JITTA

JOURNAL OF INFORMATION TECHNOLOGY THEORY AND APPLICATION

# DEVELOPING FEATURE SETS FOR GEOGRAPHICALLY DIVERSE EXTERNAL END USERS: A CALL FOR VALUE-BASED PREFERENCE MODELING

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## ABSTRACT

*Here we explore the terrain of understanding the value of IT applications for diverse users across geographically diverse markets. The domain of our investigation is the development of features for applications that make use of presence and location information about the user. There is good reason to believe that such applications might create substantial value for mobile device users because the systems could use our declared availability and intentions (presence) along with our location to present us with information and choices of high circumstantial value. We explored the use of wide audience requirements engineering (WARE) to collect and analyze data from potential lead users in Helsinki, Las Vegas, and Hong Kong about their preferences for applications using presence and location information. We further analyzed the data to differentiate among the three cities. Results showed substantial differences in user preferences for presence and location enabled applications across the three cities, suggesting that applications developed for one market might not succeed in the others. We propose the design of new methods to develop distinct feature sets for IT applications intended for use by diverse users in different markets.*

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[1] The two lead authors made substantially similar contributions to this paper. First authorship was determined by rotation among papers.

Rajiv Kishore acted as the senior editor for this paper.

Tuunanen, T., K. Peffers, C. E. Gengler, W. Hui, and V. Virtanen, "Developing Feature Sets for Geographically Diverse External End Users: A Call for Value-Based Preference Modeling," *Journal of Information Technology Theory and Application (JITTA)*, 8:2, 2006, 41-55.

## INTRODUCTION

Global products can no longer be designed for national markets and then rolled out at leisure to the world on a take it or leave it basis (Honold 2000). Intense competition demands that they be designed to accommodate the preferences of customers in different markets for simultaneous introduction. Consequently, product features and attributes need to accommodate a diverse audience of users outside the organization and outside the market of origin.

In addition, for more and more products, information systems are not only the channel through which they are marketed, but also major components of the products themselves. As a result a significant crossover between IS design and consumer product research may be required to meet the needs of systems and products in, for example, areas such as web site design (Luna, Peracchio and Juan 2002) and mobile technology based applications. Furthermore, such new systems often involve functions and technology consumers have never seen or considered before and have all the same pitfalls and concerns of other disruptive product innovations. The failure to recognize the need to understand varied and changing market preferences can spell disaster for global system and product introductions. Good examples can be seen in the troubles that the telecommunication industry has faced when rolling out global wireless Internet services (Barwise and Meehan 2004): products that suit the Northern European customer may flop in North American or Asian markets.

In this paper we explore the problem of developing application features for new consumer oriented systems that must be designed for diverse, geographically dispersed customers and which make use of technologies that the customers haven't hitherto seen. We explore the adaptation of wide audience requirements engineering (WARE) (Tuunanen, Peffers and Gengler 2004), a method we developed to collect and analyze user preferences and reasoning for new system features, for use in developing the features for geographically diverse user sets. The context of our investigation is a study of user preferences and reasoning for applications and features using presence and location data to be designed for users in Europe, North America, and Asia.

### CONTRIBUTION

This paper makes four contributions to the literature about IS development in different local markets.

Firstly, the paper motivates the extension of RE methods to better accommodate individual preferences in different geographic areas for IS features and attributes.

Secondly, it describes WARE as an RE method that might be adapted to incorporate this need.

Thirdly, it describes a case in which WARE was used for RE that both suggests the importance of the intended market to feature preferences and suggests that the current WARE method might require redesigning to accommodate them.

Fourthly, it suggests an avenue for such a design.

The paper applies WARE to a cross-continental context for requirements engineering (RE) of new consumer oriented mobile systems that will meet the needs of users in a variety of national markets. WARE is a requirements engineering method for capturing, modeling, and presenting feature preferences from dispersed end-users and potential end users, who may have little connection with the firm, the technology, or the products. Such users may have little basis for feature preferences, may have little understanding of the underlying technology, and may have little motivation to participate in the development process. Consequently, data collection from them may be costly, their preferences difficult to model, and they may be unavailable for iterative participation in the development process (Peffers, Gengler and Tuunanen 2003).

This is an exploratory paper that motivates a problem around the development of new IS in cross-continental settings and suggests an avenue for solution. Our intention is to work toward the development of a new

method for analyzing and displaying cross-market feature preferences from a product innovation perspective, we demonstrate a need for an alternative methodology for researching consumer perceptions of new products across national boundaries.

