors.”

--- J. Robert Oppenheimer

The number of websites has increased significantly over the years; hundreds are designed and published every day. New users are joining the Web all the time, not only to access and exchange information, but also to perform daily or work related tasks. The Web has become an essential part of daily life for most of the people around the world. More and more web-based applications are used to enable people around the world to be educated, do business, receive information, communicate, etc. The borders of a country no longer limit business and communication. In principle, websites are accessible all over the world.

This kind of global economy creates a need to design websites that can be used by different website users with different cultural backgrounds. Thus designing websites is not an easy task, since in principle these websites should be usable, understandable and acceptable by different types of users around the world. However, due to differences in culture, users around the world understand, believe, think and respond in different ways. Members of a particular cultural background share a common lifestyle, perceptions and expectations of the same product, measurement units, keyboard configurations, default paper sizes, character sets and notational standards for writing times, dates, addresses, numbers and currency. Moreover, to some extent people's cultural background has an influence on the way they behave. For example, e-learning web systems are usually based on the metaphor of the real world educational style. As students' expectations of education and universities, as well as the way students are educated and teachers communicate, may differ from one country to another, students with different cultural backgrounds may perceive the same e-learning web system in different ways.

Over recent years, it has been recognized in the literature and in practice that it may be necessary to take into consideration the different cultural background(s) of the target user group(s) when designing a website<sup>1</sup>. Adapting a website for a particular local target audience is called *website localization* (Rhoads, 2006; Al-badi & Mayhew, 2010; Hoft, 1996). Website localization is not only about translation or adaptation of some graphical elements; it goes deeper. Members of a community share not only a common language, but also common cultural conventions. Some jokes, symbols, icons, graphics or even colors may be quite acceptable in one country, but trigger neg-

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<sup>1</sup> Note that we will not make a distinction between a website and a web system. We will use the term website to denote websites that offer a functionality (such as an e-learning web system).



ative reactions in another country. Sometimes the style or tone of the text might be considered offensive by a particular cultural entity, as a result of which the text needs to be rewritten rather than merely translated. In addition, it may also be necessary to adapt the websites to differences in the services and content offered due to local differences in regulations or needs. Therefore, website localization is the process of adapting a website to a form that is linguistically, functionally, and culturally acceptable for a particular local target audience(s).

The localization issue is not new; localization of software has been done for years and research has been performed in this context from the beginning of the 1980th. Software companies used localization to adapt software to different markets. However, software localization was usually limited to translating text, date and number formats with clear absent of taking the target audience's cultural characteristics into account. The cultural issues became an important topic for software localization in the 1990th as software got sold worldwide (Purvis et al., 2001). Nowadays, companies are doing software localization for their own products based on their own localization process, which mainly comes from real-world experience. For instance, Microsoft offers guidelines to help application developers to prepare an application for localization step by step (Microsoft, 2012).

In the literature, there are several website design methods proposed, which are systematic approaches used to successfully develop, deploy and maintain high-quality websites, for example: Object-Oriented Hypermedia Design Model "OOHDM" (Schwabe & Rossi, 1995), the Web Semantic Design Method (WSDM) that is a user centred design method for Web development (De Troyer et al., 2008), the Hera method that is a model-driven design methodology (Houben et al., 2003), the Web Modelling Language "WebML", which is one of the most widely used methods (Ceri, 2000), and OntoWebber that builds websites using Semantic Web technologies (Jin et al., 2003). Unfortunately, most of the website design methods offer limited or no support for website localization.

Traditionally, Human Computer Interaction (HCI) researchers (as well as some website designers) use anthropological models of culture to understand users' cultural characteristics. Cultural anthropologists such as Geert Hofstede (Hofstede, et al. 2010), Fons Trompenaars (Hampden-Turner et al. 2000; Trompenaars 1993), Edward Hall (Hall, 1976, 1966), David Victor (Victor, 1992) and Quincy Wright (Wright, 1955) divide and categorize the world into cultural dimensions. These cultural dimen-

sions represent the cultural values and specifications for each nation. Based on anthropological models of culture, HCI researchers establish a research study to find a link between cultural anthropology and website design. For example Evers & Day (1997), Marcus & Gould (2000), Lodge (2007), Tanveer (2009), Reinecke (2010) have applied anthropological models of culture to global interface design, and tested user behaviour variations in understanding and perceiving colors, navigation, text, icons, pictures, symbols, phrases, etc.

## 1.1 Research Motivation and Description of the Problem

Although some research on website localization is available, there are still a number of open issues which need to be addressed. These issues came up after being involved in the research project “Multilingual Websites: Architecture and Localization (MultiWeb)”, which was a one-year project performed by the WISE research group of the Vrije Universiteit Brussel (VUB)<sup>2</sup> and the research group TTK of the Erasmus Hogeschool Brussel (EhB)<sup>3</sup>. The project ended in December 2004<sup>4</sup>. The aim of the project was to investigate and examine local websites and to study their cultural differences in order to come to a better understanding of the impact of culture for website localization. The project raised a number of new questions. The most important question was “Is there still a need for the localization of websites, and if so to what extent?” This and several other issues revealed by MultiWeb were the motivation for this PhD research. The other issues revealed by MultiWeb are as follows.

*Firstly, most of the anthropological models of culture were formed some time ago and for a specific domain. Therefore, maybe it is not a good choice to use some of them as a source of information about users for designing a localized website:* Some researchers have imported anthropological models of culture from the social sciences in order to provide a better understanding of the culture of a website’s target audience. However, it is not clear to what extent it is vital or even legitimate to use anthropological models of culture for designing localized websites.

*Secondly, existing cultural guidelines for designing localized websites have limitations:* There have been many attempts, such as Marcus & Gould (2000b) and Tanveer et al. (2009), to use the anthropological models of culture to offer guidelines and

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<sup>2</sup> <http://wise.vub.ac.be/>

<sup>3</sup> <http://taalkunde.ehb.be/>

<sup>4</sup> <http://wise.vub.ac.be/content/multiweb-multilingual-websites-architecture-and-localization>

standards for designing localized websites. However, these guidelines and standards tend to be too general, and do not offer a roadmap either for building localized websites or for assistance in website localization. However, it is vital to have clear guidelines to assist website developers in designing localized websites.

*Thirdly, practical website localization approaches have limitations.* Although some localization approaches have been proposed by Al-badi & Mayhew (2010), Hsieh et al. (2009), and Smith et al. (2004), these approaches are lacking in depth and tend to be very general and thus of limited use in helping website developers integrate culture into the website design process.

*Fourthly, there is a focus on social culture.* Most of the website developers and HCI researchers focus on the social culture and pay no attention to other types of culture. The Internet and other new technologies could, and sometimes do, affect a website's usability. Accordingly, it is necessary to investigate whether there are factors other than social culture that may affect website user acceptance and understanding.

*Fifthly, it is not clear yet to what extent existing local websites give a clear understanding of the home culture.* Some HCI researchers, such as Yeo (2001), Yalcin et al. (2011), and Callahan (2005), have suggested looking at and comparing existing local websites of a target country. In this way, they claim that one can build up an understanding of the cultural requirements of the target audience and therefore localize the target website based on this understanding. However, further investigation of this is needed in order to understand the extent to which websites from the same country provide similar cultural markers and share the same identity. Furthermore, it is necessary to investigate the extent to which it is possible to take a group of local websites as an example for designing a localized website for the same country.

*Sixthly, existing website design methods provide limited support for designing a localized website.* Although there are several website design methods available (e.g. OOHDM, Hera, WebML, OntoWebber, and WSDM) that aim to simplify and help the website developer in designing a usable website, most of these methods offer very limited or no support for website localization. They do not offer any support for dealing with the different cultural requirements of the website users. Therefore, we could ask the question as to whether there is a need for website design methods to support website localization.

## 1.2 Aims of the Thesis

The aims of this thesis are: (1) to study to what extent the user's culture has an influence on understanding and accepting websites, (2) to propose culture-centred guidelines for the localization of websites, and (3) to provide a localized website design advisor tool. Such a tool could be used by website designers to obtain specific advice on how to localize a particular website.

This PhD research study investigates whether it is still necessary to use the classical anthropological models of culture proposed by anthropologists for designing localized websites. The goal is to determine the most influential cultural factors and issues that should be taken into consideration when designing localized websites.

We also aim to develop localization guidelines that can be used when developing localized websites. The guidelines aim to simplify the design and development of localized websites. Furthermore, rather than extending an existing website design method to support website localization, we aim to develop a tool that can help website designers to develop a localized website independently of the design method used. The objective of this tool is to dynamically provide advice (i.e. guidelines) for localized website design given a target country, a language, the level of localization required, and the website domain.

The outcome of this research is expected to be useful for academics as well as for companies, as it will provide rich and concrete information for designing localized websites. The cross-cultural research results, as well as the more practical outcomes such as the localization guidelines and the Localized Website Design Advisor tool, will make it possible to effectively design localized websites with little effort.

In conclusion, we can state that the objective of the research described in this PhD work is “to evaluate and explore how culture affects the understanding of websites by their users; to formulate the anthropological models of culture that are important in this context; and to propose culture-centred guidelines for website localization, as well as a tool to support a website designer in website localization.”

## 1.3 Research Questions

To achieve the aims of the research, the following research questions are formulated. The chapters that provide answers to the questions are indicated in brackets. Note that

some of these research questions are also already addressed in published peer-reviewed papers: (Mushtaha & De Troyer, 2012, 2009, 2007; De Troyer et al., 2006) .

1. To what extent do social cultural rules and norms have an impact on users' perception towards understanding and accepting a website? (Chapters 0 and 1)
2. What are the cultural markers that influence user perception, performance, understanding and acceptance of website content and interfaces? (Chapters 1 and 1)
3. To what extent do we still need to use the classical anthropological cultural models for designing localized websites? (Chapters 1 and 1)
4. Is there any type of culture other than the one described in the anthropological cultural models that should be taken into consideration during the design of localized websites? (Chapter 1)
5. How can we formulate the design activity to obtain culturally usable localized websites? (Chapter 1)
6. How can it be ensured that the design activities formulated provide a usable, flexible and workable solution for the design of localized websites? (Chapter 7.4)

The following section explains the approach we followed to answer the questions above.

#### **1.4 Research Approach**

The research work described in this thesis was divided into two-phases.

##### *Phase One: Culture and Cross-cultural Evaluation:*

This phase answered research questions 1, 2 and 3. It focused on evaluating the impact of social culture on designing localized websites. The intent was to identify the most important and influential anthropological models of culture, factors and issues that should be taken into consideration when designing localized websites. To address this objective, a multi-method approach was used involving questionnaires, exercises, hands-on observation, task scenarios, and interviews. Several research studies (listed below) were performed, which aimed to understand the link between website design and the user's culture:

1. *Cultural markers in the local website interfaces*: Two different pilot studies were organized in order to determine the extent to which local website homepages reflected the Hofstede score assigned to their country for different cultural dimensions. The results indicated that Hofstede's theory might not be applicable as such for websites. Furthermore, there was an indication that the Web has developed its own culture which overrides traditional culture.
2. *Cultural understanding*: A comparative study between two groups of users from two different cultural backgrounds was conducted. The purpose of this study was, on the one hand, to understand the changes in previous research results, and on the other hand, to explore and evaluate the influence of the user's cultural background on understanding website content and interfaces. Six anthropological models of culture involving 16 cultural dimensions were investigated, aiming at determining the important cultural markers that are the most influential for the understanding of the users. The results indicated differences in culture between the two groups, but not as much as expected. Thanks to modern communication, the cultural gap between the two groups of users seems to have decreased. However, some cultural dimensions were still important and therefore should be taken into consideration when doing website localization.
3. *Web localization preferences*: research was conducted where we re-examined, validated and compared local sites from the same country aiming to understand the extent to which websites from the same country provide similar cultural markers and share the same distinctive identity. Furthermore, an empirical evaluation study was conducted to compare the cultural markers in current and earlier versions of the same website. This research found many differences between local websites from the same country. Moreover, it observed many changes in the current versions of the selected websites compared to previous versions for the same website.
4. *Cross-culture and website design - cultural movements and stable cultural variables*: this research was carried out to determine the stable as well as other types of cultural markers including interface design elements and anthropological models of culture that are appropriate for use for website localization. The research was performed in two different studies: the first study was carried out to re-evaluate some pre-researched websites, and the second study was performed to evaluate and rank anthropological cultural dimensions. The findings of both research studies

were evaluated and compared against earlier research results in order to provide insight into the evolution of the use of culture and cultural markers.

*Phase Two: Website Localization in Practice:*

This phase was built upon the results obtained from the first phase. It answers research questions 4, 5, and 6.

The first phase research results strongly suggest that “Identifying absolute and clear-cut cultural markers or using a dedicated anthropological cultural model for designing localized website is not possible”. For that, five different groups of cultural markers are proposed for use in designing a localized website. The five groups are (1) E-culture, (2) Stable, (3) Broad, (4) Variable, and (5) Vista. The grouping was done based on their importance for localized website design. Except for the e-culture group, each group considers markers for website design elements as well as some anthropological cultural dimensions. The e-culture group only considers markers for website design elements due to the fact that this group only contains markers of the new digital culture which come from using the Web and new technologies. Social culture, and therefore anthropological cultural dimensions, is not considered in the e-culture group. Next, the five groups of cultural markers are used to support the design of localized websites, as follows:

1. *A Cultural Markers Pyramid as a guide for user culture-centred localized website design:* The five different groups of cultural markers are organized as levels in a pyramid and in this way they allow for different degrees of localization from 1 (little localization) to 5 (full localization). This approach comes from the observation that one single cultural model for localizing websites is, in fact, a poor choice because different levels of localization may be needed in different situations. The degree of localization needed varies from country to country and, in some cases, even within the same country.
2. *A design method for culture-centred website design:* A design method consisting of four phases which specify the steps to take in order to design a localized website with various levels of localization is provided.
3. *Cultural Conceptual Model (C2M) for different purposes:* Next, the cultural markers pyramid is formally described in a conceptual data model representation. The result is called the Cultural Conceptual Model (C2M). Having

the cultural markers pyramid in a conceptual representation will help website designers as well as cultural experts to manage, validate, and improve the pyramid regularly by adding new concepts or changing others in an easy and flexible way. To conceptually represent the Cultural Markers Pyramid, the Object Role Model (ORM) is used. The use of ORM allows easy mapping to different other formats such as OWL, XSD, Relational schema, ER model, etc. Furthermore, we transformed the Cultural Conceptual Model into two different technical specifications: (1) a Localization Ontology and (2) a Relational schema.

As proof of concept for the C2M, a tool called the Localized Website Design Advisor (LWDA) was built. The LWDA uses the XML Schema (XSD) obtained from the C2M ORM schema. In this way, the LWDA is used to dynamically generate localized website recommendations for a website developer for a given target country, language, level of localization (1 to 5), and website domain.

### 1.5 Thesis Outline

This thesis is organized in four parts:

#### *Part I: Problem Specification and Background*

- **Chapter 1** outlines the research topic, the research problem, the questions, the objectives, and the research approach.
- **Chapter 2** provides background and an overview of the related work. General introductions to usability, website design, anthropological models of culture, ontology, and conceptual modelling are given. The anthropological models of culture and their effects on designing localized websites and usability are presented. It also describes the advances made by researchers and specialists in the field of website localization as well as software localization.

#### *Part II: Methodological Principles “Culture and Cross-cultural Evaluation”*

- **Chapter 3** explains and reports the findings of the research on investigating the cultural markers in local website interfaces. The aim of this research was to determine the extent to which the homepage design of the local websites reflected



the scores assigned by the Dutch anthropologist Geert Hofstede to their country for different cultural dimensions.

- **Chapter 4** describes and reports the findings of the pilot study that was used to evaluate the influence of the user's cultural background on content and interface understanding. The aims of this research are (1) to understand how cultural differences impact the user's understanding of websites, (2) to study website user behaviour with regard to websites, and (3) to investigate whether there are preferences in interface design influenced by the cultural background of the users.
- **Chapter 5** Analyses and specifies the different types of cultural markers including interface design elements and anthropological models of culture that are appropriate for use for designing localized websites. For this purpose, this chapter reports different studies of re-examined, validated, and compared local sites from the same country. Also, it reports the study to re-evaluate some of the pre-researched websites and anthropological cultural models.

### Part III: Website Localization in Practice

**Chapter 6** explains how the influence of the Web and technology acceleration is changing the users' social activities and creating a new digital generation that carries some new and special cultural values related to the Web environment. This chapter also introduces the five groups of cultural markers relevant for website localization and shows how they are organized as levels in a pyramid, and in this way allows for different degrees of website localization. Moreover, a first rough method for culture-centred localized website design is proposed.

**Chapter 7** focuses on each of the groups of the cultural markers described earlier in the pyramid and formally defines them in a conceptual data model representation to introduce the Cultural Conceptual Model (C2M). Next, C2M is mapped into two different more practically-oriented formats: (1) an Ontology, and (2) a Relational schema.

This chapter also presents the Localized Website Design Advisor (LWDA) tool that was built on top of C2M in order to dynamically generate specific guidelines or recommendations for localized website design depending on the target country, language, level of localization (1 to 5), and website domain. Subsequently, a case study of a localized website design is presented using the LWDA tool.

### Part IV: Conclusions

- **Chapter 8** summarizes the contributions of this research and outlines the future research directions.

## **2 Background and Related Work**

“Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information on it.”

--- Samuel Johnson

This chapter provides a review of the literature that helped conducting this research on localized website design. Designing localized websites requires knowledge about usability, website design, and culture. Furthermore, we used ontology and conceptual modelling to define the research results in a more formal way. Our work builds upon and is influenced by several research fields; hence, this chapter has been divided into three main parts: main background concepts, secondary background concepts, and related work.

This chapter will first briefly explore the terms of website Globalization, Internationalization and Localization in section 2.1. This section gives the necessary background knowledge to position the work of this thesis. The reminder of this chapter is structured as following:

First, section 2.2 explains the main background topics on which the research of this thesis is based: usability and cultural considerations in website design. Definitions are provided and well-known and relevant work is discussed. Subsequently, section 2.3, is about the secondary background concepts. It describes conceptual modelling and Ontology. Section 2.4 investigates related work. The related work is divided into three main sub-sections: (1) cross-culture research, (2) review and discusses of the practical approaches used for website localization, and (3) review of the main attempts made by researchers and specialists in the field of software localization. Finally, section 2.5 gives s summary and discussion.

### **2.1 Website Globalization, Internationalization and Localization**

The terms globalisation, internationalization, and localization have their origin in the late 1970s, when the translation of software products started to happen. Large well-known companies such as Microsoft<sup>5</sup> and Apple-Computer<sup>6</sup> started to apply and use these terms in the process of software engineering, especially when they started to sell their products around the world. In the mid-1990s, researchers such as Russo & Boor (1993), Keniston (1997), Teasley (1994), Nakakoji (1993) and Evers & Day (1997), explored the advantages of international and local development for economic advantages. And some practical guidelines and tips for software globalization, internationalization, and localization were published.

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<sup>5</sup> <http://www.microsoft.com>

<sup>6</sup> <http://www.apple.com>

In the late 1990s, globalization, internationalization, and localization found its way to website design in the academic world as well as in companies (Gould, 2000; Design et al., 2000; Schadewitz & Jachna, 2001; Kralisch et al., 2001; Sun, 2001; Barber & Badre, 1998; Evers, 1997; Nakakoji, 1993; Marcus & Gould, 2000b).

Figure 2-1 shows the relationship between website globalization, internationalization, and localization. A global website is used over the world. Next, the website can be prepared for localization, this is called Internationalization. Then, localized websites can be created. A localized website is a website targeting a particular locale audience. The following subsections explain the three terms in more details.

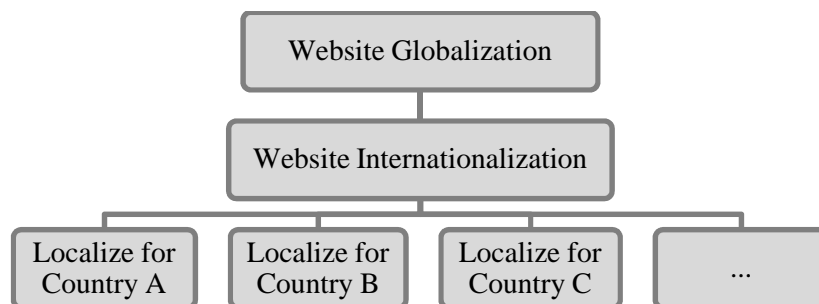


Figure 2-1 Overview of the Relations between Website Globalization, Internationalization, and Localization

### 2.1.1 Website Globalization

According to the Localization Industry Standards Association (LISA)<sup>7</sup>, *Globalization* is about spreading a thing to several different countries, and making it applicable and useable in those countries. In the context of websites, globalization usually indicates the process of converting a website to be usable by all people worldwide from different languages and communities. In addition, Al-badi & Mayhew (2010) state that, “a truly globalized website serves every visitor with the same quality experience regardless of location, language, business practices, or cultural issues”. As an example, we can imagine a website for a university or a company to be used worldwide, one global website to be used in all countries.

### 2.1.2 Website Internationalization

According to Fernandes (1995), *Internationalization* is the process of creating a base design that can be easily adapted for various international markets. The process of internationalization creates a core website which does not contain any language or

<sup>7</sup> <http://www.lisa.unige.ch>

culture dependent information or features, i.e. it extracts all cultural signs and design issues. Therefore, a good internationalized website simplifies the creation of different local websites (O'Donnell, 1994; Luong, 1995). Hence, the localization will be easier, faster and cost effective by reducing the time and resources.

### 2.1.3 Website Localization

*Localization* is the process of adapting the internationalized design for a specific locale (Nielsen, 2000). “Locale” is the name for a specific linguistic, culture and business rules for a given target audience. For example, the Spanish language in Mexico is different from the Spanish spoken in Spain, and the same conditions apply for the currency and other business rules (Al-badi & Mayhew, 2010).

On one hand, the localization process is involving translation of the website into the locale language, taking care of local conventions such as date, time, currency, number formats, text, images, colors symbols and flow of information (Nielsen, 1990; Russo & Boor, 1993). On the other hand, several researchers stress that localization needs to be deeper, it should consider the cultural differences of the target locale (Del Galdo & Nielsen, 1996; Marcus, 2009; Shen et al., 2006; Lee et al., 2008; Barber & Badre, 1998; Al-badi & Mayhew, 2010). The website localization process therefore can be divided into two main levels, technical and cultural, as following:

- *Technical adaptation:* Including text translation and adapting the website's technical aspects such as: dates, time, currency formats, addresses, measurements, weights, calendars, punctuation, and so on into correct format.
- *Cultural adaptation:* Takes into account adjusting visual design, images, terminology, colors, symbols, metaphors, navigation, content, flow of information, and all cultural aspects of a certain locale.

The research here is basically concerned with cultural adaptation. For the purpose of this thesis, the following working definition of website localization will be adopted:

*“Localization is adapting a website by making it usable and culturally acceptable for a particular locale target audience”.*

This definition is addressing the concept of usability. Taking this concept into account with user cultural perception will make the localized website more satisfied (Aykin et al., 2007; Nielsen, 2000). Hence, the research of website localization de-

depends on three main topics which are: usability, culture and website design. All of these topics are described in the following section.

## 2.2 Main Background Concepts: Website Usability and Culture in Website Design

This section describes the following three topics: website usability, culture, and cultural consideration in website design.

### 2.2.1 Website Usability

Many definitions of usability have been proposed. According to ISO 9241-11 (Jokela, 2005), usability is “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use”. The Usability Professionals Association<sup>8</sup> defines usability as “the degree to which something such as software, hardware or anything else is easy to use and a good fit for the people who use it”.

On the Web, usability is an essential and necessary condition for survival. A website needs to be easy to use and website users need to find what they are looking for quickly and efficiently (Alexander, 2006). Moreover, Nielsen has stated “If the homepage fails to clearly state what a company offers and what users can do on the site, people leave. If website users get lost on a website, they leave. If a website information is hard to read or doesn’t answer users’ key questions, they leave” (Nielsen, 2003).

To make website usable and fit to target user, there are some usability attributes that need to be considered (Blanchard et al., 2003; Shneiderman & Catherine, 2005; Sauro & Lewis, 2009; Nielsen, 2000). In the field of Human Computer Interaction (HCI), there is no single accepted usability attributes set to be used. Sauro & Lewis (2009) clarify the usability attributes that are used in different standards, models and definitions. They listed 22 usability attributes. The following table, Table 2-1 summarizes some of these usability attributes:

Source	Usability Attributes
(Reed et al., 1986)	ease of learn, ease of use
(Shackel, 1981, 1986, 2009)	ease of use, effectiveness, learnability, flexibility,

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<sup>8</sup> <http://www.upassoc.org/>

	user attitude
(Dumas & Redish, 1993)	users, productivity, tasks, ease of use
(Hix & Hartson, 1993)	initial performance, long-term performance, learnability, retainability, advanced feature usage, first impression, long term user satisfaction
(Nielsen, 1993)	learnability, efficiency, memorability, few errors, satisfaction
(Porteous et al., 1993)	efficiency, affect, helpfulness, control, learnability
(Preece et al., 1994)	learnability, throughput, attitude, flexibility
(Iso 9241-11, 1998)	efficiency, effectiveness, and satisfaction
(Kengeri et al., 1999)	effectiveness, likeability, learnability, usefulness
(Constantine & Lockwood, 1999)	learnability, efficiency in use, rememberability, reliability in use, user satisfaction
(ISO 9126-1, 2001)	understandability, learnability, operability, attractiveness, usability-compliance
(Seffah et al., 2001)	effectiveness, efficiency, satisfaction, productivity, safety, internationality, accessibility
(Oulanov & Pajarillo, 2001)	affect, efficiency, control, helpfulness, adaptability
(Brinck & Gergle, 2002)	functionally correct, efficient to use, easy to learn, easy to remember, error tolerant, subjectively pleasing
(Blanchard et al., 2003)	easy to learn, easy to use, easy to remember, error tolerant, subjectively pleasing
(Shneiderman & Catherine, 2005)	time to learn, speed of performance, rate of errors by users, retention over time, subjective satisfaction
(Sauro & Lewis, 2009)	task times, completion rates, errors, post task satisfaction, post-test satisfaction

Table 2-1 Usability Attributes in some Different Standards and Definitions by Sauro et al. (2009)



From all previous standards, models and definitions, the following can be deduced:

- Usability always means focusing on users' needs. Users always decide when a website is usable.
- Every single website has its own usability attributes. This is because maybe some usability attributes are applicable and important for some websites and not for others.
- The importance of some usability attributes may be different depending on the website domain. For example, for a news website the readability usability attribute is the most important one.
- Some usability attributes are important and should always be considered for website design.

Furthermore, *International usability* refers to localizing user interfaces for specific target countries (Reinecke, 2010). People from different countries are different; every country has its own culture, and the people of that country think, understand and act in different way. With the rapid growth of the Web, websites have to serve different types of users from other countries than the one in which they were designed (Del Galdo & Nielsen, 1996). In spite of the fact that achieving website usability is mandatory, it is not easy task to accomplish; especially when website users are spread over several countries with different national cultures (Aladwani, 2003).

### **2.2.2 Culture**

The word culture comes from the Latin word “colere” to “inhabit, cultivate”. The term “Culture” has many several different meanings in the field of history, communication, psychology, anthropology, sociology, and information studies; it is used in different ways among researchers and professionals (Sun, 2006). To discuss cultural theory in details is beyond the scope of this thesis.

In Human Computer Interaction (HCI) domain, “Culture”, “Cross-culture”, “Intercultural” and “Multi culture”, all are related to Cultural Anthropology and Sociology. In both fields, culture regarding thoughts and behaviour developed and shared over time among a group of people who live in a particular society. For the purpose of the research in this thesis, the working theory of culture is primary formed by research in anthropology and behavioural studies. In the following sections, we review definitions, meta-models, and dimensions of culture.

### 2.2.2.1 Definitions of Culture

In anthropology, culture has many definitions. One of the earliest known researchers in the field of cultural anthropology is Edward Hall who defined culture as the “way of life of people, for the sum of their learned behaviour patterns, attitudes and material things” (Hall, 1966). According to Hall, culture is the way of life a group of people has formed. This way of life is formed by a collection of ideas and habits that the group of people brought up, learned and shared. Kroeber and Parsons argue that culture is transmitted and creates content and patterns of values, ideas and other symbolic meaningful systems (Kroeber & Parsons, 1958).

According to James Spradley, culture is “the acquired knowledge that people use to interpret experience and generate behaviour” (Spradley, 1979). Fons Trompenaars proposes that, culture is “the way in which a group of people solves problems”. He views that culture resides in the ways in which its explicit and implicit aspects are used “how we do things around” (Trompenaars, 1993).

One of the most cited studies is the one by Geert Hofstede. In the 1970s and 80s he did a survey at IBM that “dealt mainly with the employees personal values related to work situation...”; According to Hofstede, culture is “the collective programming of the mind which distinguishes the members of one group or category of people from another” (Hofstede et al., 2010a). The emphasis in Hofstede’s definition is that, culture is learnt in nurture, and groups of people think in the same way because they share the same learning collective activity dynamic process.

In 2010, based on his book “Cultures and Organizations: Software of the Mind”, Geert Hofstede claims that, “every person carries within him or herself patterns of thinking, feeling, and potential acting which were learned throughout their lifetime”, and which he terms as “software of the mind”. The source of these programs lies within the social environments in which people grew up and collected their life experiences (Hofstede et al., 2010b). Similarly, Martin defined culture as “a way of living, thinking and learning, and as an individual dialectic” (Martin et al., 1998).

A culture can be distinguished as a set of shared characteristics within a group of people, and these characteristics include thoughts, values, and behaviours (Karahanna et al., 2005). In addition, cultures are primarily formed by specific social facts, including religion, politics, rituals, values and language (Bourges-waldegg & Scrivener, 1998).

Most of the above definitions refer to collection of preferences that are shared between groups of people. But still there are individual differences within a single group of people. For example, Rice asserts that, “within a given culture there is a range of individual variations created by preferences, religion and innate differences such as gender and disabilities” (Rice et al., 2001).

Although the previous cultural definitions are all slightly different, there are agreements about the following aspects:

- Culture affects the way people view the world, think, interact, behave, and how they response.
- Culture is formed by historical experiences, traditions, customs, and surroundings.
- Culture is dynamic, learned and shared.

#### 2.2.2.2 Meta-models of Culture

A cultural meta-model provides a high-level view of the concept of culture, by defining different layers of culture. It helps to understand how and from where culture comes to influence people lives in a profound way. Four cultural meta-models have been proposed in the literature, including the Onion meta-model, the Pyramid meta-model, the Iceberg meta-model and the Objective and subjective meta-model (Hoft, 1996). The following subsections briefly describe these four cultural meta-models. For the purpose of this research, the Objective and subjective cultural meta-model will be adopted.

##### 2.2.2.2.1 Object and Subjective Meta-model

The Object and subjective meta-model was developed by Stewart and Bennett in 1991 (Stewart & Bennett, 1991). They identify two main layers of culture, objective and subjective culture, as follow:

- *Objective culture* is “institutions and artefacts of a culture, such as its economic system, social customs, political structures and processes, arts, crafts and literature” (Hoft, 1996). The objective culture is “visible, easy to examine and tangible, as it is represented in terms of text orientation, date and number formats, color and language” (Del Galdo & Nielsen, 1996).

- *Subjective culture* is “the psychological features of a culture, including assumptions, values, and patterns of thinking” (Hofstede, 1996).

#### 2.2.2.2.2 Onion Meta-model

This meta-model is developed by Fons Trompenaars in 1993 (Trompenaars, 1993), and to some extent similar to the Subjective and Objective meta-model. The Onion meta-model is based on the assumptions that there are the following layers of culture:

- *The outer layer*: this layer is explicit and perceptible, which represents the first thing people encounter when they are introduced to a particular culture. This “makes up people’s first impression of another person” (Trompenaars & Hampden-Turner, 1998).
- *The middle layer*: this is a collection of symbols that go back to cultural norms and values, what should be done and what is good or bad. Norms and values “control people’s behaviour” (Trompenaars & Hampden-Turner, 1998).
- *The core of the culture onion*: this represents implicit characteristics and hidden assumptions about life people carry with themselves. This is the most intangible part of culture, which “is the key to understanding other cultures” (Trompenaars & Hampden-Turner, 1998).

#### 2.2.2.2.3 Pyramid Meta-model

This cultural meta-model was developed by Geert Hofstede in 2001 (Hofstede, 2001). He introduced three layers of culture in a pyramid model as following:

- *Personality*: The characteristics specific to a person which is learned and inherited.
- *Culture*: The characteristics specific to a group or category of people; it is learned not inherited.
- *Human Nature*: The characteristics common to all human beings. It is universal and inherited, not learned.

This model is used widely in Human Computer Interaction research because it “encompasses individual differences among users as well as similarities based on universal, inherited characteristics” (Callahan, 2005).

#### 2.2.2.2.4 Iceberg Meta-model

Edward Hall developed the Iceberg meta-model in 1976 (Hall, 1976). He claims that there is part of culture that is visible above the water and includes behaviours and some beliefs, while the part under the water includes some beliefs and the values and thought patterns that underlie behaviour. The model identifies two wide layers of culture, as follow:

- *External - Above water surface*: it is only 10% of the culture characteristics. It is objective knowledge such as beliefs and behaviours easy visible.
- *Internal - Under water surface*: it is the 90% of culture characteristics that are hidden from view. It is subjective knowledge. In other words, this culture is the unspoken and unconscious rules, underlying beliefs, values, and thought patterns. It is obscured, difficult to identify and study.

Like the Pyramid meta-model, this culture meta-model is also used in the Human Computer Interaction research and cross-culture research (Callahan, 2005).

#### 2.2.2.3 Models of Culture and their Related Dimensions

Based on the meta-models of culture, various models of cultures have been developed and proposed by several anthropologists to provide a detailed view of culture. These models of culture are used to “provide frameworks for understanding the physical and social worlds we live in” (Hoft, 1996).

Each cultural model establishes its own set of cultural dimensions, which are used to organise cultural data, focus on measure, compare, evaluate and classify groups of people. The cultural dimensions can also focus on “measure the degree of belonging to a certain culture or subculture” (Evers, 2001). The research described in this thesis uses the following anthropological models of culture, which all are highly cited and widely used in the HCI domain:

- *Edward Hall [Context and Time]*: The anthropologist Edward Hall (1914 - 2009) wrote several books about intercultural communication (Hall, 1966, 1976). In his books, he shows how members of different cultures interact and how they often fail to understand one another.
- *Geert Hofstede [Cultural Dimensions]*: Geert Hofstede (born in 1928) can be regarded as one of the leading representatives of intercultural research and studies. His research is described in his books “Cultures consequences”

(Hofstede, 2001), and “Cultures and Organizations: Software of the Mind” in different copy released versions (Hofstede et al., 1997, 2010b). The findings of his research and his theoretical ideas are used worldwide in psychology, management and technology studies.

- *Fons Trompenaars [Parsons Pattern Variables]*: Fons Trompenaars is a Dutch author and consultant in the field of cultural communication. Trompenaars wrote several books include: “Riding the Waves of Culture” (Trompenaars, 1993) and “Building Cultural Competence” (Hampden-Turner et al., 2000). In these books, he describes his model of culture with seven dimensions of culture based on a survey with 30,000 interviews and questionnaires in 20 countries representing 47 national cultures.
- *David Victor [Cultural Features]*: David Victor (born in 1956) is a professor at the faculty of management at the University of Michigan. In his book “International Business Communication” (Victor, 1992), he describes six cultural dimensions, which are mostly based on academic research.
- *Quincy Wright [International Relations]*: The anthropologist Quincy Wright (1890 - 1970) was an American political scientist working as a professor at the University of Chicago. Wright tried to define components that would locate states, nations, governments, and people in an international space. His cultural model consists of six cultural dimensions (Wright, 1955).
- *Nancy Adler [Cultural]*: Nancy Adler is a professor of international management at McGill University in Montreal, Canada. She authored over 125 articles and published 10 books on global leadership and cultural management. Adler described her six dimensions of value orientations in her book international dimensions of organizational behaviour (Adler, 2008).

The following table, Table 2-2, summarizes the cultural models and their related dimensions identified by Hall, Hofstede, Trompenaars, Victor, Wright and Adler. This summarization is based on information from Marcus & Baumgartner (2004), Evers (2001), and Hoft (1996).

Author	Cultural Dimension	Meaning
Edward Hall	Context	Context refers to the amount and specificity of information in a given situation.

	Time	Time is either monochromic (scheduling and completing one activity at a time), or polychromic (not distinguishing between activities and completing them simultaneously)
	Space	This dimension refers to the invisible boundary around an individual that is considered “personal” and the use of physical space within a society.
	Information Flow	This dimension is related to the structure and speed of messages between individuals and or organizations
.....		
Geert Hofstede	Gender Roles	This dimension focuses on the degree to which “masculine” values like competitiveness and the acquisition of wealth are valued over “feminine” values like relationship building and quality of life.
	Individualism vs. Collectivism	Individualism pertains to societies in which the ties between individuals are loose: everyone is expected to look after himself or herself and his or her immediate family. In contrast, collectivist people are integrated into strong relationships between them, and the group achievement is more important than personal recognition.
	Long-term vs. Short-term Orientation	This dimension refers to the degree to which members of a culture are willing to defer present gratification in order to achieve long-term goals.
	Power Distance	This dimension refers to the degree to which members of a society accept a hierarchical or unequal distribution of power in organizations and the society.
	Uncertainty Avoidance	This dimension focuses on the level of tolerance for uncertainty and ambiguity within the society.
.....		

Fons Trompenaars	Internal vs. External Control	This dimension refers to the degree to which individuals believe the environment can be controlled versus believing that the environment controls them. Do we control our environment or work with it?
	Universalism vs. Particularism	This dimension describes whether behaviour is personal relationship-based (“personal trust”) or law and rule-based (“written contracts”). It is about the degree of adhering to agreed standards.
	Individualism vs. Collectivism	This cultural dimension refers to the degree to which people see themselves function more as a community or more as individuals.
	Achievement vs. Ascription	This cultural dimension is about how status is accorded to people. It investigates the degree to which individuals must prove themselves to receive status versus status simply given to them.
	Specific vs. Diffuse	This cultural dimension describes to what extent business and personal relationships are separated. It measures how far people get involved with others life space.
	Time Perception	This cultural dimension is about how people developed their own response to time. In other words, whether people do one thing at a time versus several things at once.
	Affective vs. Neutral	This cultural dimension describes how cultures express their emotions. In an affective culture, people display their emotions and it is not deemed necessary to hide feelings. However, in a neutral culture, people are taught not to display their feelings overtly.
.....		
David	Authority	This cultural dimension refers to the methods that



Victor		managers and leaders utilize to influence their employees. It reflects the conception of organizational power and leadership common to an organization's members.
	Context	This cultural dimension refers to the amount and specificity of information needed by the members of a culture in a given situation.
	Experience of Technology	This cultural dimension describes how technology is perceived by the members of a culture. The scale ranges from control-oriented to harmonization to subjugation-oriented.
	Face-Saving	This cultural dimension is about politeness strategy. Victor defined face-saving as the act of reserving one's prestige or outward dignity.
	Non-verbal Communication	Non-verbal communication varies across cultures in six major ways: <ul style="list-style-type: none"> <li>- Body movement and facial gestures;</li> <li>- Distance;</li> <li>- Eye movements and eye contact;</li> <li>- Touching behaviour;</li> <li>- Tone of voice and non-language sounds; and</li> <li>- Appearance.</li> </ul>
	Time Perception	This dimension refers to the culture's response to time. There are two types of time: (1) Monochronic, time is schedule, inflexible and measured by output; and (2) Polychronic time is flexible, fluid and work time is not clearly separate from personal time.
.....		
Quincy	Degree of Power	This cultural dimension is referring to the degree of

Wright		strength or weakness of a country/culture in international comparison
	Economic Progress	This cultural dimension focuses on the degree of flexibility or rigidity of a country/culture regarding economic progress.
	International Trade and Communication	This cultural dimension focuses on the rate of development in the field of international trade and communication with other countries / cultures.
	Political Decentralization	This cultural dimension describes the degree of lethargy or energy a country shows towards political decentralization. Countries that aim for political decentralization want to give citizens more power in public decision-making.
	Resources	This cultural dimension refers to the resources a country owns. The scale ranges from resource poverty to resource abundance. For example, countries with a lack of natural resources tend to be more dependent on others than countries with rich natural resources.
	Technological Development	This cultural dimension focuses on the rate of technological development and describes the scale from advancement to backwardness.
.....		
Nancy Adler	Human Nature Orientation	This dimension describes the way people can be seen: good, evil or a mixture of both. In addition, they can be seen to be able to change or to be unable to change.
	Individualism vs. Collectivism	This cultural dimension refers to the role of the individual and group, and which interest prevails over the other.

	Internal vs. External Control	This dimension relates to the way people treat their environment.
	Space	This cultural dimension refers to the invisible boundary around an individual that is considered "personal" and the use of physical space within a society. An office may be seen as a public space to be entered without permission, or it may be seen as a private space that cannot be entered without first obtaining permission.
	Time Orientation	This dimension refers to the way target culture response and conforms to time. The scale is described as ranging from past-orientation to present-oriented cultures to cultures that focus on the future.

Table 2-2 Cultural Models and their Cultural Dimensions as Addressed by: Hall, Hofstede, Trompenaars, Victor, Wright, and Adler.

### 2.2.3 Cultural Consideration in Website Design

Ito and Nakakoji argue that, culture influences the perception of website user interface understanding, user preferences, and how the user generally receives and processes information (Ito & Nakakoji, 1996). Similarly, Honold assert that, culture determines not only the behaviour of a website user but it also determines user perception, thought and action (Beu et al., 2000). It can be “patterns of thinking, feeling, and acting that influence the way in which people communicate among themselves and with computers” (Ford, 2003). Moreover, Evers asserts that culture “shapes the way people behave, view the world, express themselves and think. It is formed by historical experiences and values, traditions and surroundings” (Evers, 2001).

In the context of HCI, Nielsen and Del Galdo stress that localization should encompass more than a “surface-level” adaptation, by acknowledging underlying cultural differences (Del Galdo & Nielsen, 1996). Similarly, Gommans et al. argue that, “a website has to be designed for a targeted customer segment [...] Local adaptation should be based on a complete understanding of a customer group’s culture” (Gommans et al., 2001). However, each country, region, state or even province has individual language, humour, colloquialisms, slang, gestures, images, names, sounds,

fashion, religion, values, symbols, animals, history, education, law, color sense and sensitivity, political correctness, etiquette, etc. In this respect, it is difficult to point out all the different cultural preferences for a specific group of people (Reinecke & Bernstein, 2011; Aykin et al., 2007; Evers, 2001). Therefore, designing a localized website has always been a challenge because of the diversity of users; this diversity belongs to different countries, religions, languages, life styles, cultures perceptions and expectations of using the website (Smith, 2004; Reinecke, 2010).

Consequently, for the purposes of the research in this thesis, the following working definition of culture will be adopted:

*“Culture is that knowledge - such as: attitudes, values, goals, and practices - a group of people share and use to view, interact, understand, behave and response for any situation. Culture is made up of experiences gained when growing up within a group of people. Furthermore, culture can be affected and develop by surroundings.”*

### 2.2.3.1 The Impact of Culture on Website Design

Several researchers insist to consider the target user’s cultural background in website design. Studies are carried out by Del Galdo & Nielsen (1996), Evers & Day (1999), Marcus & Emilie W Gould (2000), Sun (2001), Barber & Badre (1998), Regan (2005), Aykin et al. (2007), Marcus (2009), Oller (2009), and Daniel et al. (2011) with the aim to study the impact of culture in understanding and accepting websites. These studies showed that to some extent website users appreciated and accepted more the websites that take into account their cultural specifications.

The research of Juric, Kim and Kuljis claims that “website users are also becoming aware of cultural adaption in web interfaces and demand a browsing experience beyond simple information retrieval” (Juric et al., 2003). When a website does not attract the user from the first visit, immediately the website user escapes from the website (Noiwan & Norcio, 2006). And for that, the website’s content and structure should be adapted to fit the expectations and the needs of target audience (Esselink, 2003; Petrie et al., 2009).

### 2.2.3.2 Culture and Website Usability

The relationship between culture and usability was studied by several HCI researchers such as Sapienza (2008), Gibb & Matthaiakis (2007), Tanveer et al. (2009), Fraternali & Tisi (2008), Gould (2006), Smith et al. (2004), Marcus & Baumgartner (2004), and

Barber & Badre (1998). The most notable contribution is that of Marcus and Gould who organized several studies to investigate how cultural characteristics influence website usability. The Barber & Badre (1998) merge the concept of usability with culture and they termed it “culturability” to emphasize the importance of the relationship between the culture in local website design. For them, culture and usability should be together and not separate in the design for the Web. They argue that the usability is affected by the culture of the website user, and a successful usable website is achievable when the cultural characteristics of the website target audience are taken into consideration during the design process. More than that, the research of Waldegg and Scrivener found that most of the usability problems were a result of “the way the meanings of representations were rooted in culturally specific contexts” (Bourgeswaldegg & Scrivener, 1998).

Smith et al., assert that the website user requirements are strongly influenced by their local culture characteristics, and the website is usable when there is an “effective means of communication between a global website owner and a local user” (Smith et al., 2004). Moreover, Barber and Badre state explicitly that “what is user-friendly for one culture can be vastly different for another culture” (Barber & Badre, 1998). In other words, if a website is usable for one specific group of people, maybe it is not usable for others. That simply because “not everybody reads or understands information the same way, and culture especially plays a very big role in how we view websites” (Daniel et al., 2011). Website users around the world are different and therefore website users see and interact with a website differently. For example, Pan and Jordan-Marsh found that the first page of a Chinese website contains of large amount of hyperlinks and information. There seems to be two reasons for this, the first is slow internet connection and the second is to save page loading costs (Pan & Jordan-Marsh, 2010). However, this overload of hyperlinks and information in one page leads to “steer Chinese web design away from English web usability” (Tina, 2011), but from a Chinese users point of view, an overloaded page is more usable. Countries around the world are differing in accepting website usability standards, and these differences are due to cultural contexts which challenge the universality of web usability (Paterson et al., 2011). Moreover, Tina goes deeper and strongly promotes a new approach to understand website usability for the multi-cultural and “open World Wide Web experience” (Tina, 2011).

Researchers as well as website designer insist on the importance of cultural characteristics consideration while testing website usability. In his long research, Ravikiran Vatrapu argues that “international usability testing is inherently cultural”, he emphasizes that “thinking, feeling, perception and reactions of users during international usability testing can be understood and predicted by the application of Hofstede’s cultural dimensions” (Vatrapu, 2002).

### 2.2.3.3 Culture and Website Design Elements

Based on the anthropological models of culture and their related cultural dimensions, several empirical research studies were conducted in order to study the influence of culture on website design and especially on website user interfaces. HCI researchers reported obvious cultural sensitive website design elements to be localized for target culture audiences. Some of these cultural sensitive elements, such as: measurement units, keyboard configurations, default paper sizes, character sets, and notational standards for writing time, dates, addresses, numbers, and currency are obvious to observe. On the other hand, some cultural issues need more detailed research to understand their importance for the website design for a particular culture. For example, some jokes, symbols, icons, graphics, and even colors symbolism may be completely acceptable in one country, but trigger negative reactions in another country. Sometimes the style or flow of information might even be considered as not acceptable by a particular cultural entity, as a result of which the structure of website needs to be redesigned rather than merely adapted.

The cultural sensitive website design elements are pointed out by HCI researchers as: “cultural markers” (Barber & Badre, 1998), or “cultural fingerprints” (Smith & Chang, 2003) or “cultural attractors” (Smith et al., 2004).

- *Cultural markers*: The Cultural marker concept was developed by Barber and Badre. It refers to “interface design elements and features that are prevalent, and possibly preferred, within a particular cultural group” (Barber & Badre, 1998). Barber and Badre analysed hundreds of websites and provided a list of cultural markers including colors, spatial organization, fonts, shapes, icons, metaphors, language, flags, sounds, motion, preferences for text vs. graphics, language written style (left vs. right), help features, and navigation tools. They found that these

website design elements are culture sensitive and strongly influence the usability of a local website.

- *Cultural fingerprints*: Another term for these cultural sensitive website design elements comes from Smith and Chang (Smith & Chang, 2003). They proposed cultural fingerprints to evaluate how well a website match the local culture of the target website audience.
- *Cultural attractors*: This term also refers to “interface design elements of the website that reflect the signs and their meanings to match the expectations of the local culture” (Smith et al., 2004). Smith and his colleagues provided a detailed list of cultural attractors including colors, colors combinations, icons, banner adverts, trust signs, use of metaphor, language cues, and navigation controls.

In this thesis, the term “cultural markers” is going to be used to refer to the website design elements and features that are cultural sensitive and preferred within a particular cultural group.

