

When the Field is Far Afield: Multiple-Country Observations of Complex System Use

Lori Anschuetz
Tec-Ed, Inc.
38 Windsor Street
Rochester, NY 14605
716-454-7440
lori@teced.com

Deborah Hinderer
Tec-Ed, Inc.
P.O. Box 1905
Ann Arbor, MI 48106
734-995-1010
deborah@teced.com

Janice Anne Rohn
Manager, Usability Labs and Services
Sun Microsystems, Inc.
901 San Antonio Road, MPK18-107
Palo Alto, CA 94303-4900
650-786-6367
janice.rohn@Eng.Sun.Com

ABSTRACT

This paper presents a case history that illustrates some of the challenges facing usability professionals who perform studies of complex systems that are used internationally. It describes a contextual inquiry study of one component of an enterprise-wide call management system, a service order tool used daily by hundreds of people around the world for purposes ranging from call logging to account management, and from problem research to management reporting. To identify users' major concerns about the tool, the authors conducted 24 individual-user sessions at seven sites in the United States, United Kingdom, France, and Germany.

INTRODUCTION

Usability studies take on new dimensions when the object of study is a worldwide set of business practices and procedures that are supported by a complex computer application. Such a system is much more than just a massive collection of hardware and software. It represents a huge investment in staff as well as equipment. It may be used by scores of people in dozens of locations to do their jobs. It can be an important contributor to organizational cohesion and synergy. For example, it can provide a consistent structure within which people accomplish and share work; it may also compile data that managers can use to identify trends and improve business processes.

Sun Microsystems, a major manufacturer of computer hardware and software, wanted to identify significant issues associated with the main component of its enterprise-wide call management system. The component, a service order tool, is used daily by hundreds of people around the world to support a wide range of customer service and field service tasks. Sun decided to investigate how well the tool supported its business processes by interviewing managers at various levels of responsibility, and how well it supported users by performing an international usability study.

To Travel or Not to Travel

It's possible to conduct international studies remotely, with both usability specialists and participants in the relative comfort of their own labs (with audio and video links) or offices (for phone interviews). When we considered whether to do this study remotely or in person, an overwhelming number of considerations favored in-person observation:

- **Importance of the tool:** The service order tool plays an important role in the company's effort to integrate worldwide staff, skills, and expertise and to expand its service offering. Once entered into the tool, service orders can be accessed by users anywhere and can be viewed by multiple users simultaneously. At the time of the study, for example, Sun was adding third-shift call coverage in parts of Europe with second-shift staff on the West Coast of the United States.
- **Necessity for user buy-in:** The service order tool was already the focus of a user's group whose members, mostly managers, represented the major locations using the tool. However, Sun wanted all target user groups—not just managers—to “buy in” to the tool changes that would result from the study.

- **Differences in business practices:** Each country has its own process for delivering customer service and therefore develops its own job titles, descriptions, and expectations for the positions that use the service order tool. In the United States, for example, answer centers and field offices share responsibility for hardware support and customer satisfaction; in contrast, these functions are centralized in the answer centers in European countries.
- **Differences in companion software:** The companion software used with the service order tool varies from country to country. For example, U.S. and U.K. dispatchers use the same supplemental tool to match customer problems to support specialties and then route calls to appropriate engineers, but French and German dispatchers have other, unique tools.
- **Desire to see typical user behavior and problems:** Phone interviews with remote study participants don't provide visual feedback; remote laboratory testing can, but it places participants in an artificial and controlled situation. We wanted to get the "big picture" of service tool use and to see the kinds of problems that different user groups encountered.

These factors dictated an in-person contextual inquiry. Although time and budget constraints often limit field studies to one or two sites, the visibility and longevity of the service order tool justified site visits to Sun's major answer centers as well as representative field offices.