The rest of the paper is structured as follows. First, we review literature about markets and information systems. We follow with reviews of prior efforts to model feature preferences among external end users, using means-end theory and the WARE method for requirements elicitation. Then we provide a brief case study description about our data collection and analysis to study the value of presence and location enabled application features. Next we present and discuss the results of our analysis, showing how these methods may not provide good results across different markets. Finally we conclude with a discussion of how the apparent limitations of these methods might be addressed by adapting the methods to incorporate specific cultural modeling of these preferences and reasoning for specific markets.

## FEATURE PREFERENCES AND MARKETS

The speed and willingness of consumers to adopt new innovations, often discussed in terms of "consumer innovativeness" (Hirschman 1980), is an essential concern to marketers and new product developers. The issue becomes more complex when the global nature of many products is considered. The rates at which consumers adopt innovations vary across markets (Takada and Jain 1991). At the individual level, both national and personal value orientations have an impact on consumer innovativeness (Steenkamp, ter Hofstede and Wedel 1999). Similar cross-market concerns have arisen in information system design (Ives and Jarvenpaa 1991; Tractinsky and Jarvenpaa 1995).

The fact that innovations, including IS, are adopted at different rates across markets is well accepted (Nakata and Sivakumar 1996). What would be more germane to successful product and system introductions would be insightful and useful research to understand the substance of the perceptions that drive these differences. Tansey, Hyman and Zinkham (1990) point out that many theoretical generalizations about market differences may indeed lead marketers to erroneous advertising decisions. Consumer perceptions are influenced both by the individual's personal values and the context of product usage. Similarly, Myers and Tan (2002) suggest that information systems research needs to transcend the perspective of cultural difference and adopt models that recognize "the emergent and dynamic nature of culture."

Thanasankit and Corbitt (2000) studied these in the domain of requirements elicitation. The researchers found culture had significant effects on their requirements elicitation efforts in Thailand and that the use of these techniques should accommodate the cultural environment. Several researchers have, in turn, recognized that the localization of a software application (Honold 2000; Sacher, Tai-Hou and Loudon 2001) or a web site (Burgmann and Kitchen 2006) should affect the graphical user interface. Human computer interaction researchers, e.g., (Honold 2000; Sacher, Tai-Hou and Loudon 2001), have also made this point when investigating how location affects application use.

Honold (2000) studied the use of washing machines in Indian house-holds in two major cities. Dr. Honold identified eight major factors that affected use of the application: objectives and characteristics of the users, mental models of based on previous experience, environment, infrastructure, division and organization of labor and tools available. Honold ended with a comment about how important it is to understand use context correctly and underlined the importance of using proper elicitation techniques to get the requirements right in this demanding requirements engineering environment. Sacher, Hai-Hou, and Loudon (2001) arrived at parallel conclusions when they compared the language affects on application graphical user interfaces across cultures. They advocate looking beyond merely translating the functionalities of applications to different language to understand how culture influences human mental models in different local market contexts.

Other researchers argue for going further, asserting that we should study how to make a crossover to develop explicitly market oriented applications (Grier, Brumbaugh and Thornton 2006). Steenkamp, et al (1999) and Daghfous, Petrof and Pons (1999) took a significant step in this direction by demonstrating the role of individual personal value orientations as explanatory variables for consumer innovativeness across markets. Gengler and Mulvey (1993) and Oberby et al (2004; 2005) expanded this perspective, using means-end theory and laddering, to understanding the difference in personal values driving consumer choice and to study the differences in how products translate into benefits that satisfy consumers' value oriented goals. In parallel, Peffers and Gengler (2003), Peffers, Gengler and Tuunanen (2003) and Tuunanen, Peffers, and Gengler (2004) have developed methods using means-end theory and laddering to resolve problems related to defining high value IS development portfolios and high value IS feature sets for systems involving diverse users.

## MEANS-END THEORY AND WARE

Means-end theory (Gutman 1982) proposes that product attributes are relevant to consumers for the consequences derived from consumption behavior and that these consequences are relevant for the personal values they help satisfy for the consumer. A complete description of a sequence of associations, from a basic product feature through consequences and the final terminal personal value satisfied, is referred to as a means-end chain or ladder. To study consumer means-end structures about products, Reynolds and Gutman (1988) described a structured interview technique, called laddering. Using the laddering technique, the interviewer gives a participant a choice or decision task within a product category and then asks the participant to describe important consequences of the participant's choice. Next, the participant is asked a series of probing questions to elicit the values that would be affected by these consequences and the specific product attributes or features that would lead to them. The result of the interview is a series of attribute/consequence/value chains that represent the participant's preferred product features and his/her reasoning for the preferences.

