CHIMIT '08: Symposium on Computer Human Interaction for the Management of Information Technology

Sponsored by ACM, in cooperation with USENIX

San Diego, CA
November 14–15, 2008

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The second ACM CHIMIT Symposium took place in San Diego, right after the USENIX LISA conference. Like LISA, CHIMIT is about IT management, but from the perspectives of technology, people, and business. IT is vital to millions of people at home, at work, or on the go, in small or large enterprises. CHIMIT brings together researchers and practitioners who design systems management tools, to discuss human factors issues, system administrator work practices, and systems design issues. Presenters discussed their latest research on usability models of system administration, studies on system administrator practices regarding knowledge and activity management, adoption of user-centered design practices for IT systems, and human factors in system configuration and security. The symposium was sponsored by ACM in cooperation with USENIX, with sponsorship from IBM, Microsoft, and HP.

PLENARY

- ***I Got My Jet Pack and I'm Still Not Happy***
  David Blank-Edelman, Northeastern University

Even after decades of development of increasingly complex and sophisticated system administration tools, significant problems remain, both with them and for system admin-

istration in general. Historically, the tools used by system administrators have barely kept up with the challenges of the field, and the continuing promises of solutions from new tools and new interfaces have provided little but temporary and limited relief. Offerings in this area have been like the jet packs referenced in the title. Jet packs are now available—for a substantial price—but they fly neither high nor far and are a far cry from the devices envisioned in so many science fiction stories. Similarly, grand promises of innovative and cool solutions to system administration problems being just around the corner have been realized only as minute and mostly insignificant changes in interface look and feel.

Blank-Edelman highlighted the challenges still facing system administrators by reviewing a series of relationships to other fields that he has presented in the past. These comparisons both highlight the problems faced by system administrators and suggest innovative lines of approach for further investigation and thinking. For example, system administrators are like veterinarians in that they must diagnose and correct problems with systems which cannot answer direct questions (unlike doctors), for which there is little in the way of instrumentation (unlike auto mechanics), and which must generally remain functioning while being treated/modified. Looking at the diagnostic processes used by vets as well as the ways they are trained (classroom instruction combined with clinical practice) suggests directions for both system administration education and training and the sorts of tools that would be most helpful but that currently do not exist. Blank-Edelman also considered similarities to sex therapists and to storytellers and sign language interpreters, in order to illuminate challenges and potentially fruitful approaches and directions for diagnostic, debugging, and communication issues in system administration.

PAPERS: WORK PRACTICE

- ***Work Practices of System Administrators: Implications for Tool Design***
  Nicole F. Velasquez, IBM; Suzanne P. Weisband, University of Arizona

Recognizing that system administrators are special computer users and potentially have different user requirements, the authors conducted field studies in which they shadowed system administrators as they did their work, and they interviewed several administrators to develop a model of user satisfaction geared specifically to system administrators. Their findings indicated that many of the tools available to system administrators were not always practical for their work environments, given the complex, risky, and large-scale operations common in most locations. Although the administrators expressed a preference for CLI tools, the main issue was not the interface technique but the ability to get what administrators want done quickly and accurately. Based on their studies, the authors developed a model that took into account system qualities such as flexibility, scalability, accessibility, speed, and reliability and information qualities such as accuracy, completeness, format, and currency. The authors argued that their model provides an opportunity to improve system management tools by linking system design attributes to end-user satisfaction.

- ***Understanding and Supporting Personal Activity Management by IT Service Workers***
  Victor M. Gonzalez, University of Manchester; Leonardo Galicia and Jesús Favela, CICESE

Multi-tasking is common to all knowledge workers. Those involved in IT services face particularly challenging situations: their work environment is typically crisis-driven, with tight deadlines and long hours. To help IT service workers, the authors developed a personal activity management tool, taking into account the characteristics of IT service work. They developed a workflow model to guide the design of their tool, based on three fundamental aspects of personal activity management: (1) capturing and listing commitments; (2) flexible definitions and execution of work environments; and (3) constant review of commitments. Thus, their model has five meta-activities: capture, classify, focus, manage, and revise, each of which is implemented in separate modules in their tool. In a study with four IT services workers over a period of eight weeks, they found that their personal activity management tool is primarily used as a central repository, complementing email and calendar.

- ***Towards Virtualizing the Helpdesk: Assessing the Relevance of Knowledge Across Distance***
  Kevin F. White, Wayne G. Lutters, and Anita H. Komlodi, University of Maryland, Baltimore County

System administrators are working in increasingly heterogeneous environments, which require in-depth knowledge to manage such complex systems. To increase employee efficiency and reduce costs, managers of IT in large organizations deployed organization memory systems to preserve and reuse expertise within an organization. Small businesses, however, depend on external sources of support. The authors presented research to understand the efficacy of forming partnerships for information-sharing among non-competing businesses, specifically on employee satisfaction with documentation as the distance between information seeker and source increases. They presented findings from their study of five diverse research sites. A semi-structured interview with IT staff included questions regarding origin, clarity, usefulness, quality, accuracy, authority, and competence of the information source. Their findings suggest that in building partnerships it is critical to understand the abilities of employees beforehand and make an appropriate match. Differences in overall quality were argued to result from incongruent levels of education, training in technical writing, and general abilities. Authors also found that in-house documentation often contained subtle contextual cues which may lead to increasing satisfaction when

authorship abilities are matched. Thus authors argued that if appropriate training is provided there is more value to fostering internal sharing of documentation.

