Evaluating Indigenous Design Features Using Cultural Dimensions

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Abstract

This study compares previous analytical findings in the area of cultural web design using Hofstede's dimensions with findings from a three year case study. This case study used an ethnographic and user-centric approach to better integrate cultural requirements into the website for a specific Indigenous community. We overview this design process and describe the ten key design features that were identified in the project. These design features were considered essential for capturing the cultural identity of the community. They are relevant to designers of indigenous websites and designers considering culture as part of their interface design process. We evaluate these design features by considering them in terms of Hofstede's cultural model. Some correlations have previously been found between Hofstede's cultural dimensions and the structural and aesthetic design features that are used in websites from different cultures. We compare the ten design features identified from our case study with the outcomes we might expect, given the measured position of the group on Hofstede's cultural dimensions. The best correlations occurred on the power distance index where the navigation, organisation and image content conformed with expectations. However, a number of contrary results were also found.

Keywords: Culture, Indigenous, Culturability, Web Design, Hofstede's Model

1 Introduction

Culture is fundamental to all areas of design, including the design of user interfaces. Culture develops through social interactions that occur at various scales, from smaller community groups to entire nations (Hofstede 2005). Indeed many levels of culture may co-exist based on various social groupings associated with ethnicity, religion, language, generation, gender or work place (Hofstede 2005). While culture can be seen in behaviour, traditions, community values and aesthetics, many aspects remain hidden. Culture is made up of a large mass of social rules that, like an iceberg lie mostly hidden below the surface (French and Bell, 1979).

The effect of culture on the usability of an interface has been described as "culturability" (Barber and Badre 1998). Different cultural groups have been shown to employ quite different usage strategies with the same interface (Faiola and Matei 2004). A number of specific cultural factors that impact on usability have been described and these include, the use of language, the representation of time, currency and other units of measure (Fernandez 2000). More subtle cultural factors such as imagery depicting body positions or social contexts and the use of symbols and preferred aesthetics are also important (Fernandez 2000).

In terms of interface design two distinct approaches to treating culture have been described. One approach is known as "globalization" as it involves the development of a generic, culturally neutral design that can be deployed globally (Tixier 2005). By contrast, the term "localization" requires the designer to adapt the interface so it specifically targets the culture of the local group (Shannon 2000).

Localisation has been the focus of our own three-year case study. In particular we have been trying to understand the process of incorporating the cultural identity of an Indigenous Australian community into the design of a website (George et. al. 2010). To achieve this we have adopted an extended ethnographic design process that focuses on community involvement. The process has used focus groups, interviews and iterative prototyping to help identify important cultural requirements for the group. The outcomes from this study include a group of ten key design features that are considered essential for capturing the specific culture of our target group. We describe our process and these outcomes in more detail in the following sections.

Such an ethnographic design approach as ours, while considered essential to our own project aims, is no doubt time-consuming. A contrasting approach for considering cultural requirements is to first try and characterise the target group based on some well-defined 'cultural' measures. Unfortunately, agreeing on such cultural dimensions is problematic with as many as 29 different measures having been previously used in cross-cultural design (Scahdwitz 2008). In terms of interface design the most frequently cited model for such cultural measures is the one developed by the cultural theorist Geert Hofstede (2005). Hofstede's cultural model is not without criticisms or debate (Ess and Sudweeks 2005, Callahan 2005) but it does provide a pragmatic, structured framework for studying culture (Williamson, 2002). We will describe Hofstede's cultural dimensions in later sections and also discuss some of the criticisms of the model.

Having characterised the target users in terms of cultural dimensions the next step is to adopt appropriate patterns or guidelines that correlate well with their cultural measures. The Hofstede model is further relevant as there have been several studies that employ this model for studying the design of culture in websites (Callahan 2005, Marcus and Gould 2000, Robbins and Stylianou

2003, Singh and Pereira 2005, Yuan et. al 2005). Indeed many of these try to identify the key design features associated with different cultural dimensions. Of particular interest is a study that analysed university websites from eight different countries and reported on how well various design features correlated with Hofstede's cultural dimensions (Callahan 2005).

It is the results from such analytical studies that we wish to compare our own results against. A distinguishing factor for our project is that we have identified design features through an extended ethnographic process and thus we have a good understanding of the motivation behind why each design element was chosen. This contrasts with the "blind" analysis of web site elements undertaken by these other studies. This is not a criticism of these studies as the blind analysis is a key part of their methodology. However, it does mean that any insights into why particular design elements were used remains unknown.