Analysis of laddering data then involves a process of content coding each individual construct, creating an aggregate matrix tracking how many times each construct connects with another, and then drawing an aggregate map that represents all of the pathways consumers link product features to their desired end-goals or values (Gengler and Reynolds 1995). The means-end approach and perspective has been widely recommended and employed for a variety of studies and applications in positioning strategies (Gengler and Reynolds 1995), perceptions of price and quality (Zeithaml 1988), and understanding consumer value (Woodruff 1997). Lately, IS researchers have recommended this approach for its potential in requirements gathering (Browne and Ramesh 2002; Browne and Rogich 2001).

WARE (Tuunanen, Peffers and Gengler 2004) is a method, based on means-ends theory, for IS developers to gather data across broad groups about user preferences and reasoning for system applications and attributes and to analyze the data to present to decision-makers. It extends earlier research on IS planning and the resulting CSC methodology (Peffers, Gengler and Tuunanen 2003). It uses laddering to understand the perspectives of system end-users by aggregating these perspectives into maps of how potential new system features connect to and could satisfy consumer values. WARE meets a need for new approaches to requirements specification involving systems with widely dispersed end users (Peffers and Tuunanen 2005; Tuunanen 2003). It integrates ideas of using lead-users (von Hippel 1986), market segmenting, and laddering (Reynolds and Gutman 1988), as well as consensus building and support decision making in the developing organization (Tuunanen, Peffers and Gengler 2004).

## PRESENCE AND LOCATION BASED MOBILE APPLICATIONS AND FEATURES

We sought to employ the WARE method to develop feature sets in a cross continental context to determine whether we

could evaluate its use for requirements engineering for systems intended for use in multiple, distinctly different markets. An opportunity presented itself in a study to develop ideas for applications and features using "presence" technology that could be developed for consumer use by the mobile telecommunications industry.

"Presence" is a user declared attribute that tells other parties, including people and systems, who are, with permission, subscribed to the user's presence data, his or her own real time declarations about the his or her current availability and intentions. Examples of presence might be, "in a meeting," "off work and looking for fun," "bored," "out of town," "available for consultation," etc. In addition, location data could include the geographic coordinates of the mobile device. Together presence and location data could allow a variety of services to be provided to the user. For example, if the presence status were "off work and looking for fun" and the location were "The Strip, Las Vegas," the producer of a Caesar's Palace show might be able to use that data to offer the user unsold tickets to a performance one hour hence at a steeply discounted price. The many possibilities for applications using presence to enable interaction among community members, strangers, and commercial entities raise interesting questions about what such services end users might value (or hate).

## METHODOLOGY AND DATA

We collected data from potential system users in three diverse locations, Finland, China, and the US. Data collection was in the native language of each location. In each location we asked users to think about ideas for new applications that used presence and location data that would be valuable to them.

The sample consisted of "lead-users" because lead-users can be used, the literature suggests, to forecast the needs of the majority of users of a technology (von Hippel 1986) and because lead users are thought to be able to think about the desired functionality for innovative applications using technology that they haven't experienced. We used the "snowball" method to recruit participants (Olson and Bakke 2001). Starting with a small sample of known lead users, we obtained referrals from each participant to others that he or she thought might also be lead users. To screen the participants as lead users, we asked each a set of six questions, plus a second set of questions to ascertain the experience the participant had with mobile services. The question responses were compared with benchmark responses to determine whether the prospective participant was a lead user. Experience scores where benchmarked separately for each location because of local differences in technology diffusion. This recruitment process resulted in a panel of 81 participants: 28 from Helsinki, 27 from Hong Kong, and 26 from Las Vegas. Sample demographics are shown in Table 1. As we can see from this table, the sample distributions differ somewhat with respect to these standard demographic characteristics. This is an inevitable consequence of using the snowball method to recruit sample participants, in this case potential lead adopters, as the method involves one participant referring others for participation.

We interviewed each of the participants individually, in-person. During the interviews, the interviewers made digital audio recordings and took notes in a structured format. Each participant was shown a Macromedia Flash demonstration of the presence technology concept that had been provided by the Nokia Corporation for research purposes. After the demonstration the participants were told to think beyond the application examples shown in the demonstration to other applications that might be valuable for them.