In response to this, many website developers used these cultural markers to design localized website in order to gain more users (Jagne et al., 2004; Juric et al., 2003; Fraternali & Tisi, 2008; Marcus & Gould, 2000b; Callahan, 2005; Daniel et al., 2011). However, to date, no clear-cut list of cultural markers, approved by HCI researchers to be used for website Localization, exists. Also, Daniel et al. point out that “not much research has been done about what cultural issues influence the usability of websites and the level of influence” (Daniel et al., 2011).

## **2.3 Secondary Background Concepts: Conceptual Modelling and Ontology**

The technical part described in chapter 1 of this thesis is using conceptual modelling and an ontology for building the Cultural Markers Pyramid. Therefore, this section briefly discusses the technical issues which are used in the technical part in this thesis.

### **2.3.1 Conceptual Modelling**

The conceptual modelling refers to the process of developing a (usually) graphical representation or model for a part of the real world. In general, “concepts” (entities) and relationships between them are used to express the meaning of the concepts and their relationships between each other.

The conceptual modeller and problem owner both have to determine what aspects of the real world to include, and exclude, from the model, and at what level of detail to model (Kotiadis, 2008; Song et al., 2005). The conceptual model is independent of an implementation. Different conceptual modelling techniques and notations exist, such as Object-Role Modelling “ORM” (Halpin, 2006) or Unified Modelling Language “UML” (Booch & Jacobson, 2005) or Object-Modelling Technique “OMT” (Rumbaugh et al., 1991) or Integration Definition for Information Modelling “IDEF1X” (Jeong et al., 2009). In this thesis, Object-Role Modelling “ORM” is used as conceptual modelling approach for reasons described in chapter 1.

### 2.3.1.1 Object-Role Modelling (ORM)

ORM (Object Role Modelling) is a conceptual modelling approach developed in the early 1970’s for modelling an information system at the conceptual level. ORM is so-called because “it pictures the world in terms of objects “entities or values” that play roles “parts in relationships”. For example, “you are now playing the role of reading, and this paper is playing the role of being read” (Halpin, 2006).

Several conceptual modelling tools exist on the market that supports ORM (e.g., ORM2\_Draw<sup>9</sup>, Microsoft VisioModeler<sup>10</sup>, Collibra Studio<sup>11</sup>, and NORMA<sup>12</sup>). These tools are also supporting the automatic or semiautomatic mapping of the models of ORM into several other representations such as: pseudo natural language statements (Lu, 2010), OIL ontologies (Stevens et al., 2003), XSD (Nawaz, 2011), Web Ontology Language (Wikipedia et al., 2009), and Entity-Relationship model (Chen, 1976). Section 7.4 of this thesis is explaining the need for a conceptual model and the advantages of using ORM for the practical work in this thesis in details.

### 2.3.2 Ontology

There are many definitions of ontologies in the literature. In this section, we will briefly explain the concept of ontology with regard to its use in the technical part described in chapter 7 on this thesis. How to understand what are ontologies are? What are they for? What are their characteristics?, is beyond the scope of this thesis. Rather, the fol-

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<sup>9</sup> [http://www.ormfoundation.org/files/folders/visio\\_stencils/entry2878.aspx](http://www.ormfoundation.org/files/folders/visio_stencils/entry2878.aspx)

<sup>10</sup> <http://www.microsoft.com/download/en/details.aspx?id=12255>

<sup>11</sup> <http://www.collibra.com/>

<sup>12</sup> [http://www.ormfoundation.org/files/folders/norma\\_the\\_software/default.aspx](http://www.ormfoundation.org/files/folders/norma_the_software/default.aspx)



lowing reports and papers answer the prior question: Halpin (2006), Pretorius (2004), Auxilio & Nieto (2003) and Jarrar & Meersman (2007).

This thesis understands an ontology as “*a formal explicit representation of concepts in a domain; properties of each concept described characteristics and attributes of the concept known as slots and constrains on these slots*” (Noy & McGuinness, 2000). From this definition, four main components can be derived: an abstract model (i.e. “conceptualization”), a precise mathematical description (i.e. “formal”), the precision of concepts and their relationships expressed by the term “explicit”, and the existence of an agreement between ontology users “shared in domain” (Horrocks et al., 2000). Otherwise stated, an ontology includes a specification of the terms used, and agreements to determine the meaning of these terms, along with the relationships between them (Auxilio & Nieto, 2003).

Researches propose many different ways to categorize ontologies, depending on the formality of the language or the level of dependence on a particular task (Bergman, 2007). One categorization is the difference between upper-level (also named top-level or foundation ontology) and mid- and lower- (or domain-) level ontology, as follow:

- *The Upper-level ontology* is “an attempt to create an ontology which describes very general concepts that are the same across all domains. The aim is to have a large number on ontologies accessible under this upper ontology” (Mascardi et al., 2007).
- *The domain ontology* descriptions of particular subject or domain. Domain ontologies are “the world views by which organizations, communities or enterprises describe the concepts in their domain, the relationships between those concepts, and the instances or individuals that are the actual things that populate that structure.” (Bergman, 2007).

The focus in this thesis is on domain ontologies. For our purpose, the domain will be “local website design” and the focus is on the special purpose which is cross-culture localization levels. An ontology will be used to enable knowledge representation and support shared understanding, interoperability between tools, systems, reusability and declarative specifications. Section 7.4 in this thesis explains the proposed ontology in detail, as well as the usefulness of the ontology, the languages and tools used, and how to transform it into different essential formal languages (e.g. OWL) to be used in practice.

## 2.4 Related Work

In this section, we discuss related work. The relevant related work falls into three parts. The first part reviews literature related to the research of cross-culture and website design. The second part aims to review the practical work done, including models and guidelines developed for use in designing local websites. And the last part reviews efforts and related work done in the broader context of software localization. We focus on work that is most related and most important for the thesis.

### 2.4.1 Cross-culture Research

Several researches such as Marcus & Gould (2000), W. Zhao et al. (2003), Biljon & Kotzé (2006), Moura et al. (2009), Yadav et al. (2010), Ford (2003), Lodge (2007), Barber & Badre (1998), Callahan (2005), and Shneiderman & Catherine (2005) have conducted several studies aiming to examine and understand the relationship between culture and the Web to determine how culture affects website design and usability.

#### 2.4.1.1 Empirical Studies that use Anthropological Models of Culture

Several HCI researchers, such as Ford & Kotzé (2005), Marcus & Alexander (2007), Khashman & Large (2011), Snelders et al. (2011), Zhao et al. (2003), Callahan (2005), and Marcus & Baumgartner (2004), suggest bringing anthropologist cultural models into practice and use them in website design. The intent of this work is to investigate how cultural factors influence the understanding of website content and interface. Marcus and Gould for example, address Hofstede cultural model to examine the influence of cultural effects on the following five website design components: (1) Interaction, (2) metaphors, (3) appearance, (4) mental models and (5) navigation (Marcus & Gould, 2000b).

Moreover, some HCI researchers applied cultural models to website design with the aim to investigate which website design elements are cultural sensitive in order to be able to take them into account when designing a local website. As already indicated, the website design elements which are cultural sensitive are called “cultural markers” (Barber & Badre, 1998), or “cultural fingerprints” (Smith & Chang, 2003), or “cultural attractors” (Smith et al., 2004). Badre (Badre, 2001) and others Sheppard & Scholtz, (1999), Bilal & Bachir (2007), Marcus & Ackerman (2002), Callahan (2005), Sun (2001), Fraternali & Tisi (2008), and Smith & Chang (2003), gave many examples of

how cultural markers are prevalent and perceived within a particular cultural groups. For example, “the red color means different things to different people: for the Chinese it means happiness; for the Japanese, anger/danger; for Egyptians, death; for the French, aristocracy; and for Americans, danger/stop” (Barber & Badre, 1998). Evers and Day provide some cultural markers for Indonesians websites, such as “Indonesians like soft colors, black and white displays, pop-up menus, and new input technologies” (Evers & Day, 1997) .

The importance of cultural markers is normally tested by researchers by organizing empirical studies involving questionnaires, recognition exercises, hands-on observation, task scenarios and interviews (Eugene & Clark, 2009; Sheppard & Scholtz, 1999; Noiwan & Norcio, 2006; Marcus & Alexander, 2007). These studies focus on evaluating the influence of cultural markers on user performance, understanding and acceptance of a website. They tested whether the availability of absent of cultural markers change the user performance, acceptance and understanding towards the website.

Although several researchers use anthropological models of culture as primary source of information to find the cultural markers, there are some limitations in using them. Researchers such as Hsieh et al. (2009), and Bourges-waldegg & Scrivener (1998), claim that most of the existing anthropological models of culture are too general and not suitable enough to use them in website design. Moreover, the culture of a country changes over time (Mushtaha & De Troyer, 2009), and the “dynamic and ever-changing cultural contexts have not been paid enough attention” in the prior research (Sun, 2006).

Mushtaha & De Troyer (2009 and 2007), Jagne & Smith-Atakan (2006), and Oyugi et al. (2008) have found that, not all anthropological models of culture and their related cultural dimensions are relevant for designing a localized website, since most of them had been formed some time ago for a specific domain and to be used for specific needs.

#### 2.4.1.2 Testing and Studying Local Websites

Based on an assumption that local sites from the same country provide similar cultural markers and share the same special identity; researchers, such as Burgmann et al. (2006), Cho & Cheon (2005), Singh et al. (2005), Gould (2006), Yalcin et al. (2011), and Callahan (2005) have suggested looking and comparing local websites of a target

country. In this way, they suggest that one could build up an understanding about the target culture requirements by take some of local websites form a country as example for localizing another local website for the same country.

## **2.4.2 Practical Approaches for Website Localization**

A variety of contributions were proposed by companies, as well as published in different research studies, with the aim to facilitating the practical design of localized websites. The following sections present a brief overview of practical website localization approaches proposed.

### **2.4.2.1 Website Localization Guidelines**

Based on existing culture and website design research, there are a large number of guidelines about how to localise a website for a specific country. These guidelines usually provide information of “do” and “do not do” for different cultural groups on website layout, fonts, graphics, content translation, etc.

HCI researchers, such as Zahir et al. (2002), Gorman (2006), Tanveer et al. (2009), and Marcus & Gould (2000) use the anthropologist’s cultural models to develop local website design guidelines. For example, Marcus and Gould use Hofstede’s cultural model to offer website localization guidelines. The five cultural dimensions of Hofstede’s cultural model are adapted and translated into website design guidelines; they claim that high power distance countries such as Malaysia should focus on authority and show pictures of leaders, deep website links, give more information about history and use a deep hierarchical structure. Later, Marcus & Baumgartner (2004) developed a practical set of 29 cultural dimensions to be used for global user interface analysis and design. The 29 cultural dimensions are annotated with detailed descriptions and examples of what influence they have on the following five website design components (1) metaphor, (2) mental model, (3) navigation, (4) interaction, and (5) appearance.

Some localization guidelines are based on research of comparing websites of two or more countries. In this way, researchers claim to understand the differences between certain countries of how the website design elements are perceived and understood (e.g., Gould et al., 2000; Cyr & Trevor-Smith, 2004; Burgmann et al., 2006; Zhao et al., 2003; Yalcin et al., 2011).

In addition, there are some guidelines based on analysing and comparing local websites of a specific country (e.g., George et al., 2010; Zhao et al., 2003; Burgmann et al., 2006). These kinds of guidelines are mostly proposed by website developers and professionals. However, this kind of guidelines based “on single country comparisons is unlikely to ever cover the countless number of cultures in this world” (Reinecke & Bernstein, 2011).

Some researchers also show the limitations of using the proposed guidelines. These guidelines and standards are “usually based on theoretical research, and typically restricted to only a few countries” (Reinecke & Bernstein, 2011). They tend to be too general (Duygu & Eristi, 2009), or incomplete, at which they does not cover all possible website design constraints (Becker, 2002; Beirekdar et al., 2002).

#### 2.4.2.2 Website Localization Models

In 2009, Hsieh et al. (2009) reviewed the previous existing cultural website design models. Based on their research, they proposed a theoretical model to facilitate cultural website design. The model comprises four phases: (1) understand the context of use, (2) defines a cultural model for the target culture, (3) website design production and (4) evaluate the effectiveness of the web communication. Similarly, Uden (2002), Gillham (2004), and Jagne & Smith-Atakan (2006) suggested a strategic model for cross-culture design. They combine the cultural model of Hofstede (2001), the guidelines proposed in Marcus & Gould (2000) and the “Culturability” proposed in (Barber & Badre, 1998). However, these proposed models are not tested and lack empirical studies to support the models.

Based on several empirical research studies, Smith et al. (2004) establish a process model for developing local websites. The model is comprised of five sequential activities, of which the first four activities are in a loop. These activities are: (1) Plan the website development, (2) Specify the context of use, (3) Specify user and organisational requirements, (4) Produce design solutions and (5) Evaluate the design against the requirements. Furthermore, “a variety of user-based and expert-based techniques for analysis and design are placed within the lifecycle of development”. However, there are no details provided regarding the model and its related activities, rather, a very brief overview provided.

### 2.4.2.3 Localization Frameworks

Researchers, such as Macdonald et al. (2001), Isa et al. (2007), Singh et al. (2009), and Al-badi & Mayhew (2010) proposed website localization frameworks to facilitate designing localized website. For example, to achieve this purpose, Al-badi & Mayhew (2010) carried out several studies among a variety of website users, website designers, and website design production companies, focusing on evaluating the influence of culture on website usability. However, the research samples were taken from just two countries Oman and United Kingdom.

### 2.4.2.4 Culturally Adaptive Interfaces

In the area of e-learning, some efforts have been done towards using user models for offering an approach to cultural adaptivity (Heimgärtner et al., 2007; Henze, 2005; Aroyo et al., 2006; Kamenz & Womser-Hacker, 2003). For example, Kamenz & Womser-Hacker (2003) proposed an approach to e-learning, which automatically adapt learning programs to meets students cultural background, aiming at improving the students learning experience. To do so, Kamenz & Womser-Hacker defined user cultural groups, and ask the student to answer 25 learning style-related questions. Afterwards, the system classifies the student into one of those predefined cultural groups. The adaptation is mainly focused on instructions and symbols.

The research of Heimgärtner et al. (2007) describes an outlook into the future aspects of a way for culturally adaptive navigation systems based on user cultural groups. They classify website users based on their navigational patterns and cultural background (e.g., attitude, preference, skill, etc.). This work, however, mainly focuses on providing a way for cultural adaptive navigation, and has proven its feasibility only for Chinese and German.

Reinecke & Bernstein (2011), and Reinecke (2010), proposed an approach for adapting website interfaces based on the individual cultural backgrounds of website users. To support this, a cultural user model ontology was developed, which includes all various facets of user's cultural backgrounds and website user interface elements. The adaptation ontology specifies certain restrictions rules for each website design element, such as their appearance, size and its combination with another element. This approach was evaluated with a proposed cultural adaptation application called MOCCA (Reinecke et al., 2011). MOCCA takes as input the current and former countries of

residence of website user in order to generate to-do list of recommendations for a personalized interface. The limitation of this research is that, the user cultural model is only based on Hofstede's cultural model and do not take into account the change and the rapid evolution of the user's culture.

### **2.4.3 Software Localization**

Localization of software has been done for years and research has been performed in this context from the beginning of 1980, at which software localization was usually limited to translating text, date and number formats (Yeo, 1996), with clear absent of cultural issues. The cultural issues became an important topic for software localization in the 1990s as software got sold worldwide (Purvis et al., 2001).

Academic researchers as well as industry software experts have therefore suggested including culture in the software localization process. Researchers such as Russo & Boor (1993) for example, advice software localization experts to increase their "awareness of cultural differences, and to make changes to the traditional software development process". Similarly, Keniston (1997) argues that, culture is an important factor to be taken into consideration in the software localization process. Likewise, Schäler (2003) discussed the importance of considering the anthropologists cultural dimension in software localization. Furthermore, he argues ten reasons of why localization and cultural diversity are mutually exclusive.

#### **2.4.3.1 Software Localization Components**

The process of software localization for most companies is mainly focussed on localizing the objective cultural design features such as language translation, measuring units, number formats, address formats, time and date formats, fonts, default font selection, character sets, sorting, local regulations, currency conversion, taxes, etc. (Hoft, 1996). All of the previous software design elements are visible and essential to localize to the target market. In most cases, however, software localization excludes localizing the subjective cultural design features like colors, images, audience needs and expectations because of cost and time constraints (Kersten et al. 2002); excluding some essential cultural design elements, that will not make the software available on larger markets, argue Anon (2007).

Some researchers suggested the term “software culturalization” to distinguish between cultural-dependent software components and “other components of the software core” (Kersten et al., 2002). This strategy has been described by Carey (1998) as “a separation of product elements into culturally dependent and culturally independent parts”. Accordingly, the software will become better internationalized to be ready for localization with less cost in time and money.

### 2.4.3.2 Software Localization Tools and Methods

Some commercial as well as open source software localization tools are available (e.g., Sisulizer<sup>13</sup>, Catalyst<sup>14</sup>, SDL Passolo<sup>15</sup>, and RC-WinTrans<sup>16</sup>). The intent of these tools is to make the process of software internationalization and localization easy and efficient. Waßmer (2002) reviews and examines specialized software tools which are used on the market in software localization. Similarly, Purvis et al. (2001) give a practical look at software internationalization. They describe the existing tools and techniques which are useful for software internationalization. However, most of the tools are mainly focussed on translating the language and still no tool can automatically adapt software to a target country with cultural preferences. This is an issue where “human localizers have to have a closer look at each graphic in the user interface and have the right feeling about culturally sensitive pictures and gestures” (Gross, 2006).

Based on various literature, researchers such as Collins (2001) examines the key issues of software localization, including the cost and the aspects of software that must be localized, and a methodology for this matter. Likewise, Esselink (2003) evaluates the software localization in industry. In his article, he gives a historical background about software localization: what it is, where it started, how it progressed and the challenges. Moreover, he discusses internationalized as well as localized software development.

Other researchers, Hogan et al. (2004) and Richardson et al. (2005) discuss the key challenges in software internationalization to develop methods for the localization of software to different cultural environments. Similarly, in (Yadav et al., 2010), the requirements to design flexible internationalized software are discussed. The article

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<sup>13</sup> <http://www.sisulizer.com>

<sup>14</sup> <http://www.alchemysoftware.ie/>

<sup>15</sup> <http://www.passolo.com>

<sup>16</sup> <http://www.schaudin.com>



accounts the impact of taking into account the international needs in earlier phases of software development to be easy and flexible afterwards for localization to be globally distributed.

Several books (e.g., Sangwan et al., 2006; Esselink, 2000; Smith-Ferrier, 2006; Dr. International, 2002; Alex, 1997) detail guidelines on how to develop international software to be ready for localization. However, most of the books are technical detailed set of the rules and tips that software developers of software need to know in order to design internationalized software.

## **2.5 Summary and Discussion**

This chapter presented the background for this thesis: website globalization, internationalization and localization, as well as usability and cultural considerations in website design, ontology, and conceptual modelling. Moreover, this chapter reviewed related work which has been proposed to simplify the design of localized website and cultural research. The following summarize the review.

### *Several cultural definitions are available and culture change over time:*

Culture is a concept that is difficult to define. It is used by anthropologists to describe a group of people who share certain aspects of life. Although there are many different definitions available in the literature, it appears to be an agreement that culture affects the way people view the world, think, interact, behave and how they response. And it is formed by historical experiences, traditions, customs and surroundings.

Some anthropologists view culture as subject to dynamically change over time. And for that, it is not possible to point out all the aspects of culture, and also, difficult to set boundaries around a culture. Culture is constantly changing and developing, at which, people are part of its change and develop. Therefore, one of the contributions of this research is to investigate whether cultural change has an impact on websites. In other words, does a website change over time to keep meeting user's cultural expectation if the culture also changes?

### *Consideration of the target audience culture in the design of a website can improve website usability:*

Usability is all about focusing on the user and on making it easy for the user to use the product. For that, several researchers emphasize to take the user's culture back-ground

into account when designing a local website to promote and improve website usability. Then, the question is: what cultural issues influence the usability of a website and what is the level of influence for different cultures to raise website usability?

*Website design elements may have different meaning among website users with different cultural background (i.e. be cultural sensitive):*

People around the world may have different preferences or perceptions for the same website design element (e.g., colors, color combinations, banner adverts, metaphors, etc.). When these website design elements are cultural sensitive, then they are called “cultural markers” or “cultural attractors” or “cultural fingerprints”. Consequently, the challenge is to check and list website design elements that are cultural sensitive.

*Different research directions are used in the literature to define the cultural sensitive website design elements:*

There are two notable research directions used in the literature to list the cultural markers. The first one is by mapping and translates the anthropologist’s cultural models and their related cultural dimensions into cultural markers. The second approach is by analysing many tens of local websites, to know the preferred cultural markers of a specific culture. The research describes in this thesis evaluate both methods and trying to explore other methods to help discovering cultural markers.

*HCI researchers use anthropologist’s cultural models and their related cultural dimensions to understand user cultural background. Such understanding has leads to aids for designing localized website:*

There are several existing anthropologists’ cultural models (e.g., Hofstede, Trompenaars, Hall, etc.) used widely by HCI researchers. Cultural models provide frameworks for understanding the physical and social worlds people live in. Six cultural models were described in this chapter. Every cultural model involves a set of cultural dimensions, which they used to organise cultural data, focus on measure, compare, evaluate and classify groups of people. These cultural models and their related dimensions are used by most of the HCI researchers as a primary source of information to study user culture characteristics. Consequently, HCI researchers have translate these anthropologist’s cultural dimensions into website design guide-lines, tips, methods, models and cultural markers to be used to design localized website for particular culture groups.

Although several anthropologists' cultural models are available, most of these models are formed some time ago, and were not related to website design, rather, every cultural model has its own special purpose. Therefore, this research is interested in verifying the link between anthropologists' cultural models and local website design. Moreover, it aims at determining the extent to which cultural models can be used as source of information about the user culture and be used in website localization.

*Although there are many attempts to offer approaches, methods, guidelines, frameworks and models to simplify the design of localized websites most of these attempts suffer from lack of depth:*

This chapter has reviewed the key attempts which have been proposed to simplify design localized website. It is noted that currently there is a lack of having a practical roadmap that facilitate designing localized website. Some limitations of these attempts were reported and discussed.

*Research in Software Localization has been done for years and before the Web came into existing, however the localization focus is usually only on objective cultural issues:*

Software researchers as well as developers suggested increasing the awareness of cultural differences, and making changes to the traditional software development process, by including culture in the original software product development cycle process. However, mostly the focus is on the localization of the objective cultural design issues such as: language, measuring units, number formats, address formats, time and date. Because of cost and time constraints, the subjective cultural design features like colors, images, target audience needs and expectations are excluded from the localization process.



### **3 Cultural Markers in Local Website Interfaces**

“Thus, the task is, not so much to see what no one has yet seen; but to think what nobody has yet thought, about that which everybody sees.”

--- Erwin Schrödinger

“If we knew what it was we were doing, it would not be called research, would it?”

--- Albert Einstein

### 3.1 Introduction

The previous chapter explained the importance of taking user culture into consideration when designing local websites. As indicated, there are many efforts to use the anthropological models of culture and their related cultural dimensions for website localization. Likewise, it is questionable whether the current local websites contain or take into consideration the target website users' culture.

In order to answer this question, this chapter describes a comparative study which is used to examine the availability of cultural markers in local website interfaces. The purpose of this study was to determine the extent to which the design of homepages of local web sites reflected the Hofstede's score assigned to their country for different cultural dimensions, aiming to investigate to which degree it would be necessary to take cultural differences into account when designing websites.

First, homepages of universities were analysed. As the results that we got from this study were inconsistent with previous similar studies described in the literature, another study was conducted, aiming to validate results of the first study. In this second study, we evaluated newspapers websites.

This chapter will give a description of the experiments and report the findings. The results are published in the following papers (De Troyer et al. 2006; Stengers et al. 2004).

### 3.2 Objectives of the Study

As a pilot study of a research project on website localization (MultiWeb), a controlled study was conducted to determine the extent to which the homepage design of local web sites reflected the Hofstede score assigned to their country for different cultural dimensions.

This research study started from the assumption, and this was supported by the literature, that since websites are developed in many different cultures all over the world, the interface design could be influenced by the culture in which they originated. To verify this, Hofstede's theory (see section 2.2.2.3) was used. Therefore, this research study was aiming to find out to which degree it would be necessary for websites, to take cultural differences into account.

### 3.3 Methodology of the Study

For this study, some Belgian students were asked to be involved in a small-scale study in order to check whether they could find cultural markers in local websites. First, the experiment was conducted for university websites. The hypotheses regarding the cultural variation were based on the theory of Hofstede. Contrary to Hofstede's theory and findings, very little evidence of cultural markers in the interfaces of the web sites was reported. Subsequently, an online survey was conducted among webmasters of university websites in an attempt to provide preliminary explanations for the findings.

Because the results of the experiment were inconsistent with other previous research findings from the literature, the experiment was repeated with students from a different culture and for a different type of websites: newspaper websites. A number of Palestinian students were asked to participate in this second experiment. This section will discuss the methods and techniques followed during the two studies.

#### 3.3.1 Sampling

The first study was conducted in December 2003 at the Department of Applied Linguistics of the Erasmus Hogeschool Brussel<sup>17</sup> in the context of the MultiWeb project<sup>18</sup>. 16 Belgian students participated in the study on university websites: 10 female and 6 male, aged between 19 and 24. Participants had previously attended a class in which Hofstede's cultural model was discussed.

The second experiment was conducted in January 2005. 16 Palestinian students participated in the newspaper websites experiment: 4 female and 12 male, aged between 19 and 24. The participants had previously attended a class in which Hofstede's cultural model was discussed.

For the two studies, an additional online survey was conducted among webmasters of respectively university and newspaper websites in an attempt to provide preliminary explanations for the findings.

#### 3.3.2 Constraints and Limits of the Study

The study was based on the theory of Hofstede's and more in particular on four dimensions: power distance, collectivism-individualism, masculinity-femininity, and

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<sup>17</sup> <http://www.erasmushogeschool.be>

<sup>18</sup> <http://wise.vub.ac.be/content/multiweb-multilingual-websites-architecture-and-localization>

uncertainty avoidance. The fifth cultural dimension of Hofstede, long and short-term orientation, which is based on values derived from the Chinese philosopher Confucius, was omitted, as it was thought that this cultural dimension could prove intangible to the participants. This is the first limitation.

The second limitation of the study is that the participants were asked to evaluate only the website homepage (first page). Since the participants had to evaluate university homepages from countries of which they did not always master the language, they could base their cross-culture evaluation only on the visual parameters (images, symbols, logos, etc.) and design elements (color, layout, etc.).

### **3.3.3 Methodology**

The methodology used was somewhat inspired by the experiment in Dormann & Chisalita (2002). The evaluation of the websites was based on four dimensions of Hofstede's theory: power distance, collectivism-individualism, masculinity-femininity, and uncertainty avoidance. Each of the 4 dimensions was examined by 4 students. Within one dimension, each student examined 10 homepages. Students were asked to make a random selection of 5 homepages from at least three of the seven highest ranked countries, and 5 homepages from at least three of the nine lowest ranked countries (from the university portal site at <http://univ.cc> for university websites, and from: <http://www.onlinenewspapers.com/> for newspaper website). In total, 40 homepages were analysed per dimension, 20 homepages representing each pole of the dimension for every study.

For each homepage, students were asked to fill out a questionnaire, which offered them a recapitulation of the dimension they had to analyse as well as a number of questions. The 4 questionnaires (one for each dimension) are given in Appendix 1, Appendix 2, Appendix 3, and Appendix 4.

First, students were asked to give their general impression of the homepage. Secondly, students were given a concise list of various subjective adjectives, which could be reflective of cultural trends, and were asked to check the ones they felt to be relevant to the homepage. The list included the following options: attractive, bright, cheerful, dull, formal, informal, artistic, personal, impersonal, distant, concise, clear, simple, modern, old fashioned, busy, complex, nice, innovative, showy and dark.



Afterwards, the students were asked to rate from 1 to 5 the extent to which value orientations were expressed in the homepages by means of auxiliary criteria representing the cultural values extracted from Hofstede's theory (listed below for each dimension separately). The rating scale was as follows: 1 = not applicable, 2 = hardly applicable, 3 = applicable to some extent, 4 = clearly applicable and 5 = strongly applicable. For a score higher than three, participants had to clarify from which elements in the page they perceived the given value.

Finally, students had to rate from 1 to 5 the extent to which they had found that the homepage reflected the high or low score of its country of origin for the dimension analysed. Here the rating scale was: 1 = not perceptible, 2 = hardly perceptible, 3 = perceptible to some extent, 4 = clearly perceptible and 5 = strongly perceptible.

After the analysis of the 10 homepages, the student was asked to describe the main differences in design between the 5 high-score homepages and the 5 low-score homepages.

The questionnaires were identical across the four dimensions, except for the auxiliary criteria representing the value orientations, which are as follows:

*Power Distance*

The power distance dimension bears on the extent to which unequal power distribution within a culture is expected and accepted. Based on Hofstede's writings, the following criteria were gathered:

*High Power Distance:*

- Focus on hierarchy
- Focus on teaching/management staff
- Healthy respect/obedience of inferiors towards superiors
- Focus on tradition and/or religion

*Low Power Distance:*

- Focus on equality between teacher and student
- Focus on student
- Mutual respect between inferiors and superiors
- Focus on personal development

*Collectivism-Individualism*

This dimension refers to the degree of integration of individuals within groups and the extent to which individual concerns precede the interests of the group, and vice versa. These are the criteria we retained for rating:

*Individualism:*

- Individual interests prevail over collective interests
- Focus on personal development and self-realization
- Focus on freedom

*Collectivism:*

- Collective interests prevail over individual interests
- Focus on tradition and/or religion
- Focus on consensus

*Masculinity-Femininity*

Masculinity and femininity refers to differences in the social roles of women versus men. In feminine countries gender roles overlap, while masculine countries gender roles are clearly distinct. Students were requested to rate the following criteria:

*Masculinity:*

- Boys and girls are addressed separately
- Focus on ambition/competition and/or (material) success
- Women should be tender and modest and/or men should be hard, ambitious and assertive

*Femininity:*

- Boys and girls are addressed indiscriminately
- Focus on equality, solidarity and/or quality of life
- Men may be tender and modest and/or women may be hard, ambitious and assertive

*Uncertainty Avoidance*

Cultures have a different attitude towards uncertain or unknown matters. The tolerance for ambiguity is expressed through the extent to which a culture resorts to written or unwritten rules to maintain predictability. The value orientations to be rated for this dimension included:

*High uncertainty avoidance:*

- Rigid rules
- Focus on formality
- Great precision or punctuality
- Focus on tradition and/or religion

*Low uncertainty avoidance:*

- Flexible rules
- Tolerance for informality
- Tolerance for ambiguity or vagueness
- Tolerance for evolution/change

### **3.4 Findings**

The findings will be described in two parts. First, the university websites evaluation results will be given, including quantitative results, qualitative results, and the web-master survey results. Secondly, the same will be reported about the newspaper websites evaluation.

#### **3.4.1 University Websites Evaluation**

##### **3.4.1.1 Quantitative Results**

Students' reports contained two sets of quantifiable data: (i) the number of times they had ticked given adjectives in the list, and (ii) the scores (from one to five) on the auxiliary criteria they had given to the homepages. To check whether students' perceptions of the homepages differed significantly along with the host countries' positions on Hofstede's dimensions, a chi square test was applied to the former set of data and a Mann-Whitney U-test to the latter (Ugoni & Walker, 1995). In keeping with standard scientific practice, the significance levels was set at  $p < .05$  (two-tailed). The results will be reported for each dimension separately.

##### *Power Distance*

None of the adjectives in the list of descriptors was ticked significantly more often with regard to homepages from high power distance countries than with regard to homepages from low power distance countries. Feedback form participants indicated that the scores on the auxiliary criteria didn't reveal any significant difference between homepages from high power distance countries and those from low power distance countries.

The average score given for the general perceptibility rating (on a 1 to 5 scale) of the power distance dimension was 2.5 for homepages from high power distance countries and 3.4 for homepages from low power distance countries. It is conceivable, of course, that low power distance indicators may have been more perceptible to our students than high power distance indicators.

#### *Collectivism-Individualism*

In terms of collectivism-individualism cultural dimension markers, no difference in the incidence of the adjectives ticked for homepages taken from countries positioned at opposite ends of this cultural dimension. However, the Mann-Whitney U-test showed that two auxiliary criteria were significantly more likely ( $p < .05$ ) to be perceived in the homepages from individualistic countries than in the homepages from collectivist countries, namely 'individual interests prevail over collective interests' and 'focus on freedom'. In homepages from collectivist countries, the statement 'collective interests prevail over individual interests' was rated significantly ( $p < .05$ ) higher than in individualistic homepages.

Based on the scores of the general perceptibility rating both poles were perceived to some extent: 2.95 for individualistic and 3.05 for collectivist countries (on a scale from 1 to 5).

#### *Masculinity-Femininity*

The findings from this exploratory study indicate that the adjective "nice" ( $p < .01$ ) was ticked significantly more often for feminine countries. However, no significant differences in the score of the cultural values were found between students' assessments of the homepages' masculine and feminine value orientations. The cultural markers which were ticked in the given list were mostly the same.

Students did observe that feminine values were slightly more strongly expressed in homepages from feminine countries, while websites from masculine countries were also displaying some feminine values. In fact, the homepages from masculine countries were hardly found to reflect masculinity at all, with an average general perceptibility rating of 1.45. In feminine countries, femininity was found to be expressed to some extent in the homepages, with an average rating of 3.25 (on a scale from 1 to 5).

#### *Uncertainty Avoidance*

The results from this study indicate that the chosen adjectives did not reveal any significant variation in participants' descriptions of homepages from countries representing contrasting poles of the uncertainty avoidance dimension.

Participants did not observe any clear differences between both poles of websites in the given auxiliary criteria; the analysed homepages displayed values applying to both poles. The average score given for general perceptibility was 2.6 for homepages from high uncertainty avoidance countries and 3 for homepages from low uncertainty avoidance countries.

#### 3.4.1.2 Qualitative Results

Students who participated in this study were also asked to indicate how they perceived the expected cross-culture differences between the samples of homepages.

Most of the participants based their evaluation on the homepage's pictures and graphical representations. Moreover, participants looked at pictures size and position in the homepage (e.g., central, in a corner, etc.). To some extent, the page's colors and its cheerful or formal appearance were decisive.

Most of the participants indicated that huge design differences existed among homepages from one single country. The university homepages for a given country could be extremely simple or complex, very dull or very interactive, innovative or very formal, etc.

For the power distance dimension, the visual representations appeared to have been the main criterion of evaluation. Did pictures represent buildings, professors, and religious symbols or did students hold a prominent place? Eight of the 20 university homepages from high power distance countries actually portrayed students, usually laughing.

The most perceptible value orientation differences were found in the dimension collectivism-individualism. In 'collectivist' homepages, pictures of buildings or groups were found more prominently than in 'individualistic' homepages, which generally depicted smaller groups or individual students, often with smiling faces. Collectivism was strongly expressed in homepages from Latin American countries, and to a lesser extent in other collectivist countries.

According to the participants, masculine homepages proved to display some feminine values. Pictures of girls appeared on 10 of the 20 masculine homepages. In their

comments, the majority of the participants found the feminine homepages more aesthetically appealing, which explains the significant incidence of the adjective nice. In feminine countries, representations of people are more numerous than in masculine countries. Students also reported that they had been struck by the prominence of pictures of women in Scandinavian homepages.

The homepages in low uncertainty avoidance countries were not found to be more complex or innovative than in high uncertainty avoidance countries. One student remarked that innovation and complexity are not reliable criteria, as they depend on the extent to which a country has been exposed to the web, and not only on the country's uncertainty avoidance.

#### 3.4.1.3 Discussion of the Results

The findings regarding cultural markers in university websites have revealed that the value orientations were not clearly ascertained by the students in the analysed homepages. Only few cultural markers were found in the websites representing the cultural dimension collectivism-individualism.

Previous studies, which were also based on Hofstede's theory, found cultural markers appearing clearly in websites. While this research results showed inconsistent values between participants knowledge of the homepages' countries of origin and those countries' scores on Hofstede's cultural dimensions. There may be different explanations for these inconsistent finding. Maybe the participants were actually biased in their evaluation on "finding" cultural differences.

Further on, it needs to be acknowledged that, as a consequence of the participants' random selections, some homepages were just too plain to extract any information and thus got a very low rating. Nevertheless, none of the average general perceptibility ratings was  $\geq 4$  (i.e. clearly visible), which implies that no dimension was distinctly perceived. Moreover, responding to a 'random' sample of university homepages may more closely resemble authentic web browsing than responding to a pre-selection of homepages chosen by a researcher with a view to demonstrating 'culture-typical' designs.

It could be that participants' findings were influenced by their own cultural background. Since they were all Belgians, perhaps they were more / less likely to perceive things which were affinitive to their culture? However, a comparison between Bel-

gium's score for the four cultural dimensions and our students' reports showed that they had not observed their own cultural value orientations any better or worse.

It is also possible that the fact that the students only focused on the visual elements (since they did not always master the language) had an influence on the results. Maybe, if they had been able to read the content of the homepages, the results would have been different. However, the web is a very visual oriented medium and therefore, the contribution of visual aspects, as a way to communicate should not be underestimated.

It is also possible that the selected domain, university websites, had an impact on the result. University websites are mostly aimed at young people, which could also imply that these sites display less traditional features. Since some universities aim to display an international character, they might also deliberately veil certain cultural traits.

Since the results got from this pilot study were somehow unexpected, two hypotheses were proposed:

*First hypotheses*, "Students were unable to recognize culture-specific characteristics due to the setting of the experiment".

*Second hypotheses*, "the evaluated local homepages did not actually reflect local culture, as Hofstede's theory would predict".

In order to understand the results, a survey was sent to university webmasters (see Appendix 7), aiming to know about their methods used when designing or redesigning the university website.

#### 3.4.1.4 Webmaster Survey Results

The participants of this study were university webmasters from 70 countries. At the end of December 2003, questionnaires were sent out to 223 webmasters of university websites, among which the websites analysed by the students and more sites originating from countries with an extreme score for any of the four cultural dimensions. Responses were received from 45 webmasters. The questionnaire can be found in Appendix 5.

The survey's main goal aimed at finding out the extent to which webmasters or web development teams draw inspiration from other existing websites when (re)designing the university website. In order to mask the primary objective of the study, several issues through questions of various types were addressed: multiple choices, multiple answers and open-ended.

To the question whether they happen to be inspired by the design or architecture of other existing websites, 36% of the respondents answered that this was ‘often’ the case, 58% said ‘occasionally’ and only 6% answered ‘never’. Of the 94% declaring that they were indeed receptive to external influences, a modest majority (54%) claimed that they looked at websites within the country, while the others (46%) checked websites of various origins.

From the latter group’s specifications, it appeared that most webmasters do not have a preference for specific countries, but they often also visit same language countries. According to both groups of respondents’ open-ended answers, they mainly look at other university websites

### **3.4.2 Newspaper Websites Evaluation**

The findings from the university websites evaluation had demonstrated that the cultural markers were not clearly ascertained by the students in the analysed homepages. Next, the university website evaluation experiment was repeated for another domain: newspaper websites and with students with another cultural background, i.e. from Palestine. The methodology used in this study was the same as in the first study; only small changes to the questionnaires were made to adjust them to the domain of newspapers.

The domain of newspaper websites was chosen because while university websites mainly target young people, newspaper websites target nearly all ages. In addition, where it is possible that some universities aim to display an international character (and therefore refrain from using culture specific issues), the target audience for newspaper web sites are local people, not an international audience.

This experiment was conducted in January 2005. 16 Palestinian students participated: 4 female and 12 male, aged between 19 and 24. The following will describe the results.

#### **3.4.2.1 Quantitative Results**

The quantitative results for this second experiment were not significantly different from the results of the first experiment. Table 3-1 shows a summary of the results obtained from both experiments. The following findings were obtained from this study:

#### ***Power Distance***



No relevant adjectives from the list of descriptors were chosen, neither for homepages from high power distance countries nor for homepages from low power distance countries. The adjectives that have been selected by the students for both types of homepages, from high power distance countries and low power distance countries, were somewhat the same. Moreover, students concluded that in low power distance countries the homepages were more personal and made interaction between the visitor and the website possible.

The average score (on a 1 to 5 scale) of the power distance dimension was 3.1 for homepages from high power distance countries, and 3.9 for homepages from low power distance countries. So, low power distance newspaper websites indicators may have been more perceptible to participants than high power distance indicators. Also in the first study, low power distance indicators were perceived more by the participants than high power distance indicators (2.5 for high power distance and 3.4 for low Power distance).

#### *Collectivism-Individualism*

There are two adjectives that were ticked significantly more often in response to homepages from individualism countries, i.e. the adjectives 'personal' and 'modern' ( $p < .02$ ). This shows a noticeable difference between the two poles of homepages of the collectivism-individualism dimension.

The Mann-Whitney U-test showed that three auxiliary criteria were significantly more likely ( $p < .05$ ) to be perceived in the homepages from individualistic countries than in the homepages from collectivist countries, namely 'individual interests prevail over collective interests', 'focus on personal development' and 'focus on freedom'. On the other hand, in homepages from collectivist countries two auxiliary criteria, 'collective interests prevail over individual interests' and 'focus on tradition' was rated significantly ( $p < .05$ ) higher than in individualistic homepages.

The average score given for the general perceptibility rating (on a 1 to 5 scale) of the collectivism-individualism dimension was 3.5 for homepages from individualistic countries and 3.8 for homepages from collectivist countries.

The first study showed that the collectivism-individualism dimension was rather well perceived by the participants. The criteria 'individual interests prevail over collective interests', 'focus on freedom', and 'collective interests prevail over individual interests' were also rated significantly higher in the first experiment.

### *Masculinity-Femininity*

The findings from this study indicate that the adjective ‘nice’ and ‘attractive’ was ticked significantly more ( $p < .02$ ) for both feminine and masculine countries. One adjective was ticked significantly more often in response to homepages from feminine countries, i.e. the adjective ‘modern’ ( $p < .01$ ).

No significant differences in the score of the cultural values were found between students’ assessments of the homepages’ masculine and feminine value orientations. Moreover, newspaper websites from masculine countries were displaying some feminine values.

Newspaper homepages from masculine countries were hardly found to reflect masculinity. Students gave it an average general perceptibility rating of 1.9, while femininity was found to some extent in homepages from feminine countries, with an average rating of 3.

### *Uncertainty Avoidance*

There is one adjective ‘flexible’ that was ticked significantly more often ( $p < .01$ ) in response to homepages from high uncertainty avoidance countries. In general, students did not observe any actual differences for the auxiliary criteria of both types of newspaper homepages from countries representing the high and low uncertainty avoidance dimension.

The average score given for general perceptibility was 3.1 for homepages from high uncertainty avoidance countries and 3.4 for homepages from low uncertainty avoidance countries.

#### 3.4.2.2 Qualitative results

After the completion of the questionnaire, participants were asked to give clarification on how they understood the expected cross-culture differences between the samples of homepages. Although, the participants had to do the evaluation on the website first page, among the 16 participants there are 9 (56%) said that they explore the website before they evaluate it.

This study showed that in low power distance countries the homepages were usually more personal oriented and allowed for interaction between the visitor and the website. The main difference in the power distance dimension was in the visual representations and some of the understandable text. The experiment reports that 15 of the

20 newspaper homepages from low power distance countries actually contained pictures related to the content, while only 6 of the 20 newspaper homepages from high power distance countries contained such pictures.

Newspaper websites from collectivist countries contained pictures of buildings, logos and pictures representing tradition, and groups of animated pictures were found more prominently than in 'individualistic' homepages, which generally had small smoothly integrated pictures and fashionable fonts. In individualistic country homepages, the first page also contained a lot of news titles, which could be used to navigate to the different news items.

Most of the participants indicated few design differences between newspaper websites represented Masculinity and Femininity countries. Participants' responses indicate that most the masculine newspaper homepages contain feminine values. In 12 of the 20 masculine homepages, feminine values appear. In feminine countries, female-oriented pictures were more numerous than in masculine countries.

In the dimension Uncertainty Avoidance, three students remarked that for the same country, there were big difference is complexity. In addition, another student noticed that there was a big difference between the complexity of the websites of two closely rank countries (Portugal and Guatemala Newspapers websites).

#### 3.4.2.3 Webmaster Survey Results

The participants of the survey were newspaper webmasters. At the end of January 2005, questionnaires were sent out to 256 webmasters of newspaper websites by email. Responses were received from 52 webmasters. The questionnaire can be found in Appendix 5.

The aim of this survey was to find out the extent to which web development teams draw inspiration from existing websites when designing a newspaper website.

To the question whether they happen to be inspired by the design or architecture of other existing websites, 47% of the respondents answered that this was 'often' the case, 49% said 'occasionally' and only 4% answered 'never'. Of the 96% declaring that they were indeed receptive to external influences, a modest majority (61%) claimed that they looked at in-country websites, while the others (39%) checked websites of various origins. Most of webmasters declare that, they did not have a preference for specific countries, but they often visit the same language countries.

### 3.5 Discussion of the Findings

According to the results found in the first and second study it is clear that the results of the second study confirm the results of the first study. Except for the dimension collectivism-individualism, value orientations were not clearly ascertained in the analysed homepages.

The findings from the two studies look inconsistent with prior studies in this domain. The following explanations are possible. First, the scope of the study was limited since the evaluation only concentrated on visual parameters in a confined number of homepages. Secondly, the research study involved a comparison of two opposite poles of countries, but not of countries individually. Third, four of Hofstede's cultural dimensions were considered as categories of interpretation. Also the choice of the website domains (university websites and news website) as well as the culture of the participants could have influenced the results.

The following table, Table 3-1, compares and summarizes the results. Both study results were similar to some extent. These findings are inconsistent with previous research findings in literature. Based on this research, high power distance, masculinity and high uncertainty avoidance were less perceptible in the analysed homepages. On the other hand, collectivist homepages proved to express collectivist value orientations. However, the Web is highly dynamic, ever changing and quickly evolving. It seems that, rather than being a forum for different cultures, the Web has promoted the emergence of a cosmopolitan online culture, a hybrid culture that does not have the same characteristics as traditional cultures, as it is the outcome of the communication and interaction between people with different cultural backgrounds. At the same time, Hofstede's theory is more than 30 years old and some shifts might have taken place, and maybe his theory is not applicable as such to websites.

Cultural dimensions	University sites	Newspaper sites
<b>Power Distance (PD)</b>		
Adjectives for <ul style="list-style-type: none"> <li>• High PD</li> <li>• Low PD</li> </ul>	No difference	No difference
Auxiliary criteria for		

<ul style="list-style-type: none"> <li>• High PD</li> <li>• Low PD</li> </ul>	No difference	No difference
Average perceptibility for <ul style="list-style-type: none"> <li>• High PD</li> <li>• Low PD</li> </ul>	2.5 3.4	3.1 3.9
<b>Collectivism-Individualism</b>		
Adjectives for <ul style="list-style-type: none"> <li>• Individualism</li> <li>• Collectivism</li> </ul>	No difference	Personal, Modern
Auxiliary criteria for <ul style="list-style-type: none"> <li>• Individualism</li> <li>• Collectivism</li> </ul>	Individual interest prevails, focus of freedom  Collective interest prevails	Individual interest prevails, focus of freedom, focus on personal development  Collective interest prevails, focus on tradition
Average perceptibility for <ul style="list-style-type: none"> <li>• Individualism</li> <li>• Collectivism</li> </ul>	2.95 3.05	3.5 3.8
<b>Masculinity-Femininity</b>		
Adjectives for <ul style="list-style-type: none"> <li>• Masculinity</li> <li>• Femininity</li> </ul>	nice	nice, attractive  nice, attractive, modern
Auxiliary criteria for <ul style="list-style-type: none"> <li>• Masculinity</li> </ul>	No difference	No difference

<ul style="list-style-type: none"> <li>• Femininity</li> </ul>		
Average perceptibility for		
<ul style="list-style-type: none"> <li>• Masculinity</li> </ul>	1.45	1.9
<ul style="list-style-type: none"> <li>• Femininity</li> </ul>	3.25	3
<b>Uncertainty Avoidance (UA)</b>		
Adjectives for		
<ul style="list-style-type: none"> <li>• High Uncertainty Avoidance</li> <li>• Low Uncertainty Avoidance</li> </ul>	no difference	flexible
Auxiliary criteria for		
<ul style="list-style-type: none"> <li>• High Uncertainty Avoidance</li> <li>• Low Uncertainty Avoidance</li> </ul>	no difference	no difference
Average perceptibility for		
<ul style="list-style-type: none"> <li>• High Uncertainty Avoidance</li> </ul>	2.6	3.1
<ul style="list-style-type: none"> <li>• Low Uncertainty Avoidance</li> </ul>	3	3.4

Table 3-1 Results of Local Websites Evaluation Experiments

Figure 3-1 gives an overview of the comparison of the inspiration obtained from other websites between the webmasters of university websites and newspaper websites. The webmaster surveys revealed that, when developing a website, almost all of the respondents (94% of the university webmasters and 96% of the newspaper webmasters) happen to be inspired by other web sites. More of half of them (54% of university webmasters, and 61% of newspaper webmasters) looked at in-country websites, while the others declare to prospect websites of various origins. However, the in-country websites could on their turn have been designed on the basis of foreign web-sites. As one webmaster put it, the Web is ‘an international medium and inspiration comes from all over’. Moreover it appears that, within the same domain, web developers tend to mutually keep an eye on each other. This could explain why we had difficulties detecting the expected value orientations in the homepages.