For the final phase of our project we addressed the question: "Given our target group, positioned using Hofstede's cultural dimensions, how well do our identified design features match with previously reported expectations?" To answer this question we used Hofstede's revised "Values Survey Module" from 2008 (VSM08 2008) to measure our target community's cultural position along five dimensions. We then analysed our 10 key design outcomes in terms of these dimensions, comparing our outcomes with predicted outcomes. These predicted or expected outcomes were derived from the other studies that use Hofstede's model.

The results are mixed with some design features, such as aesthetics and overall structure style matching quite well with expectations. Others, such as the use of interactive games are at odds with previous studies. Some features such as the use of humour in the site have not been previously studied. In general our findings support the idea that Hofstede's model while a useful tool to help consider cultural requirements in interface design is in no way prescriptive or exact.

2   Project Description

This work was motivated by a request to design a more culturally acceptable website for the Wollotuka Institute. The Wollotuka Institute is an indigenous study centre. It is part of the University of Newcastle, a large regional university about 170 kilometres north of Sydney, located in the traditional lands of the Awabakal nation. Wollotuka supports a broad range of Indigenous programs incorporating administrative, academic and research activities.

Wollotuka provides support and development services for Indigenous staff and students. It employs about 40 full time staff, who come from a wide range of Indigenous tribes. The community embraces a broad range of urban, regional and educational backgrounds. The diverse cultures of this community became the focus of a three-year case study that centred around the redesign of their website.

From this group 12 subjects were selected by convenience to be directly involved in the study. These 12 participants included five women and seven men who represent a range of Indigenous tribes, including the Worrimi, Eora, Gumbaynggir, Bundjalung, Murray Island, Wirajuri woman, Wonnarua and Awabakal nations. The participants thus represent a range of Australian and Torres Strait Island Aboriginal culture rather than a single tribal perspective. Of these participants five have academic roles at the Institute while the other seven perform important administrative functions. Nine of them are graduates and four of these have post-graduate qualifications. The primary researcher is from an Indigenous tribe in North Western Australia, and was responsible for conducting, analysing and reporting on outcomes from the study.

One question addressed in the overall study was "What key design features should be incorporated into a website to meet the cultural requirements of this Indigenous group?" By "key design features" we mean general design factors dealing with the look and feel of the site. We did not set out to capture all the functions or user tasks to be performed on the site. Nor did we consider in detail strict technical limitations in the design, for example, network bandwidth or cross-platform browsing issues. The planned outcome of the project was not a fully functional and deployed website but rather a consensus about the critical design factors that were required to address the cultural requirements of the community.

We adopted a user-centric approach to design as the involvement of the community was seen as essential and this approach relies on the active involvement of representative users throughout the process (Nielsen 1993). In conjunction with this approach we used iterative prototyping as this is described as a key component for visualizing and evaluating design solutions with the users (Goransson et. al. 2003). To gather and refine the design requirements we used a range of qualitative methods that included a focus group and both structured and semi-structured interviews. The 12 selected subjects formally took part in the focus group, and provided feedback through one on one interviews.
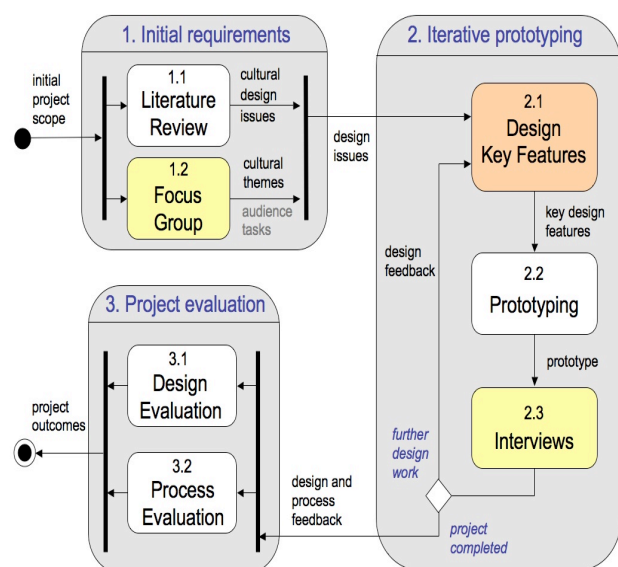

Figure 1: Phases of the Project

Visual Imagery - The website should reflect the physical space occupied by the school.

During the focus group, participants made significant references to the local landscape. For example, the school building is "our concept of place in a contemporary cultural environment." Much care was given to the various aspects of the landscape, both animate and inanimate during the storytelling. For instance, the "dust in the car park", the "sign out the front" and the "flagpoles" were referenced during the discussion.

Kinship - The website should make people feel part of an extended family.

A number of the focus group stories revolved around the relevance of kinship. One member went to the extent of comparing the Wollotuka environment to "a family unit and not like a school." The members had clear notions of how this kinship feeling works and benefits the community: "the members of Wollotuka would make themselves available to help one another if they were in trouble."