The interviews were done, using the laddering technique. They started with a presentation of the stimuli list (Appendix 1). These stimuli were intended to suggest ideas about possible applications to the participants. We asked the participants to rank-order the stimuli in terms of their importance. Then, one at a time, for the two highest ranked stimuli, the interviewer asked each participant to describe applications that would be important to him/her and to describe desirable features for each application. The interviewer proceeded to ask the subject to explain why each particular feature is important, so as to

**Table 1. Sample demographic characteristics**

| | | Helsinki | Hong Kong | Las Vegas |
|---|---|---|---|---|
| Gender | | | | |
| | Female | 2 | 9 | 6 |
| | Male | 26 | 18 | 20 |
| Age | | | | |
| | Under 20 | 3 | | 3 |
| | 20-29 | 17 | 19 | 3 |
| | 30-39 | 2 | 8 | 8 |
| | 40-49 | 5 | | 5 |
| | 50-59 | | | 7 |
| Education | | | | |
| | Secondary | 22 | 1 | 12 |
| | Tertiary | 3 | 10 | 8 |
| | Post Graduate | 2 | 16 | 6 |
| Incomplete demographics | | 1 | | |

elicit the consequences that the participant expects from the feature. The interviewing process continued with a series of "why would that be important?" questions to elicit what the subject expected as an end result from the features and consequences, i.e. as values or objectives for the chain. To elicit more concrete system attributes, we asked the participant a series of questions about "what would there be about the system that would make you think that it would do that?" The data was recorded in the notes as chains of feature—consequence—values, as described by Peffers, Gengler, and Tuunanen (2003).

## ANALYSIS

The data collection provided us with 663 chains, nearly 3500 individual statements. We analyzed this data to turn it into meaningful graphical information. In the analysis, we employed a two-step, qualitative, thematic approach to cluster the chains. The thematic approach is intended to preserve the integrity of the individual chains, i.e., so that individual statements from chains are clustered together. The chains represent the reasoning of each individual or "the voice of the customer" (Griffin and Hauser 1993). Analysts interpreted the individual statements to cluster them into constructs, where statements with similar meanings, but using different words, were given the same label. Then they clustered the chains to sort them qualitatively into themes. Three experienced researchers did classifications independently and then met and compared results to resolve any coding differences by consensus. Differences resulted primarily from the tedium of the task and the large number of items to be coded.

Once all of the chains were sorted into themes, an individual map was constructed for each theme. In iterative rounds of sketches the analysts developed network maps that aggregated the chains in each theme. The theme maps show features and attributes on the left, consequences in the middle and values on the right, linked as they were linked by participants in the interview data. This analysis follows similar studies done with WARE method and more exact information about construction of the theme maps can be obtained from Tuunanen, Peffers and Gengler (2004).

To determine whether participants in the three cities differed in their interest in features among the six themes, we compared the percentage of ladders collected from participants for each theme in each of the cities.

## RESULTS

The analysis yielded six theme maps, of which, in the interests of brevity and

sufficiency, we show just two here in Figures 1 and 2. Figure 1 shows the theme, "information access for special interest groups." Application features and attributes are shown on the left, outcomes in the middle, and the values affected on the right. In this theme high level features, like SIG discussion groups, are linked to more granular features immediately to the right. These, in turn, are linked to outcomes or performance and ultimately to the values that participants thought they influenced on the far right. Note that links in the maps reflect participants reasoning, rather than any analysts' rationale, so we should be cautious about reading causality or any particular logic into the linkages.

*Information Access for Special Interest Groups* (shown in Figure 1). In this theme applications help to coordinate the activities and behavior of individuals as part of special interest groups, such as clubs, churches or professional organizations. From the theme map we can observe that it is divided to three distinct subthemes of features, namely presence profiles, SIG discussion groups and ease of use. The figure includes ranking information collected from the participants and it shows that the dominating set of features is clearly SIG discussion groups. This is further divided to a multitude of feature sets, like customization and categorization. The reasoning behind these SIG features can be traced to a variety of performance outcomes, or consequences, that suggest better group performance and to social values members hold about their participation in such groups. This theme was a mentioned with significantly greater frequency in Helsinki (30.33% of responses) than in Hong Kong (11.52%) or Las Vegas (9.52%) (Two-tailed t-test p=. 0001).

*Presence Messaging* (Figure 2). This theme focused on communicating the location of the user for better relationships and communication to result in more efficient performance and economic gains. It portrays the potential uses and benefits of a system for sending/receiving messages among group members and receiving automatic messages from group members about their locations. Our analysis revealed four subthemes of features. All of them relate a concept of presence enabled messaging. From the ranking information we learn that the dominating feature set here is the ability to see location and status of a person directly from the mobile terminal. It should be noted that the participants saw a great difference between personal and business oriented messaging. The "see status and location" subtheme supports business and professional use, e.g., among police officers. Furthermore, the theme map includes some clear indications for a demand for a group enabled messaging in real time. Something different compared to the previous more stagnant need of SIG group communication. The division between personal and business communication is also visible in the outcomes that explain why the features are important for the participants. All these lead to a dominating goal of being more efficient. For this theme, Helsinki was significantly lower than the other two locations. (Helsinki, 8.2%; Hong Kong 19.35%, p=.01; Las Vegas 25.93%, p=.001). The difference between Hong Kong and Las Vegas was not significant.

