

One System, Worldwide: Challenges to Global Information Systems

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ABSTRACT

In a global economy, organizations are increasingly selling online in multiple markets, as well as coordinating work teams distributed across geopolitical, cultural, and language boundaries. These factors play an important role in informing the design of effective and appropriate human-computer interfaces. In this paper we explore issues in interface localization, and the challenge of designing for multiple markets and audiences. We use a high-speed low cost analysis of different national and linguistic versions of the home pages of Yahoo! and Google to illustrate the power and speed of this approach.

Keywords

Human-Computer Interface, Information Systems, Globalization, Localization, Software Internationalization.

INTRODUCTION

Many organizations are exploiting the opportunities of networked technologies to sell their products and services not just in domestic markets but internationally. Just as domestic e-commerce can open up dramatic cost savings and potential for new niches and modes of selling, so too can international e-commerce. While creating immense opportunities for growth and diversification, the resultant pressures from new international competitors are also impelling many organizations to expand not just their sales but also their operations from a domestic to a multinational perspective.

Online systems are especially valuable for multinational organizations whose members are geographically distributed and may be culturally diverse. These online systems can help fill the “structural holes” in networks (Burt, 1992; Ardichvili, Page and Wentling, 2003) to get richer information and solve problems more quickly.

But how to design a system that people from many different cultures are able to use and be happy to do so? The fundamental issues are the same whether one is designing public interfaces with which to interact with customers, or the internal system through which the organization’s members are to interact with each other. Guided by this strategy, a multi-national organization may develop a “global” system with a standardized user interface, enjoying considerable economies of scale. At its most crude, this would mean a uniform interface in a single language (most likely English) with minor modifications to conform to local legal requirements. This will rarely be feasible. However, a straightforward translation of the interface is unlikely to be sufficient either. The “global system” will probably not be embraced globally because the cultural embeddedness within information systems can not make “one-size-fits-all”.

For example, McDonald’s saying, “One taste, worldwide” (Schlosser, 2001) evokes the image of a globally standardized system for food preparation and distribution, resulting in a uniform, consistent flavor which ignores variation across cultures; the McDonald’s culture is somehow independent of the surrounding environment where its restaurants are located. However, the reality of eating at a McDonald’s is quite the opposite; it has adjusted its “recipe[s] to suit varying cultural preferences and taboos” (Schlosser, 2001). As with its different national menus, McDonald’s has carefully customized its different national websites to appeal to its user group in each target culture, in order to make sure that its marketing is as effective as possible in different cultural environments (Würtz, 2005). The case of McDonald’s illustrates the importance of creating culturally sensitive systems which are capable of adapting to local needs and preferences while adhering to standards of quality and service. However, we must also acknowledge the opportunity costs of providing such diversity compared to a consistent uniform global solution that can enjoy both greater economies of scale and reduce the complexities of synchronizing incremental changes across numerous slightly different manifestations. We will explore that tension in the challenges of developing multiple user interfaces in different cultural contexts.

Specific dimensions of information systems are always based on assumptions inherent in the cultural backgrounds of their designers. If these systems are used by people with cultural backgrounds which differ from those of the designers, features intended to facilitate utilization may actually inhibit this process (Branch, 1997, Ardichvili, Maurer, Li, Wentling and Stuedemann, 2005). For example, with a vision of “one global firm”, Accenture tried to use a standard global knowledge sharing system, but it was less successful in motivating its consultants in East Asia to contribute knowledge than its Western consultants. This was mostly due to the requirement that all contributions be in English, which was off-putting to Asian consultants who felt that their English writing skills were inadequate, or that it was too much work to create perfect English text, or were embarrassed about potential errors. Additionally, it is uncommon for Asians to write something and submit for sharing on a voluntary basis (Paik & Choi, 2005). For example, Japanese employees preferred to wait until instructed directly to contribute their own knowledge because posting something voluntarily is associated with self-promotion and thus it is not an appreciated behavior in Japanese culture. Similarly, when Microsoft released its localized Japanese version of the Windows 3.0 operating system in Japan, it was met with a lukewarm reception and sluggish sales. After studying the work habits and local culture of Japanese users, the completely redesigned Windows 3.1 quickly exceeded the sales of its predecessor. This experience helped Microsoft further build culturally sensitive products which gained rapid adoption in both Chinese and South Korean markets (O’Hara-Devereaux & Johnson, 1994).