Language - The website should use a lot of multimedia (visual and spoken language) and be informal in style.

During the focus group a participant commented: "the website needs to speak the message rather than have written text." Another confirmed this idea: "There needs to be more than just writing about indigenous people, there needs to be elements that identify Aboriginal people." We must also show respect for the elderly and for those members of the community who were not able to read.

Humour - The website should capture the good humour and light-heatedness of the group. It should be a fun place to visit.

The stories in the focus group were noted for the humorous content. For instance, when commenting on the design of an Aboriginal website, one participant suggested "putting the name 'Wollotuka' up in pink neon lights across the top of the building, like the 'Hollywood' sign, saying 'Wollyworld is here' with a big arrow."

Community feeling - The website should be an extension of the community and make people feel welcome and supported.

Much emphasis was placed on the need for community spirit. Participants remembered typical examples. One staff member recalled large groups of people from Wollotuka going out together. The group included lecturers from other faculties and students. They would play a game of pool and have a meal. People wanted to be a part of Wollotuka because of this community spirit.

Traditional Activities - the website must showcase many traditional activities, such as painting, music, dance and ceremony.

Quite some time was spent on traditional activities. Significantly, music, dance and ceremony were spoken of in relation to creating life. Singing and dancing are related to community spirit and also a fundamental to the sharing of Aboriginal knowledge.

Table 1: Cultural Themes from Focus Group

The design process contained three main phases (see Figure 1). The initial requirements phase was used to gain an understanding of pertinent cultural design issues and to gather the initial expectations of the community. As part of this phase a number of cultural design guidelines were identified from literature (George et. al 2010). These guidelines were later used to help inform design decisions. The focus group, involving the 12 subjects in our study was based on approaches from audience ethnography and involved story telling (George et. al. 2011). The focus group was used to identify the key

cultural themes within the community and these are summarised in Table 1.

Having identified potential design issues from the literature review and appropriate themes from the focus group we began the iterative prototyping phase. Researchers in the project met to discuss possible design features that would address the cultural requirements. The researchers were already familiar with many technical aspects of web design and implementation. Some initial design features were chosen to be prototyped. These prototypes were intended to act as props for gathering feedback about the design features.

After the first prototype was built it was shown to the subjects in the study who then provided feedback in one-on-one interviews. The interviews were semi-structured to focus particularly on design aspects although they also served to identify additional content information. For example, what types of images should be used. After considering this feedback the design features were refined in a further prototype stage. Once again the subjects used the prototype before providing feedback through one-on-one interviews. After two prototyping stages a list of key design features was finalised and these are described in more detail below.

The third phase of the project was designed to evaluate both the process we used and the design outcomes. The results reported here form part of that design evaluation.

3 Key Design Features

The cultural requirements for the community were expressed in ten key design features:

1. Simple structure and navigation
2. Location Map
3. Virtual Tour
4. Multimedia (video and sound)
5. Interactive Games
6. Community Links
7. Feedback Mechanism
8. Informal Language and Humour
9. Traditional Imagery and Ceremony
10. Indigenous Wiki

3.1 Simple structure and navigation

The first prototype was designed to be just a single homepage with a very basic layout avoiding too many links. Navigation was intentionally kept simple by using a menu with only six items placed at the top of the page (see Figure 2). It was intended that content of the page was browsed by scrolling rather than through targeted selection of menu items. The selected layout supports a more holistic style of reasoning, one associated with contextual, experience-based knowledge (Dong and Lee 2008).

3.2 Location Map

A navigable satellite image map was also included in the design (see Figure 3). This design feature is intended to reinforce the spatial location of the group, a need that emerged quite strongly from the focus group. The identity of the place and the ease with which someone could find it were considered crucial in building the identity of the institution. Spatial aspects like location have previously

been identified as significant in aboriginal Indigenous culture (Turk & Trees, 1998).
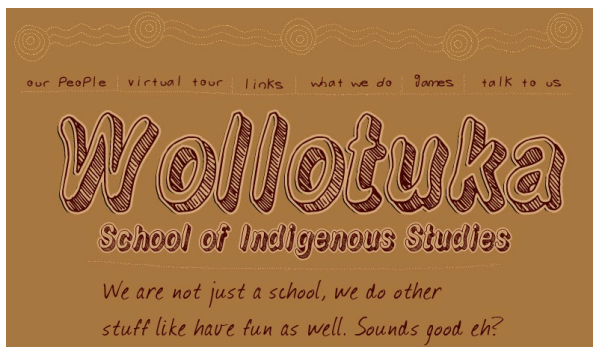