Why a Contextual Inquiry

Contextual inquiry combines observation and conversation in a user's normal work environment. This methodology allowed us to:

- Explore use of the service order tool within the restrictions of actual work, such as network response times and length-of-time targets for dispatchers and engineers dealing with customers on the phone.
- See when and how companion software and artifacts such as hardcopy tablets, reports, and forms are used to complement the tool, and get samples of the hardcopy objects.
- Collect concrete data by observing real-time experience.
- Clarify details and avoid misunderstandings about what users did and why.

With its emphasis on observation and follow-up questions to make sure the usability specialists correctly interpret the user's actions, contextual inquiry also helps minimize any language differences between the participants and usability specialists.

HOW DIFFERENCES IN USER BEHAVIOR AFFECTED THE STUDY DESIGN

User Groups, Tasks, and Locations

Designing products that are used by more than a single group of users is often a challenge. It becomes more daunting when the target user population consists of multiple job roles in multiple countries. In this case, designing a successful product—or study to assess users' needs—requires:

- Identifying all the target user groups.
- Understanding the distinct job roles.
- Understanding how the various users interact with each other and with the product.
- Not underestimating the extent to which business practices may vary from site to site and from country to country.

Identifying all user groups is not as easy as it seems. For example, the more the usability specialists worked with the managers, business analysts, and developers assigned to the team studying Sun's service order tool, the more user groups emerged. Through persistent questioning and careful listening, we ultimately identified eight distinct groups—twice as many as in early discussions:

- Dispatchers.
- Front-line support engineers.
- Mid-line support engineers.

- Back-line support engineers.
- Support services staff.
- Account ambassadors.
- Hardware support engineers.
- Regional system support engineers/customer service managers.

Some of these groups, such as dispatchers and front-line engineers, use the tool with the customer on the phone. Their goal is to record information and open service orders quickly, so the service orders can be resolved and closed quickly. Other groups, such as back-line engineers, use the tool mainly to file information and manage their time. Still other groups use the tool regularly to monitor progress on service orders and help ensure customer satisfaction.

All the user groups work in regional answer centers except in the United States, where the latter two groups work in field offices. Because we couldn't visit every answer center and field office, we developed a few criteria to help us select the study sites. First, we decided to visit primarily answer centers to take advantage of their concentration of user groups. Second, we decided to visit the most important answer centers—that is, those serving the largest number of customers. Finally, we decided to visit answer centers that were using large subsets of tool features and functions. These tended also to be the largest centers; smaller centers make “minimalist” use of the tool. Based on these criteria, we selected for our study answer centers on the East Coast and West Coast of the United States, as well as in the United Kingdom, France, and Germany.

To observe the two user groups that work in U.S. field offices, we decided to visit two offices near the U.S. answer centers. Going to two field offices let us balance individual differences among users and also let us explore how different business practices affected managers' use of the tool. (On one coast, service orders go directly to the third-party partner that provides hardware support; on the other, they are first screened by a manager.)

We anticipated that users in the “same” group would use the service order tool somewhat differently from country to country because of differences in business practices, companion software, or both. But it's important to remember that business practices and corporate culture can vary from site to site within the same country, and even within the same site. For example, the East Coast answer center had a tool “guru” who was instrumental in its recent evolution; she had conducted some training and also consulted with engineers to help them make the most of new tool features. The West Coast answer center had no such resident expert, but it did have at least one manager who directed his engineers to ignore new features in favor of “business as usual” with the tool. These experiences underscore the importance of selecting study sites—whether domestic or international—that represent a spectrum of practices, processes, and cultures.

Study Approach

Of our 24 study participants, roughly half worked in answer centers and field offices in United States, and the other half worked in answer centers in the United Kingdom, France, and Germany. We intentionally began the study in the United States so that we could concentrate on issues that were not internationally dependent, such as methodology and focus, before introducing the complexities of other languages, European cultures, and international travel. The U.S. sessions thus served both as data-gathering sessions and as a “warm-up” for Europe. We planned to reflect on what we had learned from them and refine the methodology as we prepared for the European sessions.