Plocher and Honold (2000) argue that product development needs take into account cultural characteristics of their users, including their preferences and mental models. Dray (1996) supports and extends this point to the design of user interfaces. She claims that the key to successful product localization is the customization not only of linguistic elements but also other cultural elements. Software internationalization is a growing area of interest for developers of effective and efficient user interfaces (del Galdo and Nielsen, 1996; Marcus 2002; Callahan, 2005). At the same time, studies of multinational corporations have also shown that people from different cultures perceive and use the same system in different ways (Ardichvili, Maurer, Li, Wentling & Stuedemann, 2006). As organizations go global, their customers and their employees come from different cultures, so it is important for organizations to provide culturally accommodating interfaces.

CULTURAL VARIATION IN USER INTERFACES: A HIGH SPEED LOW COST PRELIMINARY INVESTIGATION

Inspired by the success of Agile Methods in computing, we have been involved in a number of projects investigating the development of high-speed low-cost techniques that allow very rapid investigation, analysis, prototyping and evaluation of technologies in use (Marty, and Twidale, 2005; Jones, Rathi, and Twidale, 2006). Such techniques are not intended to be completely rigorous, nor can their results be definitive. They can serve however as powerful tools for guiding subsequent iterations, and precisely because they are so fast and cheap, permit many more iterations than are typically possible in a project. We chose to apply that approach to informing our understanding of software localization. As such, the following work must be treated as a work-in-progress, illustrating the power and speed of the method, but leaving the results open to question in the light of subsequent iterations.

To better understand the cultural variation present in localized information interfaces, we compared versions of Yahoo!’s homepage from different countries and in different languages. Our focus was to see how much variation exists in the interface of different versions of the same interface designed for different cultural audiences. Our analysis focused only on the top of the Yahoo! home page (Figure 1), including the banner with the service icons across the top of the page, the main search box, as well as the general appearance and layout of the rest of the page. We did not compare the contents of the pages.



Figure 1 - The portion of the Yahoo! interface being studied

Russo and Boor (1993) outlined seven criteria for consideration in internationalization of interfaces including: text, images, color, flow, symbols, measurements, and functionality. We adapted these criteria to create a comparative framework for

analyzing the different Yahoo! home pages with respect to the ‘main’ home page of Yahoo!’s originating culture (yahoo.com, shown in Figure 1, based in the USA). The framework developed compares the following elements:

- 1) Main Services: those which are given icon representation in the Yahoo! banner. On yahoo.com this includes Finance, Music, Shopping, Mail, My Yahoo!, and Messenger.
- 2) Search Categories: the different search tabs across the top of the search dialog box. On yahoo.com this includes Web, Images, Video, Audio, Directory, Local, News, and Shopping.
- 3) Other Features: any additional features present in the search dialog which are not counted in either of the previous two categories. On yahoo.com this includes the links to Advanced, My Web, and Answers.
- 4) The visual appearance of the search dialog including the search category tabs, the buttons in the dialog, the dialog box’s color and style, and any additional icons or visual artifacts;.
- 5) The overall layout and formatting of the page.
- 6) The qualitative text density of the page measured as the qualitative ratio of text to whitespace and images.

Table 1 shows the comparison with 11 other Yahoo! home pages, where the rows have been ordered by the total number of differences with yahoo.com.