Figure 2: Prototype showing a simple menu, earthy colours, handwritten fonts and informal language.
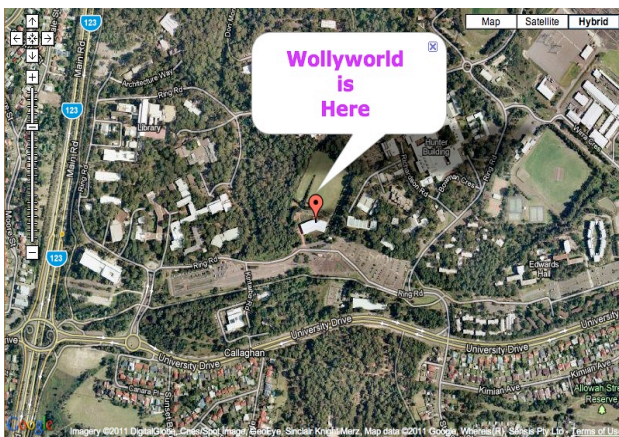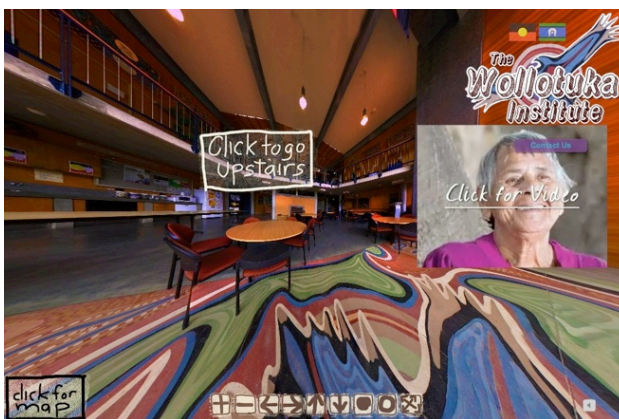

Figure 3: Satellite Image map

Figure 4: Virtual Tour of Birabahn

Figure 5: Video Introductions

3.3 Virtual Tour

We also identified the need to provide a virtual tour of the building and surroundings. Once again this was intended to reinforce the landscape where the community is situated. The tour was intended to encompass both the building itself and the external grounds. The grounds include a ceremonial site used by the community. Geographical features are said to form the foundation of Indigenous thinking (Auld 2007) and navigation by images is preferred over navigation linked to words (Williams 2002)

The results from the first prototype confirmed that this virtual tour was a key requirement of the group. The intention was to allow visitors to the site to experience the landscape. For the second prototype the virtual tour was expanded and as much functionality as possible was situated within the building and surrounds. So navigating the building became a navigation of the web site. We note the success of a similar approach in a project called 'Digital Songlines', which represented traditional Indigenous knowledge using a landscape metaphor (Pumpa, Wyeld, and Adkins 2006).

3.4 Multimedia (video and sound)

The participants were unanimous in wanting interactive images, "video, things happening, things moving", and not just images. This concurs with more general cultural guidelines that recommend providing multimedia rich environments rather than text-based ones and also including a range of audio and visual media (Buchtmann 2000, Fischer 1995). To achieve this we include a number of interactive elements. In particular we used video introductions from the academics in the school (see Figure 5). These were situated within the building to reinforce the connections with the location. Videos of traditional elders were also used to introduce visitors to the site.

3.5 Interactive Games

To provide further multimedia content, while addressing the requirement that visitors to the website would see the school as a fun place to study; we developed some casual interactive games. Two games were included (see Figure 6). One was a simple puzzle game based on card matching (Rosenzweig 2011 pp79-117). In this game local wildlife and Indigenous art were incorporated as elements into the game. Players scored points by turning over two cards with matching images. A second, action game, based on the traditional gameplay of "Asteroids" (Rosenzweig 2011 pp239-262) was also included. In this game traditional colors and imagery were combined with informal language and humorous overtones. Instead of avoiding asteroids hitting their space ship, players had to ensure kangaroos did not crash into their ute.

These game elements were intended to provide a strong message about Wollotuka being a "fun" place. There was also a desire within the group to try and appeal to the younger generation of visitors through elements such as interactive games. Once again the need to provide multimedia rich environments to encourage usage in Indigenous sites has previously been described. (Fischer 1995, Buchtmann 1999)

Figure 6: Two interactive games incorporating Indigenous images, informal language and humour
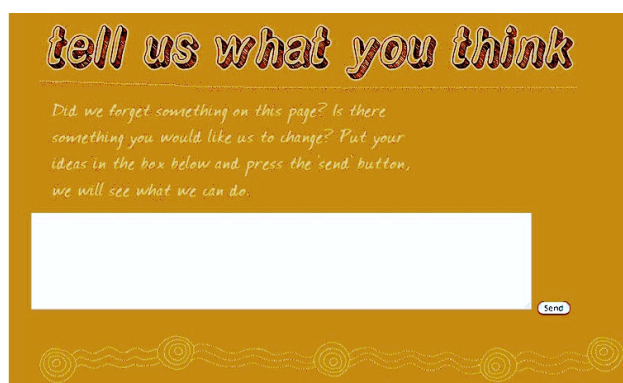