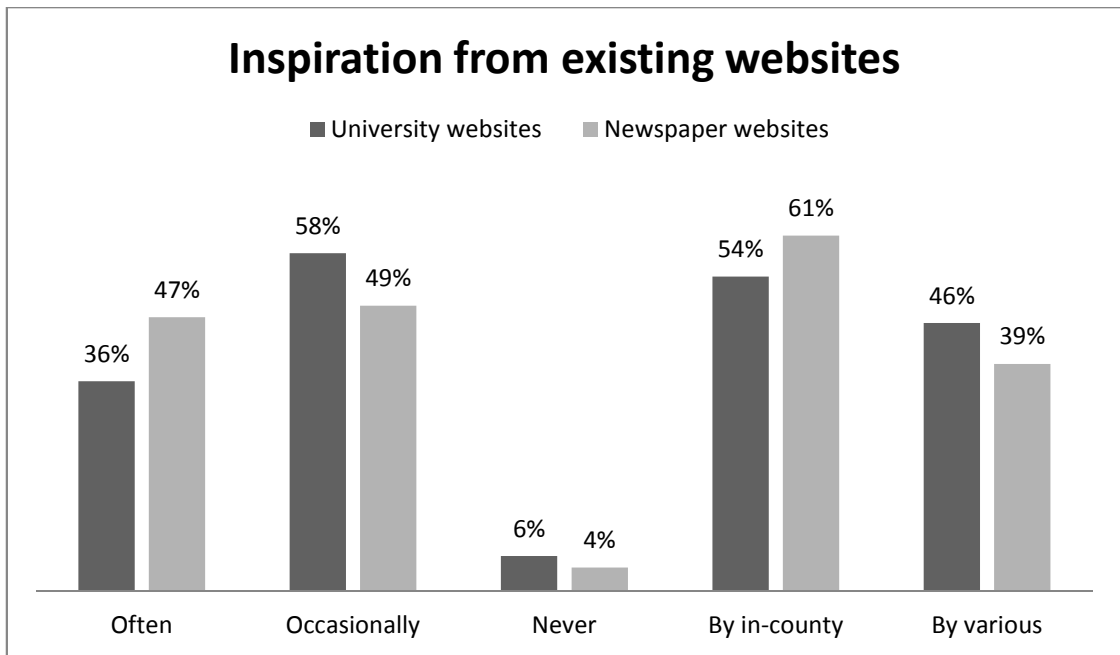


Figure 3-1 Webmaster's Percentage Rate of Inspiration from Existing Websites

Web users are also rather young and maybe they are less traditional or they are not interested to show their culture on the Web. Moreover, it is also possible that those people became more flexible and “acclimatize” to the Web culture as they continue to surf the Web’s cultural melting pot. And that could generate new habits and new cultures.

However, some domains may be more sensitive to cultural difference than others. As mentioned before, the results of the two experiments showed that the cultural value orientations are somewhat more perceived for the newspapers websites rather than for the university web sites. Therefore, it could be that the level of cultural values perception depends on the domain of website, and for every website domain different cultural values may be relevant.

Since the results showed that some cultural values for cultural dimensions exist in some websites, the following question needs to answer: Would websites really better fit users’ preferences and expectations if web developers took these cultural dimensions into consideration? This question, which resulted from this study, will be address in the following chapter, chapter 4.

### 3.6 Conclusion

This chapter describes a comparative study in cross-culture interface design. Two pilot studies were conducted aiming to determine the extent to which interface designs

could be influenced by the culture in which the website is designed. Those studies were based on the cultural theory of the Dutch anthropologist Geert Hofstede.

The results showed that the local homepages examined did not actually reflect local culture, as Hofstede's theory predicted. These findings look inconsistent with previous research findings from literature, and that may be because this study was limited or because Hofstede's theory is more than 30 years old. Also, the Web seems to promote the emergence of a cosmopolitan online culture, with characteristics that are different from those of the traditional cultures.

The findings of this study also slightly suggest that taking cultural issues into consideration during website design may be useful when designing websites for certain domains. Some domains may be more sensitive to cultural difference than others.

From the results, the following questions arise. Will websites better fit users' expectation if web developers take cultural usability into account? Which cultural markers may be responsible for influencing website usability?



## **4 Cultural Understanding of Website Content and Interface**

“What people say, what people do, and what people say they do are entirely different things.”

--- Margaret Meade

## 4.1 Introduction

The previous chapter, chapter 0 “Cultural Markers in Local website Interfaces”, we concluded that the evaluated local homepages did not actually reflect local culture as Hofstede’s theory would predict. Moreover, the research findings look inconsistent with previous research in the literature. Therefore, this chapter describes and reports on a comparative research study that was conducted with the aim to better understand the previous research results. Furthermore, we also wanted to explore and evaluate the influence of the users’ cultural background on understanding and acceptance website content and interface.

The comparative study was carried out involving Palestinian and Belgian students, aiming to better understand how students from different cultural background perceive, understand and accept some pre-selected e-learning websites. The experiment was conducted by means of two different Web-based interactive courses websites: IUG-WebCT<sup>19</sup> and Collaborative Learning Centre<sup>20</sup>. Moreover, 6 anthropological models of culture involving 16 cultural dimensions were investigated, aiming to find the cultural markers that mostly influence users’ understanding. For the research study a multi-method approach was used, involving questionnaires, icon recognition exercises, hands-on observation, task scenarios, and interviews.

The research study results indicate differences in culture between the two groups, but not as much as expected. Thanks to modern communication, cultural gap between the two groups of users seems to have decreased. Moreover, some cultural dimensions are still influential important and should be taken into consideration for website localization.

This chapter will first give a description of the research study. Afterwards, we report the findings. This is followed by a discussion of the findings and finally we provide conclusions. The work in this chapter has been published in (Mushtaha & De Troyer, 2007).

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<sup>19</sup> <http://moodle.iugaza.edu.ps/>

<sup>20</sup> <http://www.owcp.net/clc/>

## 4.2 Objectives of the Study

This study was aimed to measure the understanding and the acceptance of pre-selected e-learning websites among two groups of participants from two different cultures. The objectives of the research study were as following:

- To evaluate the influence of the users' cultural background on content and interface understanding; aiming to gain insight into cultural understanding of content and interface.
- To identify cultural and social factors including cultural markers available in the pre-selected websites.
- To map user interface design components to cultural dimensions in the pre-selected websites.
- To test if there are preferences in interface design influenced by the users' cultural background.
- To determine the effect of cultural background on the acceptance of the pre-selected websites.
- To determine the most important anthropological cultural dimensions from the 16 cultural dimensions that affect website understanding and acceptance.

In the previous chapter, we only considered Hofstede's cultural model for the website evaluation. However, other cultural models exist and maybe some of them contain dimensions that are more appropriate for websites. Consequently, in this study we use 6 anthropological models of culture involving 16 cultural dimensions (described in the literature review of chapter 2.2.2.3). The dimensions are: Human Nature Orientation, Individualism vs. Collectivism, Internal vs. External Control, Time Orientation, Authority Conception, Context, Gender Roles, Power Distance, Uncertainty Avoidance, Universalism vs. Particularism, Achievement vs. Ascription, Affective vs. Neutral, Specific vs. Diffuse, Experience of Technology, Face-Saving, and International Trade and Communication. These cultural dimensions are the most notable and have already been evaluated and tested by several HCI researchers in separate studies as it was described in section 2.2.2.3 of this thesis.

The following section will describe the two groups of students that participated in this study. After this, the methodology will be discussed, followed by the findings and a discussion.

### 4.3 Sampling

The participants of this study were students from Palestine and Belgium. Questionnaires were sent out to 100 Belgian students and 100 Palestinian students. Responses were received from 42 Palestinian and 21 Belgian students, who were then requested to further participate in our experiment.

The 42 students from Palestine were selected from the Islamic university<sup>21</sup>, the Al-Azhar University<sup>22</sup>, and the Palestine Open University<sup>23</sup>. For Belgium, 21 students from the Vrije Universiteit Brussel<sup>24</sup> and the Katholieke Universiteit Brussel<sup>25</sup> were asked to participate in this experiment. The participants were second and third year students from different study domains, such as Economy, Science, Law, Engineering, Public Health, etc., with an average age of 21 years for both groups.

The national cultures included in this study were the Belgium culture and the Arabic culture. The Belgium culture was involved because the researcher resided in Belgium. The Palestinian students were chosen to participate in this study because the researcher was born and raised in Palestine. This was expected to facilitate the study and to give some insights into cultural differences in acceptance and in understanding interface design for some websites, as the researcher was familiar with both cultures.

### 4.4 Methodology of the Study

42 Palestinian and 21 Belgian students participated in the study. The participants were asked to evaluate the 16 cultural dimensions, and also we asked them to explore the two website (WebCT and CLC) using scenarios, to answer questions and to give their opinions about their understanding and expectations of icons and text appearing in the websites. To do this, a multi-method approach involving survey, icon recognition exercises, hands-on observation, task scenarios, and interviews were used along with a survey forms to guide the study (the survey is located in ). The survey had 16 pages, divided into 3 main sections:

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<sup>21</sup> <http://www.iugaza.edu.ps>

<sup>22</sup> <http://www.alazhar.edu.ps>

<sup>23</sup> <http://www.upi.ps>

<sup>24</sup> <http://www.vub.ac.be>

<sup>25</sup> <http://www.kubrusse.ac.be/>

1. Participants' characteristics: This section was used to collect the demographic and personal details, such as: age, gender, language background, etc. and computer & Internet experience.
2. Mapping user interface elements and website content to culture - Working with the WebCT and CLC websites: This section contained a number of questions for which the students needed to work, explore and analyse the two e-learning websites separately. The goal was to explore the effects of user culture in understanding the pre-selected websites.
3. Cultural evaluation: In this section, the 16 cultural dimensions are presented by means of statements and cases. The participants were asked to indicate how much she/he agreed with each statement.

The following sections will discuss the three phases in more detail.

#### **4.4.1 Participants' Characteristics**

A background questionnaire with 21 questions was used to collect demographic information as well as computer and Internet usage. They had to provide information about themselves, their live, languages familiar, cultural background, preferences and their attitude towards a foreign culture. These questions can be found on the first four pages of the survey (please refer to Appendix 7).

#### **4.4.2 Exercise on Mapping User Interface Elements and Website Content to Culture**

In this exercise, the participants were asked to login into the pre-selected websites and examine them. Afterwards an interview was made with the students. The main objective of this part of the experiment was to discover the culture differences between the two groups of participants in understanding the website design elements of the two websites:

##### ***1. Working with the Collaborative Learning Center Website "CLC"*<sup>26</sup>**

CLC is a learning website that aims to provide a wide range of web-based interactive courses in "a clear structured way for students". The website provides free online virtual classes for students from all over the globe to meet and learn with each other. The CLC website was chosen because it supports distance learning over the Web, and the

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<sup>26</sup> <http://www.owcp.net/clc/>

website target audiences are students and teachers from different countries. Nevertheless, none of the students involved in the experiment was used to work with CLC.

## ***2. Working with the IUG-WebCT website*<sup>27</sup>**

WebCT - Web-based Course Tools - is a virtual learning environment for higher education institutions. Thousands of colleges and universities in more than 70 countries worldwide use this tool. WebCT was originally developed at the University of British Columbia by a faculty member in computer science. In February 2006, WebCT was acquired by rival Blackboard Inc.

The IUG-WebCT target website which was used in this experiment was developed for the Islamic University of Gaza. The Islamic University of Gaza is using the WebCT as web-based learning environment to support academic teaching. All the Palestinian and Belgian students involved in the experiments were familiar with WebCT.

To be able to answer the questions in the questionnaire, the students needed to work with, explore and analyse the two e-learning websites separately. The questions about the two websites were not completely the same because the students were already familiar with the WebCT website, while they were not familiar with the CLC website. Therefore, the CLC website evaluation survey included questions related to the user's expectations.

The questions used tried to investigate students' understanding and their reaction towards some icons, pictures, text, navigation, etc. For this, the participants were asked to give their general impression, and to give their opinion about the images and the icons that were shown on the website. The students were asked to answer some questions while performing some tasks, like: "What does this picture/icon/key show?" and "What kind of information do you think you will get when you click on this object?". Afterwards, the students were asked to click on an object and to look to the information that was displayed. Then, students had to answer the following questions: "What do you think of it? Is this what you expected? If not, how is it different?". At the end of the task, students were asked to suggest whether some other pictures or icons would have been better to represent the information.

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<sup>27</sup> <http://moodle.iugaza.edu.ps/>

For the CLC website, the evaluation started by asking questions that would allow the researcher to check whether the student's expectations based on his/her first impression was corresponding with the actual intention of the website. E.g., "What kind of information do you think this website is offering?", "Who do you think is the target audience of this website?", and "Which items on the screen make you think this?".

After the students finished their questionnaire, students were asked in person a few questions on what he or she thought about the websites and the culture values. These questions can be found on the .

#### **4.4.3 Cultural Evaluation**

In this part of the experiment, the 6 most important anthropological models of culture involving 16 cultural dimensions, which are used in the HCI research domain, were used. The anthropological models of culture are from Nancy J. Adler, Edward T. Hall, Geert Hofstede, Fons Trompenaars, David A. Victor, and Quincy Wright. The related 16 cultural dimensions are: Human Nature Orientation, Individualism vs. Collectivism, Internal vs. External Control, Time Orientation, Authority Conception, Context, Gender Roles, Power Distance, Uncertainty Avoidance, Universalism vs. Particularism, Achievement vs. Ascription, Affective vs. Neutral, Specific vs. Diffuse, Experience of Technology, Face-Saving, and International Trade and Communication. These theories and dimensions are discussed in the literature review, section 2.2.2.3.

The objective of this evaluation was to find out which dimensions are the most important ones for web design. The 16 cultural dimensions were presented by means of statements and brief descriptions. The participants were asked to indicate how much she/he agreed with each statement. The responses to these questions reflect how much the participant was influenced by his or her culture. Participants were asked to rate the statements from 1 to 5. The rating scale was as follows: 1 = strongly disagree, 2 = hardly disagree, 3 = agree to some extent, 4 = clearly agree and 5 = strongly agree. The chi square test was applied to the set of data obtained. The questions can be found in the Appendix 6.

#### **4.5 Findings**

The findings of this study fall into three categories. First, demographic characteristics of the participants will be given. Secondly, a report on the participants understanding,

evaluation and expectation of the pre-selected websites is provided. Thirdly, we give the results of cultural dimensions evaluation.

#### 4.5.1 Finding on the Participants' Characteristics

This section describes the 63 participants who responded to the cross-culture understanding study survey. As already mentioned, one of the purposes of the study was to compare the preference of participants; therefore, for some situations the preferences and characteristics of two groups of participants will be compared.

The following table, Table 4-1, reports the most important characteristics of the participants.

	Palestinians	Belgians
Target audience	42 participants 23 (55%) male 19 (45%) female Average age: 21 years	21 participants 8 (38%) male 13 (62%) female Average age: 20 years
Internet / computer use	All participants use Internet (100%). 41 (98%) use the computer only for Internet. 32 (76%) use Internet every day and in the weekends. 5 (12%) use Internet during the week not in the weekend.	All participants use Internet (100%). 21 (100%) use the computer only for the Web. 18 (86%) use Internet every day and in the weekends. 3 (14%) use Internet during the week not in the weekend.
Internet activities	42 (100%) e-mails and online chatting. 39 (93%) finding information for work or study. 38 (90%) making school assignments.	21 (100%) on-line chatting, e-mail, finding information for work or study, making friends, making school assignments and finding information for personal purpose.



		4 (19%) have own homepages and are working on it.
Language preferences	39 (93%) Arabic. 3 (7%) English.	11 (52%) Dutch & English 7 (33%) Dutch 3 (14%) Dutch, English and French.
Cultural preferences	19 (45%) Palestinian culture 9 (22%) Arabian and Islam 8 (19%) Palestinian and Islam 6 (14%) Arabian culture	9 (43%) Belgium culture. 6 (29%) no particular culture. 3 (14%) Flemish culture. 3 (14%): USA, Arabic culture and one consider himself belonging to the German culture
Movies preferences	All the 42 participants watch foreign movies.	All the participants watch foreign movies.

Table 4-1 Participants' Characteristics

As can be seen in Table 4-1, all the participants were familiar with the Internet and used it regularly. The main Internet activities were on-line chatting, e-mail, finding information for work or study, making friends, making school assignments, and finding information for personal purposes.

Palestinian participants felt that their cultural background belonged to Palestinian, Arabian and Islamic culture. The Belgian participants indicated as cultural background the Belgian, no particular culture, the Flanders and some other cultures. An interesting finding was that all Palestinian participants have categorized themselves in one particular culture, while some of the Belgian participants see themselves as not belonging to a particular culture, and some felt that they were belong to a culture different from their national culture. The following describes in details the outcomes.

#### 4.5.1.1 Palestinian Students

42 Palestinian students from three Palestinian universities participated in the experiment; of the 42 participants, 23 are male and 19 female. The average age of the

participants was 21 years. Participants in the sample were selected from diverse backgrounds, such as English literature, economy, law, science, and engineering.

Among 42 participants who completed the survey, 29 participants (69%) spent most of their life living in Palestine within their families and 13 participants (31%) spent most of their life outside Palestine. Of those 13 who spent most of their life outside Palestine, 7 participants (54%) lived with their Palestinian parents.

All 42 participants had Arabic as first language in their daily life, and 9 participants (21%) mentioned that they speak Arabic and English at university. However, all students knew English because English language is required for all science and humanities students. In addition, English is mandatory from the first grade in school (6 years of age). Of the 42 participants, 39 (93%) considered Arabic as their first language. 3 participants (7%) consider English as their first language. Of the 42 participants, 29 participants (69%) prefer Arabic to communicate with others, 3 participants (7%) prefer English and 10 participants (24%) can communicate in either English or Arabic. Of the 42 participants, 19 (45%) feel that their cultural background belongs to Palestinian culture, 9 participants (22%) said “Arabian and Islam”, 8 participants (19%) considered themselves belong to the culture of “Palestinian and Islam” and 6 participants (14%) consider themselves belonging to the Arabian culture.

*One of the participants first wrote “Arabian culture”, then erased it and wrote “Islamic culture”. From this it is clear that the student felt the need to distinguish between Islamic, Arabic and Palestinian culture.*

The 42 participants were asked if they watch foreign movies. All the 42 participants said “Yes”: 24 participants (57%) watch movies with subtitles, 5 participants (12%) watch movies without subtitles, and 13 participants (31%) watch foreign movies “but still Arabic” without subtitles. The students mentioned that, they are watching a lot of movies from various countries even without subtitles and they could understand them.

*One of the participants mentioned that, he enjoyed a lot of Mexican and Turkish movies translated into Arabic. The researcher asked the other students if they agree on that, all of them agreed and they preferred the Turkish movies because they reflect some of their culture, emotional way of being, and view of life.*

In terms of computer and Internet usage, all the participants used a computer. 41 participants (98%) used a personal computer, while 1 (2%) used a MAC. Of the 42 participants, 33 (79%) used the computer every day and during weekends and 9 partic-

ipants (21%) used the computer every weekday. 28 participants (67%) used the computer since 5 to 10 years, 13 participants (31%) used the computer since 3 to 4 years, and one participant (2%) used it since one year.

Our survey also asked about activities regularly done using the computer. Of the 42 participants, 41 participants (98%) used the computer to connect to the Internet. All the participants are using the Internet for online-chatting, part of their schoolwork, making friends, online-games, finding information, etc. Most of the participants (90%) agreed that the Internet is part of their schoolwork.

#### 4.5.1.2 Belgian Students

The second group of participants included 21 Belgian students from two Belgian universities. Of the 21 participants, 8 (38%) are male and 13(62%) female. The average age of the participants was 20 years. Participants in the sample were selected from diverse backgrounds, such as geography, languages, economy, public health, physics, computer science, and sport. Among the 21 participants who completed the survey, 19 participants (90%) spent most of their life living in Belgium with their families.

Dutch and English are the languages most often used in the classroom, while students talk to each other in Dutch, English or French. Of the 21 participants 11 (52%) considered Dutch and English as the first language used in their daily life, while 7 participants (33%) preferred Dutch in their daily life, and the rest 3 participants (14%) were using Dutch, English and French without preference.

At home, most of the participants were speaking Dutch. 18 participants (86%) considered Dutch as the first language used at home, while 3 participants (14%) used French, and the last 2 participants used different languages; one participant used Arabic and the other used Turkish at home within their family.

One of the questions asked about the culture participants feel to belong to. Of the 21 participants 9 (43%) feel that, their cultural background belongs to the Belgian culture, 6 participants (29%) did not mention their culture and they considered themselves free from culture, while 3 participants (14%) considered themselves belong to the Flanders culture, and the last 3 participants considered themselves belong to different cultures: the first one consider himself belonging to the USA culture, the second participant consider himself belonging to the Arabian culture and the last one consider himself belonging to the German culture.

*Concerning this point, it is clear that the student who said that he belonged to the Arabian culture has Arabic roots. This assumption is made because, on another question, this student said that Arabic and French are the languages of communication at his home, furthermore that student was living in Brussels. For the other two persons who belong to the USA culture and the German culture, unfortunately no more information about them was available to conclude if they had foreign roots.*

*Anyhow, if we removed students with possible foreign roots from our results, and add the 3 students who considered themselves belonging to the Flanders culture also to the Belgian culture, the results would be as follow. Of the 18 participants 12 (67%) belongs to Belgian culture, and 6 participants (33%) did not mentioned their culture.*

The 21 participants were asked if they watch foreign movies. All the participants said “Yes”: 15 participants (71%) watch English movies without subtitles, 3 participants (14%) watch French movies without subtitles, 2 participants (10%) watch foreign movies with the actor’s voices in their local language, and the last participant (5%) watch foreign movies with subtitles. On the question raised about the kind of foreign movies they were watching, the response was Spanish, Italian, Mexican and Chinese.

In terms of computer and Internet usage, all the participants use a computer - PC -. All the 21 participants (100%) use a personal computer every day and during week-ends. 15 participants (71%) used the computer since 5 to 10 years, while 4 participants (19%) used the computer since more than 10 years, and 2 participants (10%) used it since 3 to 4 years. Our survey also asked about the activates and reasons for using the computer: all the 21 participants (100%) used the computer to connect to the Internet. All the participants used the Internet for online-games, to download movies, read e-mail, online-chatting, making friends, part of their schoolwork, find information, etc. All the 21 participants (100%) agreed that the Internet is part of their schoolwork.

#### **4.5.2 Findings on the Mapping of User Interface Elements and Website Content to Culture**

This part of the study measures the understanding of the two websites by the participants, aiming to know the influence of culture in understanding the websites. The intention was to investigate if culture influences some usability factors: effectiveness, efficiency, and satisfaction in using the website.

The participants were asked to explore both websites separately. Then, they were asked to answer questions and to give their opinions about their understanding and expectations of icons and text appearing in website. Afterwards an open discussion was held with the participants.

#### 4.5.2.1 Working with CLC Website

Neither Belgian nor Palestinian participants had ever visited the website of the Collaborative Learning Center “CLC”. Participants were asked to explore the CLC website and to answer questions given to them.

##### **The participants were asked to write down the first things that drew their attentions and what they thought of when they had looked at the home page.**

The objective of this question is to know the first impression and to know if students understand what a website is about from the first page without navigating through a website. Moreover, we also wanted to know the design elements that drew the attention.

The participants from both cultural groups did indicate several things that drew their attentions (we asked them to limit the selected attractors to the top 3). The responses from the Palestinian participants was as follow, 24 participants (57%) mentioned “the username and the password, login area”, 23 participants (55%) said “pictures and the icons”, and 16 participants (38%) mentioned that “The word TESL and culture peace” drew their attentions. Likewise, the Belgian participants were asked to write down the things that drew their attentions. 19 participants (90.5%) mentioned that the Arabic language which appears at the bottom of the website page drew their attentions, also 13 participants (62%) mentioned that the chat room drew their attentions, moreover 7 participants (33%) said “Virtual tour”, “Live support “, “United nations advertisement”, and “login form”.

##### **Participants were asked what they thought this CLC website was about**

The objective of the question was to find the design elements which are playing a role in website understanding. For this, participants were asked to look to the homepage of the CLC, and more in particular to the graphical design elements and to guess what the website is about.

Most of the Palestinian participants (27 participants, 64%) thought that the website was about learning, educational website, and e-learning. 11 participants (26%) said website for “advertisement, peace, cultural aspects”, and the rest, 4 participants (10%),

was not sure about the topic of the website. However, Belgium participants understood the website better than the Palestinian participants. Of the 21 Belgian participants, 18 (86%) mentioned “eLearning” or “Distance learning”, likewise the other 3 participants (14%) also understood the goal of the website and included replies such as “This website is for sharing educational courses”, “This is for online courses”, “For registration courses for free”, and “Educational forum”.

**The third question was to find out the elements used to decide on the subject of the website. Every participant was asked for the things that make him or her decide on the subject of the website.**

The participant’s responses from both groups were showed that, several things are made the understanding of website subject.

26 (62%) Palestinian participants based their understanding on the website logo and icons. Moreover, 24 participants (57%) also based it on the website menu and included replies such as “The word student”, “Learning word”. And some of the Palestinian participants build their understanding from website pictures, they gave replies such as: “The ads at the middle of the page”, “The picture and the password”. On the other hand, most of the Belgian participants (18 participants, 86%) build their decision on the text of the website, also (13 participants, 62%) based on icons. Belgian participants included replies such as: “the left icons gave the meaning”, “Teachers' guide”, “Students guide”, “website logo” and “login form and the style of the website”.

**Participants were asked what kind of people they expected this website was serving and what kind of services that website was offering.**

Of the 42 Palestinian participants, 32 (76%) answered that the website was targeting students and teachers, 7 participants (17%) answered that the website was related to open education through the Internet, the rest (3 participants) (7%) could not identify the target audience. Furthermore, all the Belgium participants (21 participants, 100%) answered that the website was targeting students and teachers. Belgian students included replies such as: “Students”, “Students and teachers”, “Distance learning students”, “Specific students in particular university”, “Anyone who want to learn via net” and “Helps any student over the world”.

*The open discussion has shown that Belgium students think and work more practical than the Palestinian. For example, the Belgians are eager to discover new things, they reflect about the different elements in the website and try to evaluate the website;*

they made remarks like: “Why this site contains programming errors?” or “The alignments in the website not in a good shape”. Overall, both Palestinian and Belgian students understood the goal of the websites.

4.5.2.2 Working with WebCT-IUGAZA website

**Participants were asked to write down the first things that drew their attention after they logged into the website.**

For 23 Palestinian participants (55%) their attention was drawn on “the pictures which are in the middle of the website”, 8 participants (19%) said the picture of the women, and 5 participants (12%) said that the content of the website drew their attention. Likewise, the pictures appearing in the middle of the website drew the attentions of 16 Belgian participants (76%), the other 5 Belgian participants (24%) mentioned specific pictures such as “the chat icon”, “the greeting”, “book picture”.

**The second question was about evaluating the understanding of the objects and icons.**

Participants were asked to look to every icon/object and to name it, then to write down which information they expect to obtain when they would click on it. Afterwards, participants were asked to click on the icon/object and compare the result with their expectation. Members of both groups expressed equal acceptance and difficulties of understanding the icons and text. The following table and chart, Table 4-2 and Chart 4-1, highlight the results.

Meaning	Icon	Percentage of students that reported some understanding of the icon before visiting the target page [Palestinian]	Percentage of students for which the expectation was matching with the true meaning [Palestine]	Percentage of students that reported some understanding of the icon before visiting the target page [Belgium]	Percentage of students for which the expectation was matching with the true meaning [Belgium]








<b>Calendar</b>		86%	41%	81%	<b>62%</b>
<b>Chat</b>		93%	89%	90.5%	<b>92%</b>
<b>Syllabus</b>		62%	2%	52%	<b>0%</b>
<b>Links</b>		23%	0%	43%	<b>0%</b>
<b>Mail</b>		79%	37%	100%	<b>32%</b>
<b>Discussion</b>		81%	23%	62%	<b>14%</b>
<b>Homepages</b>		77%	<b>0%</b>	<b>84%</b>	<b>0%</b>

Table 4-2 Comparison of Understanding Measurement between Palestinian and Belgian Participants

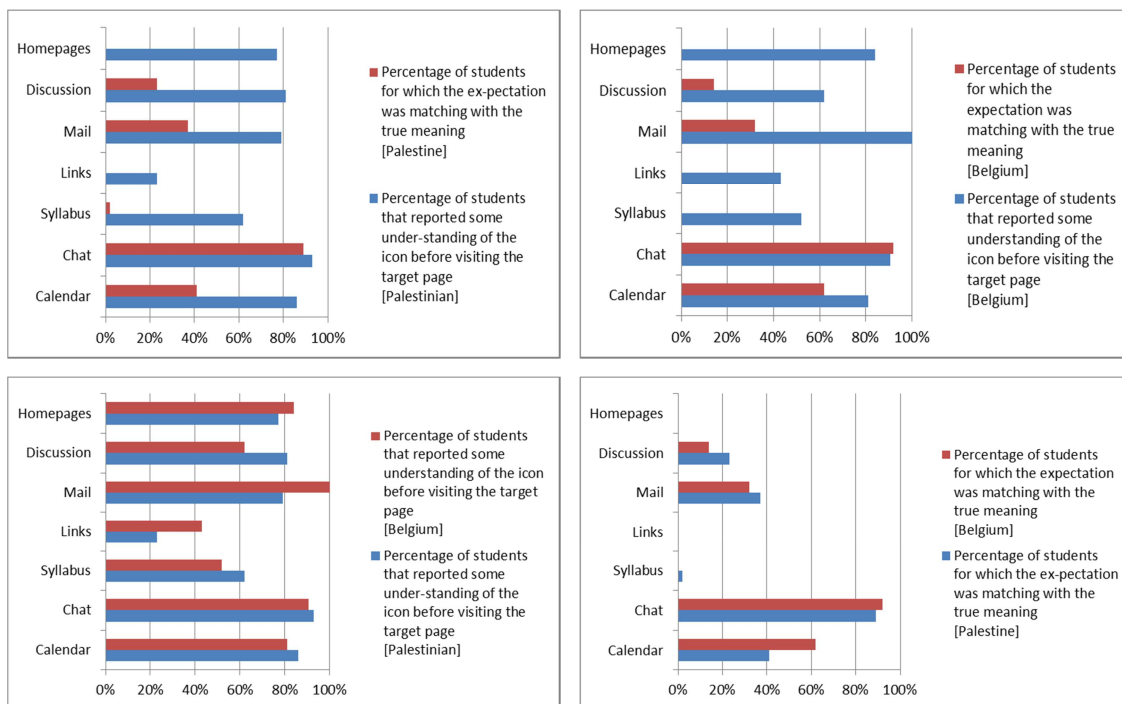


Chart 4-1 Comparison of Understanding Measurement between Palestinian and Belgian Participants

As shown above in Table 4-2 and Chart 4-1, the icons did not always help to understand what could be found on the target page. The following discusses the outcome in more details:



**Calendar:**



This icon represents the calendar page. It allows students to post events on their web page. It displays these events in daily, weekly, and in monthly views.

This icon was understood by 36 Palestinian participants (86%) and included replies such as: “Calendar”, “Daily schedule”, “Calendar of our courses”, “Appointments” and the rest (5 participants) (14%) were confused. Of the 21 Belgian participants, 17 (81%) understood the meaning of the icon, and included replies such as: “Calendar”, “Student schedule”, “Writing notes” while the rest (4 participants) (14%) did not recognise it.

Afterwards, participants were asked to compare the result with their expectation. The percentage of the Palestinian participants for which their expectations was matching the real meaning was 41%, while for the Belgian participants this was 62%.

**Chatting:**



This icon represents "Chatting room". It allows students to communicate real-time with their instructor and with other students of the class. 39 Palestinian participants (93%) and 19 Belgian participants (90.5%) associated the icon with “Chat room”, “Chatting”, “Conversation”, “Chat room for students”, “information room”.

The Palestinian participants’ thoughts match the real meaning in 89%, and for the participants of Belgium this was 92%.

**Syllabus:**



This icon represents "course syllabus". Instructors use this to distribute course syllabus, assignments, test dates, and class expectations. Almost all of the participants from both groups were confused about the meaning of this icon.

Of the 42 Palestinian participants, 26 (62%) associated the icon with discussions, as the following comments indicate: “Write here what you want”, “A page for the homework or discussion”, “I can see a pen but I do not know exactly what it's for, I think its forum for discussion”, “I think that is for writing comments”; only 1 student out of 42 (2%) predicted the real meaning, he wrote: “Our courses syllables”, while the rest (15 participants) were confused.

Of the 21 Belgian participants, 11 (52%) indicate very diverse replies such as: “I don't know”, “Writing a complaint letter”, “Surveys”, “Homework”, “Calendar”, “quizzes and examination”, “student agenda”. The other 10 (48%) participants were confused.

Almost all of the Palestinian and Belgian participants were confused by this icon. For 98% of the Palestinian participants the meaning did not correspond with their expectation. This was the case for 100% of the Belgian participants.

**Links:**



This icon represents a page contains help files and favourite links. The page offers links aiming to help students to find more resources for a specific course, and to check out similar courses.

Almost all of the participants were confused about the icon. Neither Palestinian nor Belgian participants predict the meaning of the presented icon correctly. The following notes indicate this: “information center”, “course requirements”, “school Back bag”, “I think it's for syllabus”, “Books in a bag”, “bag”, “Homework”, “contains information about the course”

23% of the students from Palestine, and 43% of the students from Belgium had some idea of what to expect, but when they actual clicked on the icon no one found what they expected. For both the Palestinian and Belgian participants, there was no match between their expectation and the real meaning.

**Mail:**



This icon represents an email box for a specific course. In the target page, students can manage emails received from their course teacher. The mailbox is open and highlighted when new mail have been received. The icon showed here means that there are no new emails.

33 (79%) Palestinian participants expected that this icon represents an email page, while the rest (9 participants) (21%) did not know what the icon could represent. The majority of the Belgian participants associated the mail icon with an email page, personal university email login page, page for email or email box.

For the Palestinian participants, for 37% the expectation matched the real meaning, while for the Belgian participants this was only 32%.

**Discussion:**



This icon represents a general discussion board. The discussion board allows students to post and read messages about certain topics.

Of the 42 Palestinian participants, 81 (81%) expected that this icon represent “discussion”, “discussion between teacher and students”, “may be advertisements”, “latest news”, “new information”, “memorization”, “course syllabus”, “quizzes time table”, “I do not know the meaning”, “hot news”.

Of the 21 Belgian participants, 13 (62%) understood that this icon represents a link to news or notice board page, as the following comments indicate: “advertisement page for the school”, “proposed things”, “notes”, “news”, “course agenda”, while the other 8 participants (38%) were confused about the meaning of this icon.

For most of the Belgian as well as the Palestinian participants, the target page was not as expected. The percentage of matching was 23% for the Palestinian participants and 14% for the Belgian participants.

**Homepages:**



The homepages icon represents a page allows students to create a personalized homepage that contains information about themselves, the projects they are working on, links to their favourite websites, and perhaps some personal information they want to share with their classmates. Furthermore, the target page contains links to the home pages of the students who were enrolled in the same course.

The icon representing the "Homepages" was completely misunderstood. None of the Palestinian or Belgian participants got the information expected after clicking on the icon. Palestinian participants expected the following: "Contact the teacher", "Discussion", "Exercises", "Homework", and "Guide women". The Belgian participants were expected things like: "Course syllabus", "The materials needed for the course", "Course guidance", "Class notes", "Students discussions" and "Information about the course".

77% of the Palestinian participants and 84% of the Belgian participants felt that they understood the meaning of the icon. However, 0% matched with the real meaning.

**The third question asked the participants to give their opinion about the use of the previous icons and if they would alternatives.**

Of the 42 Palestinian participants, 29 (69%) participants preferred to have better icons, while all 21 Belgian participants (100%) wanted to change the icons. Some examples of comments include: "Icons are not clear enough", "Not understandable icons", "Change Icon", "Most icons are indistinct", "Very poor icons", "Better to use standard icons".

The Palestinian participants also opened a discussion about "girl picture" because some of them prefer not to have pictures of girls. Therefore, the researcher asked them to vote if they would agree to replace these pictures with something else. Of the 42 participants, 17 (41%) have voted to change the pictures, 11 (26%) have voted to not change the pictures, and 14 (33%) did not care. This response is in line with the cultural and religion values of the Palestinian society. Furthermore, all the Palestinian participants can accept such pictures if they appear in foreign websites but not in the website of their own university. Belgium participants were asked if they had any objection to pictures of girls. There were no objections at all, which is again in line with the cultural values associated with the Belgian society.

**The fourth question was about to evaluate the participants' understanding on the website text.**

In the light of evaluating the understanding of the text, the participants were asked to read some pages from the website. Afterwards, the participants were asked how easy and understandable the text was. Among the 63 participants, 22 (52%) Palestinian and 13 (62%) Belgian participants agreed that the text was easy to read and understandable. They included comments such as: "It is easy", "The text is understandable", "I understood the idea behind", "There are some words I do not understand", "Not everything, but ok".

Participants were asked how they felt about the content of the website. They were asked whether they would prefer to have some local language beside the English language in the website. Of the 42 Palestinian participants, 24 (57%) said that they would prefer to have it, while only 8 (38%) Belgian participants wanted to have the local language beside the English. The ones in favour said that the local language would help them to understand the website.

**The fifth question asked the participants to go through the website and to give their opinion about the website design elements**

The participants were asked to give their opinions about the website design elements, such as: images, sounds and website menu labels. Participants were asked to evaluate website elements based on their culture background. 15 Palestinian participants (36%) agreed with the statement that some website elements do not respect their culture; 17 (40.5%) participants agreed that some of the website elements were from outside their culture. Nevertheless, the Palestinian participants indicated that they do not mind to adapt themselves to the current website style; 10 participants (23.5%) found that the website design elements respect their local culture. Of the 21 Belgian participants 18 (86%) did not care about the culture; they wanted the website to be nice, fashionable, modern or crazy, whatever the culture behind it. The rest (4 participants) (14%) found some website elements related to other cultures.

All the participants from the two groups agreed that web developers must be careful to use only well-known and standard website icons, elements and labels.

**Last question was included in order to investigate Palestinian's attitude towards Franco Arab text communication.**

The Palestinian participants were given the following "Franco Arab" sentence: "Mar7aba; Al7amdolelah enkom eb7'er we ebse7a gaeda, The pic of najy very nice,

*alah e7'aleholak we ehfazo men kol so'2 ea rab Salamy la a7mad we algame3 :-)*". Then, the Palestinian participants were asked if they understood the sentence. Moreover, they were also asked if they write Arabic using the Latin characters.

This style of writing is used to communicate in the Arabic language over the Internet or for sending messages via cellular phones; it is most commonly used by youths in informal settings, as most of text communication technologies, such as online chatting, bulletin board systems, blogs, instant messaging and mobile phone text messaging, have the ability to communicate using the Latin alphabet, and some of them have only limited support for Arabic alphabet. As a result, Arabic speaking users communicated with these technologies in Arabic but writing it in Latin letters.

42 (100%) of the Palestinian participants were familiar with Franco Arab text style and they could understand the given sentence. 38 (90.5%) out of 42 Palestinian participants used Franco Arab text style in their text communication, while 4 (9.5%) participants did not use the Franco Arab text style. The following comments were provided by participants: "sometimes I write like this with people that I know they know this language", "Yes. I can understand this text because I use this way of writing in my mobile -SMS-", "Not everyone understand this style of writing", "I write like this, but not always", "It is understandable sometimes, I write like that", "Sometimes, also I use some letters instead of words such as ("R" are / "U" you)".

### 4.5.3 Findings of the Cultural Evaluation

16 anthropological cultural dimensions were presented by means of statements and cases. The Palestinian and Belgian participants were asked to read every case separately and then they asked to indicate how much they agreed with each case. The responses to these questions reflect how the participants were influenced by his/her culture. Students were asked to rate the statements from 1 to 5. The rating scale was as follows: 1 = strongly disagree, 2 = hardly disagree, 3 = agree to some extent, 4 = clearly agree, and 5 = strongly agree. The following table, Table 4-3, reports the differences between the average scores of the two groups.

Dimension No.	Dimension Name	Palestine	Belgium
1	Human Nature Orientation.	4.1	4.3

2	Individualism vs. Collectivism.	2.1	3
3	Internal vs. External Control.	2.1	3.6
4	Time Orientation.	4.2	3.9
5	Authority Conception.	2.3	2.1
6	Context.	4.7	4.8
7	Gender Roles.	4.2	2.3
8	Power Distance.	3.6	2.8
9	Uncertainty Avoidance.	3.1	3
10	Universalism vs. Particularism.	1.8	2.9
11	Achievement vs. Ascription.	3.2	4.4
12	Affective vs. Neutral.	2.7	1.2
13	Specific vs. Diffuse.	2.5	2.6
14	Experience of Technology.	2.8	3
15	Face-Saving.	5	5
16	International Trade and Communication.	4.6	4.6

Table 4-3 Results of Cultural Dimensions Evaluation done by the Participants

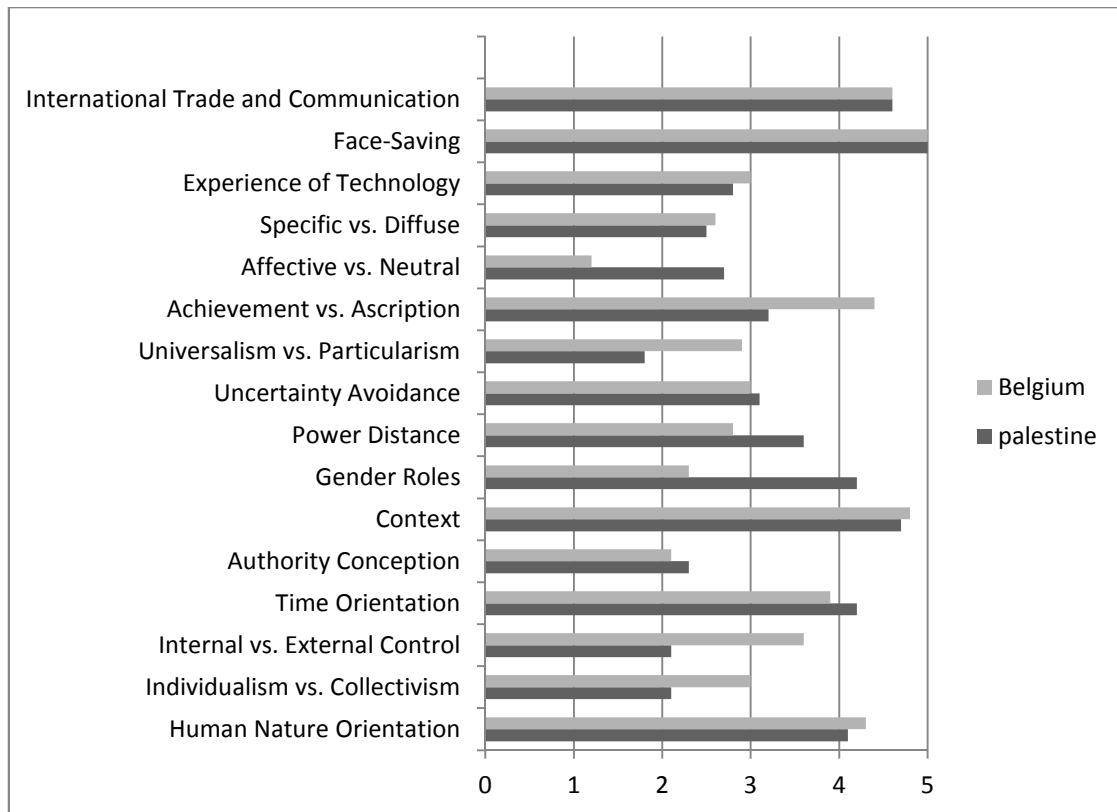


Chart 4-2 Results of Cultural Dimensions Evaluation Done by the Participants

As shown in Table 4-3 and, Chart 4-2, the cultural evaluation study shows that Palestinian and Belgian students agree on a number of cultural dimensions and share a number of cultural values. We see a little difference between Palestinian and Belgian students on the following cultural dimensions: Human Nature Orientation, Authority Conception, Context, Uncertainty Avoidance, Specific vs. Diffuse, Experience of Technology, Time Orientation, Face-Saving, and International Trade and Communication. Furthermore, participants' responses indicate that the dimensions Individualism vs. Collectivism, and Power Distance are influenced by their culture. The difference between Palestinians and Belgians are quite perceptible.

Between the two groups, the most distinct differences in cultural values orientation are found in the dimensions Internal vs. External Control, Gender Roles, Achievement vs. Ascription, Affective vs. Neutral, and Universalism vs. Particularism.

*1. Human Nature Orientation:*

This dimension describes the way people can be seen: good, evil or a mixture of both, able to change or not. The 63 participants were asked if they trust what they read on the Internet, if they show their identity on the Internet, and if they prefer to change the website looks as they want.



The Palestinian and Belgian participants showed significant agreement in this dimension. The Palestinian participants have an average score 4.1 and the Belgian 4.3 (on a 1 to 5 scale).

### *2. Individualism vs. Collectivism:*

Hofstede's studies have categorized Belgium as highly individualistic nations while Arab culture is considered a collectivistic society.

From the outcome it is clear that the Belgians are individualists but not as strong as the anthropological studies categorized them. They like to have chats with other people via Internet; they try to show their nation; they want to help people, but at the same time everyone is looking after himself and is focused on his personal development. The Palestinian show more their religion, they are focussed on their traditions, but they are also trying to be independent and everyone is looking after himself.

The statements given showed that the Palestinian participants hardly disagree to be individualistic, with a score of 2.1 voting for individualism, while the Belgian participants were individualists to some extent, with a score of 3 (on a 1 to 5 scale).

### *3. Internal vs. External Control:*

This dimension describes attitudes towards the environment. The participants were asked if they likely would blame the system designer if they cannot use the system (internal-oriented), or they blame themselves because they are not able to adapt themselves enough to the system (external-oriented).

The study found that the Belgian participants are more internal-oriented than the Palestinians. The results showed distinct differences in the cultural values orientation. The Belgian participants were agreeing to some extent to blame the system designer, with average score 3.6 (on a 1 to 5 scale). While, the Palestinian participants were hardly disagreeing to blame the system designer if they could not use the system or if something went wrong with their system, with a score of 2.1 (on a 1 to 5 scale). The Palestinians are likely to blame themselves if they cannot use the system.

### *4. Time Orientation:*

This dimension refers to how cultures response to time and how much they focus on the future. Two sentences were given to the participants. The first sentence was: "time is characterized by schedules; people tend to do one thing at a time. Therefore, staying on schedule is a must", and the second sentence was: "Doing several things at the

same time. Time commitments are desirable rather than absolute. Plans are easily changed”.

The Palestinian and Belgian participants clearly agreed to do one thing at a time, and would stay on schedule. The average score for the Palestinian was 4.2 and for the Belgian 3.9 (on a 1 to 5 scale).

*5. Authority Conception:*

This dimension describes the degree to which people favour an authoritarian, egalitarian, paternalistic, or participative management style.

The question proposed here was to measure how much the participants agreed to follow guidelines and roles when they perform any task in their work. Moreover, managers have a right to expect obedience from their subordinates and deal with manager’s decision, instructions and rolls.

The Palestinian participants gave this proposed case an average score of 2.3, and the Belgian participants ranked this case with an average score of 2.1 (on a 1 to 5 scale).

*6. Context:*

The general terms “high context” and “low context” in this dimension refers to the amount and specificity of information needed in a given communication.

The question was asked to the participants, how much they are happy within a high context culture. In a high context, people relationship more important than task, less written formal information, a lot of information, long-term relationships. Moreover, decisions and activities focus on personal face-to-face relationships. In contrast, in low context the information is not explicitly stated, and the meaning is distorted.

The results show that Palestinian and Belgian participants were more “high context”. The average rating for Palestinian participants was 4.7, and for the Belgian participants 4.8 (on a 1 to 5 scale).

*7. Gender Roles:*

This dimension refers to differences in roles people play according to their genders. The participants were asked to give their acceptance rate for the explanation of the gender roles cultural dimension.

The results show that Palestinian participants clearly agreed (with an average score of 4.2) that men are supposed to be assertive, tough, ambitious, and they prefer to ad-

dress boys and girls separately, whereas women are supposed to be more modest and tender. The Belgian participants believe in gender equality, means that men and women having the same rights and obligations, and everyone having the same opportunities in society with an average rate of 2.3 (on a 1 to 5 scale). So, clear differences are found for the gender roles cultural dimension.