*Finding My Way* (graphic not shown). This map describes the derived value from features related to location directions and/or information on local destinations (restaurants, gas stations, etc.). This theme was least mentioned overall. The percent of mentions for Helsinki (13.93%) was marginally significantly greater (p=.05, two-tailed t-test) than either Hong Kong (7.37%) or Las Vegas (6.35%). The emphasis of this theme is on finding the best route to a location and arriving efficiently and safely.

*City Reporter* (graphic not shown). This map describes how timely current information on city events, restaurants, and entertainment would be valuable to users. Hong Kong residents mentioned this theme with more than twice the frequency of either Las Vegas or Helsinki (HK 36.41%, Helsinki

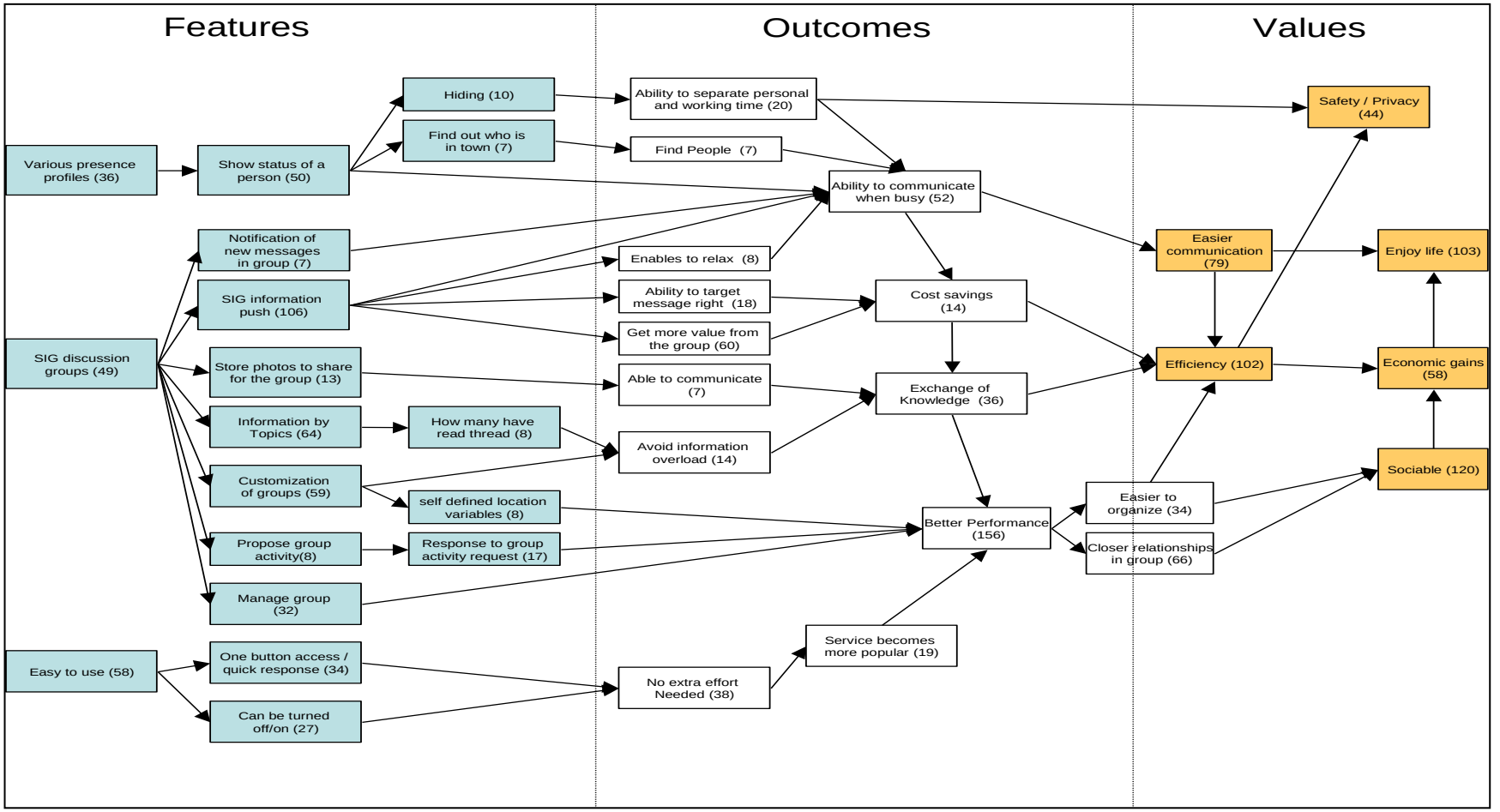


