
UEX Adventures in Convergence Design

Heather Vaughn, Ph.D.

Bell Laboratories
600 Mountain Avenue
New Providence, NJ 07974 USA
vaughn@alcatel-lucent.com

Paulo Santos, Ph.D. CHFP

Bell Laboratories
600 Mountain Avenue
New Providence, NJ 07974 USA
paulo@alcatel-lucent.com

Abstract

In this paper, we examine our end-user evaluation process for a mobile communication device with presence and location services. Convenience samples walked through scenarios in mockups of a proprietary, expensive, and complex application suite. We analyze our role in the development process.

Keywords

Mobile communication, convergence, process

ACM Classification Keywords

H5.2. , *user-centered design, prototyping.*

Introduction

Mobile phones have been ubiquitous for about a generation. Their UEX interfaces are relatively mature and accepted. Industry has added many services on top of these mobile voice networks (e.g., video, internet access, data services, location-based services, presence, content-sharing, etc.) These additions have increased the complexity of the end-user experience.

Converged services were anticipated and studied for years [1,2,3,4], promising to bring compelling and simple user experience across fixed and mobile devices. However, that simple user experience is far from being totally realized. Take, for example, a handoff of service between devices today. The usability problems are immediately apparent [5], as a certain amount of user knowledge about what type of network (wireless?) and

device (Bluetooth enabled?) is required. Our user experience (UEX) study occurred in 2004/2005 while our company integrated and tested IMS/SIP technologies. We tested a suite of applications (primarily on a mobile phone) comprising: contact lists, presence, location-based status, content-sharing such as videos and games, and other services such as Push-to-Talk over Cellular (PoC). The application was a proprietary, expensive system that was not commercially available, and for which software was in early development. We had limited access to a working device (see Figure 1).



figure 1. Application on mobile phone.

In early-design, UEX researchers are often aware that people are bound by current experience. Can a babysitter who only has voice and text on her phone imagine handoffs with multiples services? For example, imagine the babysitter is sharing a video of a child with a parent... she has a voice call and a request to IM from the other parent coming in... which should she attend to first? Can she accept a call, type an IM session with the 2nd parent, *and* keep the child in the viewfinder?

Such questions emerged as we did our analysis/testing. What we found difficult was that while we used solid UEX research methods, our impact in the development process was nascent. We revisit the experience here.

Study Design

We as UEX researchers were faced with a difficult problem: study the UEX of a suite of services that is

pervasive in life without having access to the devices and network services that would enable a realistic demonstration of such services. We resorted to running 2 studies using common UEX techniques. The first study used posterboard and mockup screens. The second study used revised screens and animations of sequence flows as prototypes (Fig. 2). Investigators prepared scenario scripts and paper surveys.

Participants were introduced to the purpose of the session and the various features they would be exploring in scenarios. They were shown menu functions and introduced to icons, but were asked not to treat this as a icon study... rather... this was a study of the *interaction* design.

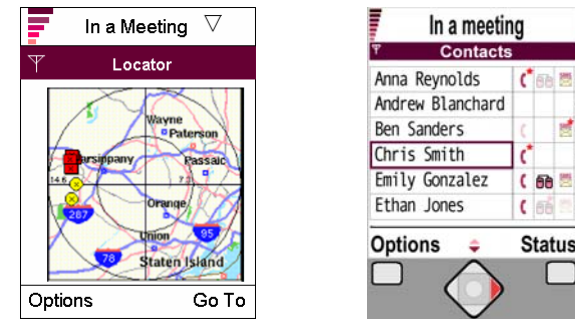


figure 2. Paper mockup of application (left) and high-fidelity animated prototype (right).

Using the "human processor" method similar to Nokia's test of the 6630 phone [6], investigators presented screens as a result of end users making hardkey or softkey selections. All possible user actions were planned. As the user indicated pressing a key, the investigator would change the paper screen to simulate

the system's response. Later, when using the animated prototypes, flows were streamlined. Conditional scripting permitted the display to redraw to new screens if a user diverged from the planned scenario.

Ten major scenarios were presented to participants, including the following six:

- 1) Examine a main list of IDs, device presence, and application availability on a per-contact basis.
- 2) Add/view a contact.
- 3) View/set presence and status information.
- 4) Remove a buddy and be interrupted with a call.
- 5) Navigate to services (IM, games, location tracking, video-sharing) and start a video sharing session.
- 6) IM a group of contacts in one session (chat).

Demographics and application usage information were collected before the walkthroughs. After all tasks, users were administered a randomized, 7-point survey that explored agreement with usefulness, usability, learnability, and satisfaction statements.

Results

The two rounds of testing were conducted with 14 participants – 9 men and 5 women during 60-90 minute sessions. They ranged in age from 20 to 59. They averaged 1.9 hours of voice/application usage per day on their mobile phones. There was a mix of participants who did or did not text on phones, used mobile phone-based applications, and IM-ed on PCs. Nearly all participants characterized their use of communication technology as “convenience seeking.”

Investigator Notes

Most user comments concerned issues with the UI. Yet, we noted interesting themes about the *purpose* of the suite. Participants wanted this to be a voice application. As appealing as the content, presence-based, and location-based services were, the making and taking of calls was the primary feature they wanted.

Several participants were confused about the concepts of presence, status, availability, and how to know who was watching who given the different services (e.g., location, presence, video). Participants perceived it as complicated to set up personal information for others to see even when presented at top-level, easily accessible navigation points. Being aware of what contextual information a user might be transmitting to others felt onerous and several participants stated that they would be unlikely to manually change their status. Another frequent, unsolicited, comment was: “This is just too much” or “I’m not sure I need all this”.