8. *Power Distance:*

Regarding the Power Distance dimension, the study shows that Palestinians to some extent believe in high power distance with an average score of 3.6 (on a 1 to 5 scale). They tend to focus on roles, and believe that leaders have a lot of authority and control. Hierarchy is very important. The relation between boss and subordinate is strictly ruled and dependent on the decisions of the boss.

The Belgian participants agreed with average score of 2.8 (on a 1 to 5 scale) to act as they are in a power distance society. They focus on personal development, equality between teacher and student, and mutual respect between inferiors and superiors. Bosses and subordinates work closely together and consult with each other.

9. *Uncertainty Avoidance:*

This dimension is defined as the extent (“high or low”) to which the members of a culture feel threatened by uncertainty or unknown situations. The participants were asked how much they agreed that students need a structured learning process, precise objectives, strict timetables, and precise answers not multiple solutions to problems. Focusing on formality, worry about future and everything different is dangerous.

The Palestinian and Belgian participants showed agreement with the statement to some extent, with an average rank of 3.1 for the Palestinian and 3 for the Belgian (on a 1 to 5 scale).

10. *Universalism vs. Particularism:*

The participants were asked how much they agree on the following statements and cases: “Good and right behaviours are musts and always applicable, and no obligation to personal relationship”, “Prefer a uniform design for website that not contains different styles” and “Crossing a street at the red light is not acceptable even if there is no traffic”.

The results showed distinct differences. The Belgians insist on follow the rules whenever possible; favour equality between all members of the society and between the elements of the website. For the Palestinians, relationships are more important than

rules. The Palestinian participants slightly agreed; they gave an average rank of 1.8 (on a 1 to 5 scale), while the Belgium participants agreed to some extent with an average rank of 2.9 (on a 1 to 5 scale).

*11. Achievement vs. Ascription:*

This dimension refers to how a status is accorded to certain member of a society. The participants were asked to score the following cases: “When you meet somebody you ask about what he or she study and not where he or she study!”, “Individuals derive their status from what they have accomplished”, “A person with achieved status has to prove what he is worth over and over again: status is accorded on the basis of his actions”.

The Palestinian participants agreed to some extent with an average rank of 3.2 (on a 1 to 5 scale), while the Belgium participants clearly agreed with an average rank of 4.4 (on a 1 to 5 scale).

*12. Affective vs. Neutral:*

The Belgium society seems to be more Neutral; people control their relationships and make a distinction between relationship and friendship. They hide their feelings most of the time. The Palestinians are a more Affective society; they express their feelings directly and relationships are more important than rules.

The evaluation was measured how much they believe on affective society; The Palestinian participants were agreed to some extent with average rank 2.7 (on a 1 to 5 scale). While the Belgium clearly strongly disagree with average rank 1.2 (on a 1 to 5 scale).

*13. Specific vs. Diffuse:*

This dimension measures how far people get involved with other's people life space.

In a specific society, relationships with others should be explicit, delineated and regulated as in a contract. Respect a person's title, family history, age, background, and connections. They prefer to separates work and private life.

In a diffuse society, there is an open private space, so work and private life are closely linked. For example, teachers play a vital role in the student's life and also have a certain influence on student's private life. The relationship does not stop inside the school; the teacher can freely discuss student's personal life.

The Belgian participants (with an average rank of 2.5) and the Palestinian participants (with an average rank of 2.6) hardly agreed to be acting as in a specific culture, neither as in a diffuse culture society.

#### *14. Experience of Technology*

The cultural dimension of technology refers to how technology is perceived by the members of a culture.

Palestinian participants preferred to interact with the website in detail instead of only scanning it as the Belgian participants do. The Palestinian participants agreed that they perform well on a computer when other people can see them working, while Belgian participants disagreed with this. Both groups of participants agreed to do a lot of tasks at once on the computer instead of one thing at a time. Moreover, they got very upset when the computer did something strange and he or she was uncertain of what to do next. Both groups of participants preferred to keep a copy of the program they used at work. And nobody likes to give access to his/her personal information and data.

Palestinian participants ranked this dimension with an average score of 2.8 and Belgian participants ranked it with an average score of 3 (on a 1 to 5 scale). Both groups of participants agreed to some extent.

#### *15. Face-Saving*

Face-Saving is more important than most business dealings. People may tend to tell you what you want to hear to avoid that you will have a bad impression about them or have troubles with you.

Both groups of participants strongly agreed that face-saving is important, with an average score of 5 (on a 1 to 5 scale).

#### *16. International Trade and Communication*

This dimension refers to the rate of development in the field of trade and communication. Some countries do not care about international standards and national trade. While cooperating countries focus on export and communication with other countries.

The participants from both countries strongly agreed that international standards are important and play an increasingly important role for the growth of the economy. Both groups gave an average score of 4.6 (on a 1 to 5 scale).

## **4.6 Discussion of the Findings**

This research has provided a perspective on the study of cultural interface understanding, focused on how much website interface is culturally sensitive. The results of this study provided a comparison between a group of Belgian and a group of Palestinian students. As expected from the literature, findings demonstrate the existence of culture differences in terms of user preferences and satisfactions of website interface, but less than expected. Some of these cultural preferences were new and not expected. Nevertheless, culture still appears to play some role in website understanding, but new culture preferences need to be taken into account. This section will summaries and discuss the research results.

### **4.6.1 Interface Understanding**

The outcome from measuring the understanding of pre-selected website interfaces for both groups was rather similar. The research results showed that Palestinian and Belgian expectations of design elements were often different from their intended meaning. When the use of a concept or icon was not entirely clear, each group went back to their social environment and tried to find the meaning for the concept in the real world. The findings suggest that participants from both groups try to associate unclear website elements with things that they are familiar with in real life from their university environment. As there are still differences in the way and style of life between the different cultures, each group gives a quite different interpretation to unknown element; therefore it was found that participants' understanding and expectations of the elements on the screen were different for the two groups of participants involved.

Participants' responses indicated that when metaphors were used, these were not always correctly interpreted. The metaphor of the collaborative learning center website incorrectly represented the concept of learning; therefore, all the participants from both groups had difficulties to understand the website.

Icons that were not clear to participants were the "Links", "Mail", "Homepages" and "Discussion". The majority of the participants in both groups agreed that the icons do not help to understand what could be found on the underlying page. For example, the "Discussion icon" represented a general discussion board. The discussion board allows students to post and read messages about certain topics. 62% of the Belgian participants thought this icon represented a link to an underlying page of "news" or

“notice board”. The participant thought they recognised the icon as a familiar real world object, because it looked similar to the nails used at their own schools and universities in Belgium to hang up posters and advertisements at boards. Therefore, 62% thought that they had understood the icon, but only 14% found what they expected on the underlying page.

The Palestinian participants, like the Belgian participants understood some icons in the same way. For example, participants in both groups associated the icons of calendar, chat room and homepages to the same concept. Moreover, participants’ expectations of the homepages icon were different from its intended meaning; no one of the 63 participants found what they expected. Accordingly, all of the participants from both cultural groups shared one meaning, and their associations and expectations also seemed to be the same; therefore, it seems that the environment and the culture of a university campus influence the participants’ understanding of the icons.

#### **4.6.2 Cultural Evaluation**

The findings from this exploratory study indicate that there is a convergence in some cultural values between students of both countries. Thanks to modern communication, Internet and multi-media, students are changing and the cultural gap between the two groups seems to decrease.

The research showed that Palestinian and Belgian students were in agreement on some cultural values. For example “International Trade and Communication”, “Face-Saving”, “Experience of Technology”, “Specific vs. Diffuse”, “Uncertainty Avoidance” and “Human Nature Orientation”. However, there are still differences in some of the cultural dimensions, sometimes only small differences but sometimes the differences are quite clear, like for “Individualism vs. Collectivism”, “Power Distance”, “Internal vs. External Control”, “Gender Roles”, “Achievement vs. Ascription”, “Affective vs. Neutral”, and “Universalism vs. Particularism”.

In the past, Hofstede’s studies have categorized the Belgian society as Individualistic with high Uncertainty Avoidance while the Arab world was categorized as Collectivist. Our results show (at least for the students) that the gap between the two groups is disappearing. Nowadays, those students that are using Internet and e-learning websites shared new cultural values. Those "digital natives" have grown up with multi-media, learn and play in new ways, absorb information quickly, and have

friends all around the world communicating with them using new media. Therefore some of the cultural differences are going to disappear.

It is also clear that some cultural factors are still very important in the Arabian culture and should be taken into consideration when localizing educational websites to the Arabian culture. Although, the Belgian students had little comments related to their cultural values, they may also have some cultural values they insist to keep. This is probably the case for all cultures.

Cross-culture studies provide a way to understand how people communicate, love, learn, interact and understand the things. This change across different cultures, for example 41% of the Palestinian participants asked to replace the pictures of girls which appear in the webCT website, while the Belgium participants did not mind.

From this study, it is clear that for designing e-learning websites, it is not necessary to take into account all the traditional cultural dimensions investigated by anthropologists. But it is necessary to know the target audience and to know the culture values that should be taken into consideration for this audience.

### **4.6.3 The influence of the Internet**

For students, the Internet is becoming a part of their daily life. They use it to discover knowledge and their identity is influenced by the new recourses found on the Internet e.g., e-books, e-television, e-press, e-cinema. More and more, technology is incorporated into their lives. Therefore, it is expected that the Internet will change the way people communicate, learn, understand and teach. The second generation of the Web, including social networking sites, Wiki's, and communication tools, will further decrease the cultural gap between the nations especially for the generation using the Internet. The Web itself is transformed from a so-called "Read-only Web" to a "Read-Write Web" (Parscal, 2010) in which content is created, shared, remixed, repurposed, and passed along. Therefore, many people will participate in such a scenario and all of them will interact with the information. Therefore, a new culture will appear. This culture will be shared between all Internet users. The same holds for students who are using educational websites.

It is clear that the Internet can influence cultural perceptions. However, the cultural identity does not change, most changes we notice, took place in understanding and interaction with website elements. In other words, some website design elements have a



meaning and that meaning is shared between all Internet users (e.g., a homepage icon has the meaning that when a user clicks on it, the user knows he will go the homepage of the website). These changes may result into new cultural dimensions specific for Internet users and e-learning systems.

The results indicated that new technology and Internet experience slightly decreased the gap between cultures for people using the Internet.

#### **4.7 Conclusion**

The cultural understanding study was carried out between Belgian and Palestinian student groups. The finding from this research aims to provide a comprehensive insight into the cultural values that influence user's interface understanding.

The research showed that Palestinian and Belgian students understood most of the website elements in the same way, and they often associated design elements on the screen with concepts from their real world environment (in this case their university campus and their local environment).

Also some interesting findings concerning the anthropologists' cultural dimensions were reported. The results showed that the cultural gap between the Palestinian and Belgian participants was smaller than predicted by the anthropologic models. Moreover, the results reported that participants from both groups shared some cultural values not seen before.

The findings in this study suggest the need to investigate new cultural dimensions for their use in designing educational websites and not taking the anthropological cultural dimensions as they are. Indeed, some cultural dimensions are important to take into account during designing websites for a specific nation, but not all anthropological cultural dimensions seem to be relevant for a specific domain. This will be further investigated in the following chapter, chapter 1.



## **5 Culture and Website Design – Cultural Evolution and Different groups of Cultural Markers**

“I don't mind your thinking slowly: I mind your publishing faster than you think.”

--- Wolfgang Pauli

## **5.1 Introduction**

The previous studies in this research work have looked at how cultural differences impact people's understanding of websites and their attitude towards websites. The results of chapter 0 and 1 showed that evaluated local homepages did not actually reflect the local culture of the target society, as anthropologist's theories would predict. Moreover, the findings look inconsistent with previous research findings. However, the findings also highlighted some cultural values which do have an impact on the user's understanding and acceptance of a website.

The research discussed in this chapter builds upon the existing body of research in website design and anthropological models of culture. It is employed to study the evolutions that took place in the use of cultural makers in local website design and in how anthropological cultural dimensions are perceived to be important for local website design. In order to achieve this goal two research studies were conducted: a first study was carried out to re-evaluate some pre-researched websites, and the second study was performed to evaluate and rank anthropologist's cultural dimensions according to their importance for local website design. The findings of both research studies were evaluated and compared against earlier research results in order to provide insight into the evolution of the use of cultural markers and cultural dimensions.

This chapter is organized as follows. Section 5.2 offers a description of the purpose and objectives of the research. Section 5.3 the research approach. The cultural markers evaluation study is provided in section 5.4.5.4; this section presents the research methodology, participants, and analysis criteria and is followed by the findings. Section 5.5 describes the study performed to investigate the evolution of the importance of the cultural dimensions; this section presents the methodology, participants, procedure, and describes the results and compares them with the results of earlier research. Finally, section 5.6 presents the conclusion.

## **5.2 Objectives**

As discussed in the literature review in section 2.4.1.2, a number of researchers have attempted to define a culture usability model for websites through empirical research; most of the researchers have based their theory on testing some websites. However, some research results are quite different from other research results, as our research

studies showed in chapter 0 and 1. For this, currently, there is no clear-cut list of cultural markers agreed upon by all researchers. This research intend to fill this gap by exploring stable as well as the different types of cultural markers, including interface design elements and anthropological cultural dimensions that are appropriate for its use in local website design and localization.

### **5.3 Research Approach**

In order to achieve the research goal, we have divided the research into two studies: A cultural markers evaluation and an anthropological cultural dimensions verification study.

#### **A first research study: Cultural markers evaluation**

The cultural markers evaluation study was carried out to re-evaluate some pre-researched websites. In this study, we reviewed some well-known websites examined in previous research and evaluate them again. Comparing current and earlier versions of the same website can give valuable information on cultural movements and the different types of cultural markers.

#### **Second research study: Anthropological cultural dimensions verification**

In this study, 19 website developers, localization, translation, and internationalization experts were asked to evaluate 16 cultural dimensions proposed by anthropologists. The aim of this study was to find out which cultural dimensions are really important for local website design and localization, and to compare this with earlier research results.

The following sections will describe in details the two studies.

### **5.4 Cultural Markers Evaluation**

This study seeks to compare cultural markers in current and earlier versions of the same websites. The websites involved in this study, were websites that were used in the research studies of Hillier (2003), De Wit et al. (2005), Gould et al. (2000), Barber & Badre (1998), Marcus & Gould, (2000), Sun (2001), and Smith et al. (2004). As mentioned in the state of the art section 2.4.1.2, previous mentioned studies results were built upon examine some websites. In the meantime, these websites have changed. For example, the research of Gould (Gould et al., 2000) shows the use of

some cultural markers in the Utara Malaysia university website<sup>28</sup>, in this study we evaluated the website again to check if these cultural markers are still available.

#### 5.4.1 Methodology of the Study

##### 5.4.1.1 Sampling

People from Malaysia, Greece, United Kingdom, Nederland, United States, and Japan were asked to join this study and to evaluate two versions of 22 websites. Every participant involved in this study was asked to evaluate his own local websites. The following table, Table 5-1, lists the 22 websites chosen for the analysis.

We selected people from different countries to evaluate their own local websites because local people know their own habits, cultures, and are best placed to evaluate if an element is linked to their own culture or not. For example, sometimes a website can be usable for people from Brazil and maybe it is not for people from Malaysia.

	Genre	Website name and URL	Country
1	Education	Universiti Utara Malaysia ( <a href="http://www.uum.edu.my">http://www.uum.edu.my</a> )	Malaysia
2	Education	Rensselaer Polytechnic Institute (RPI) ( <a href="http://www.rpi.edu/">http://www.rpi.edu/</a> )	United states
3	Education	The Aristotle University of Thessaloniki ( <a href="http://www.auth.gr">http://www.auth.gr</a> )	Greece
4	Education	The University of Southampton ( <a href="http://www.soton.ac.uk">http://www.soton.ac.uk</a> )	United kingdom
5	Education	Dutch Educational website (Technische Universiteit Eindhoven) ( <a href="http://w3.tue.nl/en/">http://w3.tue.nl/en/</a> )	Nederland
6	Rail Transportation	Keretapi Tanah Melayu Berhad	Malaysia

<sup>28</sup> [www.uum.edu.my](http://www.uum.edu.my)





		<a href="http://www.ktmb.com.my/">(http://www.ktmb.com.my/)</a>	
7	Rail Transportation	Amtrak National Railroad <a href="http://www.amtrak.com/">(http://www.amtrak.com/)</a>	United states
8	E-commerce	MPH bookstores <a href="http://www.mph.com.my">(<a href="http://www.mph.com.my">http://www.mph.com.my</a>)</a>	Malaysia
9	E-commerce	Barnes & Noble bookstore <a href="http://www.barnesandnoble.com/">(http://www.barnesandnoble.com/)</a>	United states
10	News & Media	Excite Japan <a href="http://woman.excite.co.jp/">(http://woman.excite.co.jp/)</a>	Japan
11	News & Media	Excite <a href="http://www.excite.com/">(http://www.excite.com/)</a>	International
12	News & Media	Channel 4 <a href="http://www.channel4.com/">(http://www.channel4.com/)</a>	United states
13	News & Media	ANTENNA Group <a href="http://www.antenna.gr/">(http://www.antenna.gr/)</a>	Greece
14	News & Media	Siemens Deutschland <a href="http://w1.siemens.com/entry/de/de/">(http://w1.siemens.com/entry/de/de/)</a>	Germany
15	News & Media	Siemens china <a href="http://w1.siemens.com/answers/cn/zh/index.htm">(<a href="http://w1.siemens.com/answers/cn/zh/index.htm">http://w1.siemens.com/answers/cn/zh/index.htm</a>)</a>	China
16	News & Media	Grande ABC <a href="http://www.dgabc.com.br">(<a href="http://www.dgabc.com.br">http://www.dgabc.com.br</a>)</a>	Brazil
17	News & Media	Snunit <a href="http://www6.snunit.k12.il/">(http://www6.snunit.k12.il/)</a>	Israel
18	Software company	Adobe Systems Incorporated <a href="http://www.adobe.com/">(http://www.adobe.com/)</a>	United states and

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			Germany
19	Government	Andorra ( <a href="http://www.andorra.ad">http://www.andorra.ad</a> )	Andorra
20	Travel	Senado Federal ( <a href="http://www.senado.gov.br">http://www.senado.gov.br</a> )	Brasil
21	Tourism	Costa Rica National Park ( <a href="http://www.tourism-costarica.com/">http://www.tourism-costarica.com/</a> )	Costa Ri- ca
22	Tourism	U.S. National Park Service ( <a href="http://www.nps.gov/glba/">http://www.nps.gov/glba/</a> )	United States

Table 5-1 Tested Websites

Figure 5-1 shows screenshots of the homepages of some of the tested websites: the homepage of the website as tested in previous research and the homepage of the website as tested in this study.

Earlier Website Version	Current Website Version
	
<p>The Aristotle University of Thessaloniki - Greece, (<a href="http://www.auth.gr">http://www.auth.gr</a>)</p>	
	
<p>ANTENNA Group - Greece, (<a href="http://www.antenna.gr/">http://www.antenna.gr/</a>)</p>	



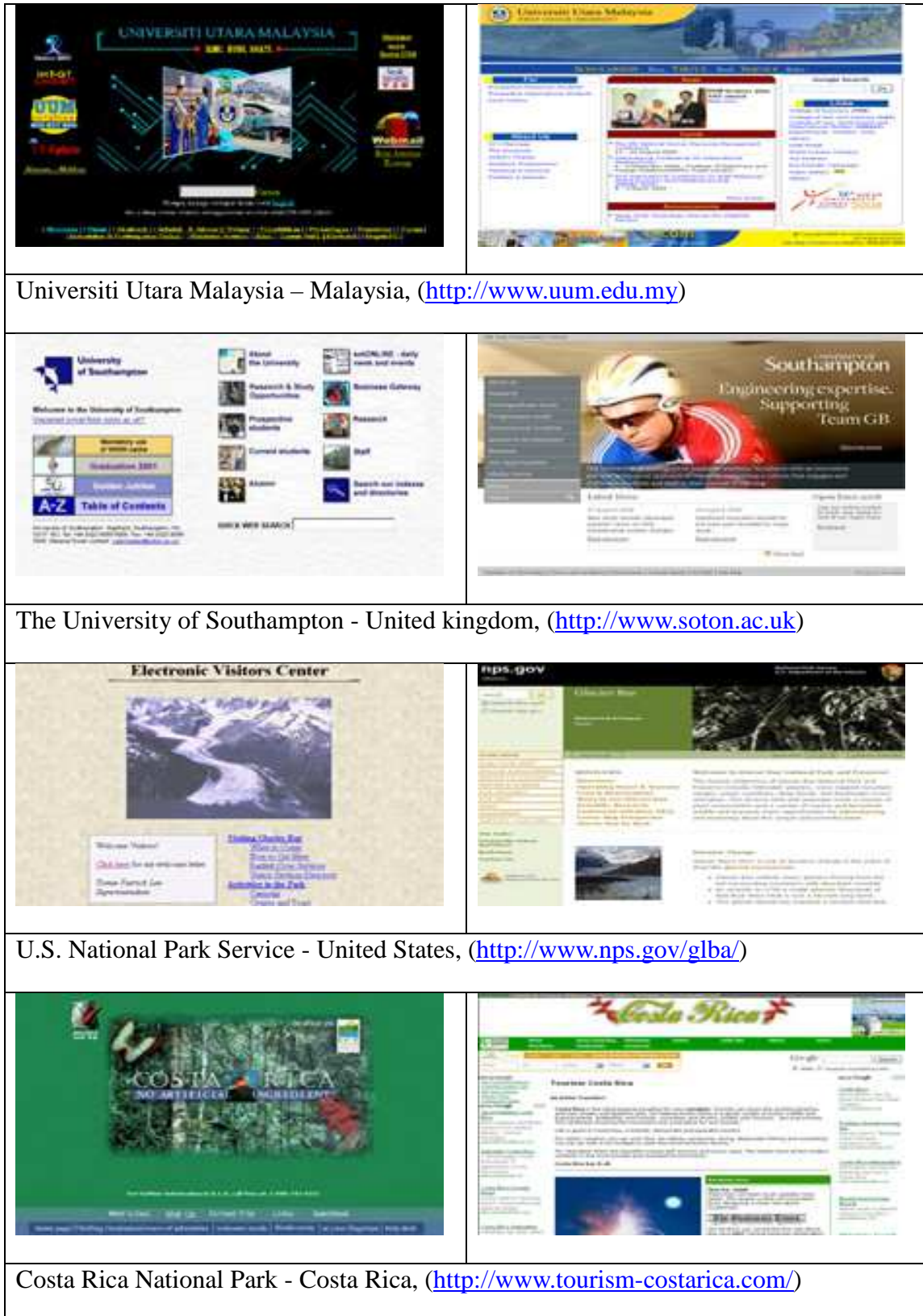


Figure 5-1 Screenshots for tested websites homepages

#### 5.4.1.2 Methodology

Participants were asked to evaluate and compare the websites which belongs to his/her culture. The current versions of websites were all available and online on the Web in

the period of the evaluation (from 20 April 2008 till 30 May 2008). The old websites versions were all available offline with the researcher, who was send them to the participants.

For each website, participants were asked to comparing the two versions of the same website by looking at the two different website versions in terms of the availability of cultural markers. Participants asked to explore the websites as much as they can, and not to limit the evaluation only on the website homepage. Evaluation and comparison focused on five main design components; (1) Text density, size, orientation, style, and type; (2) Page layout; (3) Colors; (4) Pictures, graphic elements, and sound; and (5) Interaction and navigation. The selection of these design elements was based on previous research in cultural and website design presented in chapter 0. Table 5-2 explains the comparison criteria in details.

First, participants were asked to check and to write the available cultural markers in earlier and current website version.

Secondly, participants had to rate from 1 to 5 the extent to which they had found that the website contained cultural markers (the considered cultural markers which were given to participants to check are listed in Table 5-2). Here the rating scale was: 1 = not perceptible, 2 = hardly perceptible, 3 = perceptible to some extent, 4 = clearly perceptible and 5 = strongly perceptible.

Third, participants were asked to compare the availability of cultural markers in current website version against the earlier website version. A scale of 1 to 5 was used in rating the extent to which the new website version was related to an old version. Here the rating scale was: 1 = not perceptible: “no difference between the two versions of the website”, 2 = hardly perceptible, 3 = perceptible to some extent, 4 = clearly perceptible and 5 = strongly perceptible: “Strong difference between the two versions of the website”.

The questions that guided the comparison were:

1. What are the cultural markers in the earlier website version?
2. What are the cultural markers in the current website version?
3. When looking at cultural markers, are there significant differences in the current and earlier versions of the website
  - a. If so, what are those differences?
4. What are the cultural markers similar on both versions of the website?

Design component	Explanation
Text on websites	For this element, we consider issues such as the actual content (e.g., level of formality), language used, language cues, text orientation (centered, left-right, right-left), font type, size, and style.
Page layout and organization	This has to do with the general appearance of a page (look and feel, and form); the organization of information; positioning of the banners and menus.  Position of information in a website (e.g., Arabic audience read from right to left and first concentrate on the top right part of a page).
Colors	Use of colors and color combinations.
Pictures, graphic elements, and sound	This includes graphic elements such as images, illustrations, photographs, icons, symbols, flags, and gestures, as well as metaphors used, music, video and voice, banner adverts, and trust signs.
Interaction	Interaction is any form of communication between a user and the website (input – output techniques and feedback).
Navigation	This is about the possibilities a user has to move through the website (links, menus, dialog boxes, and control panels).

Table 5-2 Comparison Criteria for Websites

#### 5.4.2 Findings of the Cultural Markers Evaluation

This section summarizes the findings emerging from this study. The findings indicate that there is a variation in the use of cultural markers between the current and earlier versions of the same website. The following table, Table 5-3 presents the results of the questions mentioned before.

Website name and URL	Design component	Availability of cultural markers		Current website version compared
		Earlier website	Current website	

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		version	version	against the earlier version
Universiti Utara Malaysia ( <a href="http://www.uum.edu.my">http://www.uum.edu.my</a> )	Text on websites	1.5	3	5
	Page layout	4	2	5
	Colors	4.5	3	4
	Pictures, graphic elements and sound	5	2.5	3.5
	Interaction and navigation	3	4	3
Total average		3.6	2.9	4.1
Rensselaer Polytechnic Institute (RPI) ( <a href="http://www.rpi.edu/">http://www.rpi.edu/</a> )	Text on websites	4	5	4
	Page layout	3	2	4.5
	Colors	2	2	1
	Pictures, graphic elements and sound	3	4	3
	Interaction and navigation	4	5	4
Total average		3.2	3.6	3.3
The Aristotle University of Thessaloniki ( <a href="http://www.auth.gr">http://www.auth.gr</a> )	Text on websites	1	1	2
	Page layout	5	2	4
	Colors	3.5	2	5
	Pictures, graphic elements and sound	5	2.5	3
	Interaction and navigation	3	2.5	3.5
Total average		3.5	2	3.5
The University of	Text on websites	1	1.5	2

Southampton  ( <a href="http://www.soton.ac.uk">http://www.soton.ac.uk</a> )	Page layout	2	4	4
	Colors	2	3	3.5
	Pictures, graphic elements and sound	2	4	3
	Interaction and navigation	3	3	1
Total average		2	3.1	2.7
Dutch Educational website (Technische Universiteit Eindhoven)  ( <a href="http://w3.tue.nl/en/">http://w3.tue.nl/en/</a> )	Text on websites	1	5	4
	Page layout	2	4	5
	Colors	3	3.5	3
	Pictures, graphic elements and sound	3.5	4	3.5
	Interaction and navigation	2	4	4
Total average		2.3	4.1	3.9
Keretapi Tanah Melayu Berhad  ( <a href="http://www.ktmb.com.my/">http://www.ktmb.com.my/</a> )	Text on websites	3.5	5	3
	Page layout	4.5	3	5
	Colors	4	2	5
	Pictures, graphic elements and sound	2.5	2	2
	Interaction and navigation	5	5	1
Total average		3.9	3.4	3.2
Amtrak National Railroad  ( <a href="http://www.amtrak.com/">http://www.amtrak.com/</a> )	Text on websites	3	3.5	2
	Page layout	3	4	5
	Colors	4	2	5
	Pictures, graphic elements and sound	4.5	3	3
	Interaction and navigation	3	4	4.5

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Total average		3.5	3.3	3.9
MPH bookstores ( <a href="http://www.mph.com.my">http://www.mph.com.my</a> )	Text on websites	2	4	3.5
	Page layout	1	5	5
	Colors	3	5	4
	Pictures, graphic elements and sound	5	5	3
	Interaction and navigation	1	5	5
Total average		2.4	4.8	4.1
Barnes & Noble bookstore ( <a href="http://www.barnesandnoble.com/">http://www.barnesandnoble.com/</a> )	Text on websites	2	4	3.5
	Page layout	3	5	3
	Colors	3	4	2
	Pictures, graphic elements and sound	2	4	4
	Interaction and navigation	4	4	2
Total average		2.8	4.2	2.9
Excite Japan ( <a href="http://woman.excite.co.jp/">http://woman.excite.co.jp/</a> )	Text on websites	2	4	4
	Page layout	2	3	3
	Colors	3	3	2
	Pictures, graphic elements and sound	2	4	3.5
	Interaction and navigation	2.5	4	4.5
Total average		2.3	3.6	3.4
Excite ( <a href="http://www.excite.com/">http://www.excite.com/</a> )	Text on websites	2	4	3.5
	Page layout	3.5	5	3
	Colors	2	3	2

	Pictures, graphic elements and sound	2	4	3.5
	Interaction and navigation	4	5	2
Total average		2.7	4.2	2.8
Channel 4 ( <a href="http://www.channel4.com/">http://www.channel4.com/</a> )	Text on websites	2	3.5	5
	Page layout	2	5	5
	Colors	3	4.5	4
	Pictures, graphic elements and sound	2	5	5
	Interaction and navigation	2	4	5
Total average		2.2	4.4	4.8
ANTENNA Group ( <a href="http://www.antenna.gr/">http://www.antenna.gr/</a> )	Text on websites	2	2	1
	Page layout	2.5	4	4.5
	Colors	2	3	2.5
	Pictures, graphic elements and sound	1.5	4	4.5
	Interaction and navigation	1	3.5	5
Total average		1.8	3.3	3.5
Siemens Deutschland ( <a href="http://w1.siemens.com/entry/de/de/">http://w1.siemens.com/entry/de/de/</a> )	Text on websites	1	2	1.5
	Page layout	3	2.5	5
	Colors	4	1.5	3
	Pictures, graphic elements and sound	1.5	2	5
	Interaction and navigation	4	3	5
Total average		2.7	2.2	3.9
Siemens china	Text on websites	5	1.5	5

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<a href="http://w1.siemens.com/answers/cn/zh/index.htm">http://w1.siemens.com/answers/cn/zh/index.htm</a>	Page layout	4	2.5	5
	Colors	4.5	3	4.5
	Pictures, graphic elements and sound	3.5	3.5	4
	Interaction and navigation	4	3.5	4
Total average		4.2	2.8	4.5
<a href="http://www.dgabc.com.br">http://www.dgabc.com.br</a>	Text on websites	4	5	1
	Page layout	3	4	3.5
	Colors	4	5	2
	Pictures, graphic elements and sound	3	4.5	2.5
	Interaction and navigation	3.5	5	2
Total average		3.5	4.7	2.2
<a href="http://www6.snunit.k12.il/">http://www6.snunit.k12.il/</a>	Text on websites	2.5	3.5	1.5
	Page layout	2	4	3
	Colors	3.5	4	1
	Pictures, graphic elements and sound	3	4.5	2
	Interaction and navigation	3.5	4	3
Total average		2.9	4	2.1
Adobe Systems Incorporated <a href="http://www.adobe.com/">http://www.adobe.com/</a>	Text on websites	2	3	3
	Page layout	3.5	4	2.5
	Colors	3.7	4	1
	Pictures, graphic elements and sound	4.5	4.5	1.5



	Interaction and navigation	4.3	4.5	2
Total average		3.6	4	2
Andorra ( <a href="http://www.andorra.ad">http://www.andorra.ad</a> )	Text on websites	3.5	4	3
	Page layout	4	4	2
	Colors	4	3	4
	Pictures, graphic elements and sound	3.5	5	2.5
	Interaction and navigation	3.5	4.8	3
Total average		3.7	4.2	2.9
Senado Federal ( <a href="http://www.senado.gov.br">http://www.senado.gov.br</a> )	Text on websites	2	2	1
	Page layout	2	3	3.5
	Colors	4	1.5	5
	Pictures, graphic elements and sound	3	3.5	2.5
	Interaction and navigation	3.5	3.5	3
Total average		2.9	2.7	3
Costa Rica National Park ( <a href="http://www.tourism-costarica.com/">http://www.tourism-costarica.com/</a> )	Text on websites	2.5	3	4
	Page layout	3	2.5	3
	Colors	4	3	2
	Pictures, graphic elements and sound	4	2.5	4
	Interaction and navigation	3.5	2	3.5
Total average		3.4	2.6	3.3
U.S. National Park Service ( <a href="http://www.nps.gov/gl">http://www.nps.gov/gl</a> )	Text on websites	2.5	4	3
	Page layout	3	5	5
	Colors	2	4	4.5

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ba/)	Pictures, graphic elements and sound	2.5	5	5
	Interaction and navigation	1.5	5	5
Total average		2.3	4.6	4.5

Table 5-3 Ranking the Availability of Cultural Markers on the Tested Websites

The following are the different cultural markers available on the tested websites:





1- Tested website name: *Universiti Utara Malaysia*

- a. *The cultural markers available in the old website version:* Black background; focus on school; talks about the university; and elements of emblem (pen, open book).
- b. *The cultural markers available in the new website version:* White background; focus on students; animated pictures; and pictures for the university.
- c. *The common cultural markers (appear in the current and old website version):* Use of colors; various logos; and Focus on student’s social activities.

2- Tested website name: *Rensselaer Polytechnic Institute (RPI)*

- a. *The cultural markers available in the old website version:* Message from the institute president in the website homepage.
- b. *The cultural markers available in the new website version:* Too long paragraphs are used.
- c. *The common cultural markers (appear in the current and old website version):* Focus on student; the amount of content (text) on websites; pictures for the institute; and president picture.

3- Tested website name: *The Aristotle University of Thessaloniki*

- a. *The cultural markers available in the old website version:* Emphasized on religious and historical images; and no text.
- b. *The cultural markers available in the new website version:* Some text; pictures of buildings and students; icons link to search, user homepages search, email search, telephone search (   ).
- c. *The common cultural markers (appear in the current and old website version):* Some religious and historical images, but not on the homep-

age; website content in the center of the page; and every part in the website has its own color.

4- Tested website name: *The University of Southampton*

- a. *The cultural markers available in the old website version:* The website menu contains text and icons; audience-driven website design; and white background.
- b. *The cultural markers available in the new website version:* The website menu is in text format; large size picture of student doing sport; and the website uses a lot of pictures.
- c. *The common cultural markers (appear in the current and old website version):* The same menu labels (no change by time); simple; and the website uses a lot of different colors.

5- Tested website name: *Dutch Educational website (Technische Universiteit Eindhoven)*

- a. *The cultural markers available in the old website version:* Icons and text represent the websites main menu; emphasis on students; photos of both genders; and students have the opportunity to operate a Webcam.
- b. *The cultural markers available in the new website version:* Animated pictures for students and staff members; the website main menu is laid on the right side; the main menu is in text format; no icons used; uses a lot of colors; news about the university; a lot of text and paragraphs in the main page; and more interaction within this website version.
- c. *The common cultural markers (appear in the current and old website version):* Use of asymmetric layout; and Use of colors.

6- Tested website name: *Keretapi Tanah Melayu Berhad*

- a. *The cultural markers available in the old website version:* Website content is laid in the center of the page; pictures of buildings; black background; information outside the website domain, such as: information on immigration policies and online newspapers; and warning red flashing banner.
- b. *The cultural markers available in the new website version:* One color family was used (blue); small picture for a building in the banner; icon links to the W3C Markup validation; and online Services (E-Ticket, Web Mail and customer services).

- c. *The common cultural markers (appear in the current and old website version):* A lot of links on the website's main menu; and focus on organizational information (Annual Report, Board of Directors, Current Projects, Headquarters, History Video, Mission, Organization, Chart and Statistic).

7- Tested website name: Amtrak National Railroad

- a. *The cultural markers available in the old website version:* White background; java pop-ups for latest-breaking news; small thumbnail pictures; Images show a friendly conductor and passengers; less information about travel; and uses icons.
- b. *The cultural markers available in the new website version:* Blue background; more information about travel; direct useful tasks (train reservation, train status, calculate distance between two points); hot news; and advertisements.
- c. *The common cultural markers (appear in the current and old website version):* Pictures of modern trains; and the entire website was very task-oriented.

8- Tested website name: MPH bookstores

- a. *The cultural markers available in the old website version:* The website focused on showing images rather than giving information; the homepage consisted of a big size picture of a book surrounding the company logo; minimal information; the website is not actually a place to buy books but more to learn more about the company; and only telephone call for help and to track the order.
- b. *The cultural markers available in the new website version:* Animated logo; a lot of books titles appear in the website homepage to encourage visitors to explore and buy; entire catalog is available; books prices in local currency are beside each book; online help and track orders are available; and the website simulates sites that sell books on the Internet.
- c. *The common cultural markers (appear in the current and old website version):* The website's focus on showing book's cover.

9- Tested website name: Barnes & Noble bookstore

- a. *The cultural markers available in the old website version:* Website main menu is appearing on the top of every website page; professional logo is used; and some categories of books are available.
- b. *The cultural markers available in the new website version:* A lot of categories are available; animated advertisement in the center of every page; main titles are in big text size; the main website menu appears in two places (on the top and on left); company logo; forum; and flash used to display some parts of the website.
- c. *The common cultural markers (appear in the current and old website version):* The entire catalog is clearly available; visitors can review books; author interviews available; reviews for individual books; and same colors are used.

10- Tested website name: *Excite Japan*

- a. *The cultural markers available in the old website version:* The website is available in Japanese only; animated pictures are used; the website menu is in text and icons format; and some pictures are used.
- b. *The cultural markers available in the new website version:* Uses some English words; large pictures; the website menu is in text format and very simple; and a lot of pictures are used.
- c. *The common cultural markers (appear in the current and old website version):* Use the same color family; pictures are for men and women; the data is categorized in blocks; and website logo was not changed.

11- Tested website name: *Excite*

- a. *The cultural markers available in the old website version:* Website visitors are able to adapt some website content; few pictures are used; the website is text oriented; and search on everything.
- b. *The cultural markers available in the new website version:* Google advertisements; flash video; the main menu is in text format; use of icons; the advertisement pictures are in big size; visitors can change page layout and website theme; ability to customize the search (Web, images, news, audio, video); and live information (stock, games, weather and sports)

- c. *The common cultural markers (appear in the current and old website version):* Website visitors are able to change the website style; and use the same fonts and colors.

12- Tested website name: Channel 4

- a. *The cultural markers available in the old website version:* The website main menu is laid on the top; few functional and information data are available; few pictures; and large picture used as website page background.
- b. *The cultural markers available in the new website version:* White background; the website main menu is laid on the top and on the right (on the top just the main categories and on the right it contains the main categories and the sub categories); the pictures are in big size; a lot of pictures are available on the homepage and on interior pages; direct useful tasks; advertisements; animated banners; some metaphors; online watching; and latest news.
- c. *The common cultural markers (appear in the current and old website version):* Animated banner located on the top right; website logo is laid on the top left; main website menu is laid on the top of the website; and search functionality.

13- Tested website name: Antenna Group

- a. *The cultural markers available in the old website version:* Animated banner on the top of the website; black and white background; and website data appears in the middle of the page.
- b. *The cultural markers available in the new website version:* New website logo; animated pictures are in big size centered in the homepage; animated pictures related to hi-technology (satellites, sound mixer, telephones, and laptop); and the website looks more professional.
- c. *The common cultural markers (appear in the current and old website version):* Website logo is laid on the top left.

14- Tested website name: Siemens Deutschland

- a. *The cultural markers available in the old website version:* Multilingual website; map of Germany; functional navigation schema (visitor has to

select his or her region in order to access company services); and no information available on the homepage.

- b. *The cultural markers available in the new website version:* The website is available only in German; main big picture takes 2/3 of the website homepage; direct and clear functional design; and website functionalities are directly available from the homepage.
- c. *The common cultural markers (appear in the current and old website version):* Website logo; and some website functionalities.

15- Tested website name: Siemens china

- a. *The cultural markers available in the old website version:* Large amount of news and announcements; the main website menu is laid on the left; and website information and functions are implicit.
- b. *The cultural markers available in the new website version:* Main big animated picture takes 2/3 of the website homepage; the website is available in two languages (Chinese and English); and direct and explicit information and functions.
- c. *The common cultural markers (appear in the current and old website version):* Logo.

16- Tested website name: Grande ABC

- a. *The cultural markers available in the old website version:* Website menu is laid on the right; and a lot of colors.
- b. *The cultural markers available in the new website version:* A lot of animated pictures; many functionality and information available; metaphors are used; website menu is laid on the top; and a lot of videos (in flash format).
- c. *The common cultural markers (appear in the current and old website version):* Different colors are used; the data is separated in small boxes and organized in a systematic way; advertisements; and white background.

17- Tested website name: Snunit

- a. *The cultural markers available in the old website version:* Three colors are used; and website menu is laid on the left.
- b. *The cultural markers available in the new website version:* Animated banner; the website is using metaphors; RSS feeds; flash is used; web-

site information and functionalities are organized in groups; advertisements; and website main menu is laid on the top and left.

- c. *The common cultural markers (appear in the current and old website version):* Website text, links and graphic elements are organized from right-to-left; and a number of icons are used on websites.

18- Tested website name: Adobe Systems Incorporated

- a. *The cultural markers available in the old website version:* Website's main menu is laid on the right and top; company logo is laid on top left; and the website functionality and information option was clearly shown.
- b. *The cultural markers available in the new website version:* Website main menu is laid on the top and left; icons are used throughout the website; company logo is laid on the top right; latest news is available on the homepage; and more text in this website version.
- c. *The common cultural markers (appear in the current and old website version):* Animated dynamic picture in big size appears in the main homepage; the two versions of website are using the same color family; the entire site is very functional-oriented; a lot of pictures with some text; and the website is organized in blocks of data.

19- Tested website name: Andorra

- a. *The cultural markers available in the old website version:* Flag of Andorra is exploited in the website; the flag of Andorra is also used to denote alternative language choices; and a lot of colors are used.
- b. *The cultural markers available in the new website version:* Animated pictures in flash format; website main menu is laid on the top and left; icons beside text are used through-out the website; the website is organized in blocks of data related to each other; flash video is available; and three colors are used in the website.
- c. *The common cultural markers (appear in the current and old website version):* The website is available in four languages; the website homepage contains a lot of text; and pictures and some descriptive text are used through-out the website.

20- Tested website name: Senado Federal



- a. *The cultural markers available in the old website version:* Employ the country national colors throughout the website.
- b. *The cultural markers available in the new website version:* Telephone number for direct help; animated pictures with text are used to display some information; W3C validation; live Television and radio are provided for visitors; metaphors are used; and some advertisements.
- c. *The common cultural markers (appear in the current and old website version):* Picture of building; website main menu is laid on the left; the website centralized within specific dimensions; some icons are used; and the website is organized in blocks of data related to each other.

21- Tested website name: Costa Rica National Park

- a. *The cultural markers available in the old website version:* The website features are emphasis on nature and ignore the individual tourist; the website uses slogan to emphasize the national agenda; display of a massive political announcement against the exploitation of children and adolescents; little text; the homepage has a green background and one big picture in the center of the page; pictures of the park; website main menu is laid on the bottom of the page; and direct telephone number is available on the homepage.
- b. *The cultural markers available in the new website version:* Google advertisements; a lot of information is available on the homepage; website main menu is laid on the top of the page; latest news is available on the homepage; and contains more information about the park.
- c. *The common cultural markers (appear in the current and old website version):* Green color is used in the two website versions.

22- Tested website name: U.S. National Park Service

- a. *The cultural markers available in the old website version:* Website main menu is laid on the middle of the page; and the homepage contains one picture of the park, located in the center of the website.
- b. *The cultural markers available in the new website version:* Website main menu is laid on the left of the homepage; audience-driven website design; detailed information; the logo of the website is laid on the top right; three colors are used; and the website is organized in blocks of data related to each other.

- c. *The common cultural markers (appear in the current and old website version):* Same website menu labels.

#### 5.4.2.1 Summary of Findings

Table 5-3 reveals that some cultural markers from the earlier version are still available in the current version of the websites. However, new cultural markers appeared strongly in some. This section summarizes the key findings presented in the previous table.

##### **Text on websites:**

Text density, size, orientation, style, and type were used to compare the current website version against the earlier website version. Current websites contain more text than previous websites versions, with an average score of 3.3, while in older website versions this was 2.4 (on a 1 to 5 scale).

In this study, we also found that the current versions of the selected websites showed more interest to focus on presenting information (text) to target audiences. Font-size was used to distinguish between different data series. For example, bigger text was used to help website visitors see quickly what the page is about, what is most important, and figure out where they want to look at next to find what they want.

This study found that the use of text properties such as density, size, orientation and type, to some extent are different from earlier websites version with average score rank 3 (on a 1 to 5 scale).

##### **Page layout:**

The results showed that the current websites focussed on presenting the content by means of “blocks of data” as shown in the following figure, Figure 5-2. Moreover, the data presented in current websites were in the centre of the screen and not restricted to left-aligned fixed-width layouts. Layout of the current website versions was more cultural oriented with a score of 3.7, while layout of earlier website versions was less cultural oriented with a score of 3 (on a 1 to 5 scale). This study found that, current websites’ layout is totally different from the earlier website versions and the layout differences between both versions were clearly perceptible, with a score of 4 (on a 1 to 5 scale).



Figure 5-2 Blocks of data and free layout

**Colors:**

Current website versions seem to use less color to decorate the website. The use of colors in current website versions was perceptible to some extent with an average score of 3.1 and 3.3 for earlier website versions (on a 1 to 5 scale).

The results show significant differences perceptible to some extent between the two website versions with an average score of 3.2 (on a 1 to 5 scale).

**Pictures, graphic elements, and sound:**

The research found that, current website versions contain many pictures and a lot of small icons to attract the visitor's attention (an average score of 3.8), while in earlier website versions, there were only a few pictures, graphics, sound, and icons (an average score of 3.1).

The differences between the two website versions were perceptible to some extent. The average score given for the general perceptibility rating of the extent to which new website versions related to old versions with respect to this design component was 3.3.

**Interaction and navigation:**

This study found that, current websites versions were easier to use, easier to navigate and easier to interact with. The average score given for general perceptibility with respect to interaction and navigation was 4 for current websites and 3.1 for earlier websites (on a 1 to 5 scale). The differences between two websites versions were perceptible with an average score of 3.4.

#### 5.4.2.2 General Observations

Overall, from the data (see Table 5-3) and analyses presented above, we noticed that some cultural markers disappeared and some are new, while others are still used. Therefore, we distinguish three types of cultural markers. The first type is the group of

old cultural markers, which appeared before in the old website versions but disappeared in the current versions. The second type is the group of new cultural markers; this group contains cultural markers which appears in current websites and did not appear before. And the third type is the group of common cultural markers; these are the cultural markers which appeared in the current and old websites versions. The three groups of cultural markers are as follows:

**Old Cultural Markers (appeared in the past and currently are disappeared):**

- Colored background;
- Focus on leaders and power (school, buildings, leaders, history);
- Minimal information;
- Emphasized on religious and historical images;
- Information of outside the website domain (ex., transport website that contains information about human health);
- Focus on images rather than action.

**New Cultural Markers (did not appear before):**

- Social activities;
- Too long paragraphs;
- The trend of user-centered design;
- A lot of pictures;
- No fixed website layout (website menu can be on left, or top or right);
- Focuses on services and functionality (due to new website technology);
- Advertisements;
- Simple logo (new company logo);
- Showing flash video (new website technology);
- Pictures are in big size: e.g., main big picture takes 2/3 of the website homepage;
- Direct and explicit information and functions;
- Metaphors;
- W3C source code validation checks;
- Live actions, such as television and radio.

**Common Cultural Markers (stable, appeared in the past and currently):**

- Use of icons;

- Icons and text used in the website main menu;
- Use of colors;
- Use of logos;
- Elements of the emblem (pen, open book);
- Focus on website target audience;
- The data is separated in small boxes and organized in systematic way: the website is divided into blocks of data related to each other;
- Pictures of website target audience;
- Animated pictures;
- Some websites were very task-oriented.

Color is an example of a shared cultural marker; it is still a cultural oriented marker, and it is still used in current website versions, while pictures are slightly more used in current website versions. It is also important to note that most of the websites have the following cultural markers: few graphic elements and more text and the text play a vital part in the current website versions.