Figure 7: Community Links

Figure 8: Feedback Mechanism

3.6 Community Links

Many of the design features can also serve to highlight community and kinship. Traditionally, in an Aboriginal community, family life and children always come before individual pursuits (Gibb, 2006). This same theme was identified in the focus group and also reinforced by the feedback obtained during prototyping. For example, the group consistently reinforced the need to use images that represented both traditional elders and group images of the students and staff connected to Wollotuka. The use of familiar images depicting local scenes and people is a recommended technique for reinforcing the concept of community (Williams, 2002).

There was also a strong request to not only include traditional elders but also other Indigenous role models from sport and music. This met a concern that the site be relevant across multiple generations of visitors. Images of the entire cross-section of the community, from students to faculty, both young and old were requested. Explicit links to and for the broader community were also included. These sites contained information of general relevance for the Indigenous community (see Figure 8). However, we note that many of these links might not be considered relevant for a more traditional university website.

3.7 Feedback Mechanism

During the design of the website we focused on a close personal collaboration with group. This approach was seen as essential to the outcomes of the project. We wanted to ensure this sense of collaboration continued to occur and was also extended to all users of the website. Thus we incorporated a feedback mechanism into the website (see Figure 8).

Even though this is a common element on many websites we need to emphasize that it was considered of special significance in this design. Consultation with an Indigenous community has been recognized as a continuous two-way process (AIATSIS 2000) and so a feedback system was an important way to encourage the sharing of ideas among the extended website community.

3.8 Informal Language and Humour

The importance of adapting language to local styles is suggested for localization (Amara and Portaneri 1996, Callahan 2005). In particular, Aboriginal students are said to often prefer simple, "straight to the point" and easy to read English (Gibb 2006). However, our choice of informal language and humor (see Figure 2,5,6,8) is somewhat at odds with the more traditional image projected by university websites. Indeed there were some disagreements within the group over the use of "uneducated" phrasing and the simplified expressions that were incorporated into the design. However, in general, the sense of informality and fun associated with the school were considered more important than the reinforcement of academic reputation. Therefore the intent in the design was always to keep the language very informal and simple. This informality was reinforced by the use of a casual, handwritten font.

3.9 Traditional Imagery and Ceremony

The design incorporated custom dot images and earthy colors that are strongly identified with traditional Indigenous culture (see Figure 2). We are aware that simple things, such as color, can affect the user's expectations and overall satisfaction (Barber and Badre 1998). Likewise, the focus group wanted to see Aboriginal art on the website as it would immediately identify the site as Indigenous. Other traditional elements such as singing and dancing are often used to help teach in the traditional Aboriginal society (Fischer, 1995).

3.10 Indigenous Wiki

The intention of a wiki for knowledeg construction was the most novel design element we tried to include in the website. Much has been written about the need to incorporate contemporary Aboriginal knowledge into such projects and to stress the involvement of the Indigenous people in the development of this knowledge. The idea is that the user should be able to 'perform knowledge'. That is, to actively participate in knowledge construction, rather than merely accessing and manipulating what is provided (Pumpa and Wyeld 2006). We had identified a similar requirement from our focus group.

However, the whole question of how to represent and evolve knowledge in an "Indigenous" versus "Western" way proved a complex question that still requires more investigation. While the wiki approach used in the first prototype was thought to be a good idea, the text-base interaction was perceived as complex and difficult for non-technical users. To address this we expect a more visual representation, much like a graphical Multi-User Dungeon (MUD), which focuses on situated visual objects, could provide a solution. A MUD provides an extensible database of people, places and things that users can interact with (Woodruff and Waldorf 1995). In the scope of this project we did not develop this design feature further.

4 Hofstede's Model

The original Hofstede model was composed of four distinct dimensions that were said to categorize national culture (Hofstede 2005). After some criticism derived from a comparison of values for cross-cultural students (Hofstede and Bond, 1988) a further dimension was added (see Table 1). Thus five cultural dimensions were defined:

- Power Distance
- Individualism
- Masculinity
- Uncertainty Avoidance
- Long-term Orientation.

4.1 Hofstede's Cultural Dimensions

The power distance index is related to the extent that power is distributed in the culture's society. Higher values indicate that power is exercised centrally from above, while lower values indicate a more even spread of power through all levels of society. In low power distance cultures, there is less distinction placed on the position in a hierarchy. Management may be less revered and equality of decision-making may be expected. This extends to family situations were children are also treated as equals.