**Figure 1. Theme Map "Information Access for Special Interest Groups"**

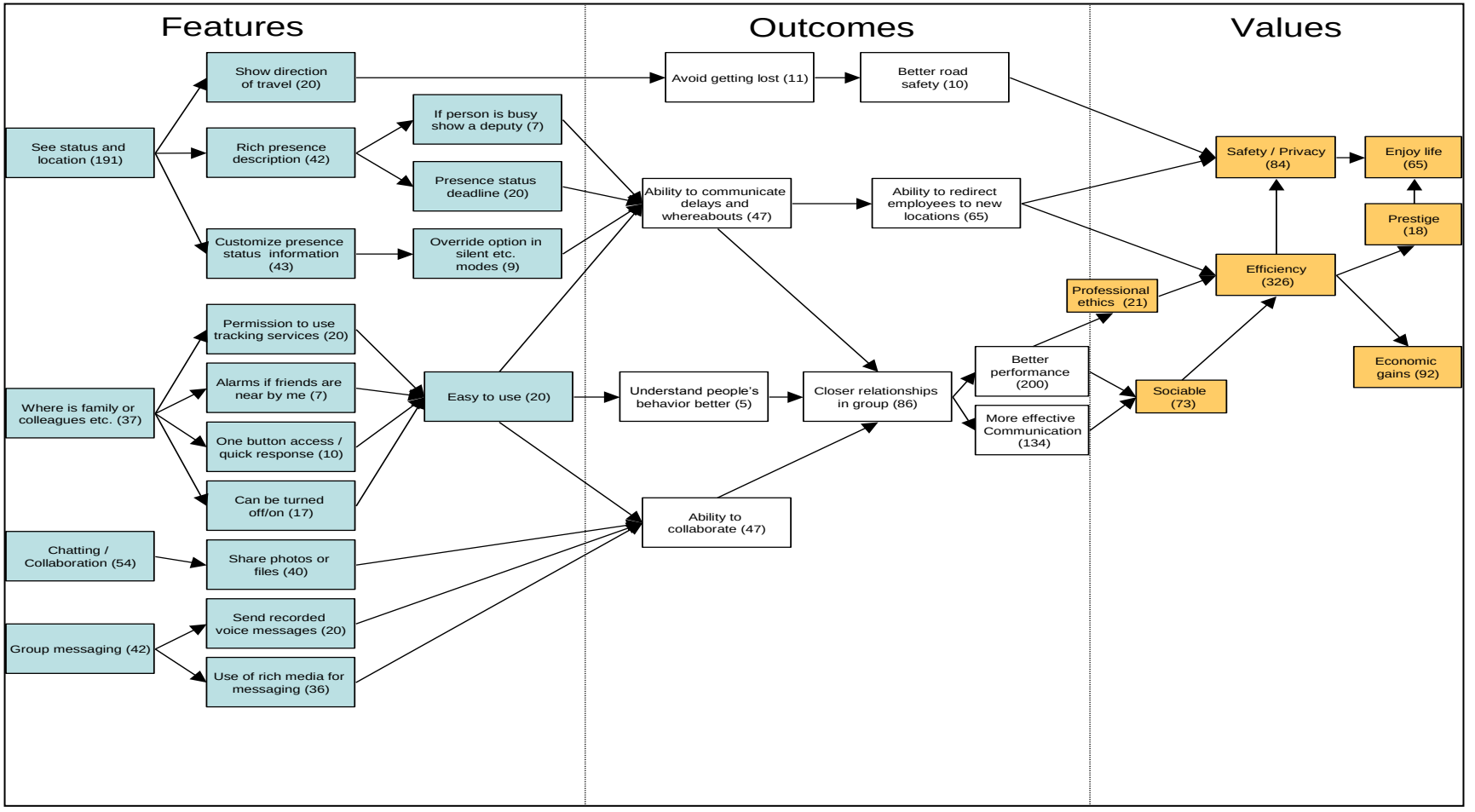


**Figure 2. Theme Map "Presence Messaging"**

15.57%; Las Vegas 16.40%; both differences significant at p=.001). This theme focused on access to information on restaurants and entertainment, with an emphasis on better ability to plan an evening and enjoy life in comfort.

*Travel Coordinator* (graphic not shown). This map describes how timely current information on city events, restaurants, and entertainment would be valuable to users. The emphasis of this theme seems to essentially be getting the best deals on travel and hotel arrangements. Las Vegas participants showed a significantly greater propensity to mention this theme than participants in the other two cities (LV 22.75%; Helsinki 13.93%, p=.05; HK 8.29%, p=.0001).