As an example of some cultural markers used before in an earlier website version that do not appear in current version, we can mention the website of the Universiti Utara Malaysia. Empirical research carried out by Gould (Gould et al., 2000) has shown that the website of the Universiti Utara Malaysia presented and focused on authority figures and contained power symbols. In their investigation they found that, this Malaysian website contained links on the home page to website administration, pictures and symbols focusing on the country itself rather than featuring photographs of individuals. Moreover, black background, monumental buildings, top level menu selection focused on symbolism and information about the leaders of the University, which correlates well with Malaysian cultural background. By contrast, the current version of the Malaysian university website focuses on individuals. The website now contains pictures of students and teachers, the black background has disappeared, no pictures of monumental buildings anymore and the website's menu is more focused on students. But still there are some cultural markers available in the current website version. As an example, the current website contains a picture in the homepage of a girl wearing a scarf, which is a symbol for Muslims girls.

## **5.5 Cultural Dimensions Verification**

Based on the anthropological cultural evaluation study which was summarized in section 4.6, it was clear that some anthropological cultural dimensions are still very important for local website design and localization. Moreover, the research results showed that people from different cultural background were in agreement on some cultural values. However, there are differences in some of cultural values between nations such as for power-distance or individualism; sometimes there are only small differences but sometimes the differences are quite clear. For that, the purpose of this study was to find out which anthropological cultural dimensions are the most important and applicable for local website design and localization from HCI experts point of view. Furthermore, to support our research we compared the research results against another earlier research of Marcus & Baumgartner (2004).

### **5.5.1 Methodology of the Study**

#### **5.5.1.1 Sampling**

A study invitation request was sent out to 50 experts with different backgrounds, such as: website developer, localization, internationalization and translation experts. Responses were received from 19 experts, who were then requested to further participate in the study. Experts who participate in this study had more than 6 years of experience in the field of user-interface design, localization, or translation. The experts had different cultural backgrounds: Belgium, United Kingdom, Luxembourg, France, United States of America, Palestine, Egypt, United Arab Emirates, and Jordan.

The theoretical frameworks that have been used to guide this study are the cultural dimensions of the following six anthropologists: Nancy J. Adler, Edward T. Hall, Geert Hofstede, Fons Trompenaars, David A. Victor and Quincy Wright. The following 16 anthropological cultural dimensions are used: Human Nature Orientation, Individualism vs. Collectivism, Internal vs. External Control, Time Orientation, Authority Conception, Context, Gender Roles, Power Distance, Uncertainty Avoidance, Universalism vs. Particularism, Achievement vs. Ascription, Affective vs. Neutral, Specific vs. Diffuse, Experience of Technology, Face-Saving, and International Trade and Communication. These cultural dimensions are discussed in details in section 2.2.2.3.

### 5.5.1.2 Constraints of the Study

The study was organized to show the important anthropologist’s cultural dimensions for local website design for all societies in general. We focussed on 16 dimensions.

### 5.5.1.3 Methodology

16 anthropological cultural dimensions, which were investigated before in a previous study (presented in section 4.5.3) were given to the participants for evaluation. Each anthropological cultural dimension was explained by means of statements and cases in terms of its effects on website design (see Appendix 8). The participants were asked to indicate how much she or he agreed with the importance of the dimension as cultural dimension. The responses to these questions reflect how the participant sees the importance of each cultural dimension for local website design and localization.

The Participants asked for their experienced opinion about each cultural dimension separately and to rate it from 1 to 5, according to its importance for local website design and localization. The rating scale was as follows: 5 = most important, 4 = important, 3 = important to some extent, 2 = not sure and 1 = being the lowest rating, which means that a specific cultural dimension did not make any sense for local website design.

## 5.5.2 Findings of the Cultural Dimensions Verification

The following table, Table 5-4, shows the scores for each cultural dimension based on the marks given by the participants. The column “Average” shows the average score given by the participants, while the columns “Minimum” and “Maximum” shows the lowest and highest score given by the participants.

Dimension Number	Dimension Name	Cultural dimension ranking		
		Average	Minimum	Maximum
1	Experience of Technology	4.8	3	5
2	Context	4.7	3.5	5
3	International Trade and Communication	4.5	3	5
4	Gender Roles	4.3	2	5

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5	Uncertainty Avoidance	4	2.5	4.5
6	Human Nature Orientation.	3.9	1.5	4.5
7	Power Distance	3.8	1	5
8	Time Orientation	3.4	2	4
9	Individualism vs. Collectivism	3.3	1	5
10	Authority Conception	3	1	5
11	Achievement vs. Ascription	2.8	1	4.5
12	Face-Saving	2.6	1	5
13	Specific vs. Diffuse	2.6	1.5	4
14	Affective vs. Neutral	2.4	1	5
15	Internal vs. External Control	1.8	1	4
16	Universalism vs. Particularism	1.7	1	4.5

Table 5-4 Anthropological Cultural Dimensions Evaluation Ratings

The feedbacks we have gotten from this study showed that seven cultural dimensions are important and play a role when designing websites for local audiences. They have an average score of more than 3.5 (on a 1 to 5 scale). We first give for each of these seven cultural dimensions the experts' motivation for giving it a high score. Then we compare the findings with the research of Marcus & Baumgartner (2004).

**Experience of Technology:**

The cultural dimension "Experience of Technology" has got the highest score in this study from the experts. It refers to the attitude of certain society members towards technology. Participants were given comments such as: "It is always a challenge to make a product suitable for a specific society", "The first thing I have to think about is what is the level of technological experience the target audience has, because it is important to understand if a target audience society is willing to use a new technology to explore new things, or use a product without complaining.", "When I localize a certain product for a certain society I try to understand target audience technology experience, to be able to customize related technology satisfy target audience knowledge and technology skills."



**Context:**

This cultural dimension seems to be the most important cultural dimension. The average score rating was 4.7, and the lowest ranking was 3.5 (on a 1 to 5 scale). All the participants agreed that amount of text, formality of website content, meaning of pictures and icons, information formality, explicit meaning or implicit information meaning of all those elements are cultural sensitive, and this cultural dimension affects website design.

Experts here suggest that designers should be aware of this cultural dimension, because some societies are “high context”, some are “low context”, and some are in between high and low context.

**International Trade and Communication:**

International Trade and Communication is a universal law rather than a cultural value. Study results showed that some countries are well aware of international standards and national trade and others do not care. For example, one of the participants noted: “The type of online payment, the level of trust and the procedure of payment should meet international standards, at the same time be compatible with user’s culture background”.

Most of the participants noted that the international trade and communication cultural dimension is important when designing commercial websites. For this it is important to understand how a country reacts with this kind of communications and rules and how the target website is involved in any of the international or local economy rules.

**Gender Roles:**

Experts believe that, in general, women and men have different needs and interests in life, and that this could affect their behaviour and interests in websites.

From participant’s experience, they noted that some cultural societies support femininity; they prefer to have pictures of females aiming to presenting website information. For example: “suppose a website selling men’s watches, for some societies they prefer to show a picture of a girl presenting a watch model, while some cultural societies refuse that, such as masculine societies”.

Moreover, some societies prefer to make a separation between genders. For this, a website visitor has to choose from the beginning his/her gender and is then directed to a specific website related to the selected gender. On the other hand, some cultural so-

cities do not care about gender and they mix between the two genders indiscriminately and using a mix of pictures, information, functions and layout.

**Uncertainty Avoidance:**

Overall, experts recognized that it is worthwhile to understand how the target audience deals with uncertain and unexpected situations, such as: what is the reaction of the target people if the website navigation or any of design elements is not familiar to them? Are the target audience afraid of strange and unexpected information or actions?

**Human Nature Orientation:**

The participants found that human nature orientation gives a good indication for website localisers whether the target society is able to change or not, and the degree of accepting changes. In other words, whether people are accepting things which are not accepted in their own culture such as pictures, symbols, mental models, text, etc.!

People around the world differ in terms of how they are seen: good, evil or a mixture of both. Therefore, people differ in terms of trusting website content, also differs in respecting or accepting some pictures and symbols that do not meet their cultural background. For example, in the Arab world, to have a picture of a crow is not acceptable since the crow is a symbol of misfortune, pessimism and death. While for some societies such as USA, the crow is a symbol of intelligence, obligingness and fidelity. Every society links objects in the world with a story that happened in the past and then these stories or believes are transmitting over generations, to become at the end programmed in the mind of people.

**Power Distance:**

Most of the participants agreed that the website structure, type of messages, instructions, pictures, icons, colors, and navigational structure are different among nations. One of the participants believes this cultural dimension is the most important one; he noted: “This is about the relationship between website owners and website visitors. For example, for this cultural dimension is important to know if website visitors are allowed to give comments or feedback on website content or not!”. Moreover, one of the participants said: “Some websites addressed target audiences differently, for this kind of website design it is based on human relationship in terms of hierarchy. Every website group visitors have their own needs of information and function”. The partici-

pant added “hence, the design is not based on the principles of user-centered design rather it is built on the nature of human relationship in terms of hierarchy.”.

### 5.5.2.1 General Observations

During the evaluation study, some participants were not able to give a direct answer whether a cultural dimension important for local website design and localization or not. When the researcher asked them about the reasons, they return that to the changes of website user interesting. As a such, some participants agreed that the knowledge and perception of website visitors have changed over time, therefore website visitors ask for more or new information and functionalities form time to time; in other words, “every time has its own requirements”.

### 5.5.2.2 Comparing the Research Results against Earlier Research Results

In 2004, Aaron Marcus (the AM+A founder and director since 1982) and his team at AM+A<sup>29</sup> studied the most practical set of anthropological culture dimensions for user interface design (Marcus & Baumgartner, 2004). Table 5-5, shows the comparison between the AM+A research results and our own research results. The table shows the cultural dimensions in order of importance according to the two research results.

	Aaron Marcus research results	Current research results
1	Context	Experience of Technology
2	Technological development	Context
3	Uncertainty avoidance	International Trade and Communication
4	Time perception	Gender Roles
5	Authority conception	Uncertainty Avoidance
6	Affective vs. neutral	Human Nature Orientation.
7	Face-saving	Power Distance

Table 5-5 Comparing Research Results of the Top Seven Most Important Anthropological Cultural Dimensions

As can be seen in Table 5-5, both research studies found that *Context* and *Experience of Technology* are the most important cultural dimensions for culture-centred

<sup>29</sup> <http://amanda.com/>

website design, followed by *Uncertainty Avoidance*, and *Power Distance*. The cultural dimensions *Time Perception*, *Affective vs. Neutral*, and *Face-saving* seem to be less important nowadays since those cultural dimensions do not appear in the current research results. Furthermore, current research found that some cultural dimensions are now important for culture-centred website design while they were not in the past: *International Trade and Communication*, *Gender roles*, and *Human Nature Orientation*.

## 5.6 Conclusions

This research was designed to study the evolution of the use of cultural markers including interface design elements and cultural dimensions in local website design and localization. For this, research discussed in this chapter builds upon the existing body of research in website design and anthropological cultural dimensions. The research was performed in two phases: First, a cultural markers re-evaluation study has been performed. The second study was to evaluate and rank 16 anthropological cultural dimensions.

The findings from first exploratory study indicate that there is a difference in the use of cultural markers between current and earlier versions of the same website. Some of the cultural markers which were discovered by previous research studies are disappeared in the current examined version of the website, and some cultural markers are still present. Furthermore, the study also reported that some cultural markers are shared between groups of nations.

The findings from the second exploratory study indicate that anthropological cultural dimensions are still considered to be important for local website design.

From the findings, we can conclude that it is important to take user culture into account for designing local websites.

## **6 A Cultural Markers Pyramid for Culture-centred Website Design**

“If a website is usable in one country it is not necessary usable in another country, for that it is essential to consider the user and his/her culture who needs to use the website”

---Abdalghani Mushtaha

## 6.1 Introduction

The research studies discussed in the previous chapters 0, 1 and 1, studied the relationship between website design and the user's culture. In this chapter, we will put all results together and develop a new theoretical model for localized website design. First, we will introduce the concept of Digital Culture (section 6.2). This section explains how the influence of the Web and technology acceleration have changed the user's social activities and created a new digital generation that carries new and special cultural values related to the Web environment. Next, we describe our Cultural Markers Pyramid (section 6.3), that classifies cultural markers into different groups according to their relevance for website localization and provide guidelines for different levels of localization. The last contribution of this chapter, section 6.4, provides a theoretical method for the design of localized websites. Finally, in section 6.5, we provide conclusions.

The work in this chapter has been published in (Mushtaha & De Troyer, 2012)

## 6.2 Digital Culture

The results of the research studies discussed in section 4.6 and 5.5 show that people who are using the Web are likely to be faced with different types of websites coming from various countries, which results in new understandings and new experiences. The Web is a dynamic environment and people who are using the Web are sharing that environment and are constantly in contact "directly or indirectly" with each other. Therefore, based on the majority of definitions used for culture, which are based on the fact that culture is learned from and shared by people who communicate with each other (see section 2.2.2.1 ), we could say that the Web and other digital communication technology has an impact on culture, as well as that it creates a culture of its own. For that, we could say that everyone who uses the Web and these new communication technologies has a "digital" identity in addition to his or her own "social" identity. This means that Web users actually have two kinds of cultures, a *digital culture* and a *social culture*, illustrated in Figure 6-1.

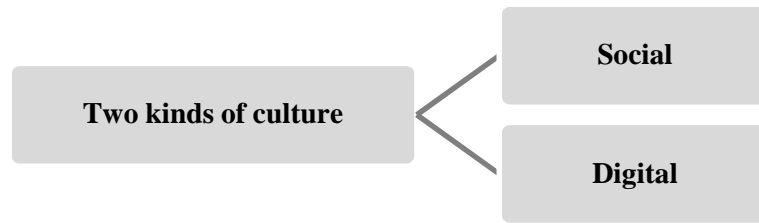


Figure 6-1 Web User's Cultural Background

While the “social culture” is in relation to the customs, traditions, morals, and values that affects everyone from their physical environment, such as: family, friends, religion, etc., the “digital culture” is powered by the use of the Web and digital technology. Currently, people can do most of their daily activities using new forms of technology, for example students can study, write, read news, get information and interact in ways that are very different from previous generations.

This implies that when creating a website, we do not only need to take into account the Web users' cultural characteristics (social culture), but also their digital characteristics. As an example, consider the following situation. Hofstede's studies have categorized the Belgium society as a high uncertainty avoidance culture (Hofstede et al., 1997). This means that Belgian people do not like to be on risk. This would imply that when Belgian people want to buy a product such as a camera for example, they want to know everything about the product, such as features, guarantee, goodies, weaknesses, what they can do with the product. However, from our experience (5 years website usability consultant) if we look to Web users in general, most of these people share the same requirements as the Belgian people. Most of the people want to know everything about the product they plan to buy. For this, it is a fact that most e-commerce websites offers full descriptions of their products (e.g., pictures, product specification, information about the guarantee, return policy, product evaluation from other customers, etc.). Some companies are even dealing with some social websites, to offer them reviews for their products, such as Digg<sup>30</sup>, delicious<sup>31</sup> and Reddit<sup>32</sup>. Those evaluation websites are social websites that give an opportunity to everybody to give his or her opinion about anything. These comments could be used for helping other people to take a decision about e.g., buying a product. Belgians, French, Arabs..., most of the people around the world have adopted this attitude of informing themselves well

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<sup>30</sup> <http://digg.com/>

<sup>31</sup> <http://delicious.com/>

<sup>32</sup> <http://www.reddit.com/>

before buying something on the Web, i.e. they share this same digital characteristic despite the difference in their social culture.

In the rest of this section, we first discuss the impact of the Web on the social activities of people and how this contributes to the creation of their digital identity (section 6.2.1), and in section 6.2.2 we elaborate on different digital cultural markers.

### **6.2.1 The Influence of Web on the User’s Social Activities and their Digital Identity**

Technology acceleration and the role of the Web in our daily life have changed people’s approach to various activities. These activities range from information gathering, shopping, learning, communicating, doing business, and even photographing, just to name a few. These activities, while still available in their original forms, are now perceived in a whole new light. For example, reading news is widened from reading physical newspapers to reading digital newspapers and, more recent, also reading web blogs. More and more people are using the Web to share ideas, to take part in social online activities, to play games, to learn, and to communicate. For instance, in the research results reported in section 4.4.1 we see that about 43% of the people who use the Internet spend more than five hours per day doing activities on the Internet. For a lot of people, the Web has become a primary source of information and a means to communicate with people. These people can be referred to as the “new digital generation”. The new digital generation or so called digital natives are the people who consider the Web and other forms of digital technology essential for their daily lives and have practically grown up with the Web (Reed-Swale, 2009).

In Figure 6-2, posted by Fred Cavazza<sup>33</sup>, we see the user positioned in the middle of and surrounded by different digital societies, which all contribute to the user’s digital cultural identity. For example, an individual can say what products he likes via Crowdstorm<sup>34</sup>, write a blog on Wordpress<sup>35</sup>, be contacted via cellular or Internet phones, publish and share photos on Flickr<sup>36</sup>, watch videos on YouTube<sup>37</sup>, bookmark

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<sup>33</sup> <http://www.fredcavazza.net/>

<sup>34</sup> <http://www.crowdstorm.co.uk>

<sup>35</sup> <http://wordpress.org>

<sup>36</sup> <http://www.flickr.com>

<sup>37</sup> <http://www.youtube.com>



recipes on del.icio.us.<sup>38</sup>, manage contacts via LinkedIn<sup>39</sup>, sell things on eBay<sup>40</sup>, buy via PayPal<sup>41</sup>, and have a Facebook<sup>42</sup> account to stay connected with friends and family.

Thus, the Web has now become a tool for socialization. It gives Web users the opportunity to gather together, sharing their thoughts and shaping new ideas. As a result, the digital identify of a Web user is evolving over time and is influenced by the digital identifies of other Web users.

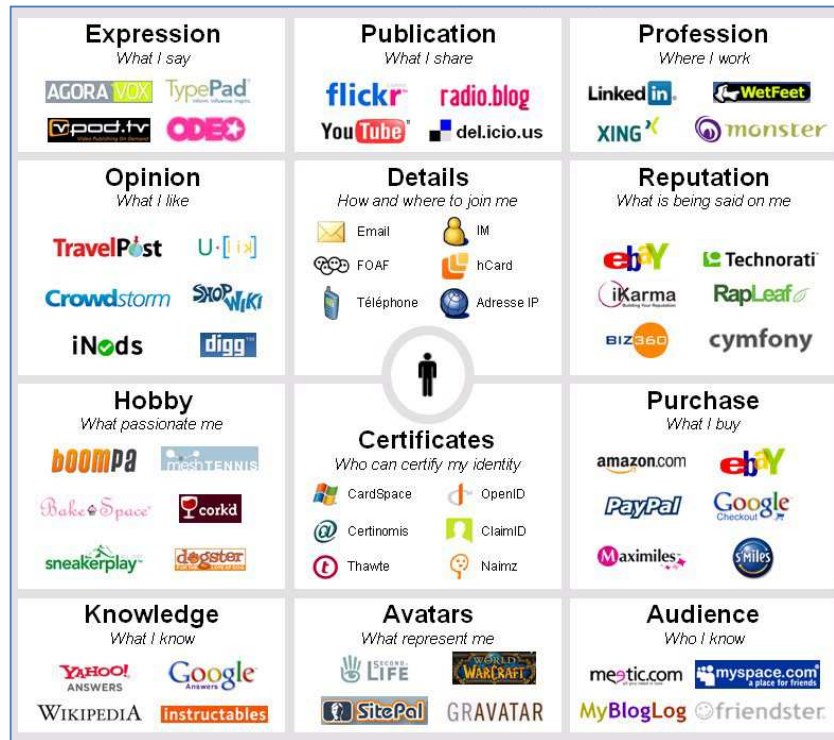


Figure 6-2 Forming the Web User's Cultural Digital Identity, Posted by Fred Cavazza

## 6.2.2 Digital Cultural Markers

In our previous research studies, we have seen cultural markers that are not related to the user's social culture. Rather, this group of discovered markers contains the cultural markers that come from using the Web and new technology. We call them *digital cultural markers*.

Digital cultural markers are website elements such as colors, colour combinations, website layout, data organizing, trust signs, use of metaphor, navigation style, lan-

<sup>38</sup> <http://delicious.com>

<sup>39</sup> [www.linkedin.com](http://www.linkedin.com)

<sup>40</sup> [www.ebay.com](http://www.ebay.com)

<sup>41</sup> <https://www.paypal.com>

<sup>42</sup> [www.facebook.com](http://www.facebook.com)

guage cues or images, etc., which are well understood and accepted by Web users for a certain website domain and country.

As we described above (see section 6.2.1), in order to design a localized website, it is necessary to work with two kinds of cultural markers: social and digital ones, matching both the target context and the Web. The social cultural markers for the target context are markers that are related to social culture of the target country or target audience, while the digital cultural markers are digital cultural markers related to the target website domain and the Web for a certain country. For example, suppose that two websites need to be designed, both for the Belgium market, but one should be an e-commerce website and the other a news website. The digital cultural markers appropriate for e-commerce websites are different, to some extent, from the digital cultural markers for news websites, even for the same target context (Belgium). This type of digital cultural markers for website design it is important to consider this, therefore, we distinguish between:

(1) *Web Digital Markers (WDM)*: these types of markers are shared between all Web users for all domains, e.g., the home page icon.

(2) *Domain Digital Markers (DDM)*: each particular domain has specific digital cultural markers and Web users around the world understand these domain specific digital markers in the same way (see section 3.5). Therefore, these digital cultural markers are shared between all Web users who use the same domain. For example, the shopping basket in an e-commerce website is known in most e-commerce websites.

(3) *Country Digital Markers (CDM)*: this type of digital cultural markers is shared between Web users from one country or society for all website domains. For example, the Franco Arabic is used between Arab Web users.

To illustrate these different types of markers, consider two news website that need to be designed, one targeting the Belgian people and another for the Germans. To define the cultural markers suitable for each group of users, it is vital to define the two types of markers “digital and social”. For the digital cultural markers four sets needs to be defined: (1) The Web Digital Markers (WDM) are shared between all of the Web users, so they can be used for Belgian as well as for the German website. (2) The Domain Digital Markers (DDM) are shared between all news website users, so these are cultural markers that could be used for both the Belgian and for the German news

website. (3) The Country Digital Markers (CDM) for the Belgium are shared between all Belgians Web users, as these markers are specific for Belgians Web users. (4) The Country Digital Markers (CDM) for the Germany are shared between all the Germans Web users, as these markers are specific for the Germans Web users.

For the social cultural markers, two sets of social cultural markers should be investigated separately, one for the German news website which is specific for the Germans and the other specifically designed for the Belgian people.

**Relationship between Domain Digital Markers (DDM) and Country Digital Markers (CDM):**

Some digital cultural markers could be specific for both the domain and the country. As an example, colors are cultural markers sensitive to the website domain and also to the target context. A specific color can mean something in e-commerce websites and may have a different meaning in news website for the same context such as Belgium. As we found in section 4.5 and 5.4.2, the Palestinian people perceive the red color in news website as important news, while in e-commerce websites the red color is perceived as an unavailable product. This is can formulated as following:

- The color {Red} for country {Palestine} for website domain {News} means {breaking news}.
- The color {Red} for country {Palestine} for website domain {e-commerce} means {unavailable product}.

### **6.2.3 Semantic Meaning of Website Design Elements**

We also investigated by means of our studies (Chapter 1) how website users try to understand the meaning of some unknown elements in a website (e.g., a picture, icon, etc.). We found that web users use a specific way for understanding the meaning of an element, in which the different types of culture identified play an important role. We have illustrated this process of understanding in Figure 6-3:

(1) *First step*: the web user tries to link the element to the Country Digital Markers he knows, and attempt to understand the element in this way. If the user does not understand the element, then he goes to the second step.

(2) *Second step*: the web user tries to understand the unknown element in the light of his or her understanding of the other websites belonging to the same domain. Therefore, the user will use the Domain Digital Markers to understand the unknown

element. If the website user still does not understand the element, then he or she goes to the third step.

(3) *Third step:* the web user attempts to use his/her general web knowledge to link the element to any website marker he/she has previously seen on other websites. This means that the user is using the Web Digital Markers to understand the meaning of the unknown element. If still no meaning is found, the user goes to step four.

(4) *Fourth step:* This is the final step where the user falls back to its own “social” culture. If the user still does not understand the element then the meaning remains unknown.

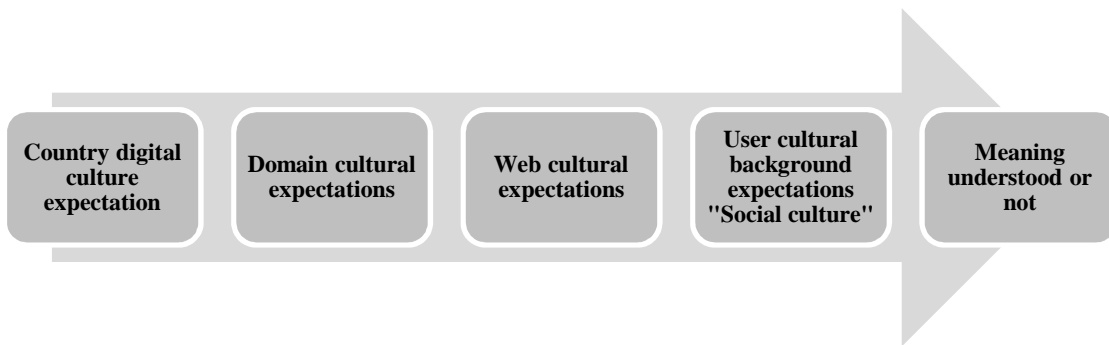


Figure 6-3 Steps used by a user to understand an element

## 6.3 A Cultural Markers Pyramid for Culture-centred Website Design

### 6.3.1 Overview and Motivation

As stated in the previous section 6.2, there are many factors that influence the understanding of website users; the influence not only comes from the user’s social cultural background, but also the Web itself has its influence.

The results of the research discussed in section 3.5 and, 4.6 indicate that identifying absolute and clear-cut cultural markers or using a dedicated anthropologist cultural model for website design is not possible. Moreover, it was found that, not all websites in a society fit its own cultural pattern exactly. Therefore, it is difficult to establish absolute criteria for what is important and which cultural markers are required for local website design. In light of the foregoing, this section proposes five groups of cultural markers. These groups can be used as design guideline for achieving different levels of website localization. Each group of cultural markers contributes to a specific level of localization (cultural adaptation). The five levels are: (1) e-culture, (2) stable, (3) broad, (4) variable, and (5) vista. They build upon the previous research results described in this thesis as following:

1. *Digital Cultural Markers (e-culture)*: this group contains the digital cultural markers described in section 6.2.2.
2. *Stable Cultural Markers*: this group includes the cultural markers of which their importance for local website design was confirmed by current and earlier research studies.
3. *Broad Cultural Markers*: these are the anthropological cultural dimensions and website design markers that were discovered in this research study during the previous research studies.
4. *Variable Cultural Markers*: these are the cultural markers and anthropological cultural dimensions that were discovered in previous research and were not confirmed in this current research.
5. *Vista Cultural Markers*: these are all the other anthropological cultural dimensions. This type of cultural markers is identified and characterized at the national level.

As illustrated below in Figure 6-4, the five groups of cultural markers are organized as a pyramid targeting five different levels of website localization. The level in which a marker is placed represents its importance for localization - the lower the level, the more important to consider the marker. For example, markers from the first level, e-culture level, should be considered in all localized website designs, i.e. they should be given the highest priority, but the level of localization can be considered as minimal. Using markers from all levels will result in a maximal localization. Therefore, these levels are organized as a pyramid, where each level adds some more cultural adaptation to the previous level.

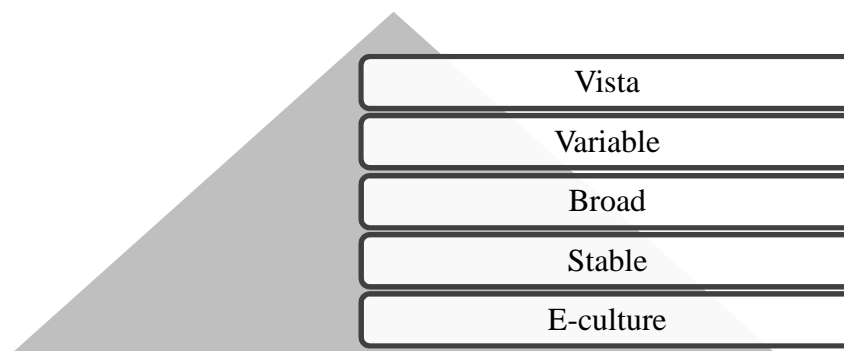


Figure 6-4 Cultural Markers Pyramid

Except for level 1, “e-culture level”, each level considers markers for website design elements as well as some anthropological cultural dimensions. The first level of the Cultural Markers Pyramid, the e-culture, only considers markers for website de-

sign elements due to the fact that this level is only about applying the new digital culture which comes from using the Web and the new technologies. Social culture, and therefore anthropological cultural dimensions, is not considered at this level. The fifth level of the Cultural markers pyramid, which is the vista level, is targeted towards full localization and therefore considers “cumulatively” all the related anthropological cultural dimensions and website design markers.

The website design elements considered for the different levels are: (1) Text on websites [T], (2) Layout and Organization [L], (3) Colors [C], (4) Pictures, Graphic Elements, and Sound [GS], (5) Interaction [I], and (6) Navigation [N]. These design elements were identified and justified in previous research studies (see section 3.5, 4.4.2 and 5.4); they are summarized in Table 5-2. The anthropological cultural dimensions are the 16 cultural dimensions that were used and tested in our previous research studies (see Table 2-2).

### **6.3.2 Cultural Markers Pyramid Levels**

The following is going to describe the five cultural markers levels in details. We explain how the design elements considered in Table 5-2 should be adapted for each level (some adaptations are required and some are advisable to consideration during website localization), and which anthropological cultural dimensions should be taken into account for each level. We refer to the website design elements as follows: (1) Text on websites →[T]; (2) Layout and Organization → [L]; (3) Colors →[C]; (4) Pictures, Graphic Elements, and Sound → [G]; (5) Interaction → [I]; and (6) Navigation → [N].

#### **6.3.2.1 E-Culture Level**

This e-culture marker group has the first priority to be taken into consideration in any website design. The cultural markers from this level are the digital cultural markers (see section 6.2.2).

##### **6.3.2.1.1 Markers for the “e-cultural” Level**

At this level, we only consider website design elements and no cultural dimensions. Therefore we only need to indicate how the website design elements given in Table 5-2 should be adapted to achieve this first level of localization. The following Table 6-1 summarizes this. For example, in order to localize “website text element”

using this level of localization, two things are required: (1) translate the website text to the target language, and (2) investigate if there are specific font size and text orientation requirements from the domain or the context that need to be taken into consideration. Note that for this level, it is not required to consider the issues such as the amount of text, the font type and formality of the text.

Design Element	Markers (requirements and advices) (R): required, (A): Advice
Text on websites [T]	<ul style="list-style-type: none"> <li>- Used the target language. The website content text needs to be translated to the local target language (R)</li> <li>- Use text orientation and font size as required by the domain or context (R)</li> </ul>
Layout and organization [L]	<ul style="list-style-type: none"> <li>- All of these design elements need to satisfy the requirements of the domain of the website. For example the shopping basket in an e-commerce website should appears in all website pages, and this website domain requirement is essential for all e-commerce websites, no matter the target audience's social cultural background. (R)</li> </ul>
Colors [C]	<ul style="list-style-type: none"> <li>- Red, green, black, white, orange and blue colors are culturally sensitive colors. Avoid using culturally sensitive colors in this level. It is also preferred to use the W3C<sup>43</sup> standard web safe colors, such as blue for hyperlinks, black for normal text, bold black for important notes. (R)</li> <li>- Use colors that are relate to the website's domain (i.e. colors whose have a common meaning for web users with different cultural backgrounds). (R)</li> </ul>
Pictures, graphic elements and sound [GS]	<ul style="list-style-type: none"> <li>- Avoid any type of graphical element that carries a specific meaning related to a specific culture. (R)</li> <li>- Use pictures, symbols and icons known by most web users and that related to the website's domain. For example, using a home icon for homepage link (R)</li> <li>- Symbols having cultural meaning should be omitted. For example,</li> </ul>

<sup>43</sup> <http://www.w3.org/>

	<p>pigs are considered unclean for Muslims and cows as holy in India. (R)</p> <p>- Trusted signs: use content and security trust signs that are shared between all web users with different cultural backgrounds (e.g., logos of the security company who takes care of the payments). (A)</p>
Interaction [I]	<p>- The interaction must meet the characteristics of the website's domain. For example: children's websites need special interaction techniques. Moreover, interactions in blogs and wiki's are different from interaction provided for e-commerce and university websites. For that, the website's domain plays an important role in defining and choosing the proper form of interaction. (R)</p>
Navigation [N]	<p>- Well-known links (e.g., contact, about us, site map) should be available on all websites. (R)</p> <p>- Link organization: links should be organized in a common way. Some commonly related website links needs to be group together because websites users may be used to find them together (e.g., contact link may contains sub links such as contact by email, contact by web form, contact details, etc.). (A)</p> <p>- Website navigation system is chosen depending on the website domain. It could be Horizontal Bar, Vertical Bar, Horizontal Tabs, Vertical Tabs, Horizontal Menu, Vertical Menu, Tabbed Menu, Navigation Trail, Drop-Down, etc. (e.g., Mega menus<sup>44</sup> are commonly used on e-commerce websites because with this menu it is possible to show a lot of links. And according to website usability experts, the Mega menu is useful for e-commerce website visitors). (A)</p>

Table 6-1 Markers for the e-culture Level

### 6.3.2.2 Stable Cultural Level

This is the second level in the Cultural Markers Pyramid. It considers website design elements but also anthropological cultural dimensions that are essential for this level of cultural adaptation. This level includes all cultural markers that were clearly empha-

<sup>44</sup> <http://designm.ag/inspiration/mega-menus/>



sized and repeated in many previous researches, as well as those confirmed by our previous research studies, hence the name “stable”.

#### 6.3.2.2.1 Markers for the “Stable” Level

Table 6-2 summarizes how the different website design elements should be adapted for this level. For example, as shown in the Table 6-2, the amount of text needed and the formality of the text are both culturally sensitive and need be considered at this level. Thus, the amount of text and the formality of the text need to meet the expectations of the target culture (e.g., some societies are expecting to find more information and require more explanation, while other society’s prefer quick and direct information).

Design Element	Markers (requirements and advices) (R): required, (A): Advice
Text on websites [T]	<ul style="list-style-type: none"> <li>- Adjust the amount of text to the target culture (R)</li> <li>- Adjust the level of formality of website text to the target culture (A)</li> </ul>
Layout and organization [L]	<ul style="list-style-type: none"> <li>- Organize and group information according to the requirements of the target culture (R)</li> <li>- Position of information in a website is partly cultural dependant (e.g., some users start from the center of a website homepage while others start at the top) (A)</li> </ul>
Colors [C]	<ul style="list-style-type: none"> <li>- Culturally sensitive colors such as red, green, black, white, orange and blue need to be considered carefully to be congruent with the expectations of a target society and the domain of use. For example, what does the red color, in the news domain mean for Belgians? (R)</li> </ul>
Pictures, graphic elements and sound [GS]	<ul style="list-style-type: none"> <li>- Every icon, picture, and graphic element should be evaluated and it should be assured that those elements carry the true meaning for the targeted cultural audience. (R)</li> <li>- Pictures and symbols in a website need to be related to the target culture, but pictures and symbols related to the history of the targeted culture should be avoided (e.g., a university website could include pictures of university students and buildings but pictures of historical</li> </ul>

	buildings of the target society should be avoided if not necessary). (R) - Music, video, and voice need to be adapted to the target culture. (R)
Interaction [I]	- The formality of the relationship between website owner and visitor needs to be investigated and understood, as this can have an impact on the style of feedback, content of contact forms, results of search engines, suggestions and comments. (R)  - Investigate the rules and policies about privacy of user information (e.g., in some culture it may not be acceptable to collect private information by means of cookies). (R)
Navigation [N]	To be taken into consideration:  - How the people from the target culture find and retrieve information. (R)  - How the people from the target culture expect to find information they are looking for (link grouping, what is related to what). (A)  - Number of links in a group on a website page. (A)

Table 6-2 Marker for the Stable Cultural Level

6.3.2.2.2 Anthropologists Cultural Dimension for the “Stable” Level

Some anthropological cultural dimensions need to be considered in order to understand the target culture when designing a website that needs to be culturally adapted (see section 4.6). For the stable level, (1) Context, (2) Experience of technology, (3) Uncertainty avoidance, and (4) Power distance are the cultural dimensions to be considered. The following explains the influence of these anthropological cultural dimensions on website design elements.

- **Context:** *“The degree of direct and explicit information needed in a website”*  
The amount of information required, whether explicit or implicit, is culturally sensitive.
  - This cultural dimension affects the following website design elements:

T	L	C	G	I	N
•	•	•	•	•	•

- **Experience of Technology:** *“Does the technology experience affect website usability?”* For this dimension the website developer needs to investigate the

attitude of the members of the target culture towards technological development, e.g., are people willing to absorb information technology and use new technology?

➤ This cultural dimension affects the following website design elements:

T	L	C	G	I	N
				•	•

- **Uncertainty avoidance:** *“How do web users from the target culture react when threatened by uncertain or unknown situations?”* The degree of formality, predictability, punctuality, information structures, tolerance for ambiguity, focus on tradition, and acceptance of changes all differ between societies.

➤ This cultural dimension affects the following website design elements:

T	L	C	G	I	N
•					•

- **Power Distance:** *“Which communication style and relationship between website owner and the targeted audience is required?”* This cultural dimension can provide insight into how the people from the target culture interact. This gives an indication how to compose proper website feedback, error messages and information structuring.

➤ This cultural dimension affects the following website design elements:

T	L	C	G	I	N
•	•			•	

### 6.3.2.3 Broad Cultural Level

This level is the third level of cultural adaptation. The “Broad cultural” level contains a collection of new cultural markers discovered from recent research studies do not appear before (see section 3.5, 4.6 and 5.5.2.2). The following describe the Broad cultural markers: (1) website design elements and (2) anthropological cultural dimensions in order.

#### 6.3.2.3.1 Markers for the “Broad” Level

Table 6-3 summarizes the markers for the different website design elements that need to be taken into consideration for this level. For example, as shown, for this level it is required to investigate how the target audience perceives the text density, font size and style. These three text design elements are understood differently among Web users from different societies.

Design Element	Markers (requirements and advices) (R): required, (A): Advice
Text on websites [T]	- Adapt text density, font size and style to the preference of the target society. (R)
Layout and organization [L]	<ul style="list-style-type: none"> <li>- The look and feel of advertisements should follow the user's cultural background (e.g., people from different cultural background differ in the way they see things: good, evil or a mixture of both). (R)</li> <li>- Position, placement and length of paragraphs should be adapted to the user's cultural background. (A)</li> <li>- The organization and layout of external information (e.g., RSS feeds) should be adapted. For example, some users from specific cultural backgrounds prefer to know where the information comes from. There are users who prefer to distinguish between the website's own information and information obtained from external sites. (A)</li> </ul>
Colors [C]	- The adaptation has to be done according to the previous cultural level. There are no special requirements in this level.
Pictures, graphic elements and sound [GS]	<ul style="list-style-type: none"> <li>- Investigate how much icons, pictures, and graphic elements need to be available in the target website. (A)</li> <li>- Investigate how the dimension and size of graphical elements is perceived in the culture. (R)</li> <li>- For some cultures/people, videos are the preferred form of getting information, while for others text would be better. For example in news websites it is vital to investigate if the website's targeted audience within the target cultural group prefers to read news in text style or video, or both. (R)</li> </ul>
Interaction [I]	- No especial action is required for this level.
Navigation [N]	- The information accessibility should meet the user's cultural expectations: e.g., do they prefer one or different paths to arrive to the same

	<p>information. (R)</p> <ul style="list-style-type: none"> <li>- It may be necessary to adapt the time needed to visit a page (this marker help to know how much information and links can be put on a page) (A)</li> <li>- The navigational style should meet user’s cultural expectation. (A)</li> </ul>
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Table 6-3 Markers for the Broad Cultural Level

6.3.2.3.2 Anthropologists Cultural Dimensions for the “Broad” Level

The cultural dimensions to be considered in the “Broad” level are: (1) International trade and communication, (2) gender roles, and (3) human nature orientation. The following discuss the impact that these cultural dimensions have on website design elements.

- **International trade and communication:** *“Are there national or international trade rules that need to be follow”*. With this cultural dimension, we can figure out how much people from the targeted culture are actually concerned with or rely on standards and trade, both nationally and internationally.

➤ This cultural dimension affects the following website design elements:

T	L	C	G	I	N
•	•				

- **Gender roles:** *“Refers to the value placed on traditional male and female roles”*. In various societies in which feminine roles are clearly visible, there is a preference for pictures, news and activities related to social life. For example, for a website selling cars it would be advisable to know how much the target audience is influenced by gender roles. In this example, it would allow the web designer to find out if there is a preference for pictures of actual vehicles alone, or in combination with a family, or in front of houses.

➤ This cultural dimension affects the following website design elements:

T	L	C	G	I	N
		•	•		

- **Human nature orientation:** *“what are the good and bad things seen or perceived by the target culture?”* People differ in terms of their understandings in things that are good and bad. There is also a difference in the acceptance of images or symbols in cultures. This cultural dimension provides information on

how the target society is capable of changing and whether or not it accepts elements from other cultures.

- This cultural dimension affects the following website design elements:

T	L	C	G	I	N
•	•		•		

#### 6.3.2.4 Variable Cultural level

The variable cultural level is the fourth level in the Cultural markers pyramid. The cultural markers in the “variable cultural level” were earlier identified in different cultural and website design research studies but do not anymore appear clearly in the current research studies we conducted (see section 3.5, 4.6 and 5.5.2.2).

##### 6.3.2.4.1 Markers for the “Variable” Level

Table 6-4 provides a summary of the website design markers for the variable level. For example, for the text element two markers are added: (1) Information outside the website domain but relevant and important for the target audience could be added (this is an advice). For example, a transport website could include information about new vaccines against diseases. For this, web developers should investigate the target audience to reveal the information they feel is important in daily life and the need for it to be available in a website. (2) Language cues and dialects: The information given should contain words and phrases from the target society (this is required). For example, a phrase in Arabic would be understandable for the entire Arab speaking world, but its meaning among Palestinians may be different from its meaning among Egyptians. At this level, local dialects should be considered.

Design Element	Markers (requirements and advices) (R): required, (A): Advice
Text on websites [T]	<ul style="list-style-type: none"> <li>- Add information from outside the website domain: this information has to be important and localized for the targeted audience. (For example includes some information about new vaccine against disease available for website visitors in a transport website. For that, web developer needs to investigate what kind of information for people from a specific culture is really important for them in their daily life) (A)</li> <li>- Language cues and dialects should be adjusted to the target society</li> </ul>

	(this includes words and phrases commonly used in the target society). (R)
Layout and organization [L]	- Website banner layout is culturally sensitive (e.g., having the banner on the top of website page and containing pictures and text showing some local culture). (A)
Colors [C]	- Colors used in a website need to emphasize a particular culture (e.g., in Africa certain colors represent different tribes). (R)  - Color symbolism should be considered (e.g., the color green is a commonly accepted color for Muslims) (R)
Pictures, graphic elements and sound [GS]	- Pictures, icons and graphic elements should be more focused on the history of target culture. (A)  - Music, videos, banners, pictures, and icons should be more cultural oriented (e.g., famous or former leaders and historical buildings). For that, the website could (for instance) be focusing on religion, leaders, and/or historical actions. (R)
Interaction [I]	- No especial action is required
Navigation [N]	- Investigate which navigation depth is acceptable for the targeted audience of the specific culture. (R)  - Investigate the level of familiarity needed in naming navigational links labels (e.g., University president Prof. Dr. XYZ). (R)  - Investigate the priority of links when ordering them in menus and sub-menu (e.g., in some cultures the “director of the research group”-link should be placed before the link of any other “member of the research group”). (R)

Table 6-4 Markers for the Variable Cultural Level

#### 6.3.2.4.2 Anthropologists Cultural Dimensions for the “Variable” Level

Three cultural dimensions are considered in this level: (1) time perception, (2) affective vs. neutral and (3) face-saving. The following discusses these three

anthropological culture dimensions and maps the impact of each cultural dimension onto the website design elements.

- **Time perception:** *“how cultures respond to time and how much they focus on the future”*. This cultural dimension indicates how the target audience links historical events with the current time and the future. For example, in some cultures users expect to see the same style of homepage icon or email icon in every website they visit, because they have seen it previously on websites and they expect to see it in every future website they encounter.

This help to know what kinds of information are needed to be available, whether technical or historical or about future or motivation. For example, suppose an e-commerce website selling electronic devices then this cultural dimension can give insight in whether the target website audience prefer to have: product information from people already bought the product, or product technical specifications, or information about how old versions of the product are improved and the enhancements the current one has.

This cultural dimension also gives an indication of how much the people from a target culture are willing to give themselves time in finding required information.

- This cultural dimension affects the following website design elements:

T	L	C	G	I	N
•	•		•		•

- **Affective vs. neutral:** *“How do the people from the targeted culture express their emotions?”* This cultural dimension gives essential feedback on rating the amount of emotion that is needed for a picture and even in the text of the website.

- This cultural dimension affects the following website design elements:

T	L	C	G	I	N
•	•		•	•	

- **Face-saving:** *“What are issues and acts that avoid a loss of dignity?”* This dimension gives information about the requirements that need to be taken into account in order to avoid a website owner/user losing respect or dignity. Moreover this cultural dimension helps to know how the people from a specific culture prefer to receive questions and error messages (e.g., some website de-



sign elements, or information, or logos harm some people and cause a loss of face).

- This cultural dimension affects the following website design elements:

T	L	C	G	I	N
•	•	•	•	•	•

### 6.3.2.5 Vista Cultural Level

The Vista cultural level is the fifth and last level in the Cultural markers pyramid. It considers four anthropological cultural dimensions, which are: (1) Individualism vs. Collectivism, (2) Internal vs. External, (3) Control Achievement vs. Ascription and (4) Universalism vs. Particularism. These anthropological cultural dimensions were not mentioned neither in the current nor in previous others research studies. Nevertheless, the research results described in previous chapters highlight the importance of those four anthropological cultural dimensions in designing extremely localized website.

#### 6.3.2.5.1 Anthropologists Cultural Dimensions for the “Vista” Level

- **Individualism vs. Collectivism:** *“Do people from a target culture prefer to do things as individuals or in groups?”* This cultural dimension helps to identify some requirements for the website, e.g., societies based on collectivism need more collaborative-oriented features, such as FAQs and troubleshooting supports.

- This cultural dimension affects the following website design elements:

T	L	C	G	I	N
•				•	•

- **Internal vs. External Control:** *“How much do people from a target culture adapt to and are controlled by their environment?”* This cultural dimension offers information on how the people from different cultures can adapt themselves, or even refuse to adapt themselves, to new concepts and ideas. It also indicates how targeted groups react to unexpected or unknown situations (e.g., adapt to or refuse a new concept; blame the website designer or themselves if there are unclear concepts).

- This cultural dimension affects the following website design elements:

T	L	C	G	I	N
	•	•	•	•	•

- **Achievement vs. Ascription:** *“How do the people from the target culture prefer to be questioned?”* It is important to know how to ask the website users

questions, and which communication style is common to use (i.e. how do you address people), the types of questions that can be asked (e.g., some people will be pleased if they are asked where they studied).

- This cultural dimension affects the following website design elements:

T	L	C	G	I	N
•				•	

- **Universalism vs. Particularism:** “*What is more important - rules or relationships?*” How much does the targeted culture adhere to specified rules, customs, rituals, heroes and values? This gives an indication how much the people from target culture prefer to see country-specific symbols in the website.

- This cultural dimension affects the following website design elements:

T	L	C	G	I	N
•	•	•	•	•	•

### 6.3.3 Using the Cultural Markers Pyramid Levels

The degree of website localization needed will vary from country to country, and between websites even within the same country (e.g., websites from the same country may show more or less cultural markers than others). Thus, the previously proposed cultural markers pyramid (see Figure 6-4) is for designing special degree of culture-centred localized website, by being able to choose the level of localization needed. The five website localization levels are: (1) e-culture level - not localized (but rather international) website, (2) stable cultural level - semi-localized website, (3) broad cultural level - localized website, (4) variable cultural level – highly localized website, and (5) vista cultural level - fully cultural localized website.

Next, we discuss two possible ways to use the Cultural Markers Pyramid. The first approach is for designing localized website, the second one is for obtaining website globalization.

#### 6.3.3.1 Bottom-up Website Localization

The cultural levels should be applied respectively, starting from the bottom of the cultural markers pyramid towards the top in the correct order. It is not possible to apply level 2 “stable cultural” level without first dealing with level 1, “e-culture” level. This is because the markers in a level must be read as cumulative; each level depends on each lower level.