	Main Services	Search Categories	Other Features	Visual Appearance	Layout & Formatting	Text Density	
Yahoo.com (English)	-/-	-/-	-/-	-	-	-	<p>‘-‘ denotes a zero value, or no difference compared to yahoo.com</p> <p>‘X/Y’ X = the number features present on yahoo.com which are not present on the other site Y = the number of features present on the other site which are not present on yahoo.com</p> <p>‘D’ denotes that the page has a different layout and/or formatting than yahoo.com</p> <p>‘Lo’ denotes the page has a lower text to whitespace and images ratio than yahoo.com</p> <p>‘Hi’ denotes the page has a higher text to whitespace and images ratio than yahoo.com</p>
Yahoo! UK & Ireland	1/1	1/-	1/2	1	-	-	
Yahoo! España	2/2	2/-	3/-	1	-	-	
Yahoo.com (Español)	2/2	3/-	2/2	-	-	-	
Yahoo! Brazil	3/3	3/-	1/1	-	-	-	
Yahoo! France	2/2	3/-	1/2	1	-	-	
Yahoo! Australia & NZ	1/1	2/-	1/1	4	D	Lo	
Yahoo! Russia	4/-	5/-	2/2	-	D	Lo	
Yahoo! India	3/3	5/-	2/2	-	-	-	
Yahoo! China	5/3	4/2	2/2	3	D	Lo	
Yahoo.com (Chinese)	3/3	7/-	3/3	4	D	Hi	
Yahoo! Korea	3/3	4/4	3/6	5	D	Hi	

Table 1 - Comparison of visual differences between yahoo.com and other Yahoo! pages

In order to evaluate the effectiveness of our analysis framework, we applied some rapid statistical analyses in SYSTAT. The purpose of this analysis was not to make any definitive claims about the different interfaces, but rather to verify our intuitions about the data and that the evaluation framework we applied was keeping inline with our intuitions. Figures 2 and 3 show the results of an additive tree cluster analysis and two-dimensional scaling respectively. The resulting visualizations coincide with our qualitative evaluation of the differences among Yahoo! pages as well as an intuitive understanding of cultural variations. In the additive tree clustering, Yahoo! Korea is a far outlier, and is clustered with Yahoo! China and Yahoo! Chinese, forming an “East Asian culture” cluster. This cluster is repeated in the two-dimensional scaling.

The two-dimensional scaling clearly shows a European/Euro-centric cluster containing, UK, France, España, Yahoo! en Español, Russia, India and Brazil. While India and Brazil are not in Europe, their Yahoo! pages are very similar to European sites. This cluster is somewhat discernable in the additive tree visualization as well. Yahoo! Australia and yahoo.com are offset from the other pages, although comparatively closer to the European cluster than the Asian cluster. These visualizations show patterns of similarity among the Yahoo! pages which coincide with an intuitive understanding of cultural variations.