*Shopping Assistant* (graphic not shown). This map details perceived advantages of getting presence triggered shopping information, such as special offers from a store you are walking past or into, or the ability to research, reserve, or purchase items via a mobile communication device. Participants in the three cities showed propensities to mention this theme that were not statistically significantly different (Helsinki 18.03%; Hong Kong 17.05%; and Las Vegas 19.05%). It seems that the whole world agrees on one thing—they want to get the best quality and price relationship when shopping. Indeed, it is hard to imagine a place where people did not appreciate this.

## DISCUSSION

The above results represent interesting potential applications using presence technology to support a wide variety of functional purposes. The theme maps and descriptions could form the basis for user customizable applications that could be adapted for many purposes. For example, an application developed from theme 1, "information access for special interest groups", could support the activities of a pick-up hockey league in Helsinki (games form when and where there are enough interested players) as well as ad hoc events for an inter-denominational church youth group in Nevada. An application from theme 2 could be the basis for an application to support safety and productivity among members of a police department or for the coordination of a deer hunting party (for safety it is helpful to know where the other members of the party are).

Recall that the requirements elicitation data for this study was gathered in three cities, Hong Kong, Las Vegas, and Helsinki, with approximately equal numbers of interviews in each of the three cities. The cities were selected because they are thought to represent very different markets. Hong Kong, the trading city, represents a high density, tri-lingual Chinese city and a well-known economic miracle; Las Vegas represents a well known leisure and entertainment capital, with 17 of the largest 22 hotels in the world (Vegas 2006), but perhaps less well known, a high proportion of practicing religious adherents (Sys.com 2006); and Helsinki represents a very well educated, technically sophisticated, and wealthy Northern European city in a country with a very low population density. Would these new applications be equally interesting in the three markets in which we gathered data?

Participants in the three cities differed substantially in their interest in the six themes. We used descriptive analysis to indicate whether the data shows differences among the cities in order to determine whether there is reason to extend the study using more elaborate data gathering and analysis techniques. Table 1 shows the percentage of respondents in each city who offered ladders connected to each of the themes. T-tests show significant differences among the three cities in all but one of the themes. We have provided explorative analysis results of the six themes in Table 2.

Clearly these results suggest that some of these applications based on these themes might be received more favorably in by end users in one market or another. For example, an "information access for special interest groups" based application might be more successful in Helsinki than in Las Vegas, while one based on the "city reporter" theme might be more successful in Hong Kong. This might be the expected way to approach the

**Table 2.Percentage of Ladders Classified to Each Theme**

| Theme | Helsinki | Hong Kong | Las Vegas | All |
|---|---|---|---|---|
| Information Access for Special Interest Groups | 30.33% | 11.52% | 9.52% | 15.15% |
| Presence Messaging | 8.20% | 19.35% | 25.93% | 19.13% |
| Finding My Way | 13.93% | 7.37% | 6.35% | 8.52% |
| City Reporter | 15.57% | 36.41% | 16.40% | 24.43% |
| Travel Coordinator | 13.93% | 8.29% | 22.75% | 14.77% |
| Shopping Assistant | 18.03% | 17.05% | 19.05% | 17.99% |

problem and, if these were already finished applications, it might be good enough, even though it would "waste" a very substantial portion of the expressed preferences of potential end users in each of the markets. There might be a better way, however, to use the strengths of the WARE methodology to produce feature sets better tailored to users in the three cities.

For obvious reasons, WARE analysts in this study focused on attribute/feature data to cluster chains into themes. It is the features and attributes that will be explicitly required in any proposed new systems. The data, however, also includes reasoning, including outcomes and values that participants attached to these application features. Outcomes and values are thought to represent cultural characteristics better than features (Overby, Woodruff and Gardial 2005), although attributes, consequences, and values can all map directly to local preferences. It is not unreasonable to expect that redeveloping constructs and themes using outcome and value data collected from the participants would result in application themes that closely matched user preferences in each market.

A casual glance at figures 1 and 2 reveals two characteristics of the results presented here. First, there is some overlap among the themes in terms of the values and outcomes constructs. This strongly suggests that thematic clustering using consequences and values would result in very different themes. Secondly, there are many more constructs, each with fewer frequency scores, for features in the graphics than for consequences and values. It seems likely that the analysts, knowing that thematic clustering would be done on the basis of application features, were unconsciously more nuanced in clustering feature statements into constructs than they were for clustering consequence and values statements.