The first part of the localization process is to specify how the six website design elements, given in Table 5-2, should be adapted in the target website. This should be done considering the specification given in each level required. For this, the target culture should be investigated (e.g., using existing studies or/by interviewing people from the target culture or people having a good understanding of target culture preferences). The e-culture level can be achieved by interviewing experts with a good understanding of the domain of the target website and of the Web culture.

Every cultural dimension considered in the Cultural Markers Pyramid, needs to be evaluated to see how the target culture fit to the specific cultural dimension. Then, their effects on the website design elements should be investigated.

#### 6.3.3.2 Website Globalization

To achieve website globalization, only the first level of the Cultural Markers Pyramid, the “e-culture level”, should be considered. The reason that only level 1 is used for this is due to the fact that this level contains the digital culture, which is shared and understood by all Web users, bypassing cultures and societies.

### **6.4 A Design Method for Culture-centred Website Design**

In this section, we present a method for designing localized website. We do not have the intention to provide a detailed localized website design method, although we do see the need for such a method. The proposed method only concentrates on the localization aspects of the design and therefore cannot be considered as a complete website design method. However, it should be possible to integrate the method into existing web design methods. Figure 6-5 shows this theoretical method for the development of localized websites.

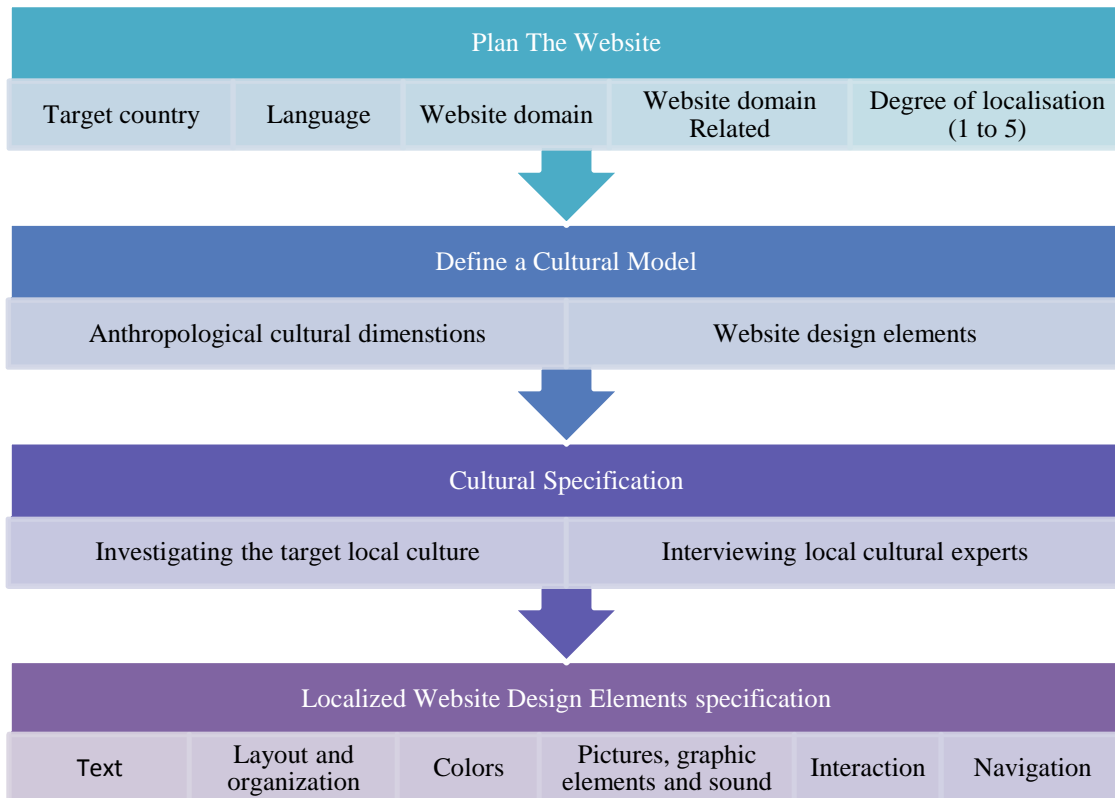


Figure 6-5 Theoretical Method for Localized Website Design

It comprises of four phases. We provide a brief description of those phases:

- **Plan the website**

This phase should specify the target country, language, website domain, related web-site domain(s), and the website localization degree that is required (1 to 5, related to the Cultural Markers Pyramid).

The target country is needed to establish the specific social cultural characteristics of the country. The domain of the website is needed in order to be able to choose the relevant digital cultural markers related to the target website domain. For some localiza-tion levels, the related domain(s) are used as source of external information. And finally, it is necessary to identify the degree of website localization that must be ob-tained. Once these specifications are determined, the following phase can be performed.

- **Compose the required cultural model**

During the first phase, the localization level was identified. The goal of this phase is to list all the cultural markers for the target localization level. For example, to achieve level 4 of localization (variable, highly localized website), the cultural markers of e-culture, stable, broad and variable levels need to be taken into consideration. Once the

list of the cultural markers of the target website localization is ready, then the following phase defines the website design elements specifications.

- **Cultural specification**

The goal of the cultural specification phase is to establish a cultural description for the 6 different website design elements (Text, Layout and organization, Colors, Pictures, graphic elements and sound, Interaction, and Navigation) for the target culture group. The cultural markers guidelines formulated collected in the previous phase needs to be used for this cultural investigation.

To perform this phase, the website developer should investigate the target local culture, as Del Galdo and Nielsen suggested (Del Galdo & Nielsen, 1996), e.g., using existing studies or by interviewing people from the target culture or people having a good understanding of target culture preferences.

- **Website design elements specification**

Based on the cultural specifications phase, the specifications for the 6 groups of website design elements (see Table 5-2) will be defined. The website design elements specifications should be ready to be used for the design of the target localized website.

## **6.5 Conclusion**

Website users are using two different types of cultures to understand a website: (1) a digital culture and (2) a social culture. It is essential to take these two types of cultures into account when designing a website. The digital culture is shared between all web users from different cultural groups and is created by using the Web. The social culture is the result of growing up and living in a certain social environment.

There are three different groups of digital cultural markers. The first group is Web Digital Markers (WDM), which is across all website domains, and shared between all web users. The second group is Domain Digital Markers (DDM), which is for a specific website domain, and shared between all web users. And the third group is Country Digital Markers (CDM), which is including the markers shared between Web users from a specific country or nation, and appropriate for all website domains.

The main contribution of this chapter is a multi-level Cultural Markers Pyramid for the development of culture-centred websites. Five groups of cultural markers are organized as a pyramid targeting five different levels of website localization. The levels within the Cultural Markers Pyramid classify the factors that contribute to localization

into a number of levels. This approach comes from the observation that one single cultural model for localizing websites design could, in fact, be a poor choice because different levels of localization may be needed in different situations. The five website localization levels are: (1) e-culture level - not localized (but rather globalize) website, (2) stable cultural level - semi-localized website, (3) broad cultural level - localized website, (4) variable cultural level - highly localized website, and (5) vista cultural level - fully cultural localized website.

Each website localization level represents a group of related cultural markers and anthropological cultural dimensions, having its own sensitivity and level of importance for website design and localization. The first level “called the e-culture” has the highest priority level in website localization but provide the lowest level of localization, the second priority is level 2 “the stable ones”, and so on, while the least priority is the Vista level with the most cultural oriented group of markers. In this way, website developers can choose between the five levels of localization depending on the cultural adaptation needs formulated for the website. The degree of localization needed varies from country to country and, in some cases, even within the same country. Also the available resources to develop a website may be a factor that influences the choice for a certain level of localization.

The cultural levels identify important cultural dimensions to be used, as well as aspects of website design elements that are important for each level of localization. Each website design element has its own requirements in each level of the Cultural Markers Pyramid.

A theoretical method for culture-centred website design was proposed. The proposed method is composed of four phases. The method only concentrates on the localization aspects of the design and therefore cannot be considered as a complete website design method.

## **7 The Cultural Conceptual Model (C2M) & the LWDA tool: Putting the Cultural Markers Pyramid into Practice**

“Design can be art. Design can be aesthetics. Design is so simple, that's why it is so complicated.”

--- Paul Rand

## 7.1 Introduction

In the previous section 6.3, we have described five groups of cultural markers to be used as a guideline in order to design culture-centred websites. The groups are organized as levels in a pyramid and in this way it allows for different degrees of website localization. The proposed Cultural Markers Pyramid is useful for technical users who are familiar with anthropological cultural dimensions, and willing to use them for designing a localized website. Although the Cultural Markers Pyramid provide useful guidelines for website localization, in practice, the user of the Cultural Markers Pyramid still needs to investigate the culture of this target audience. This can be, depending on the required level of localization, a very time intensive job. In this chapter, we aim to remove this disadvantage and provide an environment ready to use for any website developer. For this, we will create a localization ontology to provide an abstract cultural specifications, and a cultural markers knowledge base that contains all the information provided in the Cultural Markers Pyramid and that can be filled with concrete information about specific cultures and web domains. In this way, a website designer can query the knowledge base and obtain a concrete set of guidelines on how to localize a website for a specific country, a specific website domain, and for a specific localization level.

To realize this, we will first construct the conceptual model for the knowledge base. We call this conceptual model, the Cultural Conceptual Model (C2M). Object Role Modelling (ORM) is used for modelling C2M. ORM is a powerful fact-oriented approach for designing models at the conceptual level. Furthermore, the use of ORM allows easy mapping to different technical output formats such as ontologies, XSD, relational schema, and ER model. Based on C2M, a proof of concept tool, called Localized Website Design Advisor (LWDA), has been developed to dynamically generate advice on how to localize a website based on the target country, language, level of localization, and website domain.

This chapter is structured as follows. In section 7.2, we explain the necessity of describing the cultural markers pyramid using a conceptual modelling formalism, and the reason for using the Object Role Modelling (ORM) language for this. Section 7.3 describes the Cultural Conceptual Model (C2M) using ORM. In section 7.4, we describe how to use the Cultural Conceptual Model (C2M) in practice. The Localized Website



Design Advisor (LWDA) tool is outlined in section 7.5. Conclusions are drawn in section 7.6.

## **7.2 Conceptual Model: Requirements and Techniques**

The purpose of the Cultural Conceptual Model is to provide a conceptual representation of the Cultural Markers Pyramid for the purpose of proving a knowledge base which should contain the concrete guidelines of the pyramid as well as concrete information about different cultures to be used for applying the guidelines for a particular website design. This means that the conceptual model should represent the components and their relationships of the different cultural markers levels, i.e. the website design elements and anthropological cultural dimensions (cultural markers), as well as the relationships in terms of cultural needs. By this, every level of the five cultural localization levels in the pyramid is formally modelled and described.

In the rest of this section, we first discuss the need for a conceptual model and next we motivate the use of ORM for this conceptual model.

### **7.2.1 The Need for a Conceptual Model**

It is essential to represent the cultural markers pyramid guidelines by means of a conceptual representation for the following reasons and benefits:

- A conceptual model provides a formal description of the Cultural Markers Pyramid and its guidelines.
- The conceptual model of the localization levels can be viewed in one place, thus it is easy to see all localization levels together and to understand the relationships among them.
- A conceptual model is easy to be shared by experts and provide a central and unique source of knowledge, which can be used to maintain and enhance this knowledge.
- The conceptual model can be used to provide tools for testing and validation the knowledge.
- The conceptual model can be used by different applications and systems to provide different kinds of support.

## 7.2.2 Object-Role Modelling (ORM) for Conceptual Knowledge Representation

Object-Role Modelling (ORM) is a conceptual modelling approach that was developed in the early 1970's. It models the world in terms of objects and the roles that they can play. It specifies the model using modelling concepts that can easily be understood by non-technical people. ORM is easy to understand and flexible for change (see section 2.3.1). The following figure, Figure 7-1, depicts a simple example of an ORM diagram illustrating the relationship between a Website and a Website project name.

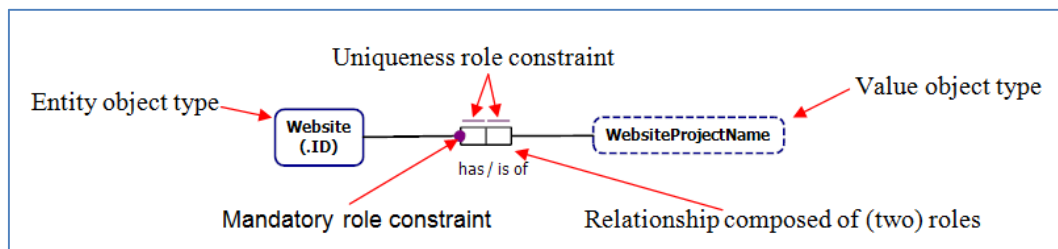


Figure 7-1 ORM Conceptual Modelling Shows the Relationship between Website and Website Project Name

One can see in this example that ORM distinguish between two types of object types:

- Value object type (e.g., *WebsiteProjectName*): the instances of a Value type can be pronounced or written down. A value object type is represented by a dashed oval. The name of the value type is put inside the oval.
- An entity object type (e.g., *Website*): The instances of an entity object type can only be represented by means of some other object type(s). In general, an instance of a value type is used to refer to an instance of an entity type, e.g. a *WebsiteProjectName* is used to refer to a *Website*. An entity is represented by means of a solid oval. The name of the entity type is put inside the oval. The (.ID) under the Website is called the reference of the entity.

The relationships between object types are represented by connected boxes and lines that connect the boxes to the object type lines. The boxes represent the roles that the object types play in the relationship. In general, the roles are named. Some symbols are used to express constraints:

- Uniqueness role constraint (Notation: '—' under or above the role box(es)), the example shows the 1:1 (one-to-one) cardinality restriction. It can be ver-

balized as “each Website has at most one Website project name, AND each Website project name is of one Website”.

- Mandatory role constraint (Notation: ‘•’ on the relevant role), the example constraint means that “each Website must have a Website project name”.
- Exclusive role constraint (Notation: ‘⊗’ between the relevant roles), indicates that the populations of the two roles are mutually exclusive.

#### 7.2.2.1 Advantages of ORM for C2M

The ORM is particularly suited to model the cultural markers pyramid guidelines because of the following most essential features of the ORM:

- ORM is human-oriented, it is easy to be understood by non-computer-technical users (Halpin, 2006).
- ORM has an expressive and reliable graphical notation. This expressiveness allows a high level of detail to be included in the graphical notation and therefore more thorough analysis is possible.
- ORM is easy to be shared, exchanged, tested, validated and maintained.
- ORM can be translated into pseudo natural language statements. The benefit primarily being that the whole ORM schema can be verified and understood by business analysts (Jarrar, 2005).

#### 7.2.2.2 ORM Tools

There are many tools that support drawing ORM models such as such as Microsoft visual studio<sup>45</sup>, Norma (Neumont ORM Architect)<sup>46</sup>, ORM2 Draw<sup>47</sup>, Collibra Studio<sup>48</sup> and Case Talk<sup>49</sup>. Each of the previous tools has its own characteristic and level of support.

We actually tested and compared the tools available. For the needs of this project, the Norma modelling tool was chosen to be used for drawing the Cultural Conceptual Model (C2M). The Norma is free and available as open source plug-in for Microsoft visual studio. It is capable of verbalizing most constraints, and provide automatic code

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<sup>45</sup> [www.microsoft.com/visualstudio](http://www.microsoft.com/visualstudio)

<sup>46</sup> [http://www.ormfoundation.org/files/folders/norma\\_the\\_software/default.aspx](http://www.ormfoundation.org/files/folders/norma_the_software/default.aspx)

<sup>47</sup> [http://www.ormfoundation.org/files/folders/visio\\_stencils/entry2878.aspx](http://www.ormfoundation.org/files/folders/visio_stencils/entry2878.aspx)

<sup>48</sup> <http://www.collibra.com/>

<sup>49</sup> <http://www.casetalk.com>

generation for a variety of database management systems (e.g., SQL Server, DB2, Oracle and MySQL) as well as class models and different technical output format (e.g., XML, XSD, UML, OWL, etc).

### 7.3 The Cultural Conceptual Model (C2M)

The Cultural Markers Pyramid and its guidelines are represented as a conceptual model using the ORM. The complete model is illustrated in Figure 7-2. The conceptual model has been tested and several improvements have been applied before we obtained this final model.

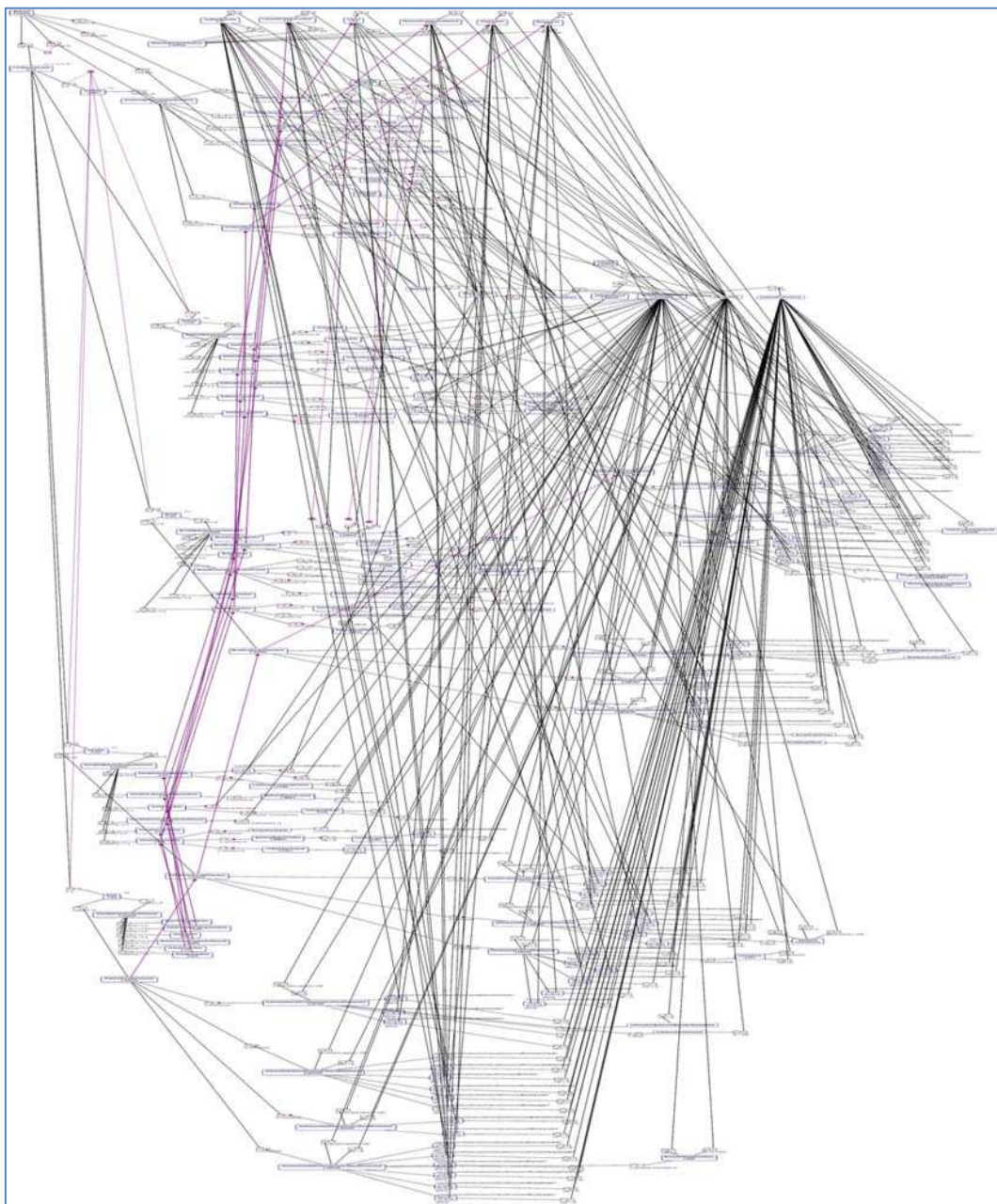


Figure 7-2 Cultural Conceptual Model

As it would be rather extensive to describe the complete Cultural Conceptual Model (C2M) in detail, the following two sections, section 7.3.1 and 7.3.2, are going to describe the main components of the C2M and the conceptual representation of the main six website design elements. Section 7.3.3 describes briefly the five localization levels. The full C2M is available on the attached CD and on the project website (<http://www.mushtaha.be/PhD>).

### 7.3.1 C2M Starting Point: Website

An important object type of the C2M is the object type *Website*. This can be used as a starting point for traversing the model. Figure 7-3 provides the relevant part of C2M.

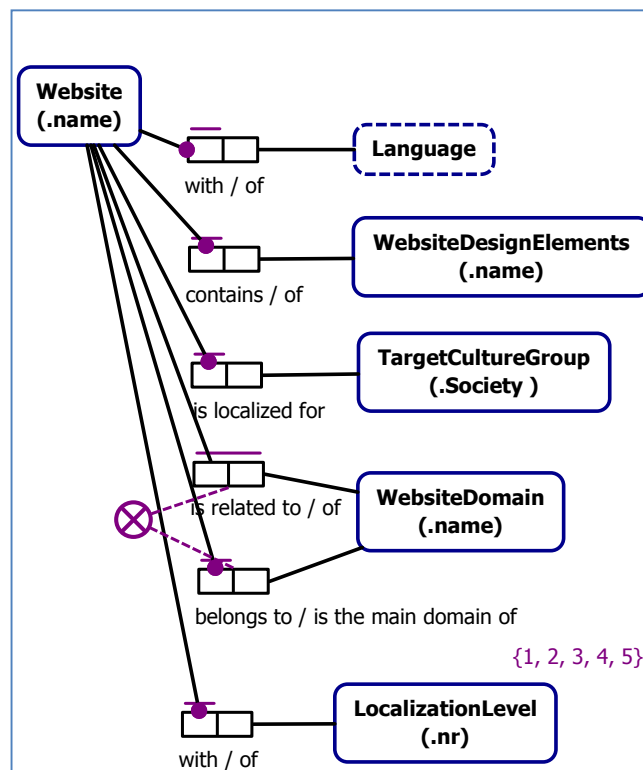


Figure 7-3 C2M Main Components

The above ORM fragment, Figure 7-3, is verbalized as following:

- *Website* is an entity type. The (.name) under *Website* is the reference for *Website*, i.e. a website is uniquely identified by its name. Thus, this means that “every website has at least and at most one name”.
- Each *Website* with exactly one *Language*.

- Each *Website* contains exactly one *WebsiteDesignElements*. This *WebsiteDesignElements* group is an entity type and is further specified in Figure 7-4.
- Each *Website* is localized for exactly one *TargetCultureGroup*.
- Each *Website* is belonging to exactly one *WebsiteDomain*.
- A *Website* may be related to some *WebsiteDomain*. It is possible that one *Website* is related to more than one *WebsiteDomain* or to none.
- Each *Website* is with exactly one *LocalizationLevel*. The possible localization levels are (1, 2, 3, 4 and 5). This is further elaborated in Figure 7-5.
- No *Website* is related and belongs to the same *WebsiteDomain*.
- The circled “X” (symbol ⊗) depicts an exclusion constraint, indicating the populations are mutually exclusive. It means that, no website is related and belongs to the same website domain.

### 7.3.2 Website Design Elements

The following ORM fragment, Figure 7-4, shows the main components of Website design elements.

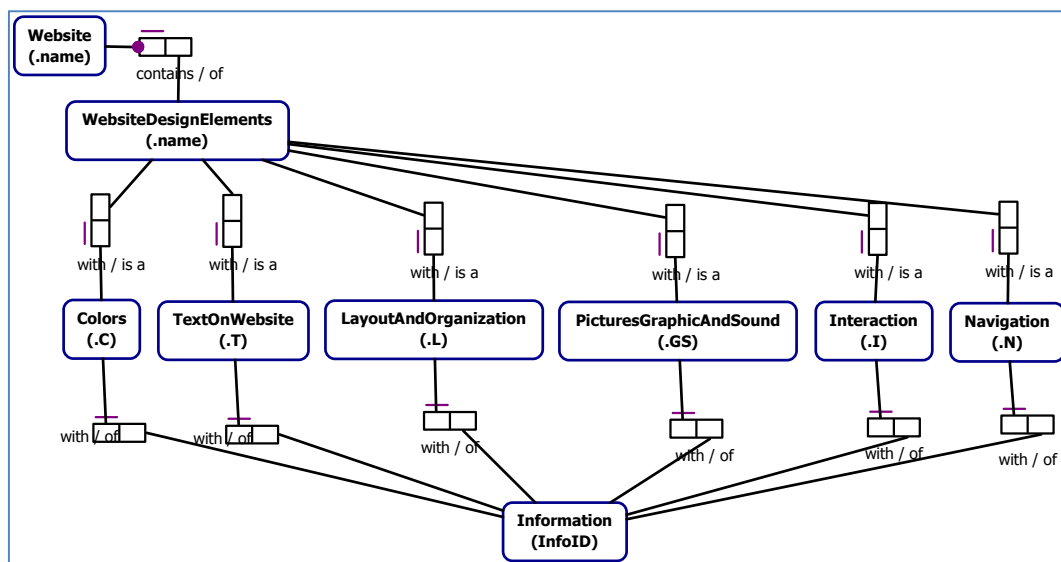


Figure 7-4 C2M of the Website design elements

The above ORM representation Figure 7-4 can be verbalized as following: Each *Website* contains exactly one *WebsiteDesignElements* group. This *WebsiteDesignElements* group is an entity type that contains six main different website design elements groups: (1) *TextOnWebsite*, (2) *LayoutAndOrganization*, (3) *Colors*, (4) *Pic-*

turesGraphicAndSound, (5) Interaction, and (6) Navigation. Each one of the previous six website design elements is linked to an entity object type “information”.

### 7.3.3 Localization levels

Figure 7-5 gives the ORM schema for the five different levels of website localization.

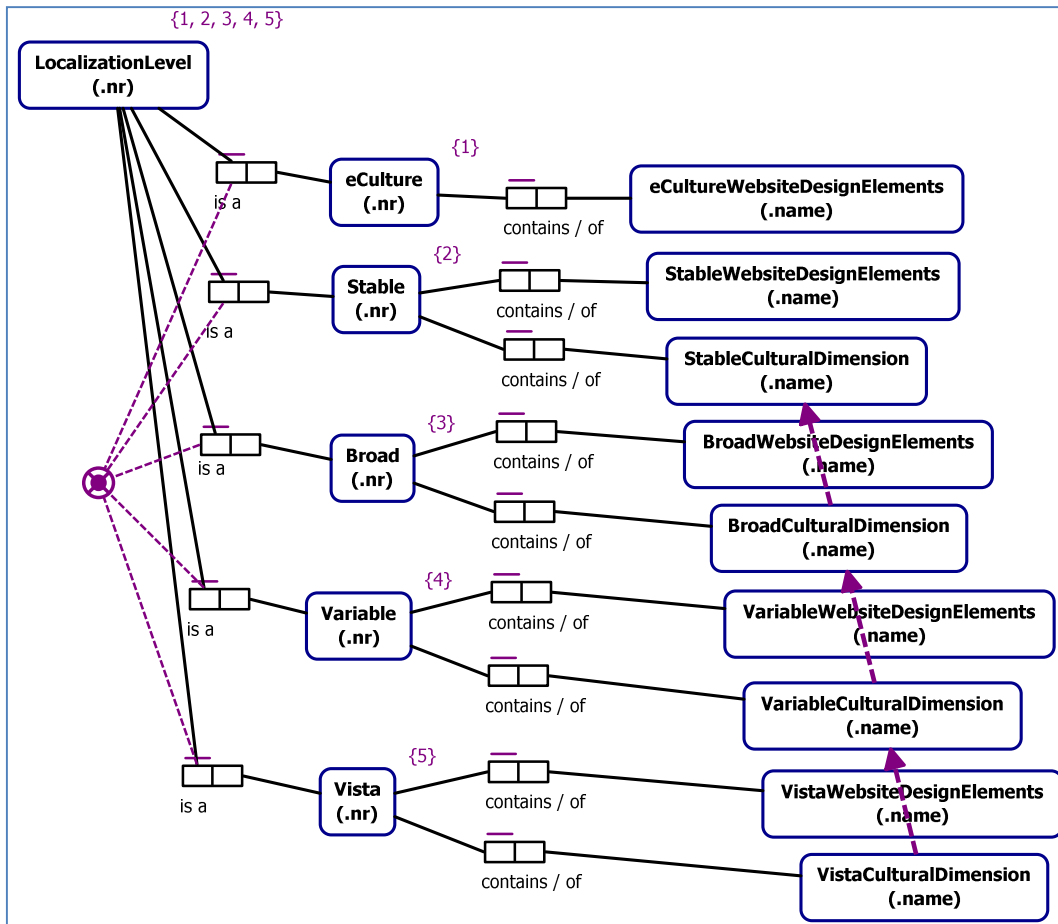


Figure 7-5 ORM schema for website localization levels

The above ORM schema, Figure 7-5, in combination with Figure 7-3 is state that each *Website* is with exactly one *LocalizationLevel*. That localization level has to be one to five as following (1) *eCulture*, (2) *Stable*, (3) *Broad*, (4) *Variable*, and (5) *Vista*. The exclusion ( $\otimes$ ) and exhaustion ( $\odot$ ) constraints mean that, at least and most one of the five previous localization levels can be applied. In other words, any website can only achieve one particular localization level.

The following sections (7.3.3.1, 7.3.3.2, 7.3.3.3, 7.3.3.4 and 7.3.3.5) briefly describe the five different localization levels.



7.3.3.1 E-culture Level

As described in section 6.3.2.1 in this thesis, the e-culture localization level is only considering digital cultural markers for website design element and no anthropological cultural dimensions are used for this localization level. As it would be rather extensive to describe the complete ORM schema of the e-culture localization level here, the following figure, Figure 7-6, illustrates a simplified ORM schema of it.

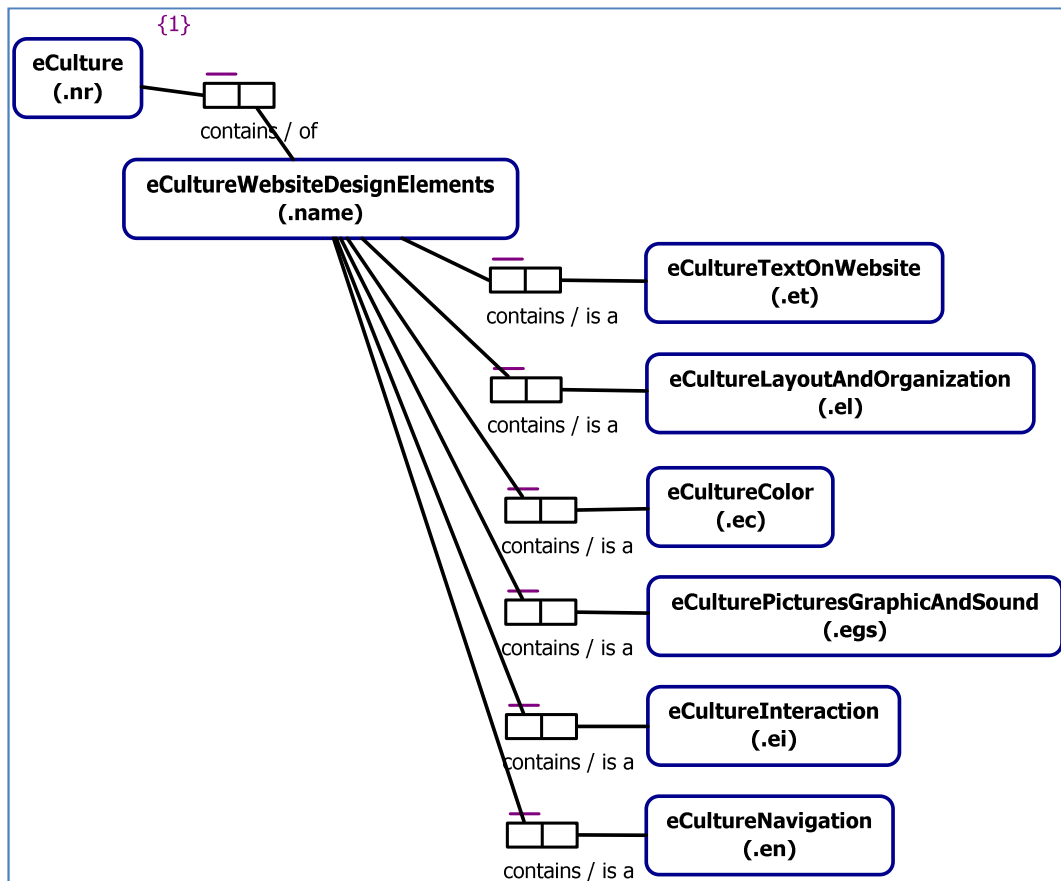


Figure 7-6 Simplified ORM Schema of E-culture Localization Level

Figure 7-6 shows that eCulture localization level contains at most one *eCultureWebsiteDesignElements* group. The *eCultureWebsiteDesignElements* group contains six website design elements as following: (1) *ECultureTextOnWebsite*, (2) *ECultureLayoutAndOrganization*, (3) *ECultureColor*, (4) *ECulturePicturesGraphicAndSound*, (5) *eCultureInteraction*, and (6) *ECultureNavigation*.

Note that each of the six *eCultureWebsiteDesignElements* group is actually a sub-type of its corresponding *WebsiteDesignElements* (given in Figure 7-4). Figure 7-7 shows the *eCultureWebsiteDesignElements* and its associated super-types. For example, the *ECultureTextOnWebsite* is a sub-type of the *TextOnWebsite*. The sub-type in



this situation means that the *ECultureTextOnWebsite* is a special kind of a *TextOnWebsite* object. Thus, all the characteristics of the *TextOnWebsite* are inherited by *ECultureTextOnWebsite*, which adds more specific characteristics.

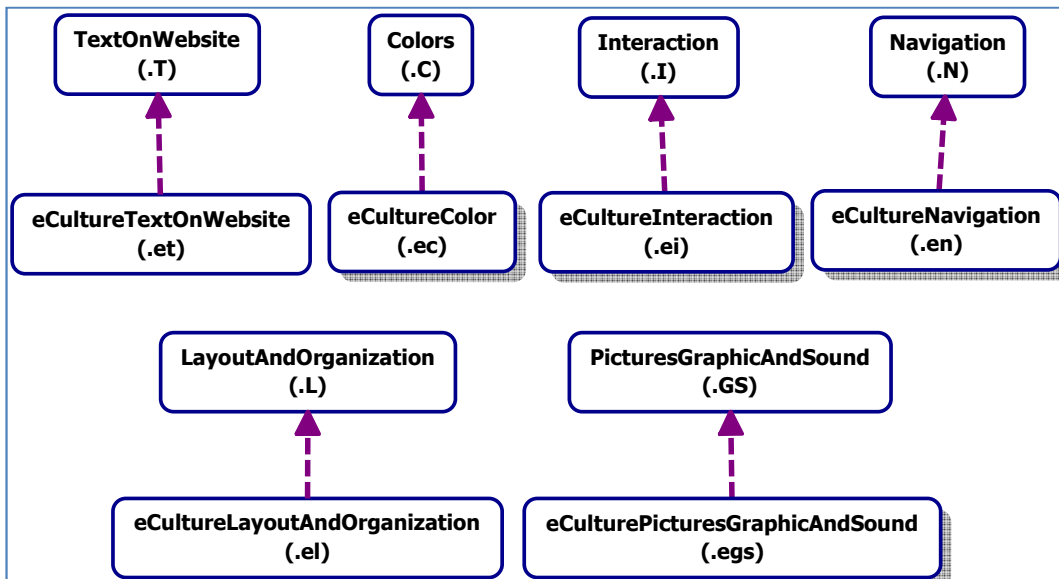


Figure 7-7 ORM Schemas of E-culture Sub-type Website Design Elements

### 7.3.3.2 Stable Level

Stable level is the second level in the Cultural Markers Pyramid. As described in the previous section 6.3.2.2, this localization level considers website design elements and those anthropological cultural dimensions that are essential for this level of cultural adaptation. Figure 7-8 shows a simplified conceptual ORM fragment for this localization level.

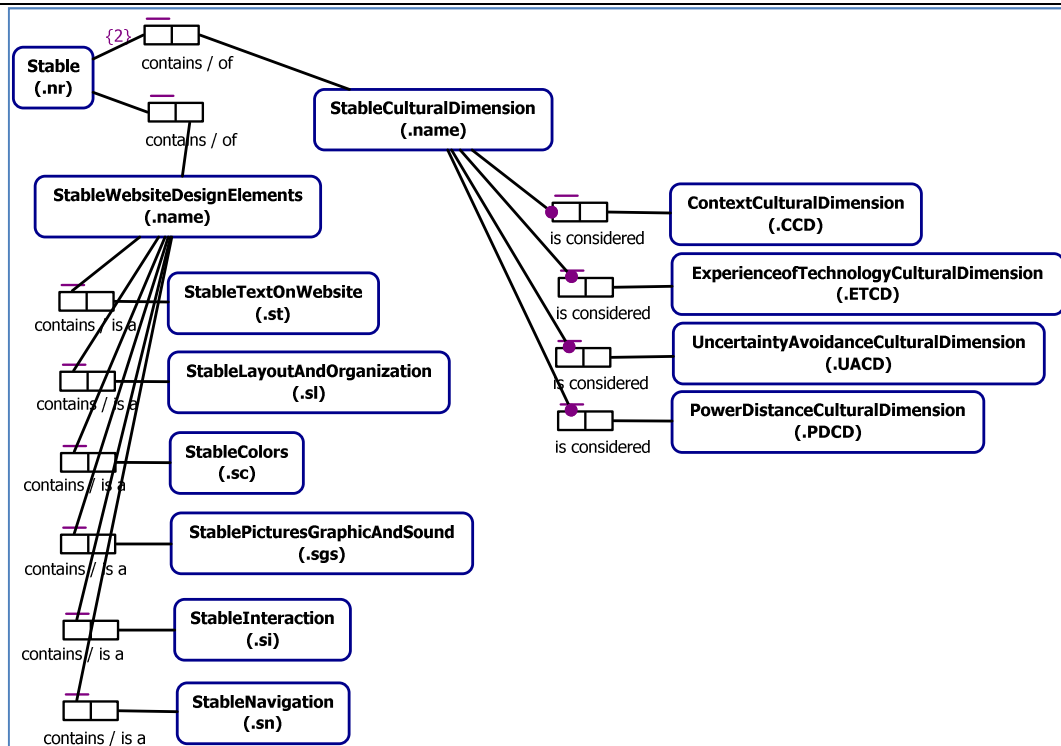


Figure 7-8 Simplified ORM Schemas of Stable Localization Level

As described in Figure 7-8, the stable level contains *StableWebsiteDesignElements* and *StableCulturalDimension*.

- *StableWebsiteDesignElements* contains six different website design elements: (1) *StableTextOnWebsite*, (2) *StableLayoutAndOrganization*, (3) *StableColors*, (4) *StablePicturesGraphicAndSound*, (5) *StableInteraction*, and (6) *StableNavigation*. Each of these six Stable website design elements is a sub-type of its corresponding *eCultureWebsiteDesignElements*.
- *StableCulturalDimension* considers four different anthropological cultural dimensions.

It is not possible to explain this localization level in full detail because it involves too much detail, therefore the following example, illustrated in Figure 7-9, shows a simplified conceptual model of *StableTextOnWebsite*, and *StableColors*.

- *StableTextOnWebsite* is a sub-type of the *ECultureTextOnWebsite*. In this way, *StableTextOnWebsite* inherits the specifications of the *ECultureTextOnWebsite* and can add some own specific specifications, which are (1) *TextAmount* and (2) *TextFormality*. If the own specific specifications are conflicting the specifications of the super-type then ORM offers constraints able to remove this overlapping.

- *StableColors* is a sub-type of *ECultureColor*, and it has its own specification which is *SensitiveColors*. This object type is linked with *WebsiteDomain* through a nested relationship this is because it is possible that more than one *SensitiveColors* is used in the same *WebsiteDomain*, and that the same *SensitiveColors* is used in more than one *WebsiteDomain*.

It is read like: “SensitiveColors used in WebsiteDomain for specific target-CultureGroup has ColorMeaning”. For example, *Sensitive Color: [Red] used in website domain: [News] for target culture group: [Japan] has color meaning: [happiness, wealth, longevity and good luck. This is to be used for pleasure news. Not to be used for bad news, even if it is important].*

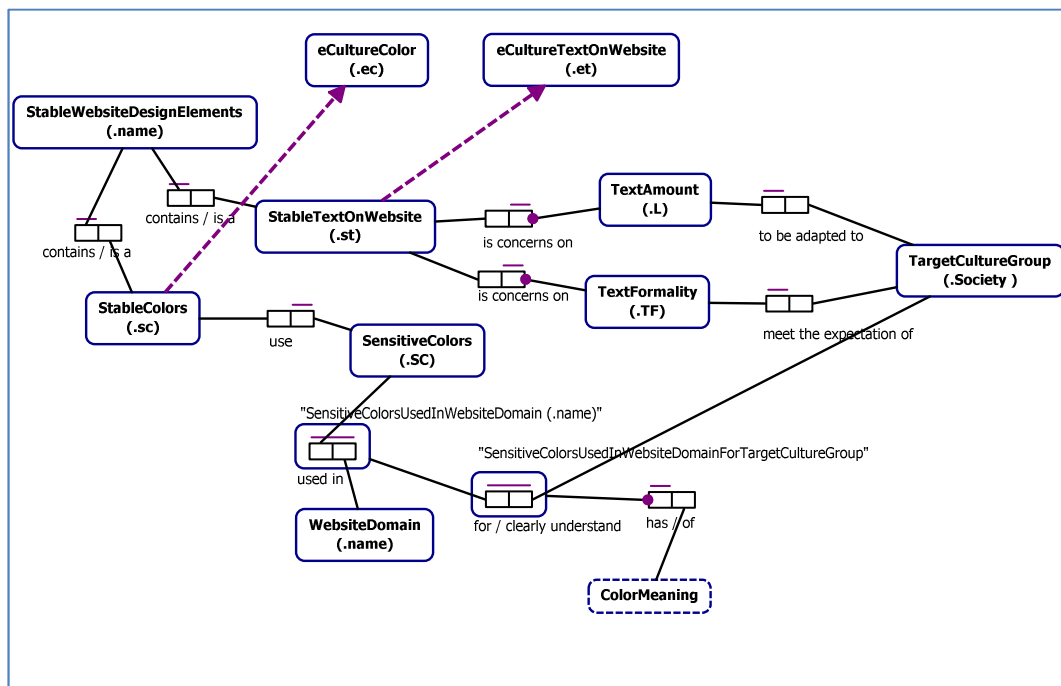


Figure 7-9 ORM Schemas Shows Some Relations between Stable Website Design Elements

### 7.3.3.3 Broad Level

The Broad localization level is containing two main components *BroadWebsiteDesignElements* and *BroadCulturalDimension*. Figure 7-10 shows a very simplified conceptual ORM fragment of this localization level.

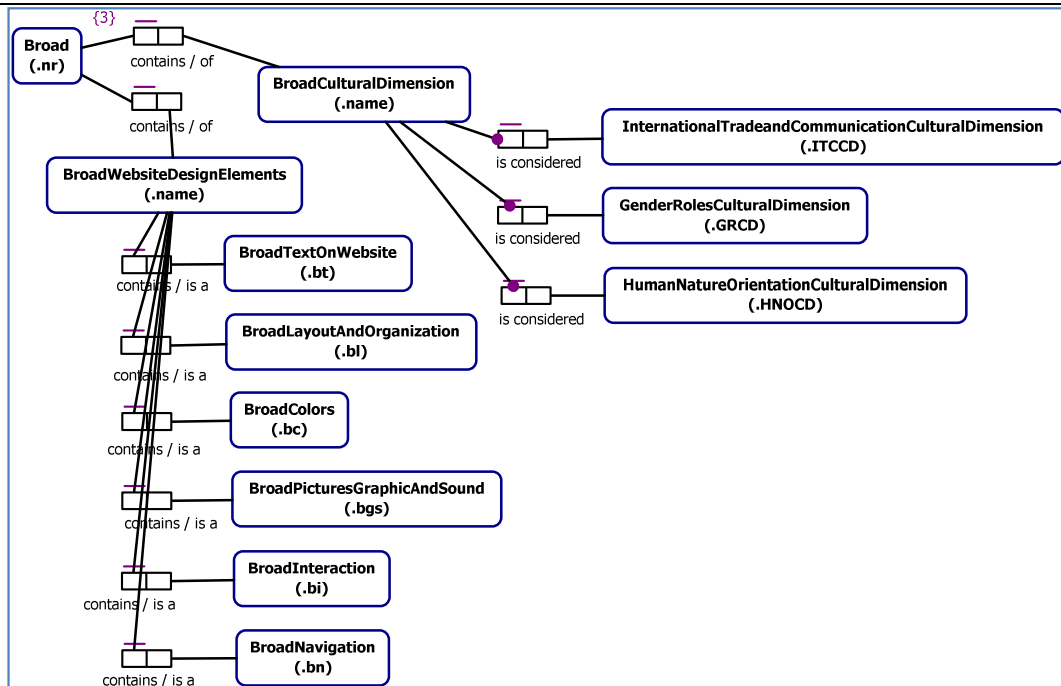


Figure 7-10 Simplified ORM Schemas of Broad Localization Level

- *BroadWebsiteDesignElements* contains six different website design elements as following: (1) *BroadTextOnWebsite*, (2) *BroadLayoutAndOrganization*, (3) *BroadColors*, (4) *BroadPicturesGraphicAndSound*, (5) *BroadInteraction*, and (6) *BroadNavigation*.

Each one of the broad website elements is a sub-type of the stable peer component. For example, *BroadNavigation* is a sub-type of *StableNavigation*, *BroadColors* is a sub-type of *StableColors*, etc. Accordingly, every broad website design element component inherits all the characteristics of its peer related stable website design elements component. Moreover, it adds some own specific characteristics for the broad localization level.

- *BroadCulturalDimension* is a sub-type of *StableCulturalDimension*. Therefore the *BroadCulturalDimension* contains the four cultural dimensions of the *StableCulturalDimension*, illustrated in Figure 7-8, in addition to the following three cultural dimensions as illustrated in Figure 7-10: *InternationalTradeandCommunicationCulturalDimension*, *GenderRolesCulturalDimension*, and *HumanNatureOrientationCulturalDimension*. Every cultural dimension is described in full details in the conceptual representation. Figure 7-11 describes as an example the *InternationalTradeandCommunicationCulturalDimension*.

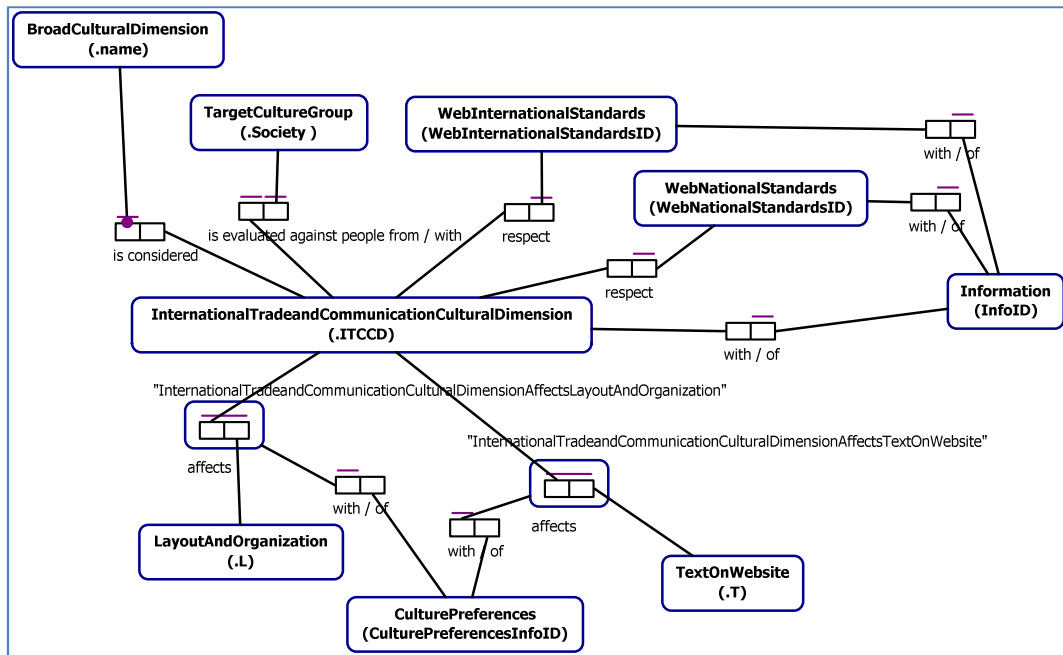


Figure 7-11 ORM Schemas of International Trade and Communication Cultural Dimension

As appears from the previous Figure 7-11, the *InternationalTradeandCommunicationCulturalDimension* respects *WebInternationalStandards* and *WebNationalStandards*. Furthermore, this cultural dimension affects *LayoutAndOrganization* and *TextOnWebsite*. And, this cultural dimension needs to be evaluated against people from *TargetCultureGroup*.