The individualism measure relates to the way larger, strong cohesive social groups function as opposed to smaller individual and tight family groupings. This is also described as individualism versus collectivism. We might typically associate Asian cultures with a lower value of individualism compared to western cultures such as America and Australia, where personal pursuits tend to override the achievements of the group.

The masculinity index is intended to estimate the way roles are distributed between genders in the culture. Female values were found not to vary greatly between cultures while male attitudes did. In high masculinity countries traditional distinctions between gender roles are enforced. Value is often placed on social recognition, competition and advancement. By contrast, in low masculinity cultures, male and female attitudes, roles and values can be very similar. Values surrounding quality of life, modesty and equality are more prevalent.

The uncertainty avoidance dimension indicates the culture's tolerance for ambiguity and uncertainty. Cultures that measure low on this dimension place less emphasis on rules and regulations that attempt to enforce certainty. They accept less structure and are more tolerant of change.

The long-term orientation measure was added to the Hofstede model to measure the cultural importance placed on the future rather the past and present. Values such as thrift and perseverance are associated with a high long-term orientation while respect for tradition and meeting social obligations are important values for countries with lower measures on this index.

Cultural Dimensions					
Cultural Group	Power Distance	Individualism	Masculinity	Uncertainty Avoidance	Long-term Orientation
Wollotuka	15	15	-5	18	-33
Australia (Indigenous)	80	89	22	128	-10
Australia (western)	36	90	61	51	31
Austria	11	55	79	70	
Denmark	18	20	66	30	118
Ecuador	78	8	63	67	
Greece	60	35	57	112	
India	77	48	56	40	61
Japan	54	46	95	92	80
Malaysia	104	26	50	36	
Netherlands	38	80	14	53	44
Sweden	31	71	5	29	33
United States	40	91	62	46	29

Table 1: Measures on the five Hofstede dimensions for a selection of cultural groups (Hofstede 2005).

We do note that Hofstede's cultural model is not without criticisms, and some of these include the use of an initial sample made up of employees from a single company and then how well these relate to the national culture as a whole (Sondergaard 1994). Callahan provides a good review of this issue and the ongoing debate surrounding Hofstede's model (Callahan 2005).

4.2 Hofstede's Value Survey

Hofstede's cultural model was originally derived from a survey of work-related values. The survey was completed by staff working for subsidiaries of IBM across 50 different countries between 1967 and 1973 (Hofstede 2005). An improved version of the value survey was made generally available in 1982 and many of the studies using Hofstede's work relate to this original survey.

In 1994, when the model was extended to include the long-term orientation dimension the values survey was also extended to include questions that measured values related to this new dimension. Even though later studies were carried out using this survey, data is not yet available for some countries along the fifth dimension.

The values survey was again revised in 2008 and questions related to two further dimensions were included for research purposes (Hofstede et. al. 2008). These two new values were related to self-effacement and indulgence. In this study we used this 2008 version of the values survey. It includes 28 Likert-scale questions, four for each of the seven dimensions and a further six questions that provide demographic information. Since the latest two dimensions are yet to be correlated in the model and little data exists in terms of web design we will not consider them further in the study.

At the end of the project we surveyed the 12 subjects directly involved in the study along with 9 additional subjects that work at Wollotuka. Having completed the survey we calculated the dimensions using the described approach for the 2008 values survey (Hofstede et. al. 2008). This resulted in low scores on all five of the Hofstede cultural dimensions. These calculated scores are shown in Table 1 along with scores previously measured or estimated for other national cultures. Note that scores are typically scaled to fall between 0-100, although lower and higher values are sometimes used when these dimensions are estimated. We have also chosen not to apply any scaling and thus negative values are shown for two of the dimensions for Wollotuka.

Our sample size of 21 is at the bottom limit of the recommend sample size for the value survey. We also note that this survey is intended to measure national cultural variations and not cultural differences between smaller groups. Ideally we would only compare results against similar schools from a university population rather than comparing against results obtained from a different employment sector, namely IBM employees. As a result some caution must be applied in interpreting the results in too quantitative a fashion. To address this we do not assume a well-defined metric when comparing scores. Rather we treat cultural dimensions in broad categories ranging from low to high. Our group fall into the low category for all five dimensions (see Table 2).

Having placed our group with low measures in each of the five Hofstede dimensions we then compared our ten

key design features with expected results. To do this we turned to previous studies that delineate the expected design features for cultures with low scores in the power index, individualism, masculinity, uncertainty avoidance and long-term orientation dimensions. Table 2 shows a list of low and high cultures for each of the Hofstede dimensions. We have selected countries that feature in previous studies (Callahan 2005, Dormann and Chisalita 2003). Table 2 also includes Australia, a previously estimated value for an Indigenous group in the Northern Territory and the results from the Wollotuka survey.