Participant Selection

We developed detailed participant selection criteria for each target user group, including time in current position, type of service order tool training (if any), and opinion of the tool. Our in-country recruiters tried to use the same screening criteria for all participants, and were successful in the United States and United Kingdom.

In France and Germany, we confronted the language barrier that is a major challenge to international studies. Here we also required that participants speak English sufficiently well to be able to discuss their jobs—a reasonable prerequisite because the company's employees use English on the job to conduct business between countries.

It was particularly difficult in Germany to find many service order tool users who met the English-language criterion as well as all the others. We therefore prepared to relax the recruiting criteria to require only that the German participants use the tool and speak English. In the end, however, the in-country recruiter was able to find participants with a range of characteristics similar to what we had originally sought.

Study Focus

Finally, we developed an individual focus or list of topics to guide the observation of and conversation with participants from each user group, adapting the focus as necessary for each country. As it turned out, the official focus didn't change much—the differences occurred in the follow-up questions we asked participants in each country after watching them use the tool.

HOW INTERNATIONAL ISSUES AFFECTED STUDY MANAGEMENT

International Team

An international usability study needs the buy-in and support of international managers. It also needs an international team to help carry it out, ideally representatives of all countries or locations where sessions will take place. Our international team was drawn from the user's group mentioned earlier and included managers from the United Kingdom, France, and Germany. A U.S.-based project manager coordinated the efforts of these managers and the usability specialists.

Because of time zone differences, we tended to use email to communicate with team members, with occasional phone calls or group conference calls. We quickly learned that our international team members—our local “champions” for the study—were often distracted by other concerns and agendas. Two of them eventually assigned their day-to-day team activities to lower level colleagues, which improved responsiveness.

In addition to geo-cultural insights, our international team members provided study-design feedback, topic-list ideas and edits, and in-country recruiting.

Cultural Differences

Cultural differences were less a problem than they might have been because of our international team and because the usability specialists were well-traveled in Europe and schooled in French and German languages and culture. In addition, the project manager—who traveled with the usability specialists to help with last-minute arrangements at each site and observe the sessions—had previously met some of our international team members in person.

Not only national culture but also corporate culture varies from setting to setting. For example, while all friendly, work environments ranged from more formal in the United Kingdom to more relaxed and casual in France and Germany.

Logistical and Survival issues

Travel between the U.S. coasts and to three countries within Europe would have added several days to a tight schedule. Fortunately, this study had been planned to stretch over a few months.

Other logistical and “survival” issues included:

- How to arrange the initial flight to Europe so that our geographically distributed usability team could travel together. This flight was the first chance in several weeks for our California-based project manager, Michigan-based usability specialist, and New York-based usability specialist to discuss face to face the latest project arrangements, potential problems, and possible Plan Bs. Two of us flew to Detroit, from which the three of us flew together to London.
- Where to stay at each European location, and its proximity to the study site. In Germany, we found that Sun's travel agency had booked us at a hotel that was a one-hour drive from the study site. Although we moved the next day to a more convenient hotel, the first hotel assessed a penalty fee for our premature departure and the scenic taxi ride to the study site was unnecessarily expensive. We learned the importance of not simply asking local team members to recommend accommodations, but of insisting that they do so.

- How to get to the study sites. Our short stays in each location, ready availability of public transportation, and lack of interest in driving (and getting lost) in unfamiliar locations made taxis our best choice. We relied on international team members and hotel management to advise us about taxi service and customary charges (although in France we were able to walk from the hotel to the study site).
- The “electrical compatibility” of tools such as laptop computer and audio and video equipment. We decided to use battery-powered tape recorders (as we do in the United States) and, although we carried a laptop, we had no need to use it. (Also, we were skeptical about the international adapters we had bought Stateside when none of them fit the U.K. outlets.)
- Whether to carry supplies such as tapes, batteries, and photocopies of the session protocol, or plan to obtain them locally. We decided to carry all supplies so that we would always be ready for our study sessions, regardless of travel delays or other unforeseen circumstances. (Unfortunately, we underestimated how much weight the photocopies would add to our luggage. One of the authors had to unpack them from her suitcase and repack them in an airline-provided box while waiting in the check-in line.)