#### 7.3.3.4 Variable Level

As shown in the following ORM schema, illustrating in Figure 7-12, the Variable level contains two main components *VariableWebsiteDesignElements* and *VariableCulturalDimension*.

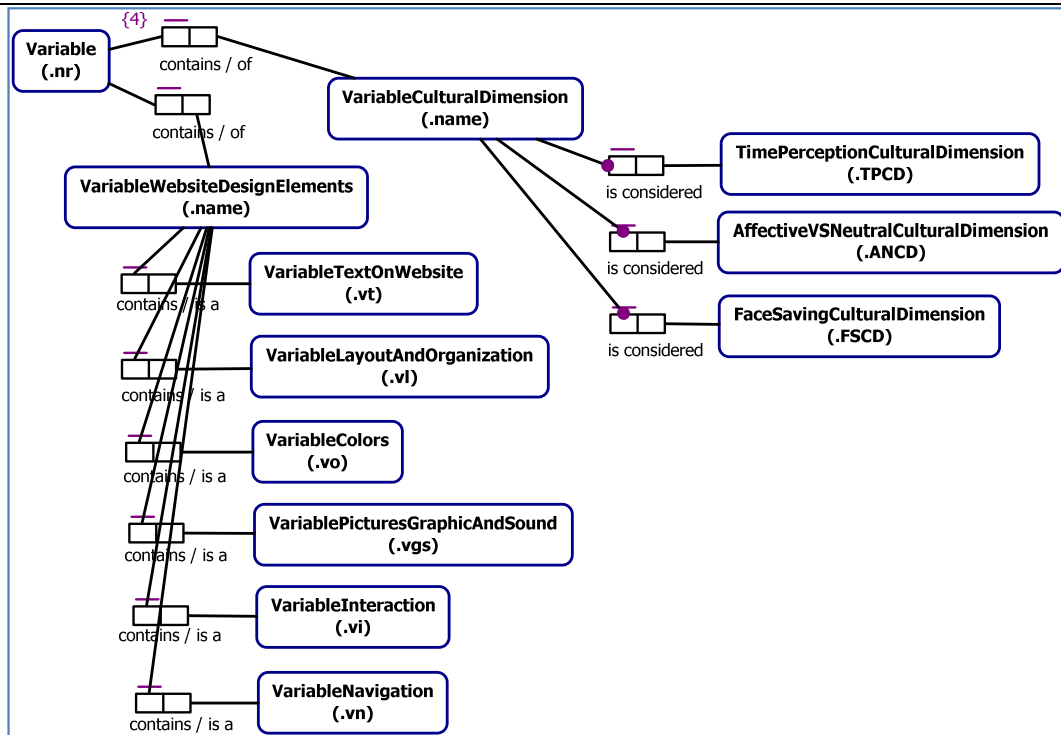


Figure 7-12 Simplified ORM Schemas of Variable Localization Level

- *VariableWebsiteDesignElements* contains six main variable website design elements: (1) *VariableTextOnWebsite*, (2) *VariableLayoutAndOrganization*, (3) *VariableColors*, (4) *VariablePicturesGraphicAndSound*, (5) *VariableInteraction* and (6) *VariableNavigation*.

Each of the previous six components is a sub-type of its relevant peer broad website design element component. As an example, the *VariableTextOnWebsite* is a sub-type of the *BroadTextOnWebsite*. Thus, *VariableTextOnWebsite* inherits all characteristics of *BroadTextOnWebsite* and adds some specific characteristics.

- *VariableCulturalDimension* is a sub-type of the *BroadCulturalDimension*. Therefore, the *VariableCulturalDimension* contains the seven cultural dimensions listed in *BroadCulturalDimension* in addition to the following three cultural dimensions (see Figure 7-12): *FaceSavingCulturalDimension*, *AffectiveVSNeutralCulturalDimension*, and *TimePerceptionCulturalDimension*.

7.3.3.5 Vista Level

Figure 7-13 illustrates a very abstract conceptual schema for the Vista localization level. As shown, this localization level contains two main components *VistaWebsiteDesignElements*, and *VistaCulturalDimension*.

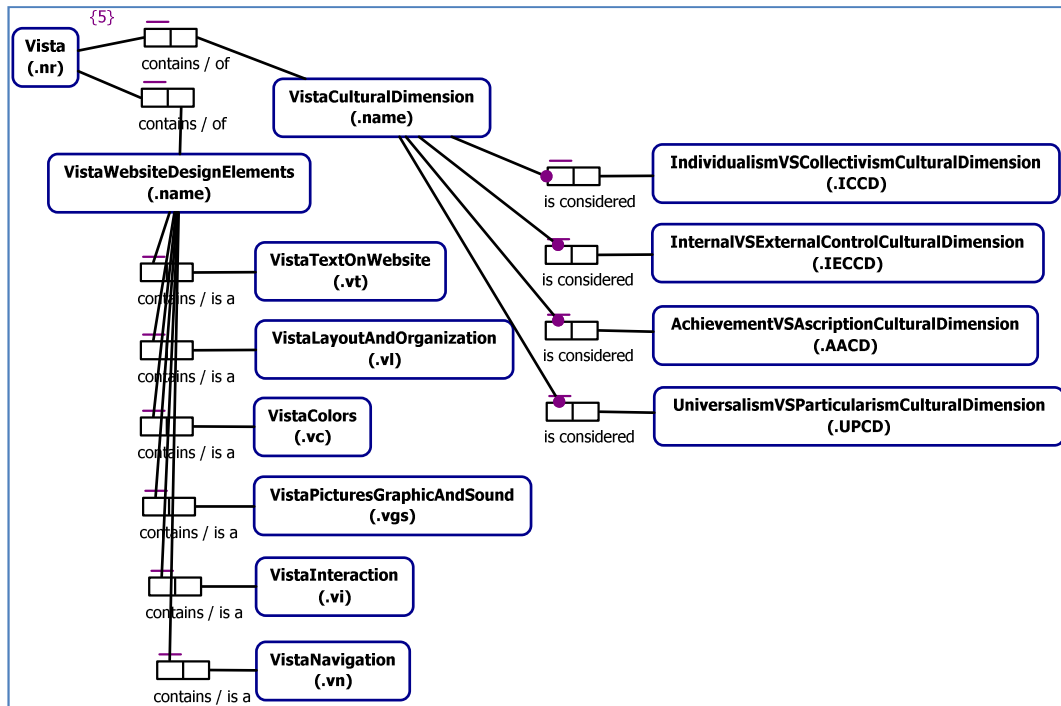


Figure 7-13 Simplified ORM Schemas of Vista Localization Level

- *VistaWebsiteDesignElements* contains six different website design elements, as following: (1) *VistaTextOnWebsite*, (2) *VistaLayoutAndOrganization*, (3) *VistaColors*, (4) *VistaPicturesGraphicAndSound*, (5) *VistaInteraction* and (6) *VistaNavigation*.

Each one of these vista website design component is a sub-type of its relevant peer variable website design component. Consequently, and as an example, the *VistaTextOnWebsite* inherits all the characteristics of the *VariableTextOnWebsite*.

As an example, Figure 7-14 shows the ORM schema for the *TextOnWebsite* for all different localization levels. As shown in the figure, the top of the hierarchy is *TextOnWebsite*. The *eCultureTextOnWebsite* is a sub-type of *TextOnWebsite*. *StableTextOnWebsite* is a sub-type of *eCultureTextOnWebsite*. *BroadTextOnWebsite* is a sub-type of *StableTextOnWebsite*. *VariableTextOnWebsite* is a sub-type of *BroadTextOnWebsite*. Finally, *VistaTextOnWebsite* is a sub-type of *VariableTextOnWebsite*. As described

earlier, each website component inherits the characteristics of all its super-types.

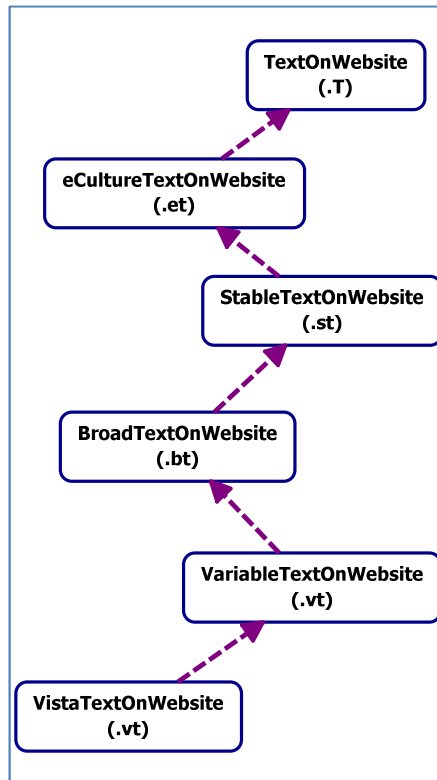


Figure 7-14 TextOnWebsite Sub-type ORM Schemas

- VistaCulturalDimension* is a sub-type of *VariableCulturalDimension*. This means that *VistaCulturalDimension* is considering all previous anthropological cultural dimensions considered, and add to them the following four specific anthropological cultural dimensions (as shown in Figure 7-13) (1) *IndividualismVSCollectivismCulturalDimension*, (2) *InternalVSExternal-ControlCulturalDimension*, (3) *AchievementVSAscriptionCulturalDimension*, and (4) *UniversalismVSParticularismCulturalDimension*.

The following ORM schema, Figure 7-15, shows how the different cultural dimensions are related to each other. The first group is the *StableCulturalDimension*, which contains the four anthropological cultural dimensions important for the stable localization level. The second group is the *BroadCulturalDimension*, which is a sub-type of *StableCulturalDimension*. In this way, *BroadCulturalDimension* includes the four cultural dimensions listed for *StableCulturalDimension*, and in addition to its own three cultural



anthropological dimensions. *VariableCulturalDimension* is a sub-type of *BroadCulturalDimension*, so *VariableCulturalDimension* inherits all cultural dimensions listed for *BroadCulturalDimension*, and has three own cultural anthropological dimensions important and special for this localization level. *VistaCulturalDimension* is a sub-type of *VariableCulturalDimension*; in this way *VistaCulturalDimension* includes all cultural dimensions listed for all super-type cultural levels and adds to them its own special cultural dimensions.

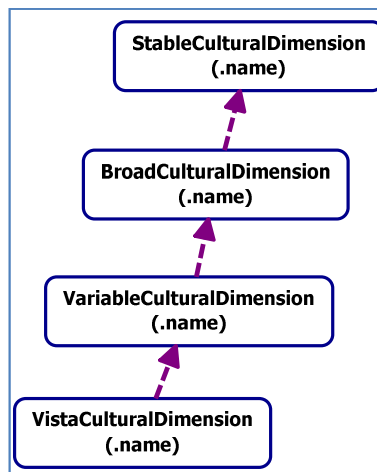


Figure 7-15 Simplified ORM Schemas of Anthropological Cultural Dimensions Groups

#### 7.4 Putting the Cultural Conceptual Model (C2M) into Practice

While the previous section explained the main components of the Cultural Conceptual Model (C2M), this section is going to detail how to use the conceptual model in practice. Figure 7-16 summaries the steps we followed. They are as following:

- 1- *Exploring the Website user's social and digital cultural characteristics*: In general, this is done by a cultural expert. We studied this in the first part of the thesis.
- 2- *Construct the Cultural conceptual model "C2M"*: This is described in the previous section, section 7.3, of this chapter. Later on, social and digital culture experts or researchers can edit or improve this conceptual model.
- 3- *Transform C2M into a practical format*: To be useable in practice, it is best to translate the C2M into a format that can be implemented easily. This transformation will be described on this section.

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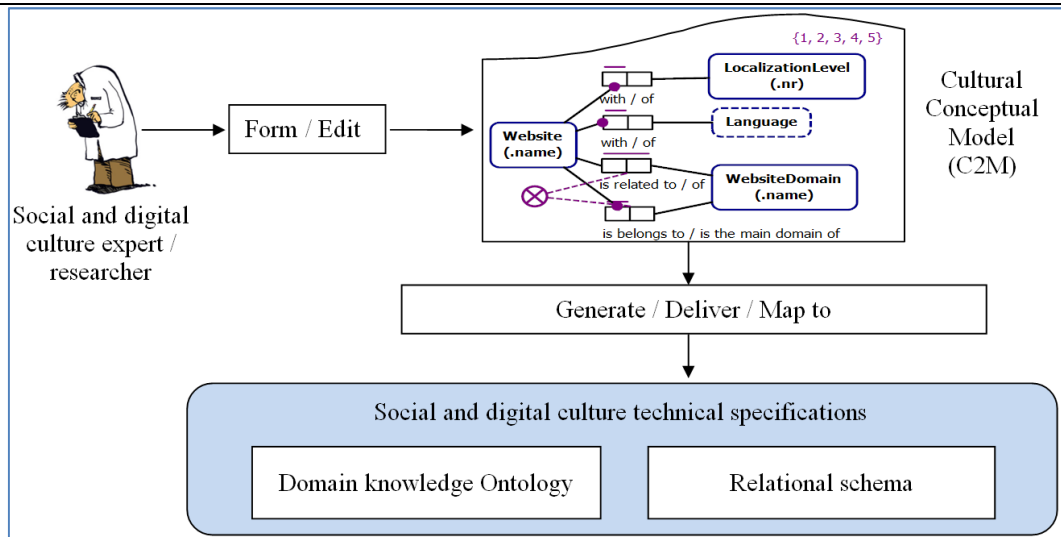


Figure 7-16 Steps followed the research

As appears above in Figure 7-16, the intent is to transform the proposed C2M to different technical specifications usable in practise. The technical output formats targeted are: (1) Domain knowledge Ontology (Localization ontology), (2) Relational schema. The following sections will describe these technical output formats and how to use them in the context of localised website design.

#### 7.4.1 Domain Knowledge Ontology “Localization Ontology”

There are two fundamental reasons why it would be beneficial to have the Cultural Conceptual Model in an ontology format:

- Ontologies are machine understandable, in such a way that they enable making statements and asking queries about websites (Erlangung et al., 2004; Jarrar, 2005).
- An ontology could be used to create a knowledge base about cultural specifications for target countries and localized website design. The knowledge base is formed by the ontology and a set of individual instances of its classes, and can be queried by agents in order to enrich, reuse and maintain them (this issue is going to be discussed later in section 7.5 of this chapter).

##### 7.4.1.1 Building a Localization Ontology from C2M

As explained in section 2.3.2, there are upper level and domain level ontologies. The focus here is on the domain ontology. The ontology we are going to derive from the

C2M is an *ontology describing a particular domain which is website design, with the focus on the special purpose of cultural localization.*

To create such a localization ontology, we need to map or transform the C2M into an ontology. Practically, we need to transform the ORM model described previously in section 3 into an ontology language. There are a number of such languages: OIL (Stevens et al., 2003), Web Ontology Language (OWL) (Wikipedia et al., 2009) and Resource Description Framework (RDF) (Candan, 2004). OWL is recommended by the W3C and it is widely used as an ontology language among ontology users, thus our first choice was OWL. NORMA, the modelling tool that we used to model the C2M, is supposed to support the automatic generation of OWL from ORM, but till the last moment (last check on 23.03.2012), this feature is not totally finished. However, NORMA allows generating OIL and XML schema. Therefore we attempted to transform the generated OIL and XML Schema into an OWL document. This is described in the following sections.

#### 7.4.1.1.1 Mapping ORM into Ontology Inference Layer (OIL)

So far, the NORMA modelling tool is able to transform the ORM into OIL. The following listing, Code 7-1, shows an example of the OIL code that was automatically generated by NORMA (the full code is available on the attached CD and on the project website: <http://www.mushtaha.be/PhD>).

```
<oil:conceptType name="LocalizationLevel" sourceRef="85E3-21678F90501B">
  <oil:conceptTypeRef name="eCulture" target="eCulture" opposite-
Name="LocalizationLevel" mandatory="false" sourceRoleRef="6FA2E07998"/>
  <oil:conceptTypeRef name="Stable" target="Stable" opposite-
Name="LocalizationLevel" mandatory="false" sourceRoleRef="8BFECD2F89"/>
  <oil:conceptTypeRef name="Broad" target="Broad" opposite-
Name="LocalizationLevel" mandatory="false" sourceRoleRef="41528367AC"/>
  <oil:conceptTypeRef name="Variable" target="Variable" opposite-
Name="LocalizationLevel" mandatory="false" sourceRoleRef="2AD9B450C4"/>
  <oil:conceptTypeRef name="Vista" target="Vista" opposite-
Name="LocalizationLevel" mandatory="false" sourceRoleRef="5B87949C4B"/>
  <oil:informationType name="LocalizationLevel_nr" format-
Ref="LocalizationLevel_nr" mandatory="alethic" sourceRef="AED8-782E5894D0F6"
sourceRoleRef="98E6-CB3E41E88904">
    <oil:singleRoleUniquenessConstraint
name="InternalUniquenessConstraint15" sourceRef="_1D6B4273-1C56-46FC-87E3-
34B8425AD803" modality="alethic" isPreferred="true"/>
    <oil:valueConstraint name="RoleValueConstraint1" sourceRef="A0A6-
D262BEF97BEF" appliesTo="self" modality="alethic">
      <ormdt:enumeration value="1"/>
      <ormdt:enumeration value="2"/>
      <ormdt:enumeration value="3"/>
      <ormdt:enumeration value="4"/>
      <ormdt:enumeration value="5"/>
    </oil:valueConstraint>
  </oil:informationType>
</oil:conceptType>
```

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```
<oil:conceptType name="Stable" sourceRef="B62F-224CC7259016">
  <oil:conceptTypeRef name="StableWebsiteDesignElements" target="StableWebsiteDesignElements" oppositeName="Stable" mandatory="false" sourceRoleRef="8E22E03114"/>
  <oil:conceptTypeRef name="StableCulturalDimension" target="StableCulturalDimension" oppositeName="Stable" mandatory="false" sourceRoleRef="5C5586DBD4"/>
  <oil:informationType name="Stable_nr" formatRef="Stable_nr" mandatory="alethic" sourceRef="B7A1-94E8DEF3207C" sourceRoleRef="B468-74629950546A">
    <oil:singleRoleUniquenessConstraint name="InternalUniquenessConstraint31" sourceRef="B027-D95391081F06" modality="alethic" isPreferred="true"/>
    <oil:valueConstraint name="RoleValueConstraint3" sourceRef="A6D7-4D72C08653BA" appliesTo="self" modality="alethic">
      <ormdt:enumeration value="2"/>
    </oil:valueConstraint>
  </oil:informationType>
</oil:conceptType>
```

Code 7-1 OIL C2M Sample Code Generated by NORMA Tool

### 7.4.1.1.2 Mapping OIL and XML Schema into OWL

As OWL is recommended by the W3C and many tools are available for it, we attempted to transform the generated OIL and XML Schema (also generated with NORM) into OWL:

- *OIL into OWL*: There are a lot of tools that can do this transformation automatically. For example, Rager et al. (2003) offered an open source Perl scripting language to transform OIL into OWL. This transformation option was not followed because we do not have experience with Perl scripting.
- *XML Schema into OWL*: an Extensible Style sheet Language Transformations (XSLT) file is developed to dynamically transforming an XML Schema into OWL. The XSLT transformation file is an adapted version from the source file authored by Roberto García (González, 2005). This transformation option was adopted because we have experience with the XSLT language.

The following blocks of codes (Code 7-2 and Code 7-3) are examples of the generated XML schema and by using the XSLT transformation, OWL is generated (Code 7-4).

```
<xs:complexType name="WebsiteFacts">
  <xs:complexContent>
    <xs:extension base="oxs:WebsiteIdentifier">
      <xs:element name="WebsiteDomain" type="oxs:WebsiteDomainIdentifier" />
      <xs:element name="LocalizationLevel" type="oxs:LocalizationLevelIdentifier" />
      <xs:element name="TargetCultureGroup" type="oxs:TargetCultureGroupIdentifier" />
      <xs:attribute name="WebsiteDesignElements_name" type="xs:string" use="required" />
      <xs:attribute name="Language" type="xs:string" use="required" />
    </xs:extension>
  </xs:complexContent>
```

```
</xs:complexType>
```

Code 7-2 C3M XML Schema Shows the Complex-Type of website

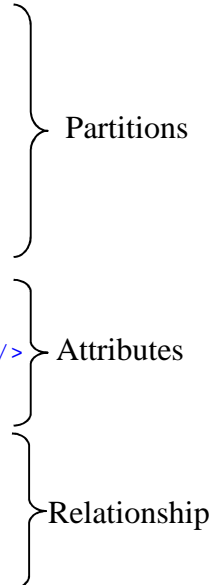
```
<xs:complexType name="LocalizationLevelFacts">
  <xs:complexContent>
    <xs:extension base="oxs:LocalizationLevelIdentifier">
      <xs:sequence>
        <xs:element name="eCulture" type="oxs:eCultureIdentifier"/>
        <xs:element name="Stable" type="oxs:StableIdentifier"/>
        <xs:element name="Broad" type="oxs:BroadIdentifier"/>
        <xs:element name="Variable" type="oxs:VariableIdentifier"/>
        <xs:element name="Vista" type="oxs:VistaIdentifier"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

...

<xs:complexType name="LocalizationLevelIdentifier">
  <xs:attribute name="LocalizationLevel_nr" use="required"
  type="oxs:LocalizationLevel_nr"/>
</xs:complexType>
```

Code 7-3 C3M XML Schema Shows Complex-Type of Website Localization Levels

```
<owl:Class rdf:ID="LocalizationLevel">
  <owl:oneOf rdf:parseType="Collection">
    <owl:Thing rdf:about="#e-culutre"/>
    <owl:Thing rdf:about="#Stable"/>
    <owl:Thing rdf:about="#Broad"/>
    <owl:Thing rdf:about="#Variable"/>
    <owl:Thing rdf:about="#Vista"/>
  </owl:oneOf>
</owl:Class>
.....
.....
<owl:DatatypeProperty rdf:ID="Language">
  <rdfs:domain rdf:resource="#Website"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema"/>
</owl:DatatypeProperty>
.....
.....
<owl:ObjectProperty rdf:ID="IsLocalizedFor">
  <rdfs:domain rdf:resource="#Website"/>
  <rdfs:range rdf:resource="#TargetCultureGroup"/>
  <rdfs:subPropertyOf rdf:resource="#involves"/>
</owl:ObjectProperty>
.....
.....
```



Code 7-4 OWL Code Generated from Mapping the XML Schema using XSLT Transformation

The full code of the (1) Cultural XML schema, (2) XSLT transformation file and (3) generated Cultural OWL, all are available on the attached CD and on the project website: <http://www.mushtaha.be/PhD>.

### 7.4.2 Relational Schema

An alternative to the use of an ontology for creating our knowledge base is the use of a relational database. That relational database could be used for storing all relevant information that is needed to design a localized website.

NORMA is able to automatically map ORM into a relational schema. Code 7-5 shows the standard SQL code generated to create two tables: (1) *Website* and (2) *LocalizationLevel*. The complete generated code is available on the attached CD and on the project website: <http://www.mushtaha.be/PhD>.