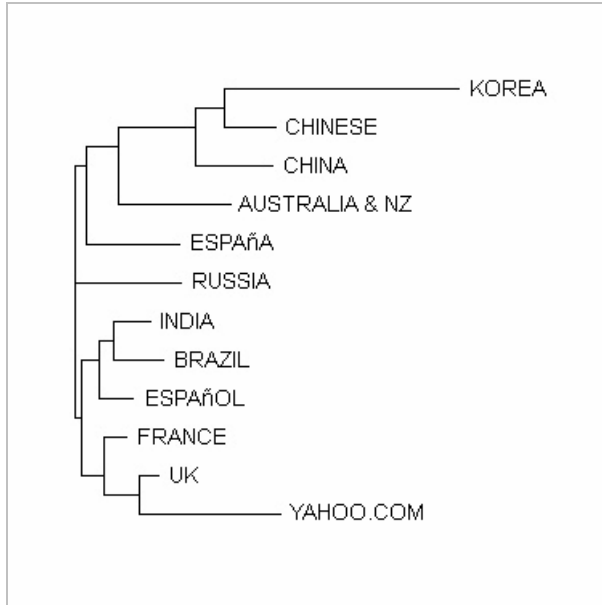


Figure 2 - Additive Tree Clustering

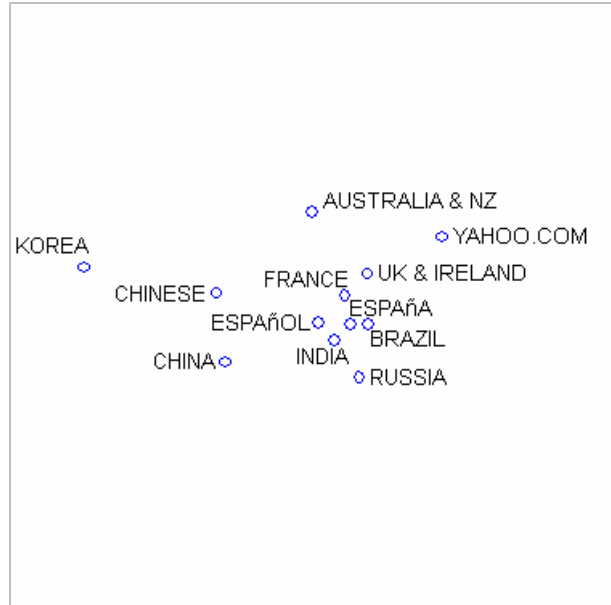


Figure 3 - Two-Dimensional Scaling

The analysis of the “Main Services” icons reveals a surprisingly large amount of variation in the different pages, while maintaining at least some consistency of design and certain graphic elements. It is clearly not the case that Yahoo! redesigned each site from scratch for a local audience. Although it is something of a challenge to hypothesize the design rationale from the resultant variations, we can speculate that at least some changes were made in response to local cultural needs. The language changes are an obvious case. Other aspects of layout and design may be more a matter of responding to locally dominant styles of webpage design, so that new users can exploit their familiarity with those structures from other local websites. Some features may be absent simply because they are not yet offered in that market, and additional features because that market is serving as a test site before going global. In order to better understand how the icons differed in their visual form we compiled Table 2 which contains all the icons from the pages studied, grouped and categorized by function. The mail service is the only Yahoo! service present across all pages. However, there are eight different variations of this icon with minor differences, such as a “1GB” tag, or the left-to-right orientation of the image, or other visual marks.

	Mail	Messenger	Finance	My Yahoo!	Music	Shopping	Movies	Games	News	Other	
Yahoo.com	Mail	Messenger	Finance i ▾	My Yahoo!	Music i ▾	Shopping i ▾					
Yahoo! Hong Kong	Mail	YM	財經				電影			拍賣	旅遊
Yahoo! Mexico	Correo	Messenger		Mi Yahoo!		Compras		Juegos		Autos	
Yahoo! España	Correo	Messenger		Mi Yahoo!	Música		Cine i ▾	Juegos i ▾			
Yahoo! en Español	Correo	Messenger		Mi Yahoo!	Música i ▾					Deportes	Entretención
Yahoo! Brazil	E-mail	Messenger		Meu Yahoo!			Cinema			Encontros	Acesso Grátis
Yahoo! Australia & NZ	Mail		Finance	My Yahoo!	Music	Shopping				7 TV	
Yahoo! Russia	Почта	Messenger									
Yahoo! India	Mail	Messenger	Finance				Movies		News	Mobile	
Yahoo! China	邮箱								门户	助手	知识堂
Yahoo! Chinese	電郵		財經	個人化					新聞	說明	新奇
Yahoo! Korea	메일 i ▾		금융 i ▾		뮤직			게임 i ▾		구리기	블로그

Table 2 Catalog of icons used for Yahoo!'s main services

The icons used at the top of these different home pages constitute the primary features, presumably those most used or desired by the sites' users. As such, the number, type and arrangement of these icons reflect the differences among what is considered important in each market. Take, for example, the football icon in Yahoo! en Español which indicates a strong focus on providing sports information, especially football (known in the USA as soccer), to Latin American users, reflecting, hopefully, an equivalent level of interest amongst users. Consider also, the icons for games, where Yahoo! Korea and Yahoo! España use console video game controllers, which Yahoo! Mexico uses a die.