Others understood status, presence and availability so well, they were concerned about privacy and the reliability of the network to maintain it. Some even saw this feature as more powerful than voice, and wanted to use status and availability as a tool for social deception. For example, they would want to be one place while showing others they were somewhere else.

Finally, users needed to be reminded they could set these services on a PC (e.g., administer a contact list through a website), and that perhaps they could even handoff mid-session. While perceived as useful, this ability was hard for subjects to remember during tasks.

Surveys

The 21-question, 7-point end survey is reported in Table 1. While correlations showed consistency within responses, no ratings proved statistically significant between groups ($p > .05$). These non-significant results were expected given multiple features, early study design, and small samples. We shared results with the product team, but advised them to consider those factors while looking at these averages.

Analysis

We are aware that users today are more familiar with the presence, location, and content-rich communication we studied. They may be less confused by the concepts and more comfortable about privacy and etiquette.

Our UEX tools were simple and common, and we'll share more about the mechanics and utility in our presentation. They drive product development team toward UEX improvements. User interactions on some platforms are sophisticated, but we used simple guides with pen/pencil surveys; cardboard screens using Velcro™ we called Monopoly™ cards; and in the last iteration of the study – short movies illustrating the interaction, making it easy to step through the scenarios. In our experience and training, we knew that drawing developers away from complicated IMS/SIP and phone device registrations/settings and drawing them back into the simple UEX was critical.

The findings we gave were useful for fixing bugs and refining navigation paradigms. Ultimately, larger factors that we noted in our Investigator Notes section made moving forward with this all-in-one product difficult. It was a rapidly moving development process that the company had to spawn into subsets of development.

Scaled Agreement	Test 1 (n = 8)	Test 2 (n = 6)
<i>Useful</i>		
It helps me be more effective	4.75	5
It makes the things I want to accomplish easier to get done	4.38	4.67
It gives me more control over the activities in my life	4.25	4.6
It is useful	5.38	5.17
It saves me time when I use it	4.57	4
It does everything I would expect it to do	4.38	5.33
It helps me be more productive	4.38	4.6
<i>User friendly</i>		
It requires the fewest steps possible to accomplish what I want to do	3.13	4.33
It is simple to use	4.25	4.67
It is user friendly	4	5.2
It is easy to use	4.5	5
<i>Easy to learn</i>		
It is easy to learn to use it	4.25	5.17
I easily remember how to use it	4.75	5.67
I learned to use it quickly	4.5	5.17
<i>Satisfying</i>		
I feel I need to have it	3.63	3.67
I am satisfied with it	3.88	4.83
I would recommend it to a friend	4.75	5
It is fun to use	3.88	3.83
It is pleasant to use	4	4.5
It is wonderful	3.63	3.5
It works the way I want it to work	3.63	5

Table 1. Average 7-point ratings in end surveys.

Our impact at this moment in the product development process was “later,” than we as UEX experts would like. In our estimation, the functionally integrating technologies at that time were minimally informed by

documented focus groups, interviews, and usability requirements we had provided. But perhaps UEX methods will always present us as practitioners with a challenge of balancing our desire for a “great” user experience and the need for development teams to march toward fast and successful releases. You can never get to “perfect” - we have to understand that product development is iterative and evolutionary.

We balance this against what your expectations may be if you are situated in academics. While the academic community can often build in travel for distributed groups, has more freedom to explore “new directions,” and can dictate where UEX support will occur throughout that type of development (e.g., building it in at grant-writing time), we found ourselves in a typical commerce-driven situation: we were grabbing time outside of testers’ schedules to examine the UI on the device; we were working “backward” from the complicated application suite to create experimental designs that could capture end user issues; and we were reporting in formats we hoped our audiences could understand... they are software architects, product managers, developers, testers, and field integrators who have demands and “languages” often different than UEX professionals feel comfortable with.

Conclusions

Some themes would recur as we looked at other complex communication technologies after this study. The appeal of presence, location, and content in communications depends on culture and society. We saw patterns about small devices or coordinating across distributed devices that can be a recipe for cognitive overload. And finally, we were reminded that some artificial intelligence is needed in converged

communication. Fundamentally, simple UEX methods that employ end-user analysis; document usability requirements based on findings; and test/prototype iteratively with simple tools (paper, scripted animations), will help developers who are crafting complicated UI’s in a timeframe that is useful and acceptable for the fast pace of product development.

Acknowledgments

Our gratitude to Scott Lively for his collaboration with us. Thanks also to Cheryl L. Coyle for editing advice.

Citations

- [1] Kocan, K.F., Montgomery, W.A., Siegel, W.A, et al. Service creation for next generation networks. *Bell Labs Technical Journal*, Vol. 7, No. 1, 2002, 63-79.
 - [2] Wunderlich, B. Meeting customer expectations with converged services. *Journal of the Communications Network* Vol. 4, July-Sept.,2005, 103-107.
 - [3] Marcus, A. & Chen, E. Designing the PDA of the future. *Interactions*, Vol 9, Iss. 1, Jan. 2002, 34-44.
 - [4] Jones, M. & Marsden, G. *Mobile interaction design*. John Wiley & Sons: West Sussex, England, 2005. 11-13.
 - [5] Inoue, M.; Mahmud, K.; Murakami, H.; Hasegawa, M. and Morikawa, H. Context-based network and application management system for seamless services in heterogeneous networks. In *Transactions of the Information Processing Society of Japan* Vol. 46, No. 9, 2005, 2236-49.
- Lindholm, C. & Keinonen, T. *Mobile Usability: How Nokia Changed the Face of the Mobile Phone*. McGraw-Hill, 2003.