```
CREATE TABLE Website
(
    websiteName VARCHAR(16383) NOT NULL,
    websiteDesignElementsName VARCHAR(16383) NOT NULL,
    `language` CHAR(63) NOT NULL,
    websiteDomainName VARCHAR(16383) NOT NULL,
    localizationLevelNr INT NOT NULL,
    targetCultureGroupSociety VARCHAR (16383) NOT NULL,
    CONSTRAINT Website_PK PRIMARY KEY(websiteName)
);
CREATE TABLE LocalizationLevel
(
    localizationLevelNr INT NOT NULL,
    vistaNr INT,
    variableNr INT,
    broadNr INT,
    stableNr INT,
    eCultureNr INT,
    CONSTRAINT LocalizationLevel_PK PRIMARY KEY(localizationLevelNr)
);
```

Code 7-5 C2M SQL Code for Creating Two Tables

Having the relational schema for C2M, we can now create a corresponding database, as illustrated in Figure 7-17, containing all the different cultural localization levels for different target audiences and for different website domains. Consequentially, we can develop an interface to deal with this database and support the localization process by giving the website design requirements to develop a localized website. The next section in this chapter will shows a prototype of such a localized website design tool.

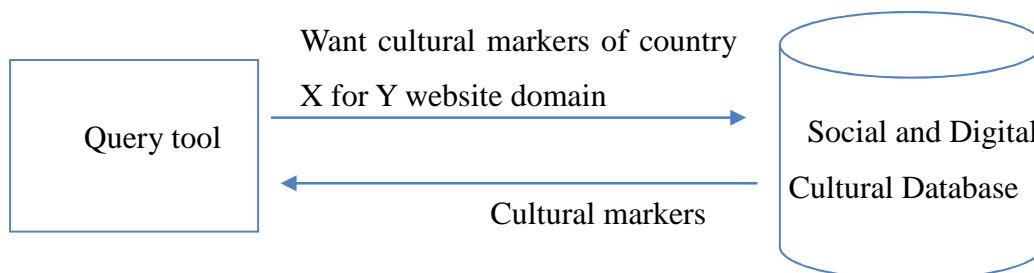


Figure 7-17 Cultural Database for Website Localization

## 7.5 Localized Website Design Advisor (LWDA)

LWDA is an acronym for Localized Website Design Advisor. It is a web-based tool that uses the Localization Ontology extracted before and explained in section 7.4.1 in this chapter. In addition, LWDA also uses a knowledge base, called the cultural markers knowledge base that contains information and cultural markers specifications about target societies.

Note that LWDA tool is not a website design application; rather it is an advisor that provides guidelines to be taken into consideration to design a localized website for a given localization level, society, language, main website domain, and some website related domains. This means that the input for the tool is: (1) Website name, (2) Localization level that one wants to achieve “1 to 5”, (3) Target society “Country”, (4) Website language, (5) Main website domain, and (6) Related website domain.

LWDA was developed because there is a lack of a proper way to describe the cultural markers that need to be taken into consideration for the design a localized website. Furthermore, LWDA could also be employed as a localization evaluation guideline for testing websites. In addition, LWDA is a proof-of-concept for how the technical findings of this research work can be used in practise.

### 7.5.1 LWDA Technical Details

LWDA was developed using ASP.NET (Microsoft web application framework) and AJAX (Asynchronous JavaScript and XML) is used for the communication between the browser and server (this removed the need for a whole page to be reloaded after each interaction).

In order to communicate with the ontology, LWDA makes use of XSLT, which dynamically generates a questionnaire based on XML documents. Furthermore, LWDA is connected to a Microsoft access database, which is used for the cultural knowledge base to store information about the cultural markers of target societies.

#### 7.5.1.1 LWDA Architecture

Figure 7-18 illustrates the architecture of the LWDA application, which is subdivided into six processes. This section describes all processes, as well as the internal relationship between them.

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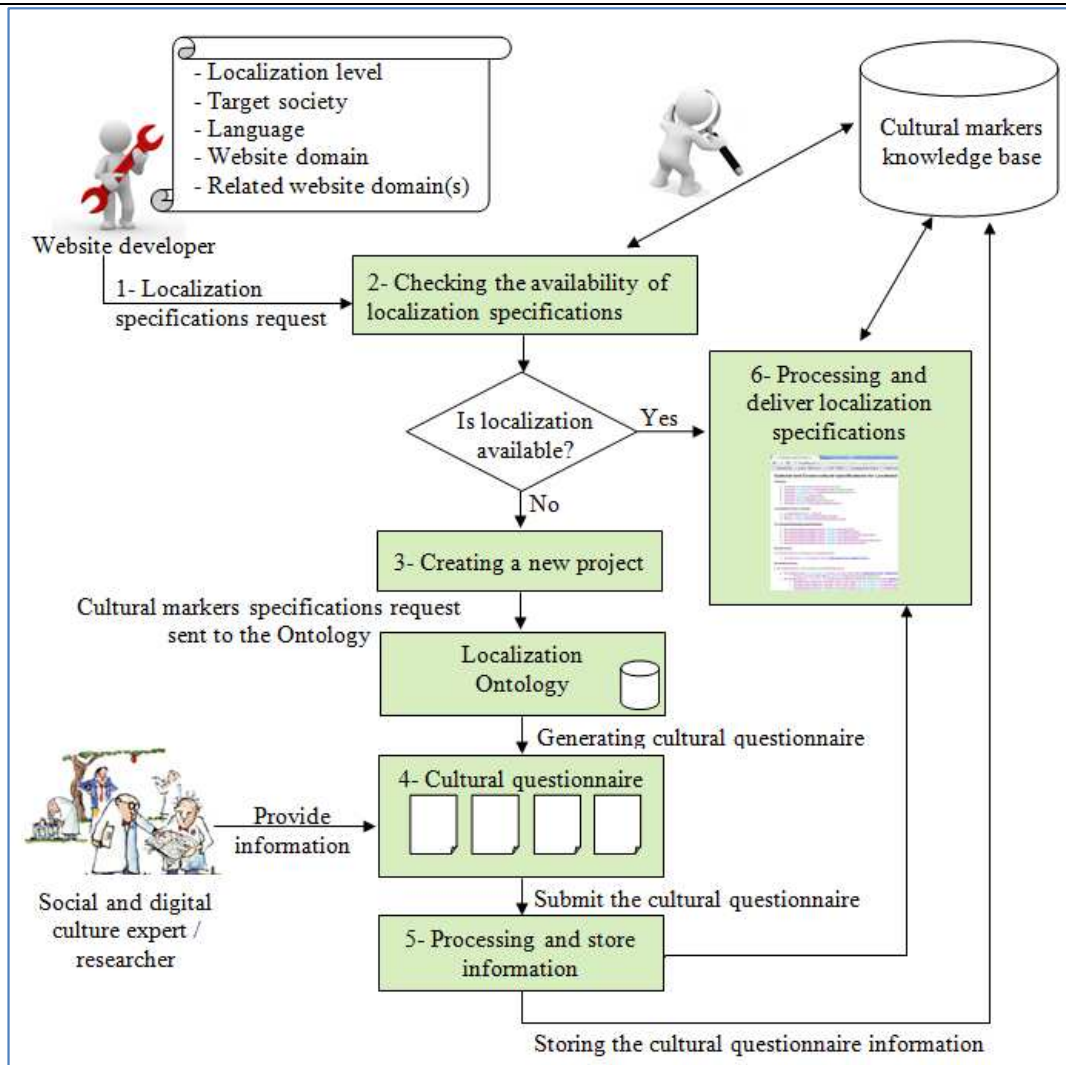


Figure 7-18 Localized Website Design Advisor (LWDA) Architecture

According to Figure 7-18, LWDA contains two cultural markers information repositories: (1) the Domain knowledge Ontology, and (2) the Cultural markers knowledge base.

- *Localization Ontology* is used to provide a common and unambiguous understanding of the website design elements and cultural dimensions and their interdependencies for the different localization levels. It actually contains all information provided by the Cultural Markers Pyramid.
- *Cultural Markers knowledge base* contains information and cultural markers information about specific societies and specific website domains.

We separate between those two cultural information repositories for the following reasons:



- 1- The Localization Ontology is kept for the abstract guidelines as specified in the Cultural Markers Pyramid. The Localization Ontology should only be changed by a researcher specialised in culture. For example, somebody who can decide whether or not the “number of links in a group” is a cultural marker for a specific localization level. Furthermore, this kind of information is coming from research and long-lasting investigations.
- 2- The Cultural markers knowledge base is a culture information repository about (1) a particular country, (2) a specific website domains, and (3) a specific localization level. The stored information can be considered as an instantiation of the abstract guidelines provide by the Localization Ontology. The Cultural markers knowledge base can be maintained by somebody who is a culture expert for a particular target culture.
- 3- As already discussed previously in this thesis, the social as well as the digital culture are change constantly, therefore, for example, maybe today the maximum number of links in a group has to be 7 for Chinese people in Health website, and maybe after a while this is needs to be changed to 8. As long as the number of links is still a cultural marker, the value can be updated in the Cultural makers knowledge base. If the number of links would no longer a cultural marker, then the Localization Ontology needs to be updated (separation between the marker itself and the value of the marker).
- 4- Having the cultural markers characteristics in a knowledge base, makes it easy and flexible for external application to use this data.

In order to provide a better understanding of LWDA, the following section describes the different processes of LWDA, as well as the roles of the two cultural repositories.

#### 7.5.1.2 LWDA Processes

Here we describe the LWAD processes using a real example. Suppose we need to design a localized website, then (as shown in Figure 7-18), the following processes are involved:

##### **(1) Localization specifications request**

In this first step, the website developer needs to provide the tool with some information about the website he or she wants to design. Suppose that a website developer wants to design a health website for China, wants to achieve the localization level 4

(Variable), and the website language is Chinese. After providing this information to LWDA, the tool takes over the process and passes to the second process.

**(2) Checking the availability of localization specifications**

In this process, the tool checks the Cultural markers knowledge base trying to find out whether the knowledge base contains information about such a request.

Since this is the first time to use the LWDA tool, the answer of this question is no. Thus, the tool passes to process, number 3.

**(3) Create a new project**

The LWDA tool contacts the Localization Ontology asking for cultural markers specifications for the information entered by the website developer.

For example, the ontology generated the following specifications: “*VariableNavigation contains at most NavigationDepth*”; “*NavigationDepth is accepted by TargetCultureGroup*”. This means that, in the variable level, the navigation depth is important to take care of and it is important to identify the depth of website navigation accepted by the target culture.

The information collected from the “Localization Ontology” is still abstract and no values are assigned (e.g., the actual value of NavigationDepth is not provided). For that, a questionnaire is generated from the Localization Ontology to be given to social and digital cultural experts / researchers to be fill-in. This is explained in the following process, number 4.

**(4) Cultural questionnaire**

In this process, all the specifications obtained from the localization ontology are formulated in the form of a questionnaire. The generated questionnaire is easy for non-computer specialists to deal with it. For the example, the questionnaire will contain a question on the maximal navigational depth accepted by Chinese people for Health websites. The answer to this question is expected to be provided by social and digital cultural experts / researchers who have deep knowledge about the target country China.

After the questionnaire has been filled in, the answers are processed by the tool. The tool ensures that the mandatory questions in the questionnaire are answered. Next, the information is processed and stored (process 5).

**(5) Processing and store information**

The tool will pass the questioner information to the Cultural markers knowledge base to store it. In this way, the information can be reused for later projects (e.g., somebody needs to have website localization specifications for a similar website). It could also be used for querying the knowledge base for some information, or to be used by other applications.

Next process is the process with number 6.

**(6) Processing and deliver localization specifications**

Based on the information in the Culture markers knowledge base, the tool generating a report contains the localization specification guidelines.

**7.5.2 Using LWDA**

In this section, we illustrate the use of LWDA in practice. For example, suppose we need to design a localized website, then LWDA (see Figure 7-19 for its start page) guides the website developer through the following four stages:

**(1) Website information:**

In this stage, website developer provides LWDA with the required information about the target website. This can be entered at the start page (Figure 7-19).

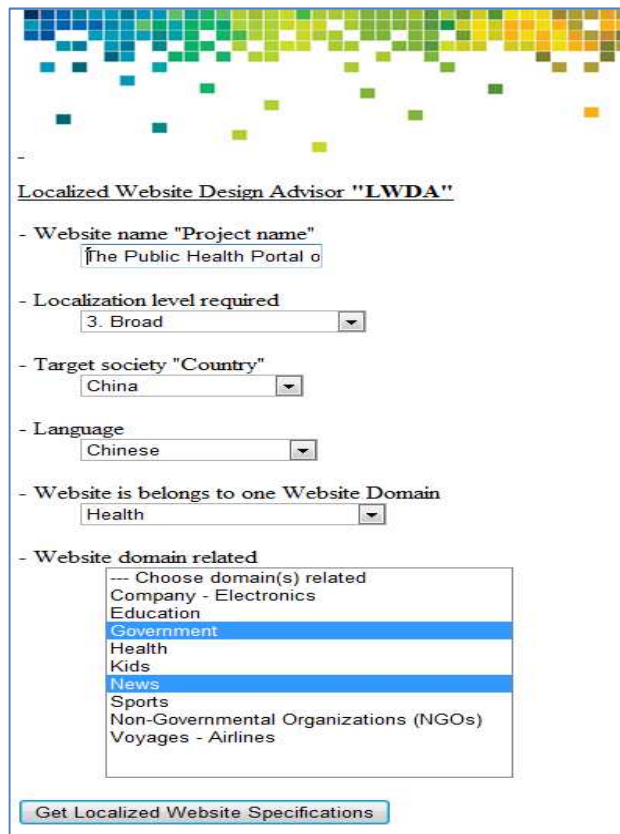


Figure 7-19 LWDA Start Page

## Chapter 7: The Cultural Conceptual Model (C2M) & the LWDA tool: Putting the Cultural Markers Pyramid into Practice

As an example, suppose the website that needs to be designed has the following characteristics:

- Website name "Project name": The Public Health Portal of China
- Localization level required: level 3, Broad
- Target society "Country": China
- Language: Chinese
- Website is belongs to one Website Domain: Health
- Website domain related: Government and News

### **(2) Analysis:**

The system checks if the Cultural markers knowledge base already contains the requested information. If the information is available in the knowledge base, then the specifications of the website will be generated and the process directly goes to the following stage 4. Otherwise, if the target specifications are not available in the knowledge base, then LWDA tool will generate a “Cultural questionnaire” from the information in the Localization Ontology.

### **(3) Cultural and Cultural questionnaire:**

LWDA uses the Localization Ontology to generate a “cultural questionnaire” in a XML format. The questionnaire should filled-in by a social or cultural expert and needs to be returned to LWDA for processing. Figure 7-20 shows the structure of the generated questionnaire for the target website.

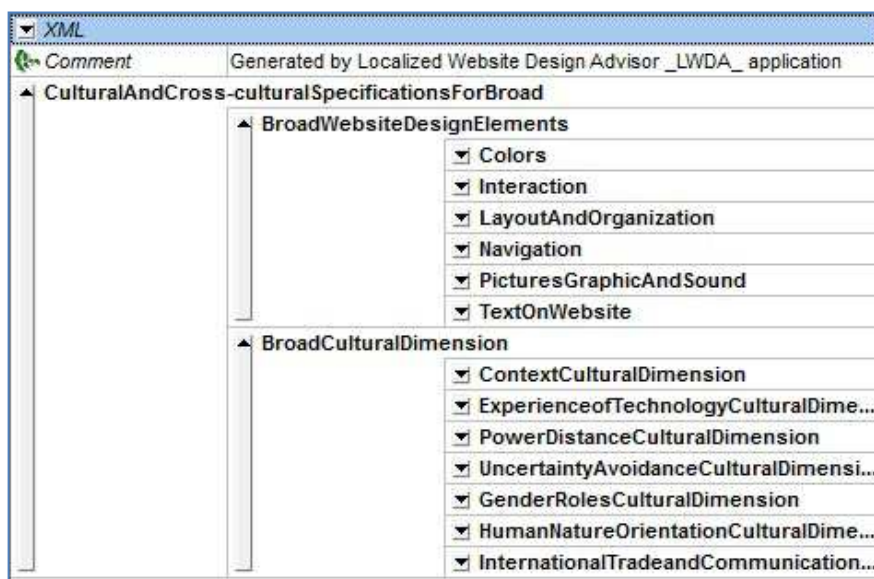


Figure 7-20 Generated Cultural Questionnaire

The questionnaire is divided into two main categories. The first category is for collecting information about website design elements, and the second is to collect information about anthropological cultural dimensions.

Figure 7-21 shows an example of collecting information about one of the website design elements “Colors”. The questionnaire provides information and raises questions about the colors. Figure 7-21 shows that the expert gave three notes about colors; these notes are cultural markers values.

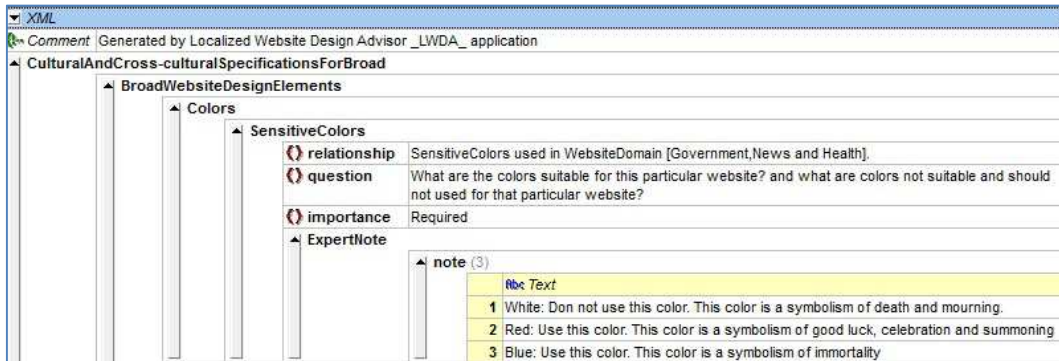


Figure 7-21 Generated Cultural Questionnaire: Question about Colors

The following figure, Figure 7-22, shows examples of an anthropological cultural dimension questions. The expert has added notes in the “ExpertNote” field.

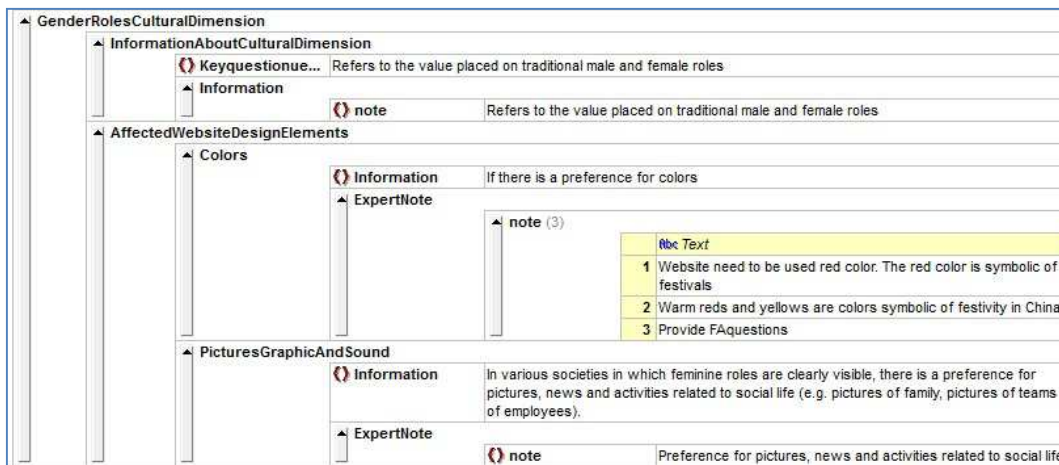


Figure 7-22 Generated Cultural Questionnaire: Question about the Gender Roles Anthropological Cultural Dimension

After answering the questions, the expert should return the questionnaire to the LWDA tool for processing. Afterwards, the system goes to stage 4.

**(4) Target localized website specification:**

LWDA stores the information from the questionnaire in the Cultural markers knowledge base, and then automatically generates specific guidelines for target website.

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The following snapshots, Figure 7-23, Figure 7-24, and Figure 7-25, are a part of the specification report which was generated. The generated guidelines are in a pseudo natural language (English).

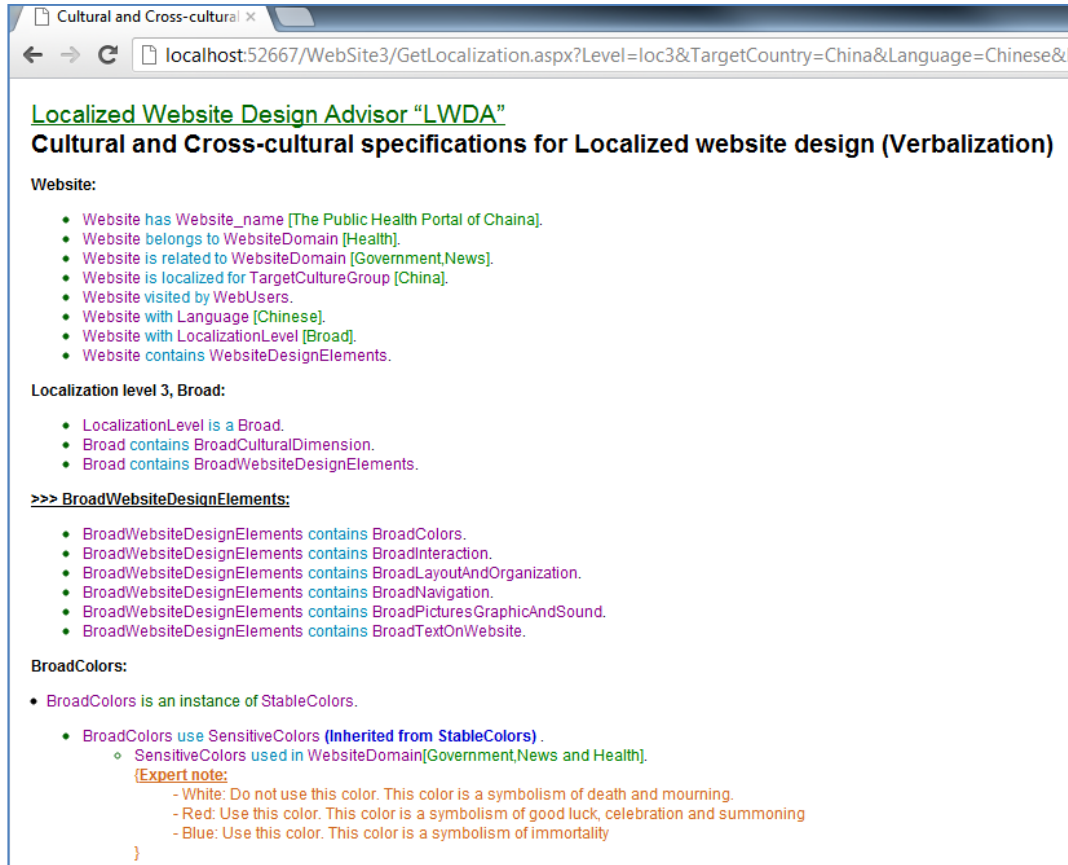


Figure 7-23 Target Localized Website Specification Guideline

Figure 7-24 shows part of the target localized website specification report for “Interaction”.



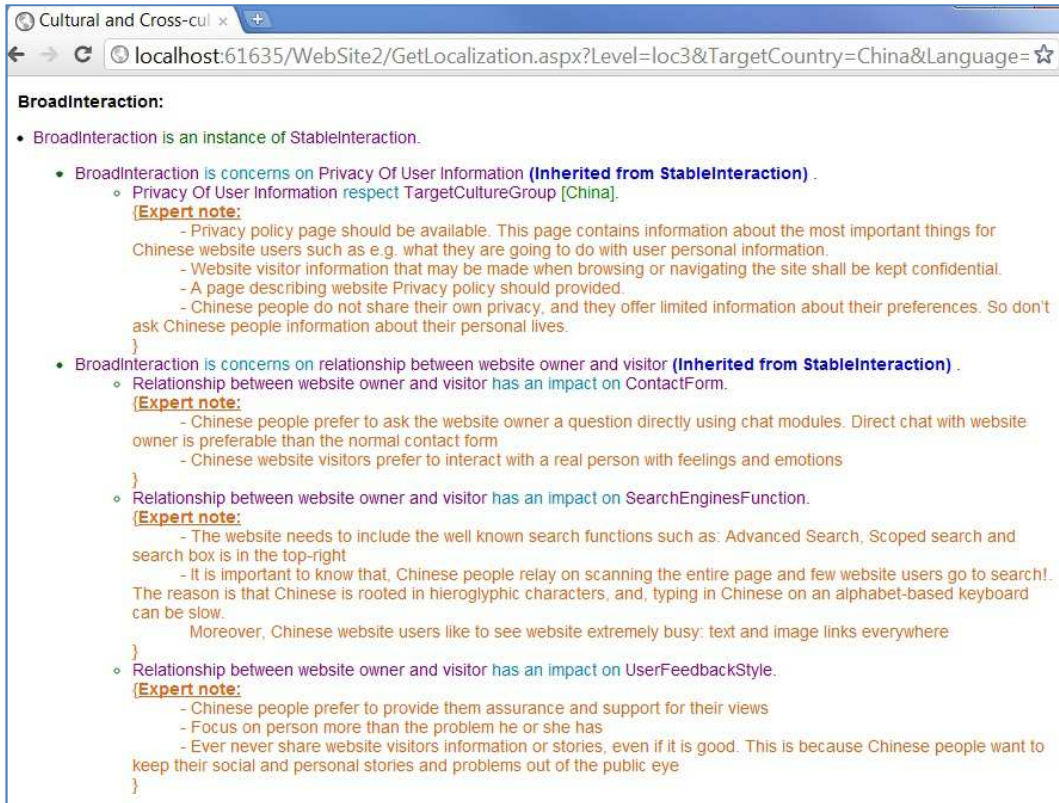


Figure 7-24 Target Localized Website Specification Guideline for Interaction

Figure 7-25 shows part of the target localized website specification report for two anthropological cultural dimensions (1) Uncertainty avoidance and (2) Gender roles.

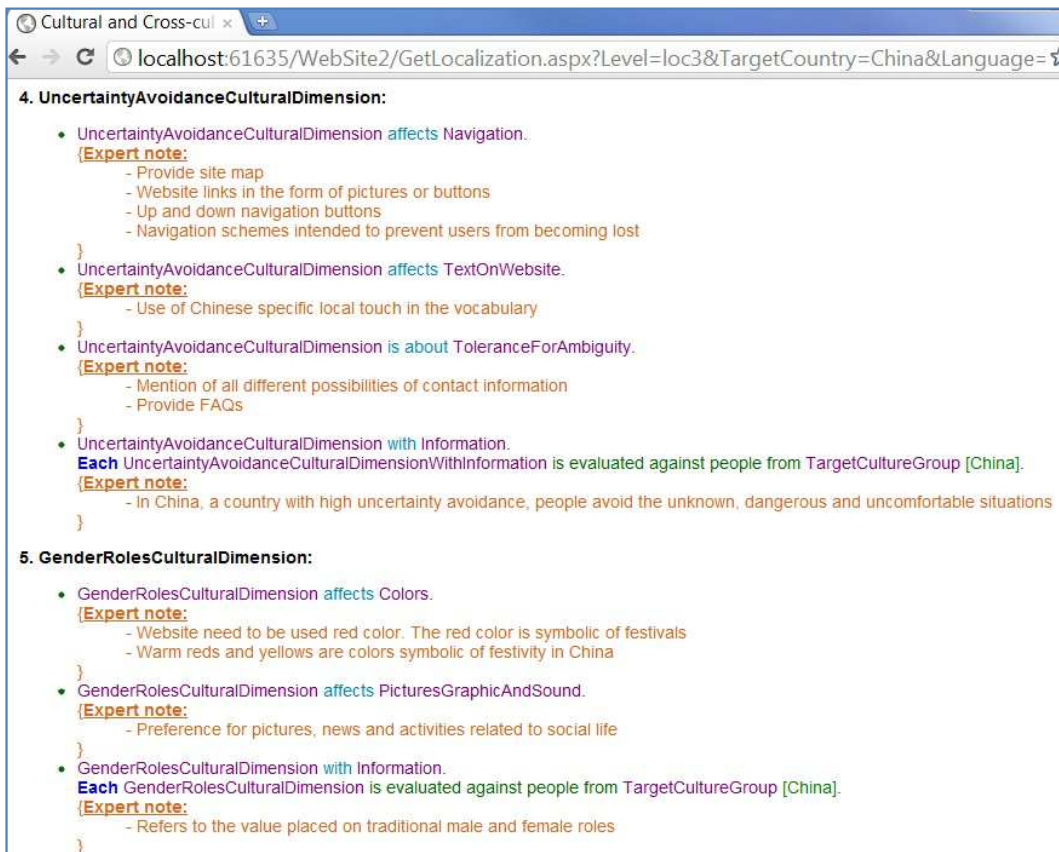


Figure 7-25 Target Localized Website Guidelines for Uncertainty Avoidance and Gender roles

Every pseudo natural language sentence appearing in the report is clickable and is a hyperlink to an explanation page with more details. For example, the pseudo natural language sentence “*Website with LocalizationLevel [Broad]*” (shown in Figure 7-22) is a clickable hyperlink to a particular page explaining this role, shown in Figure 7-26.

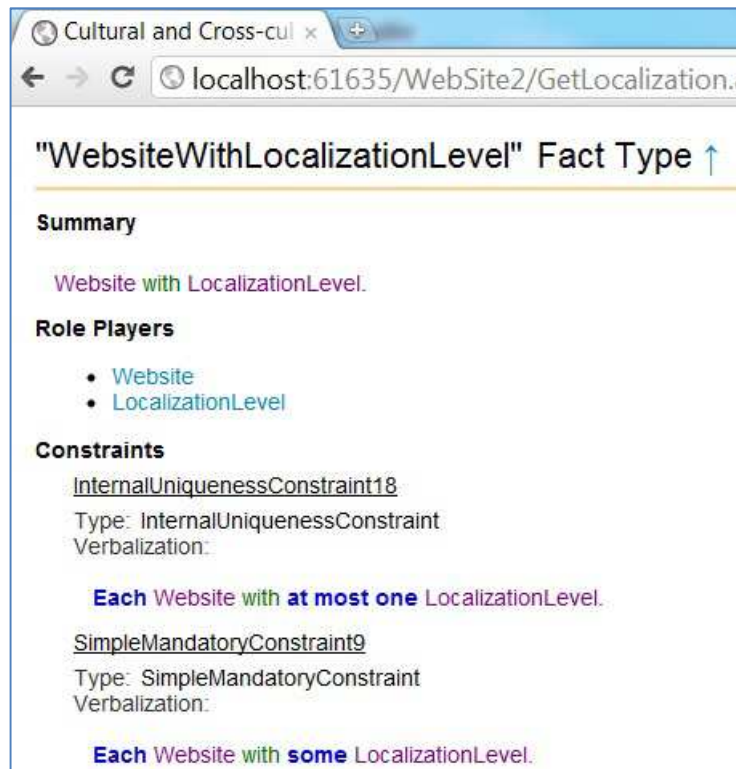


Figure 7-26 More Information Page of a Particular Pseudo Natural Language Sentence

## 7.6 Conclusion

In this chapter, we have presented how to turn the Cultural Markers Pyramid into a practical tool usable by website developers and cultural experts. For this purpose, we first developed a conceptual model for the information contained in the Cultural Markers Pyramid. The proposed conceptual model we called C2M, the acronym stands for “Cultural Conceptual Model”. Having the Cultural Markers Pyramid guidelines in a conceptual model will help experts to manage, validate and improve the model regularly.

C2M was modelled using Object Role Modelling (ORM). This had the advantage that we could automatically transform C2M into a more practical oriented format (e.g. XML, XSD, UML, OWL, etc.). C2M was transformed into two different outputs: an ontology, and a Relational schema.



Based on this C2M, a tool was developed to support designing localized websites, the Localized Website Design Advisor (LWDA) tool. LWDA dynamically generates advice on how to localize a website based on the target country, language, level of localization, and website domain.

LWDA includes two types of cultural information repositories, (1) Localization Ontology and (2) Cultural markers knowledge base. We distinguished between them because each one has its own contribution and role. The ontology is used for providing abstract cultural specifications, while the knowledge base is used for storing the values and the description of these specifications for a particular website domain, a particular target country, and a specific website localization level. We believe both of them could be useful for any domain that requires cultural information.

**Acknowledgements**

I want to thank Miss. Sohe Lee, expert in Chinese culture and language teaching, for her fruitful collaboration.



## 8 Conclusion and Future Work

“[Leonardo Da Vinci] combined art and science and aesthetics and engineering, that kind of unity is needed once again.”

--- Ben Shneiderman

This final chapter concludes the thesis and discusses some possible future work. We start by summarizing the work in section 8.1. Next, we present the main contributions and achievements in section 8.3. Finally, in section 8.4, we suggest a list of related topics for possible future work.

### **8.1 Summary**

The aim of this thesis is to investigate the influence of users' cultural background in understanding and accepting a website, to formulate the cultural markers that are essential for designing usable cultural (localized) websites, and to propose user culture-centred website design guidelines. Based on these challenges, the research was divided into two phases.

In the first phase, the in-depth investigation about the link between website design and user culture, we focussed on how a user's culture influences and contributes to the design of a successful localized website. The objective was to identify and assess the impact of factors and parameters such as the anthropological models of culture and other issues that should be taken into consideration when designing localized websites. To address this objective, seven different empirical research studies were performed.

We have found that web users are influenced by their own website surfing experience while using different types of websites coming from various countries (cultures), which results in new understandings and new experiences that forge the Web culture of each user. Moreover, the culture of web users changes and shifts with their accumulated experience and understanding of the Web. Accordingly, website users are using two different types of cultures to understand a website: (1) their digital culture and (2) their social culture. It is essential to take these two types of cultures into account when designing a website. The "digital culture" is powered by the use of the Web and digital technology, while the "social culture" relates to the customs, traditions, morals, and values that influence everyone from their physical environment, such as family, friends, religion, etc.

Our research concluded that it is difficult to establish absolute criteria for what the important and applicable cultural makers for localized website design are. As a result, we argued for the need for different groups of cultural markers for local website design.

The second phase of the research was built upon the results obtained from the first phase. We presented five different groups of cultural markers to be used as culture-centred website design guidelines. The five groups are (1) E-culture, (2) Stable, (3) Broad, (4) Variable, and (5) Vista. The groups are organized as levels in a pyramid and in this way they allow for different degrees of website localization. With this approach, we cover the limitations observed when one single cultural model for localizing websites design is used.

The cultural markers grouping was done based on their importance for localized website design. Except for the e-culture group, each group considers markers for website design elements as well as some anthropological cultural dimensions. The e-culture group only considers markers for website design elements due to the fact that this group only contains markers of the new digital culture which comes from using the Web and new technologies. Social culture, and therefore anthropological cultural dimensions, is not considered in the e-culture group.

Although the five groups of cultural markers already provide guidelines for designing localized websites, website developers may find them too abstract, especially if they are not familiar with the cultural characteristics of the target audience of the website to be developed. Therefore, we developed an ontology to capture the guidelines and a knowledge base capable of storing values for the cultural markers in the guidelines for different countries and different website domains. To achieve this, we first developed a Cultural Conceptual Model (C2M) to represent the five groups of cultural markers pyramid using the Object Role Modelling (ORM) language. We then transformed this cultural conceptual model into two different outputs: (1) a Localization Ontology and (2) a Relational schema. Based on this, we created a tool, the Localized Website Design Advisor (LWDA), which was developed in order to dynamically generate a set of recommendations for the design of a culture-centred localized website, given the target country, language, level of localization (1 to 5) and website domain.

We hope that the outcomes of this thesis will contribute to and advance the state of the art of the broad field of website localization, for academics as well as for industry.

## **8.2 Constraints and Limits**

As each research, also this research has its limitations. The research studies described in chapter 0 and 1 in this thesis were mostly focussed on news and learning websites and done by students from Belgium and Palestine. Although, we also conducted some

research studies based on different website domains (as described in section 5.4 and 5.5) and with participants from different cultural background, it is possible that for other or more domains and with participants of other or more cultures the results would have been different. Maybe for some domain or for some culture, some cultural makers would appear to be in a different group of cultural markers, however, we believe, the general conclusions of the research, i.e. the need for different levels of localization and the principles behind the five groups of cultural makers, remain valid. Also, the localization ontology and the localization database are flexible enough to deal with these changes that will appear anyhow in the future as culture is constantly evolving.

### **8.3 Contributions and Concluding Remarks**

Here in this section, we present the main contributions and concluding remarks for both the methodological and the practical fulfilments, thereby referring to the thesis goals and research questions as described in the introduction (section 1.1, 1.2 and 1.3).

#### **8.3.1 Implications for Cultural Research**

The studies described in chapters 0 and 1 argue that relying on only one theory or anthropological model of culture is not sufficient. The more anthropological models of culture are involved in a study, the more insight there is into the social culture preferences of users.

From the results of the user evaluation studies we conducted, we argued that the new technology and Internet experience have slightly decreased the gap between cultures for many people who are using the Web. We found that, nowadays, Web users have a special culture which comes from using the Internet. Moreover, the Web creates a culture of its own. Also worth highlighting is the fact that the Web can influence cultural perceptions. However, the social cultural identity of a Web user does not change; most changes we noticed took place in understanding and interaction with Website elements. Moreover, the research results in this thesis emphasise that taking user social cultural into consideration during website design could still be useful when designing websites for some website domains. Moreover, some domains may be more sensitive to cultural difference than others (e.g., news and learning).

Our experiments demonstrated that some anthropological cultural dimensions are very important and should be taken into consideration to understand the social culture of a website's target audience. All website design experts who participated in our different studies advised understanding the cultural background of the website target audience using anthropological cultural dimensions. These cultural dimensions provide a way to understand how the people from the target culture group communicate, love, learn, interact, and understand things.

This research studies performed within the context of this thesis found that local websites from the same country do not always provide similar cultural markers. Accordingly, it is not possible to build up an understanding about the target culture requirements by taking a sample of local websites from the target country as examples for localizing another local website for that country.

The Web is a dynamic interactive environment, and people who are using the Web are sharing that environment and are constantly in contact (directly or indirectly) with each other. We observed many changes in the current versions of websites compared to previous versions of these websites.

We have contributed to the research on digital cultural markers. Digital cultural markers are website elements such as colours, colour combinations, website layout, data organizing, trust signs, use of metaphor, navigation style, language cues or images, which are preferred, shared, well understood and accepted by Web users for a certain website domain and country. We observed three different groups of digital cultural markers. The first group is Web Digital Markers "WDM", which are used across all website domains, and shared between all web users. The second group is Domain Digital Markers "DDM", which are specific to a website domain but shared between all web users. And the third group is the Country Digital Markers "CDM" group; the markers of this group are shared between Web users from a specific country or nation, but are appropriate for all website domains.

Based on our research, as well as our experience in leading practical website consulting projects in companies, we advocate the idea that in order to design a localized website, it is necessary to consider two kinds of cultural markers: social and digital cultural markers (see section 6.2.1).

An interesting finding from two research studies (see section 6.2.3) was that if a website user is facing an unknown website design element in a website (e.g., a picture, icon), then the website user employs a specific method for understanding the meaning

of this element, in which the digital culture and social culture both play an important role.

Our seven experiments showed that it is difficult to establish an absolute and clear-cut set of cultural markers to be used for designing localized websites. For this reason, this research has argued the need for different groups of cultural markers for local website design and localization.

### **8.3.2 Implications for Website Developers**

Based on the research studies described in the first phase, we have contributed to the state of the art by providing five different groups of cultural markers that affect user culture-centred website usability. Five different groups of cultural markers were proposed for use in designing localized websites. The five cultural markers groups are organized as a pyramid that targets five different levels of website localization. This pyramid of cultural markers is one of the main contributions of this thesis. This approach comes from the observation that one single cultural model for localizing websites design could, in fact, be a poor choice because different levels of localization may be needed in different situations. The five website localization levels are: (1) e-culture level - not localized (but rather international) website, (2) settled cultural level - semi-localized website, (3) broad cultural level - localized website, (4) variable cultural level - highly localized website, and (5) vista cultural level - fully cultural localized website.

Another valuable contribution is the Cultural Conceptual Model (C2M), which is a formal representation of the guidelines for the pyramid of cultural markers. Furthermore, via this work we also show how to transform the Cultural Conceptual Model into two different technical specifications: (1) a Localization Ontology and (2) a Relational schema. Based on this, and as proof of concept for the theory developed in the thesis, we have developed the Localized Website Design Advisor (LWDA) tool in order to dynamically generate specific website localization guidelines given a target country, language, level of localization (1 to 5), and website domain.

We have developed this LWDA tool because there is a lack of proper ways to describe the cultural markers that need to be taken into consideration for designing a localized website. Furthermore, the LWDA tool could also be employed as a localization evaluation guide for testing websites.



For creating the LWDA, the Localization Ontology and a Cultural knowledge base, two information repositories of cultural markers were created (see section 7.5.2). We have distinguished between these two repositories because each one has its own contribution and role.

#### **8.4 Future Work**

The research work presented in thesis provides ample opportunities for future work. The following are suggested topics:

##### **Personalized Culture-centred Websites**

Let us first give an example. Suppose that a woman is 30 years old. Currently she has been living in Belgium for 10 years, and she is from China where she lived for 20 years. The questions then are: what kind of website localization should we offer for this woman? To which cultural group does this woman belong (i.e., Belgium or China)?

The answer to these questions is that this woman carries with her two types of cultures (Belgium and China), and the challenge then is to establish the extent to which she is influenced by both cultures (to be able to know the level of website localization we can offer). To overcome this problem, one possibility would be to extend the work of the “cultural markers pyramid” (presented in section 6.3.2) to be used for personalized culture-centred websites. One of the research directions could be to calculate the “cultural influence percentage rate” for each country that the person lived in currently and in the past. We could have the cultural markers pyramid localization levels as following (an extension for the cultural markers pyramid).

(1) e-culture level - not localized (but rather international) website: 0% to 20% cultural influence,

(2) Stable cultural level - semi-localized website: 21% to 40% cultural influence,

(3) Broad cultural level - localized website: 41% to 60% cultural influence,

(4) Variable cultural level – highly localized website: 61% to 80% cultural influence, and

(5) Vista cultural level - fully cultural localized website: 81% to 100% cultural influence.

To facilitate the idea let us return back to the earlier example; to calculate the “cultural influence percentage rate”, the user needs to provide his or her current residence

and the years spent, as well as the former countries he or she lived in and the number of years spent there. This data could be used to calculate the cultural influence percentage rate for those countries. For example,

→ *Belgium cultural influence percentage rate is:  $10/30= 33\%$  (number of years that person has spent in Belgium divided by the person's age)*

→ *China cultural influence percentage rate is:  $20/30= 67\%$  (number of years that person has spent in China divided by the person's age)*

Accordingly, from the cultural influence percentage rates of the countries, one can imagine a localized website for that person has to be 33% Settled cultural level - semi-localized Belgium website, and 67% Broad cultural level - localized China website. The longer this person stays in Belgium, the higher the Belgium cultural influence percentage rate will be and the lower the Chinese cultural influence percentage rate.

The challenge in this research is to overcome the overlapping caused by using two different groups of cultural markers from two different countries; e.g., the colour red means happiness for Chinese people and danger for Belgian people. The problem then is how to remove this contradiction.

This research direction may be very suitable for designing personalized culture-centred websites for learning websites targeting students who study abroad.

### ***A Methodology for user culture-centred Localized Website Design***

Nowadays, there are few in-depth user culture-centred website design methods that can assist website developers in the design of appropriate localized websites (see literature section 2.4.2). Such a method will go a step further to support website developers in facilitating their understanding of the theoretical steps that they need to follow to design a localized website.

In section 6.4, we provided the major steps for a methodology for localized website design. Future research may focus on extending and enhancing the proposed method. It would be possible to extend the proposed model to support other existing website design methods (e.g., WSDM, Hera, and WebML – see section 1.1), which offer limited or no support for website localization design.

### ***Building a Cultural Database***

This research concerns the extension of the database explained in section 7.4.2. This database could be used for storing all website cultural markers needed to design a localized as well as a globalized website for different target countries (e.g., Belgium, Germany, China, etc.) and for different website domains (e.g. news, learning, commerce, etc.).

*Website Localization:* The cultural markers of different countries for different website domains could be collected through empirical research. Such a cultural database would then provide a very rich source of information about cultural markers. This information could be used by academics as well as industry for website localization design or for other purposes (e.g., information about countries to be used by third party applications).

*Website Globalization:* Another possibility may be to gather the three types of digital cultural markers (Web Digital Markers, Website Domain Digital Markers and Country Digital Markers - see section 6.2.2). This information could be used for designing globalized websites (i.e. one global website for all people around the world - see section 2.1.1).

In this respect, my student Rasha Tolba has made some efforts. She has gathered the social cultural markers of three website domain: news, health and learning for Jordan (Tolba, 2010).



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## Appendix 1: Power Distance Survey Questions

Q0a: Name:

Q0b: Age:

Q0c: Nationality:

Q0d: Organization name:

Q0e: URL:

Q0f: Country:

Q0g: Hofstede-score on this dimension:

The homepage is the most important page of a web site. Base your evaluation especially on the homepage of the web site (you can also navigate through the site, perhaps this may provide some useful information). Look especially to the images, graphics (symbols, logo's ...), colors and layout. Be objective!

\*\*\*\*\*

Q1a: What is your general impression about the homepage (minimum 3 sentences)?

Q1b: Select the adjectives, which are applicable to the homepage of the site attractive, bright, cheerful, dull, formal, informal, artistic, personal, impersonal, distant, concise, clear, simple, modern, old fashioned, busy, complex, nice, innovative, showy and dark

Others:

\*\*\*\*\*

Rate from 1 to 5 the extent to which the following statements are applicable for the homepage.

1 = not applicable, 2 = hardly applicable, 3 = applicable to some extent, 4 = clearly applicable, 5 = strongly applicable.

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Please, choose between the possibilities. If your choice is score 3 or above, please indicate which elements on the page (e.g. the content of the images, layout, color) have given rise to the statement.

Q2a: Emphasis on hierarchy: 1, 2, 3, 4, 5

Which elements?

Q2b: Professors/executive/writers have a central place: 1, 2, 3, 4, 5

Which elements?

Q2c: Healthy respect/obedience of inferiors towards superiors: 1, 2, 3, 4, 5

Which elements?

Q2d: Emphasis on established values (e.g. tradition, religion, nationalism): 1, 2, 3, 4, 5

Which elements?

Q2e: Hierarchy is not perceptible: 1, 2, 3, 4, 5

Which elements?

Q2f: The student/visitor has a central place: 1, 2, 3, 4, 5

Which elements?

Q2g: Mutual respect between inferior and superior: 1, 2, 3, 4, 5

Which elements?

Q2h: Emphasis on personal development: 1, 2, 3, 4, 5

Which elements?

Q2i: Other observations?

\*\*\*\*\*

Q3: In your opinion, the high/low score on power distance is on this site (underline your choice!):

1 = not perceptible

2 = hardly perceptible

3 = perceptible to some extent

4 = clearly perceptible

5 = Strongly perceptible

\*\*\*\*\*

Q4: After the analysis of the 10 homepages, please answer the next question (give minimum 4 sentences): What do you think are the most important differences in the design between the 5 homepages (sites) from countries with a high score and those from countries with a low score (the content of images, graphics, colors, layout, etc.)?

## Appendix 2: Individualism – Collectivism Survey Questions

Q0a: Name:

Q0b: Age:

Q0c: Nationality:

Q0d: Organization name:

Q0e: URL:

Q0f: Country:

Q0g: Hofstede-score on this dimension:

The homepage is the most important page of a web site. Base your evaluation especially on the homepage of the web site (you can also navigate through the site, perhaps this may provide some useful information). Look especially to the images, graphics (symbols, logo's, etc.), colors and layout. Be objective!

\*\*\*\*\*

Q1a: What is your general impression about the homepage (minimum 3 sentences)?

Q1b: Select the adjectives, which are related to the homepage (site) attractive, bright, cheerful, dull, formal, informal, artistic, personal, impersonal, distant, concise, clear, simple, modern, old fashioned, busy, complex, nice, innovative, showy and dark

Other:

\*\*\*\*\*

Rate from 1 to 5 the extent to which the following statements are applicable for the homepage.

1 = not applicable, 2 = hardly applicable, 3 = applicable to some extent, 4 = clearly applicable, 5 = strongly applicable.

Please, choose between the possibilities. If your choice is score 3 or above, please indicate which elements on the page (e.g. the content of the images, layout, color) have given raise to the statement.

Q2a: Collective interests precede individual interests: 1, 2, 3, 4, 5



Which elements?

Q2b: Emphasis on established values (e.g. religion, tradition, nationalism): 1, 2, 3, 4, 5

Which elements?

Q2c: Emphasis on consensus and/or official slogans: 1, 2, 3, 4, 5

Which elements?

Q2d: Individual interests precede collective interests: 1, 2, 3, 4, 5

Which elements?

Q2e: Emphasis on personal development and self-realization: 1, 2, 3, 4, 5

Which elements?

Q2f: Emphasis on own opinion: 1, 2, 3, 4, 5

Which elements?

Q2i: Other observations?

\*\*\*\*\*

Q3: In your opinion, the high/low score on individualism/collectivism is on this site (underline your choice!):

1 = not perceptible

2 = hardly perceptible

3 = perceptible to some extent

4 = clearly perceptible

5 = Strongly perceptible

\*\*\*\*\*

Q4: After the analyses of the 10 homepages please answer the next question (give minimum 4 sentences): What do you think are the most important differences in the design between the 5 homepages (sites) from countries with a high score and those from countries with a low score? (the content of images, graphics, colors, layout, etc.).

### **Appendix 3: Masculinity – Femininity Survey Questions**

Q0a: Name:

Q0b: Age:

Q0c: Nationality:

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Q0d: Organization name:

Q0e: URL:

Q0f: Country:

Q0g: Hofstede-score on this dimension:

The homepage is the most important page of a web site. Base your evaluation especially on the homepage of the web site (you can also navigate through the site, perhaps this may provide some useful information). Look especially to the images, graphics (symbols, logo's, etc.), colors and layout. Be objective!

\*\*\*\*\*

Q1a: What is your general impression about the homepage (minimum 3 sentences)?

Q1b: Select the adjectives, which are related to the homepage (site) attractive, bright, cheerful, dull, formal, informal, artistic, personal, impersonal, distant, concise, clear, simple, modern, old fashioned, busy, complex, nice, innovative, showy and dark

Other:

\*\*\*\*\*

Rate from 1 to 5 the extent to which the following statements are applicable for the homepage.

1 = not applicable, 2 = hardly applicable, 3 = applicable to some extent, 4 = clearly applicable, 5 = strongly applicable.

Please, choose between the possibilities. If your choice is score 3 or above, please indicate which elements on the page (e.g. the content of the images, layout, color) have given raise to the statement.

Q2a: Boys/man and girls/woman are addressed separately: 1, 2, 3, 4, 5

Which elements?

Q2b: Emphasis on ambition, competition, performance and/or material success: 1, 2, 3, 4, 5

Which elements?

Q2c: Women must tender and modest and/or men must hard, ambitious and assertive: 1, 2, 3, 4, 5

Which elements?

Q2d: Boys/men and girls/women are addressed indiscriminately: 1, 2, 3, 4, 5

Which elements?

Q2e: Emphasis on equality, solidarity and/or the quality of life: 1, 2, 3, 4, 5

Which elements?

Q2f: Men may tender and modest and/or women may be ambitious and assertive: 1, 2, 3, 4, 5

Which elements?

Q2g: Other observations?

\*\*\*\*\*

Q3: In your opinion, the high/low score on Masculinity - Femininity is on this site (underline your choice!):

1 = not perceptible

2 = hardly perceptible

3 = perceptible to some extent

4 = clearly perceptible

5 = Strongly perceptible

\*\*\*\*\*

Q4: After the analyses of the 10 homepages please answer the next question (give minimum 4 sentences): What do you think are the most important differences in the design

## References

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between the 5 homepages (sites) from countries with a high score and those from countries with a low score? (the content of images, graphics, colors, layout, etc.).

## Appendix 4: Uncertainty Avoidance Survey Questions

Q0a: Name:

Q0b: Age:

Q0c: Nationality:

Q0d: Organization name:

Q0e: URL:

Q0f: Country:

Q0g: Hofstede-score on this dimension:

The homepage is the most important page of a web site. Base your evaluation especially on the homepage of the web site (you can also navigate through the site, perhaps this may provide some useful information). Look especially to the images, graphics (symbols, logo's, etc.), colors and layout. Be objective!

\*\*\*\*\*

Q1a: What is your general impression about the homepage (minimum 3 sentences)?

Q1b: Select the adjectives, which are related to the homepage (site) attractive, bright, cheerful, dull, formal, informal, artistic, personal, impersonal, distant, concise, clear, simple, modern, old fashioned, busy, complex, nice, innovative, showy and dark

Other:

\*\*\*\*\*

Rate from 1 to 5 the extent to which the following statements are applicable for the homepage.

1 = not applicable, 2 = hardly applicable, 3 = applicable to some extent, 4 = clearly applicable, 5 = strongly applicable.

Please, choose between the possibilities. If your choice is score 3 or above, please indicate which elements on the page (e.g. the content of the images, layout, color) have given raise to the statement.

Q2a: Flexible rules: 1, 2, 3, 4, 5

Which elements?

Q2b: Informality is tolerated: 1, 2, 3, 4, 5

Which elements?

Q2c: Tolerance for ambiguity or vagueness: 1, 2, 3, 4, 5

Which elements?

Q2d: Tight rules: 1, 2, 3, 4, 5

Which elements?

Q2e: Emphasis on formality: 1, 2, 3, 4, 5

Which elements?

Q2f: Large precision and punctuality: 1, 2, 3, 4, 5

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Which elements?

Q2g: Other observations?

\*\*\*\*\*

Q3: In your opinion, the high/low score on uncertainties avoidance is on this site (underline your choice!):

1 = not perceptible

2 = hardly perceptible

3 = perceptible to some extent

4 = clearly perceptible

5 = strongly perceptible

\*\*\*\*\*

Q4: After the analyses of the 10 homepages please answer the next question (give minimum 4 sentences): What do you think are the most important differences in the design between the 5 homepages (sites) from countries with a high score and those from countries with a low score? (the content of images, graphics, colors, layout, etc.).

## Appendix 5: Webmaster Survey Questions

Thank you for completing this questionnaire.

Feel free to add any comments.

Q0a: What is your nationality?

Q0b: Web site URL:

Q1a: Who designed the web site? (Company, Person ...)

Q1b: How many persons were involved in the design of the web site?

Q2: How frequently did the design/architecture of the web site change?

- Between once a year and once in two years
- Between once in three and once in five years
- Less than every five years
- Other:

Q3: What is usually the reason for changing / redesigning the web site?

- Change of organization policy
- New webmaster
- To remove the shortcomings of the previous web site
- Other:

Q4: The redesigned web site is usually:

- More attractive than the previous one
- More extensive than the previous one (more content)
- Easier to navigate than the previous one
- Technologically more sophisticated than the previous one
- Other:

Q5: Who determines the content of the web site?

- Organization board

- The webmaster
- Other:

Q6a: Do you personally decide on how the design/architecture is made/changed (structure, pictures, graphics and colors used, layout, etc.)?

- Yes, completely
- To some extent, I get some directives
- No, I get many directives

Q6b: From whom do you get directives?

Q6c: To what do these directives relate?

- Visual representations (images, symbols, logo)
- Colors
- Structure
- Other:

Q7a: Do you happen to be influenced by design/architecture features from other existing web sites?

- Often
- Occasionally
- Never
- Other:

Q7aa: Could you give an example?

Q7b: You are generally inspired by:

- American web sites
- Asian web sites
- African web sites
- European web sites
- Web sites from different countries



- Local web sites
- Other:

Q8: Do you use any methodology for designing the web site?

- Yes
- No

If you used a methodology, what's the name of that methodology; or can you explain the methodology?

Q9: Do you consider the needs of target audience explicitly during the design process?

Q10: Do you study the culture of the target audience of the web site to adapt the web site to this culture?

## **Appendix 6: The Effect of User Cultural Backgrounds in Understanding Website**

### Directions

This survey includes four kinds of questions:

1. Open questions.

These questions include blank lines. For these questions please print your answers in the space provided.

2. Checklist questions.

For these questions, please put an X in the box for the answer that seems to be the best. Put an X in one box only unless the question says you can select more than one answer.

3. Scale questions with numbered boxes or statement boxes.

The answers to these questions range on a scale from 1 to 5, put a cross in the box that shows your answer best. For the statement boxes, just put an answer in the box that seems to be the best answer.

4. Working with the WebCt and CLC websites

In this exercise you will be asked to 'think aloud'. The researcher will explain this to you.

### **Confidentiality**

The information you provide is strictly confidential. The completed questionnaires will only be read by the researchers involved.

### **Benefits of this project:**

Your participation in this study will provide information that will be used to improve the understanding of cultural effects in web engineering. No guarantee of benefits has been made to encourage you to participate.

Please remember that this is NOT a test. The researcher is interested to know your opinion on the webpage. Therefore, there are no wrong or right answers.

Many thanks

### 1) Demographic Questionnaire, Personal Details

1. What is your nationality?
2. What was your age on the first of March 2006?
3. What are you?
  - Male
  - Female
4. What are you currently studying?
5. Please tell us in which country you've spent the most time. (This may be the country where you were born, but not necessarily.)
  - a. Most of my life I have lived in:
    - b. I have lived there: (please cross only one)
      - My whole life
      - 1-9 years
      - 10-12 years
      - 13-15 years
      - 16-18 years
      - Over 18 years
    - c. How many generations of your family have lived there? (please cross only one)
      - Only I have lived there
      - Me and my parents have lived there
      - Me, my parents and grandparents from my mother's side have lived there
      - Me, my parents and grandparents from my father's side have lived there
      - Many generations of my family have lived there
    - d. Did you grow up in a neighbourhood where most people had the same culture as you and your parents, but most people outside of the neighbourhood had some other culture? (For example: you are Chinese in China town in New York)
      - yes (what neighbourhood:
      - no

e. My father was born in (country):

f. My mother was born in (country):

\*\*\*\*\*

The following questions are to find out more about your language background:

6. Language:

At school we speak (language):

At home we speak (language):

Most of the time in my country I speak (language):

7. What language do you consider your 'first language' (the language you have used most of your life)?

8. Which languages do you speak well enough so that you can have a reasonable conversation with a local person? (Cross as many boxes as needed)

9. What cultural background do you feel you belong to?

10. Do you watch a lot of foreign movies? If yes, movies from which country?

No  Yes, mostly movies from:

Most foreign movies I see have:

Subtitles

Voices in my own language

\*\*\*\*\*

The following questions are asked to find out about your computer-experience and your cultural background.

11. How often do you use a computer? (Please cross only one)

Every day and in the weekends.

Every weekday.

3 to 4 times per week.

1 to 2 times per week.

1 to 3 times per month.

Other (how many times):

12. How many years have you been using a computer? (Please cross only one)

Less than 1 year.

1-2 years.

3-4 years.

5-10 years.

- More than 10 years.

13. For what activities do you regularly use a computer?(Cross as many boxes as needed)

- Typing/word-processing.
- E-mail
- Internet for other things than E-mail
- Games
- Other (what activities):

14. What sort of computer do you like using most? (please cross only one)

- Personal Computer (e.g. IBM PC).
- Apple Macintosh.
- Sun workstation.
- Other (which one):

15. Where do you use a computer most?

- At home.
- At work
- at university.
- Somewhere else:

16. How often do you use the Internet? (Please cross only one box.)

- I don't use the Internet (go to question 8).
- Every day and in the weekends.
- Every weekday.
- 3 to 4 times per week.
- 1 to 2 times per week.
- 1 to 3 times per month.
- Other (how many times):

17. What do you use the Internet for most? (Cross as many boxes as needed)

- E-mail.
- On-line chatting.
- To find information on personal interests.
- To find information for work or study.
- Use of on-line facilities (like ordering books, shopping).
- As part of schoolwork.
- Game related.

## References

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- Working on homepage.
- Other:

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### Culture evaluation:

18. With which religion do you tend to identify? (Please cross one box only)

- None.
- Buddhist.
- Islamic.
- Christian
- Hindu
- Other:.....(Please tell us which).

19. Have you ever bought a product that in your opinion was not designed for your culture?

- No
- Yes:..... The product was:.....

I thought the product wasn't designed for my culture because:

.....

20. Are there certain products that you would buy just because they are from a foreign country?

- No
- Yes, which products:.....

21. What is your movie preference?

- Local-language movies only
- Local-language movies mostly
- Equally Local/English language movies
- Mostly English-language movies only
- English-language movies only

\*\*\*\*\*

22. In the following questions, please tell us how much you agree with each statement. Your responses to these questions reflect your general values that are influenced by your culture and your unique experiences.

Think about your own feelings concerning each of these statements and answer for yourself, not how you think other people would answer. For each question, place a number in the blank at the right.

1 = I strongly disagree with this statement

2 = I slightly disagree with this statement

3 = I neither disagree nor agree with this statement

4 = I slightly agree with this statement

5 = I strongly agree with this statement

a) "I prefer to instruct a website in detail, instead of only overview visiting"

Strongly disagree   1      2      3      4      5      Strongly agree

b) "I like a website of which I can change the way it looks, so it will look the way I want it to".

Strongly disagree   1      2      3      4      5      Strongly agree

c) "I find it important that I perform well on a computer when other people can see me working".

Strongly disagree   1      2      3      4      5      Strongly agree

d) "I would prefer a computer that is able to do a lot of things at once, instead of one thing at a time".

Strongly disagree   1      2      3      4      5      Strongly agree

e) "I get very upset when the computer does something strange and I am uncertain of what to do next."

Strongly disagree   1      2      3      4      5      Strongly agree

f) "I like to have the same software (programs) on my computer at home as on my computer at work

Strongly disagree   1      2      3      4      5      Strongly agree

g) "I would like my colleagues at work to be able to access my computer and add or review things in my work. I would like sharing my work as a team effort

## References

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Strongly disagree 1      2      3      4      5      Strongly agree

h) “I prefer to see detailed instructions in text on the screen instead of symbolic information in pictures or drawings”.

Strongly disagree 1      2      3      4      5      Strongly agree

i) “ If something would go wrong when using a computer, I would always blame the computer or the person who designed the software program”

Strongly disagree 1      2      3      4      5      Strongly agree

j) In most situations managers should make decisions without consulting their subordinates.

Strongly disagree 1      2      3      4      5      Strongly agree

k) In work related matters, managers have a right to expect obedience from their subordinates.

Strongly disagree 1      2      3      4      5      Strongly agree

l) Once a top-level executive makes a decision, people working in the company should not question it.

Strongly disagree 1      2      3      4      5      Strongly agree

\*\*\*\*\*

## **2) Working with the WebCt and CLC websites**

### **1. Collaborative Learning Center - CLC**

The following exercise is to find out about what things on the screen mean to you. Login into the following website: (<http://www.owcp.net/clc>)





Figure 1: Collaborative Learning Center website

- 1) After a little while the webpage will appear on the screen. Scroll up and down the screen and check out the whole page. What is the first thing that you thought of when you looked at the page?
- 2) What on the screen drew your attention first?
- 3) What do you think this page is about?
- 4) Write down what you expect from this 'CLC website'; What sort of service does this page offer?
- 5) What sort of people do you think this page is for?
- 6) What things on the screen make you think the page is about that?
- 7) Have a look at the picture on the screen. What does it show? (All the pictures)

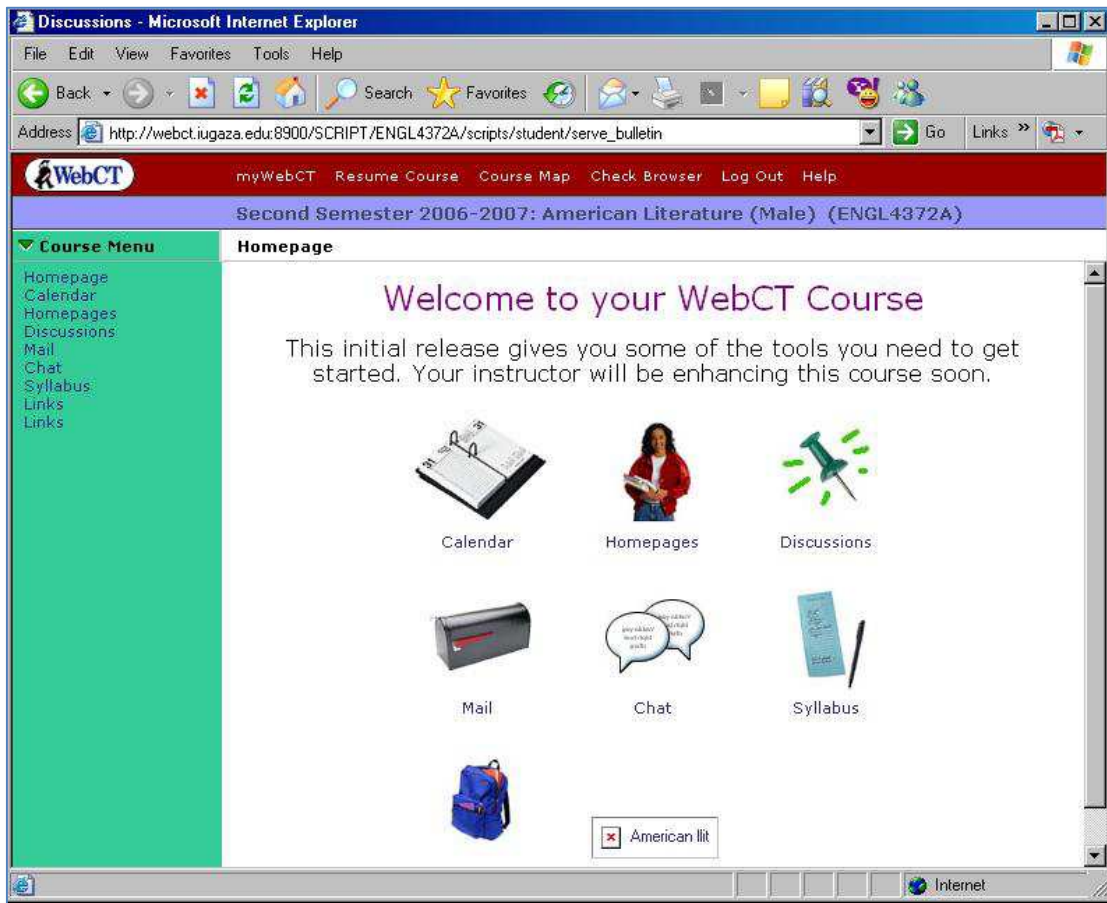
## 2. WebCT - iugaza

## References

The following exercise is to find out about what things on the screen mean to you.

Login into the following website: (<http://webct.iugaza.edu>)

Login into WebCT using your username and password; As shows below:



- 1) What on the screen drew your attention first?
- 2) Have a look at the icons on the screen.
  - a. What does it show?
  - b. What sort of information do you think you will get when you click on this object?
  - c. Click on the object and have a look at the information that comes up. What do you think of it? Is this what you expected? If not, how is it different?
- 3) Do you think there are another pictures and icons can represent the idea better than the icons shows in the website? try to explain that?
- 4) Click on "Syllabus"; do you think the language of the text easy or difficult? try to explain that?
- 5) Do you think it's better to have some local language beside the English language in the website as shown below? try to explain that?



6) Do you understand the text bellow?

"Mar7aba; Al7amdolelah enkom eb7'er we ebse7a gaeda, the pic of najy very nice, alah e7'aleholak we ehfazo men kol so'2 ea rab Salamy la a7mad we algame3 :-)"

If yes

Do you think anyone can understand that text? Do you write like that?

7) Are the images, sounds, and words culturally authentic?

8) Does the "WebCT program" reflect knowledge of learning theory as it is at your university?

End of the Questionnaire!

When you finish the researcher will ask you a few questions on what you thought of the website. This should only take a few minutes.

THANK YOU VERY MUCH FOR HELPING US !!

## **Appendix 7: Webmaster questionnaire**

How frequently do you change the design/architecture of the web site?

Why the website is generally changed?

Do you personally determine the way in which it is changed (pictures, graphics and colors used, layout, etc) or do you get directives? Who do you get directives from? What do these directives relate to (e.g. pictures, colors, etc)?

Do you happen to be influenced by design/architecture features from other web sites?

Could you give some examples?

You are generally inspired by (underline the applicable answer):

- American (US) websites
- Websites from different countries
  - Local websites
  - Other:

## Appendix 8: Anthropological Cultural Dimensions Evaluation – for HCI Experts

- Cultural dimension evaluation

Dimension No.	Dimension Name / Description
1	<p>Human Nature Orientation (By: Nancy Adler):</p> <p><i>“what are the good and bad things seen or perceived by the target culture?”</i></p> <p>This cultural dimension describes the way people can be seen: good, evil or a mixture of both. In addition they can be seen to be able to change or to be unable to change.</p>
2	<p>Individualism vs. Collectivism (By: Fons Trompenaars, Geert Hofstede, Nancy Adler)</p> <p><i>“Do people from a target culture prefer to do things as individuals or in groups?”</i></p> <p>This cultural dimension helps to know whether the target culture prefers to work together or individual.</p>
3	<p>Internal vs. External Control (By: Fons Trompenaars, Nancy Adler)</p> <p><i>“How much do people from a target culture adapt to and are controlled by their environment?”</i></p> <p>This cultural dimension shows how people from different countries relate to their natural environment and changes. People from internal-oriented cultures may show a more dominant attitude, focus on their own functions and groups and be uncomfortable in change situations. While the people from external-oriented cultures are generally more flexible and willing to compromise, valuing harmony and focusing on their colleagues, being more comfortable with change.</p>

4	<p>Time Orientation (By: Nancy Adler)</p> <p><i>“How cultures respond to time and how much they focus on the future”.</i></p> <p>The time orientation cultural dimension refers to the way cultures conform to time. The scale is described as ranging from past-orientation to present-oriented cultures to cultures that focus on the future.</p>
5	<p>Authority Conception (By: David Victor), or, Power Distance (By: Geert Hofstede), or, Achievement vs. Ascription (By: Fons Trompenaars), or Degree of Power (By: Quincy Wright)</p> <p><i>“How do the people from the target culture prefer to be questioned?”</i></p> <p><i>Which communication style and relationship between website owner and the targeted audience is required?”</i></p> <p>Different cultures often view the distribution of authority in their society differently. This cultural dimension focuses on the nature of human relationship in terms of hierarchy. It describes “the extent to which less powerful members of institutions and organizations accept that power is distributed unequally.”</p> <p>People from achievement-oriented countries respect their colleagues based on previous achievements and the demonstration of knowledge, and show their job titles only when relevant. On the other hand, people from ascription-oriented cultures use their titles extensively and usually respect their superiors in hierarchy.</p>
6	<p>Context (By: David Victor, and Edward Hall)</p> <p><i>“The degree of direct and explicit information needed in a website”</i></p> <p>The amount of information required, whether explicit or implicit, is culturally sensitive. For example:</p> <p>High-context culture: Many covert and implicit messages, with</p>

	<p>use of metaphor and reading between the lines. Much nonverbal communication.</p> <p>Low-context culture: Many overt and explicit messages that are simple and clear. More focus on verbal communication than body language</p>
7	<p>Gender Roles (By: Geert Hofstede)</p> <p><i>“Refers to the value placed on traditional male and female roles”.</i></p> <p>This cultural dimension focuses on “the degree the society reinforces, or does not reinforce, the traditional masculine work role model of male achievement, control, and power.</p> <ul style="list-style-type: none"> <li>- A High Masculinity ranking indicates the country experiences a high degree of gender differentiation. In these cultures, males dominate a significant portion of the society and power structure, with females being controlled by male domination.</li> <li>- A Low Masculinity ranking indicates the country has a low level of differentiation and discrimination between genders. In these cultures, females are treated equally to males in all aspects of the society.”</li> </ul>
8	<p>Uncertainty Avoidance (By: Geert Hofstede)</p> <p><i>“How do web users from the target culture react when threatened by uncertain or unknown situations?”</i></p> <p>This cultural dimension focuses on discovering the level of tolerance for uncertainty and ambiguity within the society - i.e. unstructured situations, the degree of formality, predictability, punctuality, information structures, tolerance for ambiguity, focus on tradition, and acceptance of changes all differ between societies.</p>
9	<p>Universalism vs. Particularism (By: Fons Trompenaars)</p> <p><i>“What is more important - rules or relationships?”</i></p> <p>The first dimension describes how people judge the behaviours</p>

	<p>of their colleagues.</p> <ul style="list-style-type: none"> <li>- Universalistic-cultures focus more on rules, are more precise when defining contracts and tend to define global standards for company policies and human resources practices.</li> <li>- Particularistic-cultures, the focus is more on the relationships; contracts can be adapted to satisfy new requirements in specific situations and local variations of company and human resources policies are created to adapt to different requirements.</li> </ul>
10	<p>Affective vs. Neutral (By: Fons Trompenaars)</p> <p><i>“How do the people from the targeted culture express their emotions?”</i></p> <p>People from neutral cultures admire cool and self-possessed conducts and control their feelings, which can suddenly explode during stressful periods.</p> <p>People from cultures high on affectivity use all forms of gesturing, smiling and body language to openly voice their feelings, and admire heated, vital and animated expressions.</p>
11	<p>Specific vs. Diffuse (By: Fons Trompenaars)</p> <p><i>“How people engage colleagues in specific or multiple areas of their lives?”</i></p> <ul style="list-style-type: none"> <li>- People from more specific-oriented cultures tend to keep private and business agendas separate, having a completely different relation of authority in each social group.</li> <li>- Diffuse-oriented cultures, the authority level at work can reflect into social areas, and employees can adopt a subordinated attitude when meeting their managers outside office hours.</li> </ul>
12	<p>Experience of Technology (By: David Victor)</p> <p><i>“Does the technology experience affect website usability?”</i></p> <p>This cultural dimension describes how technology is perceived</p>



	by the members of a culture. Attitude of the members of a certain society towards technological development.
13	<p>Face-Saving (By: David Victor)</p> <p><i>“What are issues and acts that avoid a loss of dignity?”</i></p> <p>This dimension gives information about the requirements that need to be taken into account in order to avoid a losing respect or dignity.</p>
14	<p>International Trade and Communication (By: Quincy Wright)</p> <p><i>“Are there national or international trade rules that need to be follow”</i></p> <p>This cultural dimension gives an indication how the rate of development in the field of trade and Appendixcommunication with other countries. For example, some countries tend not to care about international standards and face on national trade whereas some other countries focus on export and communication with other states.</p>

Thank you!

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