In each case, our goal was to reduce and simplify additional demands on our time in unfamiliar locations so that we could concentrate on the study.

HOW STUDY COMPLEXITY AFFECTED DATA ANALYSIS AND REPORTING

Interim Report

We used the six-week lag between the U.S. and European sessions to examine our U.S. data and prepare an interim report of findings. Determining what to report was challenging because we didn’t know whether something we observed in U.S. participants would be validated by European participants. We decided not to restrict ourselves to trends but rather to report “everything,” taking care to draw no conclusions and make no recommendations at this point in the study. This approach enabled the development team for the service order tool to compare our preliminary findings to those of the management interviews, analyze where the findings overlapped, and begin to think about the implications for the service order tool and the underlying business process.

Final Report

After the European sessions, we developed a top-ten list of findings for a “quick-results” presentation that preceded the comprehensive written report. The top-ten findings identified high-level issues that the usability team felt were the most important to address.

We then created a FileMaker Pro database to organize our abundant notes and quickly “slice” the data in different ways—for example, by target user group, by formal vs. informal training on the tool, and by features used. Given the number of participants and characteristics that might affect their tool use, a database was the best way to get different views on the collected information both quickly and accurately.

We found that not only did this two-step approach jump-start our final reporting, but it was also instructive to see the extent to which our gut-feel judgments agreed with the actual data.

CONCLUSION

As a result of the contextual inquiry, Sun instituted more in-depth training for service order tool users, along with some changes to the interface for improved usability. In addition, the numerous long-term recommendations for simplifying the system are being fed into specifications for the next version of the service order tool.

The usability specialists also learned a few things for the next time a usability study takes us to diverse locations and sites in the field, in one country or many:

- **Take nothing for granted.** The managers and developers know more about their products and processes than the usability specialists, but they don't know what we don't know or what's most important to us—or they may simply forget to mention certain details. Ask lots of questions, follow up on the answers, and repeat yourself as often as necessary.
- **Expect skeptics.** Usability is still a new concept to many people, and even those who have heard of it—particularly if they work at sites removed from the corporate offices or other perceived power centers—may not be believers. Put on your diplomats' hats to explain usability work in general and the current study and its goals in particular.
- **Lean on the team.** Establish a personal connection with local team members as early as possible. Don't be afraid to pick up the phone to check the status of their activities, find out about their work environments, or ask advice about getting around and where to stay. Be polite but insistent.
- **Be prepared to scramble.** Unless the schedule is tight and your arrival is imminent, local team members may put the usability study at the bottom of their to-do lists. Then, while you're en route, the on-site recruiter will need to change the session schedule or substitute participants with different profiles. Surprises are no surprise—they're just harder to manage at 40,000 feet or when you're jet-lagged.

Most products and processes involve people at some level, and *people* are complex and inconvenient. But our usability participants have always been conscientious workers, not to mention delightful personalities, which helps make usability work fun as well as rewarding. That's probably why we're in this business.

BIOGRAPHIES OF AUTHORS

Lori Anschuetz, Usability Specialist
Tec-Ed, Inc.
Voice: 716-454-7440
Fax: 716-454-5124
Email: lori@teced.com

Lori Anschuetz is a senior project manager and usability specialist in Tec-Ed's Rochester (NY) office with more than 20 years of technical communication experience in corporate and consulting environments. In 12 years at Tec-Ed, Lori has planned, implemented, and managed usability research, user-interface design, and documentation projects for clients such as Xerox, Sun, Intuit, Thomas, and Netscape.

With Stephanie Rosenbaum, Tec-Ed's founder and president, Lori coordinated the advanced usability progression at the 1997 STC conference and co-chaired the 1996 IEEE Professional Communication Society conference program. She has also written papers on whole-product usability research for IEEE PCS and ErgoCon conferences.