Score on Hofstede Dimension				
LOW ⟵				⟶ HIGH
≤ 20	[20,40)	[40,60)	[60,80)	≥ 80
Power Distance				
Wollotuka Austria Denmark	Australia Netherlands Sweden	Japan USA	Ecuador Greece India	Indigenous Malaysia
Individualism				
Wollotuka Ecuador	Greece Malaysia	Austria India Japan	Denmark Sweden	Indigenous Australia Netherlands USA
Masculinity				
Wollotuka Denmark Netherlands Sweden	Indigenous	India Greece Malaysia	Australia Austria Ecuador USA	Japan
Uncertainty Avoidance Index				
Wollotuka	Denmark Denmark Malaysia Sweden	India Australia Netherlands USA	Austria Ecuador	Indigenous Greece Japan
Long Term Orientation				
Indigenous Wollotuka	USA Australia Sweden	Netherlands	India	Japan

Table 2: A list of low and high countries as measured on the Hofstede cultural dimensions.

5   Design Features and Hofstede

A number of previous studies have used Hofstede's dimensions to examine cultural variations in web site design. For example, a series of structural and linguistic guidelines for each of the cultural dimensions have been suggested (Marcus & Gould 2000). Using frequency counts a set of design features for each of the Hofstede's dimensions was identified in a study of 500 commercial web sites across several cultures (Robbins and Stylianou 2002, Robbins and Stylianou 2010).

Hofstede's model has also been explicitly used in the study of university websites across cultures. A study of university web sites found correlations between feminine values and the masculinity index in the low masculinity country of Netherlands and the high masculinity culture of Austria (Dormann and Chisalita 2003). When Indian and American university websites were compared differences in the design were measured in the three dimensions of uncertainty avoidance, individualism and long-term orientation (Rajkumar 2003).

Score on Hofstede Dimension	
LOW ⟵⟶ HIGH	
Power Distance	
Less structured access to information & shallow hierarchies. Less focus on expertise, authority, and official logos. Fewer access barriers. Photos of students. Images of both genders. (Marcus and Gould 2000) Images of public spaces and everyday activities. (Ackerman 2002)	Significant emphasis on social and national order in symbols. Access restrictions. Photos of faculty. Photographs of leaders and monumental buildings (Marcus and Gould 2000) Images of monuments (Ackerman 2002) Symmetrically designed sites (Callahan 2005)
Individualism	
Include socio-political achievements Emphasize history and tradition. Emphasis on state of being. (Marcus and Gould 2000) Use of formal speech. (Rajkumar 2003) Images of groups and older people. (Callahan 2005)	Frequent images of success. Personal information. Emphasis on action. (Marcus and Gould 2000) Frequent pictures of individuals. Direct address. Expression of private opinion. Individual success stories. (Rajkumar 2003) Images of individuals & young. (Callahan 2005)
Masculinity	
Emphasis on visual aesthetics. Support cooperation and exchange of information. (Marcus and Gould 2000) Images of people, laughing, talking or studying together. (Dormann and Chisalita 2002) Multiple choices. Orientated toward relationships. (Ackerman 2002) Figurative images. Black & white (two tone) images Pictures of women. (Callahan 2005)	Focus on task efficiency. Navigation oriented toward exploration and control. Utilitarian graphics. Interactive elements like games and animations. (Marcus and Gould 2000) Emphasis on tradition & authority. Frequent images of buildings. (Dormann and Chisalita 2002) Limited choices. Orientation toward goals. (Ackerman 2002) Highly saturated colour images Animated pictures. (Callahan 2005)
Uncertainty Avoidance	
More complex designs. Variety of choices. Long pages with scrolling. (Marcus and Gould 2000) Abstract images. (Ackerman 2002) Fewer links. Vertical page layout. Abstract images. Pictures of students & people. (Callahan 2005)	Simple with clear metaphors. Restricted amounts of data (Marcus and Gould 2000) Formal organization charts, rules, regulations, extensive legalese. (Rajkumar 2003) References to daily life. (Ackerman 2002) Horizontal page layout. More pictures of buildings. (Callahan 2005)
Long Term Orientation	
Emphasis on allowing the user to accomplish tasks quickly. (Marcus and Gould 2000) Few references to tradition. Emphasis on current events. Present clear strategic plans. (Rajkumar 2003)	Emphasis on tradition and history. Provide archives of early photos & images of founders. Make frequent references to the distant future. (Rajkumar 2003)

Table 3: A list of design features expected for low and high values for each Hofstede cultural dimension. Green items were confirmed in our study, while red items are in disagreement with our outcomes.