Beyond the comparative differences in the icons of shared services, there are interesting insights to be gleaned by studying the icons of services unique to particular pages. Take, for example, the child icon in Yahoo! Korea. This icon links to kid-themed section of the Yahoo! Korea site with information and services geared towards South Korean youth. This is understandable given the high level of broadband penetration in South Korea and local cultural attitudes towards Internet technology. The 7TV icon for Australia and New Zealand is locally understood given the partnership of Channel 7 and Yahoo! Australia. Consider the following sequence of images from the Yahoo! China page, a Chinese stock quoting service, and Yahoo! Taiwan. Note the usage of the color red in each.



Figure 4 - Comment rating in Yahoo! China with red thumbs up and green thumbs down.

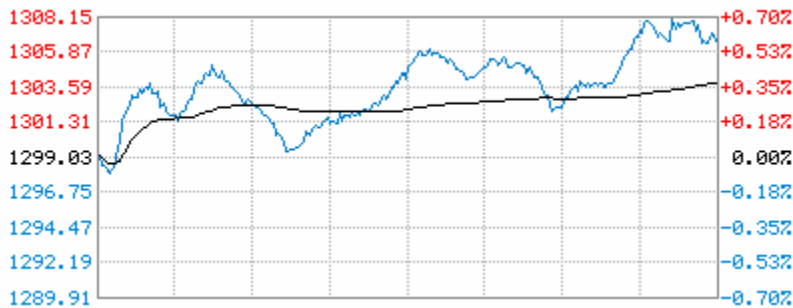


Figure 5 - Chinese stock quote with red positive and blue negative values (from <http://quote.stockstar.com/>)

4	▲	5天堂官方網站	300	120
5	▼	4統一發票	241	48

Figure 6 – Ratings of topics on Yahoo! Taiwan with green up arrow and red down arrow.

In Chinese culture, “red” represents passion, exuberance, happiness or celebration. So red is a good sign and good comments are in red as we can see from Figure 4. Similarly, stock market gains are marked with red (Figure 5). But in Yahoo! Taiwan, green arrows are used for “up” and red arrows for “down” (Figure 6). This may reflect a greater influence from Western culture in Taiwan as compared to China; thus, the meanings associated with “red” in Taiwan are more consistent with the associated meanings of “red” in the US.

The culture of dating and relationships is also reflected in the different Yahoo! pages. Not all Yahoo! pages had dating services, and of those that did, few were advertised beyond a link mixed in with the rest of the Yahoo! services. However, some sites had clear links to their dating service. Yahoo! UK had two graphical links to their dating service, called Yahoo! Personals (Figures 7 & 8). Yahoo! France and Yahoo! Brazil had a link in the “Main Services” portion of the page with the label “Meetings” (Figure 7). Figure 8 shows two banner ads for Yahoo! dating services displayed immediately below the main search box on Yahoo! UK and Yahoo! India. Yahoo! India’s dating service, however, is labeled as a “Matrimony” service, reflecting a different outlook on dating by Indians. Yahoo! Hong Kong’s dating service is advertised on its main page as “Fated Friends” (Figure 9). Contrasting this is a similar portion of the Yahoo! India page describing Yahoo! India’s Matrimony service. By comparison, Yahoo! China has just a small text link to its dating service, linked from the bottom of the page (marked in Figure 9).