Deborah Hinderer, Usability Specialist
Tec-Ed, Inc.
Voice: 734-995-1010
Fax: 734-995-1025
Email: deborah@teced.com

An experienced usability practitioner, Deborah Hinderer specializes in heuristic evaluation, usability testing, and customer and user interviews. Deborah also trains Tec-Ed clients and staff members in test administration and participant recruiting methodology. She has performed usability projects for Autodesk, Claris, IEEE, Intuit, Latitude Communications, Macmillan/McGraw-Hill, Netscape, PageMart, SkyTel, Sun Microsystems, and University Microfilms.

Deborah is a member of the Usability Professionals' Association (UPA), the Society for Technical Communication (STC), and the Michigan Technology Council (MTC). She co-presented the paper "Multiple-User Testing: When One Person Can't See Everything" at the UPA '97 conference.

Janice Rohn, Manager of Usability Labs and Services
Sun Microsystems, Inc.
Voice: 650-786-6367
Fax: 650-786-4096
Email: janice.rohn@eng.sun.com

Janice Rohn is Manager of Usability Labs and Services at Sun Microsystems. She joined Sun in 1992, when she founded the usability engineering group and designed and built usability labs for Sun's sites in California and Colorado. Janice has been working on human-computer interaction (HCI) and strategy issues across Sun, and has led a number of efforts to improve the integration, usage, and efficiency of HCI methods. As a Quality Officer, she has worked on driving usability into the practices and processes across the company.

Prior to joining Sun, Janice was a usability engineer and designer for Apple. Prior to Apple, she was a research assistant at Stanford University in expert systems and medical informatics, where she blended her background and interests in psychology, computer science, design, and video to perform what is now known as usability engineering.

Janice has done a wide variety of presentations, including presentations and panels for CHI, UPA, and Interact and guest lectures and courses for Stanford University, College of Notre Dame, University of San Francisco, Sun Microsystems, and Apple University. She has also produced a number of videotapes on HCI and written a number of publications, including journal articles and columns and book chapters and contributions. Janice has been President of the Usability Professionals' Association for the past two years, and is a founding board member of the organization. She is currently spearheading an effort to raise the awareness of usability and HCI in the press, public, and the government through a UPA Outreach program that she founded.

System operations are generally successful. Overt catastrophic failure occurs when small, apparently innocuous failures join to create opportunity for a systemic accident. Each of these small failures is necessary to cause catastrophe but only the combination is sufficient to permit failure. Put another way, there are many more failure opportunities than overt system accidents. The complexity of these systems makes it impossible for them to run without multiple flaws being present. Because these are individually insufficient to cause failure they are regarded as minor factors during operations. Eradication of all latent failures is limited primarily by economic cost but also because it is difficult before the fact to see how such failures might contribute to an accident. Complex fields can be nested. The following will define a container that creates multiple slides and allows positioning of multiple text fragments on each slide: use Carbon_Fields\Container; use Carbon_Fields\Field; Container::make('post_meta', 'Slider Data') ->where('post_type', '=', 'post') ->add_fields(array(Field::make('complex', 'crb_slides')->add_fields(array(Field::make('image', 'image'), Field::make('complex', 'slide_fragments')))))

Complex field values are retrieved using either carbon_get_post_meta() or carbon_get_theme_option() (or a different retrieval function, depending on the container it is added to). The format of the returned data is a multi-dimensional array, as follows: array (0 => array (. 'photo' => 'http://example.com/lorem.jpg'))

The near field and far field are regions of the electromagnetic field (EM) around an object, such as a transmitting antenna, or the result of radiation scattering off an object. Non-radiative 'near-field' behaviors dominate close to the antenna or scattering object, while electromagnetic radiation 'far-field' behaviors dominate at greater distances. Far-field E (electric) and B (magnetic) field strength decreases as the distance from the source increases, resulting in an inverse-square law for the