The most thorough study in this area examined the similarities and differences between university websites from eight different countries (Austria, Denmark, Ecuador, Greece, Japan, Malaysia, Sweden, USA). (Callahan 2005). Callahan's study examined home pages of 20 universities from each of the eight countries. These countries were selected to represent low and high values on each of the four cultural dimensions. The study looked for correlations between the way specific design elements were used and the four original Hofstede dimensions. We have summarised the outcomes from each of these previous studies in Table 3 by showing the expected design features for low and high values on each of the cultural dimensions. In the following section we compare the own ten key design features in terms of these previous expected results.

5.1 Power Distance Dimension

There are a number of good matches between our design features and the expectations of cultures with a low power index measure. These include the unstructured and shallow navigation hierarchy of our design. The less formal, authoritarian approach to layout and content is also as expected and contrasts with the existing official homepage. The types of images requested focus on public spaces and include both genders. There was a request to try and balance the use of both faculty and student images and this contradicts the expectations for the preferred use of student images. This might be explained by the intention of the site to introduce staff members to prospective students. This is accomplished through videos of staff. Another contradiction to expectations is related to the desire to emphasise Indigenous symbols, by use of the Indigenous flag and recognised aesthetics related to colour and abstract dot paintings.

5.2 Individualism

Again there were some good matches between our design features and the expectations of cultures with a low individualism measure. The emphasis on traditional representations and ceremony in the design was confirmed. There was also a request to include as many community-based photos as possible, although there was no strong preference for younger or older people but rather that cross-generational images are equally represented. Once again personal information of individual faculty were part of the task requirements of the site and the intention was that these be a less formal more real world interaction. Individual success stories were included with the very clear intent of providing role models for younger people. The largest disagreement between our own design and expectations was the use of informal language on the web site. This was one design feature that received much debate during the design process. In the end the intention was to use this to make the web site more generally accessible to the community and less authoritarian.

5.3 Masculinity

The best two matches between our design features and the expectations of cultures with a low masculinity measure were the strong emphasis on simple aesthetics,

namely the earthy colours and simple font. The overall emphasis on community relationship building and inclusive features such as the feedback are also predicted by previous studies. However, there are also a number of design features that have been suggested belong to high masculinity cultures. These include navigation oriented toward exploration, images of buildings, an emphasis on tradition and interactive elements like games and walkthroughs. The reason for including computer games in the site was to appeal to a younger generation and project an image of fun. The disparity with the other features relate to fundamental ideas of knowledge representation in Indigenous. This involves the exploration of things in the context of places, including landscapes and buildings in this case.

5.4 Uncertainty Avoidance

Our website featured a single long pages with scrolling. This matches well with previous expectations for cultures with a low uncertainty measure. Other features such as the vertical page layout the use of abstract images and the inclusion of community pictures involving students also match expectations. However a few expected design features are at odds with a low uncertainty avoidance culture. For example, we might expect a more complex design with a large variety of choices. By contrast the simple, clear metaphors used in our design have been suggested are more appropriate for cultures that score high on this dimension.

5.5 Long Term Orientation

Long Term orientation is the least studied of the Hofstede dimensions. There were no good matches between our design features and the expectations of cultures with a low score on this dimension. It is suggested that websites for low scoring cultures will focus on fast efficient task execution. However, our web site promotes a slower explorative navigation by way of the interactive media. There was also a strong preference in our design to focus and highlight traditional practices. This is directly at odds with expectations from literature.

6 Conclusion

Hofstede's dimensions have previously been used a number of times to analyse the impact of culture on web design. In all these cases the websites were evaluated blindly, with no specific knowledge about how culture actually impacted on the design decisions. Our study is therefore unique in that the design features were first identified using a protracted ethnographic process that was intended to capture elements that best represented the culture of the group. It was at the conclusion of the project that we measured the group's cultural position using Hofstede's cultural dimension survey. This allowed us to compare the actual outcomes in terms of the web design with the expected outcomes as suggested by previous work. The question we addressed was "For our group, as positioned using Hofstede's cultural dimensions, do the identified design features match with expectations that have been previously reported?"

The answer to this question was mixed. Our group measured low on the five Hofstede dimensions and some of our design features correlated well with expected outcomes. The best correlations occurred on the power distance index where the navigation, organisation and image content conformed with expectations. However, a number of contrary results were also found. In particular the use of informal language with a low individualism score and the focus on tradition with low a long-term orientation.

As previous authors have indicated (Ess and Sudweeks 2005), while design features associated with the Hofstde dimensions provide useful input to the cultural design process they do not provide straightforward definitive design solutions. Rather variations in individual groups still need to be catered for in the design process.

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