In brief, a plan to extend WARE to develop feature sets that are closely matched to potential users' locally influenced means-ends structures might involve four extensions to WARE. First, the two-step clustering process would be conducted independently for data from the different locations to generate specific local preference models. Secondly, when analysts cluster interview statements into constructs, they would adapt the clustering process to insure that consequence and values statements were clustered at a high level of nuance, like those for the features. Thirdly, thematic clustering would focus on consequence and values constructs in the chains or on all constructs from all three categories, rather than primarily on feature constructs. Finally, the process would include follow-up validation of the feature sets, perhaps comparing customer preferences for the local thematic models with preferences for those from other regions.

## CONCLUSION

In this paper we explored the problem of understanding differences in user preferences when developing innovative applications for global consumer markets. We used WARE to discover and analyze user preferences and reasoning for applications features, for use in developing the features for geographically diverse user sets. The context of our study was mobile applications using presence and location data to be designed for users in Europe, North America, and Asia. At the time of the study these services had not been enrolled to markets.

The initial results are promising. The participants in our study were easily able to

use a description of the technology and the stimuli to generate ideas for new applications and features, even though they had never experienced use of the technology. The 633 ideas that the participants related to us about desired application features, each accompanied by a rational set of expected consequences and values, attest to the effectiveness of this method for generating ideas. The theme maps and the actual requirements that we gathered, more than 3500, provide a very rich and detailed information package about the potential presence and location enabled mobile applications.

Furthermore, the differences in application ideas and feature preferences among participants in the three cities were substantial and dramatic. One could easily infer from these results that users in the three cities would likely prefer very different sets of applications. Inversely, if product developers had designed a product portfolio based on studies in just one of the three cities and then rolled it out globally, it might have met with very mixed results in different markets. For example, if a set of applications were developed solely based on Las Vegas participant data, it might be heavily weighted toward discount travel services and applications for organizational members, e.g., members of police departments, churches, and deer hunting parties, to coordinate their activities in time and space and it might not emphasize entertainment and luxury features. Such applications might not meet market success in Hong Kong.

The results here must be interpreted with caution because, like all qualitative preference data, e.g., from focus groups, the methodology is very good for discovering the ideas and preferences that occur in a population, but more limited in value for observing their importance. Consequently, we regard the cross city analysis as explorative. Additionally, we collected data for the study in three cities, Hong Kong, Las Vegas, and Helsinki. Naturally, we cannot make any claim that ideas in these cities can be continentally generalized. We might note, however, that these results are not inconsistent with the very well known mixed preferences that existing mobile services have expressed in various global markets, with remarkable differences in the preferences of location specific customers, such as Hong Kong (stylish phones), the U.S. (cheap phones), and Europe (technologically advanced phones), in the sense that the differences appear to be culturally embedded and not just differences in rates of technological diffusion.

We think that these results justify the design of a new method to extend requirements engineering methodology to better capture culturally distinct feature sets for new consumer oriented, IT-based products. Such a method would focus on developing feature themes based more on region-specific preference reasoning than on specific feature preferences. The method would incorporate construct analysis that better captures the local nuances of consequences and values, local thematic clustering, and follow-up surveys and/or prototypes to validate the resulting preference models.

The study opens several interesting pathways for future research. One potential stream for such research would include further studies to investigate systematic cultural differences in application feature preferences. A second stream would be design studies to further develop better requirements engineering methods for use across various local markets. A related area of interest for further studies might be to design techniques for including diverse requirements into the application development roadmap so that application upgrades might consider these locally defined preferences.

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## APPENDIX 1

1. Presence enabled service for special interest group(s) Think about the following special interest areas. If you think about Presence enabled mobile services, which two of the following would interest you? Please rank them. You can also invent your own. Please do not limit yourself to the video's vision of presence services. Think out of the 'contact list'. Let's change the future together!

2. A presence enabled mobile travel services for while you are enroute. It would provide personalized information for you, like the following: last minute offers of travel organizer (flights, events, hotels etc.) according to your profile, reminder messages to the registered participants of the event etc. You can think of foreign or domestic traveling. What services would be interesting to you?

3. A presence enabled mobile service while you're out and about in the city. It would provide you information when you move around in down-down area. For example, there are 12 seats which have not been purchased available to the members of our loyalty program, click here and buy" or when you are within certain distance from the store you are persuaded to visit the store by a relevant offer, like "a pint of beer or an ice cream costs X Euros/dollars". What services would be interesting to you?

4. A presence enabled mobile service for special interest group member / community. It would provide you personalized information for each customer, like "The hottest/coolest club offers, only for you." A member of a book club is shown a new book which matches her profile. Retail store announces to its VIP-customers the arrival of spring clothing collection. An electricity company announces to its customer about a black out. What services would be interesting to you?

5. A presence enabled mobile service for you. Think a special interest group / community you belong to. What services would be interesting you or your community? Think about the possibilities a mobile presence enabled service gives and set your mind free! What services would be interesting to you?

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