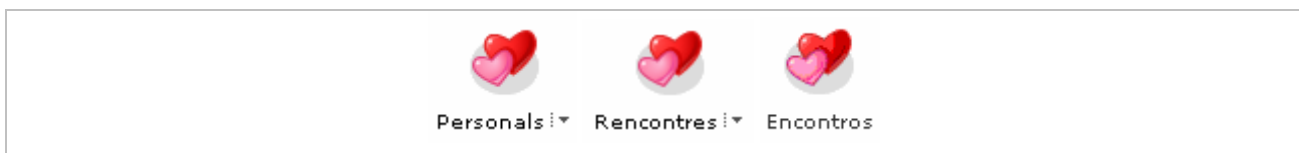


Figure 7 - Icons for Yahoo! Personals service on (from left-to-right) Yahoo! UK, Yahoo! France, and Yahoo! Brazil

though Bihari-Angika is considered a dialect of Hindi, the two translations of the Google page are different (Figures 10 & 11). These variations will exist across other dialects of Hindi, like those mentioned above and other subdialects of Bihari, like Bhojpuri, Maithili, and Magahi. Thus the translation into one dialect of Hindi, or into Bihari-Angika, is not serving the speakers of other dialects. Hindi-speaking users have only the option of using Standard Hindi or Bihari-Angika translated interfaces, neither of which may be the person's mother tongue. Beyond this extreme example, there persists the problem with volunteer-based translation systems wherein the translations provided by volunteers for a particular language may or may not be universally understood by all speakers of that language. It is obvious where the breakdowns may occur in the case of Hindi, but also within English, concepts and images embedded in the choice of words in the translation may not carry the same meaning for native speakers in the USA, Canada, UK, Ireland, Australia, New Zealand, South Africa, India, etc., let alone for non-native speakers. Di Biase (1987) emphasizes the importance of recognizing these variations with respect to translation stating that "the translator needs to know the community he or she is translating for and to become acquainted with its linguistic, social and cultural characteristics in terms of both the origins of the community and its ... environment" (as quoted by Fraser, 1993).



Figure 10 - Google's Hindi Interface



Figure 11 - Google's Bihari-Angika Interface

USING THE WEB FOR HIGH SPEED LOW COST ANALYSIS OF ISSUES OF USABILITY AND LOCALIZATION

The above work shows how companies can achieve multinational reach and sales via localization and branding efforts far more effectively and cheaply in an increasingly networked world, as well as knitting together distributed work teams through similarly thoughtfully localized corporate intranets. The work also shows how the web allows far more effective and lightweight *analysis* of current practice in multinational localization and branding efforts. Our preliminary investigation was remarkably quick and easy to do, serving as an indication of both the richness and the efficiency of the technique. Each analysis and discussion above represents an iteration of the low-cost, rapid-evaluation approach described in the introduction. With minimal effort and investment of time and money, we were able to come to a detailed understanding of significant cultural variations among different international markets. The use of at-hand resources like Yahoo! and Google, allowed us to progressively explore issues of cultural variation, reaching deeper and more subtle problems on subsequent iterations.

It has always been possible, but effortful, for researchers to analyze how a company packages and positions the same product slightly differently for different markets, or alternatively makes the design choice to use the same 'product interface' for several markets. In the case of analyzing ecommerce, (even advertising-fuelled informational sites like Yahoo! and Google that may not sell a product directly to consumers), this ceases to be a matter of traveling to distant lands or requesting materials from different regional divisions, but simply a matter of clicking and comparing. We should note that this rapid fall in the costs of comparing means that the process of multicultural marketing may itself change. Consumers themselves are equally able to see if they are being offered the same products in the same ways at the same level of quality for equivalent prices. If they find they are being treated unfairly they are likely to complain and use the internet to coordinate their complaints. They may also be able to circumvent legal, fiscal or corporate policy barriers to obtaining certain goods at certain prices by alternative purchasing and shipping routes. Thus companies face the challenge of balancing the multiple but often competing advantages of localization, niche marketing and price differentiation with consistency, uniformity and perceptions of universally reliable standards of quality, while avoiding their associated risks of perceptions of inconsistency and unfairness versus a global blandness rather than a global brand.

CONCLUSION

From a cultural perspective, language issues (such as translation and coding), graphical aspects (such as cultural aesthetics, icons, and colors) and information structuring (such as formats and layout) should be given serious consideration when trying to design interfaces for users from different cultures. In this paper, we use Yahoo! as an example to show how one company has managed to create an overall consistent global brand, features and interface, while allowing for considerable national cultural differences. But interface customization does not stop here. Even within the same nation cultural differences exist and so we use Google in Hindi as a case to briefly explain the within-nation cultural differences. The ease of doing such a rapid preliminary analysis serves to emphasize the power of using the web to explore concepts of software internationalization and to learn from the best practices of organizations addressing this vital competitive issue.

REFERENCES

1. Ardichvili, A., Maurer, M. Li, W., Wentling, T. and Stuedemann, R. (2006) Cultural Influences on Knowledge Sharing through Online Communities of Practice, *Journal of Knowledge Management*, 10, 1, 94-107
2. Ardichvili, A., Maurer, M. Li, W., Wentling, T. and Stuedemann, R. (2005) Knowledge Sharing through Online Communities of Practice: The Impact of Cultural Variations, paper presented at the Academy of Human Resource Development 2005 International Research Conference, Estes Park, Colorado
3. Ardichvili, A., Page, V. and Wentling, T. (2003) Motivation and Barriers to Participation in Virtual Knowledge-Sharing Communities of Practice. *Journal of Knowledge Management*, 7, 1, 64 -77
4. Branch, R. M. (1997). Educational technology frameworks that facilitate culturally pluralistic instruction. *Educational Technology*, 37 (2), 38-41.
5. Burt, R. (1992) *Structural holes: The social structure of competition*, Cambridge, MA: Harvard University Press
6. Callahan, E. (2005) Interface Design and Culture, *Annual Review of Information Science and Technology*, 39, 57-310
7. Di Biase, B. (1987). Translating for the community. *Australian Review of Applied Linguistics supplement 4*, 52-65
8. Dray, S. (1996) Designing for the Rest of the World: A Consultants Observation, *Interactions*, March '96, 15 – 18
9. Fraser, J. (1993) Public Accounts: Using Verbal Protocols to Investigate Community Translation, *Applied Linguistics* 10(2), Oxford University Press, 325-343
10. del Galdo, E. M. and Nielsen, J. (1996) *International users interface*, New York: John Wiley & Sons, Inc., 1996
11. Jones, M. C., Rathi, D. and Twidale, M.B. (2005) Wikifying your Interface: Facilitating Community-Based Interface Translation. Submitted to the Designing Interactive Systems Conference, State College, Pennsylvania
12. Marcus, A. (2002) Global and intercultural user-interface design. In: J.A. Jacko and A Sears, Editors, *The human-computer interaction handbook: fundamentals, evolving technologies and emerging applications*, 441–463
13. Marty, P. F. and Twidale, M. B. (2005) Usability@90mph: Presenting and Evaluating a New, High-Speed Method for Demonstrating User Testing in Front of an Audience. *First Monday* 10, 7
14. O'Hara-Devereaux, M. and Johansen, R. (1994) *Global Work: Bridging Distance, Culture and Time*, Jossey-Bass San Francisco, CA
15. Paik, Y. and Choi, D. Y. (2005) The Shortcomings of a Standardized Global Knowledge Management System: The Case Study of Accenture, *Academy of Management Executive*, 19, 2, 81-84
16. Plocher, T. and Honold, P. (2000) Culturally-Adapted Products in the Global Market: Dealing with the Naysayers, *Conference on Human Factors in Computing Systems*, ACM Press New York, NY, USA, 308
17. Russo, P. and Boor, S. (1993) How Fluent is Your Interface? Designing for International Users, In *Proceedings of the SIGCHI conference on Human factors in computing systems*, ACM Press, 342-347
18. Schlosser, E. (2001) *Fast Food Nation*, New York: Houghton Mifflin
19. Würtz, E. (2005) A Cross-Cultural Analysis of Websites from High-Context Cultures and Low-Context Cultures, *Journal of Computer-Mediated Communication*, 11, 1, article 13, <http://jcmc.indiana.edu/vol11/issue1/wuertz.html>