PAPERS: TOOLS

- ***Sysadmins and the Need for Verification Information***
  Nicole F. Velasquez, University of Arizona, Alexandra Durcikova, University of Arizona

In this paper the authors argue that traditional usability metrics may not be appropriate in system administration. Given that system administrators work in complex and risky environments, they often need powerful but also informative and credible tools. The authors studied the relationship among task complexity, task risk, and information verification activities in GUI tools. They examined whether tasks with greater complexity would lead users to verify information from another source, and, if so, whether there would be an increase in the amount of verification information paralleling task complexity. They also examined if similar hypotheses would hold for task risk. Their findings suggest that higher-complexity tasks led users to seek verification information. Regarding task risks, they did not find a significant factor contributing to information verification. Authors do caution about the small sample size of their experiment but argue that tool designers should consider credibility beyond usability.

- ***Information Displays for Managing Shared Files***
  Tara Whalen, Elaine G. Toms, and James Blustein, Dalhousie University

File-sharing problems in the workplace may hinder collaboration among co-workers and security of information sources. The authors argue that a solution could be to improve presentation of file-sharing settings and activities. They conducted two studies. The first used a group card-sorting activity, an icon-labeling task, and a questionnaire to examine how users currently label file-sharing concepts and interpret icons. Results of the first study suggest that an arrow label did not appropriately indicate file activity and that that there is little overlap between people- and file-related concepts. File-sharing concepts such as "sent" were not clear from an iconic representation alone. The first study was conducted with a small focus group, but the second study surveyed a larger pool. According to the survey for pull-oriented sharing, the words "opened" and "accessed" were very popular, while for push-oriented sharing, there was only one clear favorite: "sent."

EXPERIENCE REPORTS

- ***Strategies to Influence and Accelerate Adoption of User Centered Design Best Practices in a Company***
  Vijay Agrawal and Ken Chizinsky, Cisco Systems, Inc.

Cisco Systems has over 150 products with user interface aspects, most of which did not incorporate User Centered Design (UCD) methodology in their software development processes, resulting in many inconsistencies in look and in functionality. The goal of the central User Experience Group was to change this by making it easier for development groups to do so. They began by developing a set of application UI guidelines based on a large number of interviews, surveys, and product studies. They also provided consulting services to product teams in order to ensure that the guidelines resulted in maximally usable products. Initially, the group encountered resistance due to increased costs and emphasis on features over UCD compliance. The group devised strategies for overcoming such resistance and lowering the adoption barrier by engaging product teams early in the design cycle, building a design pattern library and support tools that made building compliant interfaces easy and efficient, and creating instrumentation for measuring the positive impact of compliance. These strategies have enabled the group to achieve significant success, with over 40 teams adopting the design patterns and tools.

- ***Configuration Tool Development Experiences***
  Narayan Desai, Argonne National Laboratory

Desai and coworkers are the authors of the Bcfg2 configuration management tool. They have worked on Bcfg2 and its predecessor, Bcfg, for almost six years. The design of the earliest versions focused on implementation of features based on the team's considerable expertise with system administration. It paid little direct attention to usability and interface design (due in part to their lack of HCI experience). User feedback resulted in substantially more time and effort going toward usability-related aspects of the tool as it developed over time. With Bcfg2, usability became an equal partner to functionality, with the team successfully prioritizing the usability side of design tradeoffs.

PLENARY

- ***Human-Centered Design: Finding the Sweet Spot Among the Many Stakeholders in the Design of a Complex System***
  William B. Rouse, Tennenbaum Institute, Georgia Institute of Technology

Human-Centered Design is a systematic process that ensures balanced consideration of concerns, values, and perceptions of all stakeholders in the design of a complex system. This is important because the success of a product usually depends on a wide range of players, including designers, developers, and, of course, users. The goal of this process is to find a sweet spot that will delight the primary stakeholders and at the same time foster acceptance of the design by secondary stakeholders. Rouse argued for a top-down approach where the issues related to the viability, acceptability, and validation are given appropriate attention at the beginning of the design process. He suggested two principles to guide the design: plan top-down and execute bottom-up. Rouse argued that planning too late and executing too early are typical problems in failed designs.

He suggested four phases: (1) a naturalist phase, in which stakeholders are identified and their roles and concerns are understood; (2) a marketing phase, in which solutions are introduced and viability, acceptability, and validity are planned; (3) an engineering phase, in which issues related to conceptual design and technological realities are sorted and evaluation, demonstration, verification, and testing are planned; (4) a sales and service phase, focused on remediating problems, recognizing further opportunities, and maintaining relationships. Rouse provided three examples to demonstrate human-centered design based on his framework: an intelligent cockpit design, a tradeoff analysis tool, and a strategy and planning tool.

INVITED TALK

- ***Ergonomic Issues in System Configuration***
  Paul Anderson, University of Edinburgh

System configuration is a challenging area in many ways. One of the most basic is the problem of specification. A typical problem is usually expressed in a high-level, general way—e.g., we need another Web server—which must ultimately be implemented by acquiring and configuring a variety of hardware and software components, and then also be maintained over time. The difficulty of this general problem becomes clear when such a scenario is multiplied by thousands of computer systems, each with its own set of tens to hundreds of software applications and the resulting hundreds to thousands of parameters all interacting with one another. Add users and administrators into that mix, and things become very complicated very quickly, generally far beyond the scope and capabilities of the available tools.

Anderson described how configuration languages can make such situations better or worse. He described seven levels of configuration abstraction, ranging from precise and complete specification of each operation at one extreme (e.g., copy this disk image onto those machines, then set these parameters to these values, and so on) to a general statement of requirements at the other end (e.g., configure enough mail servers to provide an SMTP response time of *x* seconds). He went on to discuss the current and potential degrees of automation possible for each level, as well as how configuration management tools can aid in identifying and mediating configuration and functional conflicts. An ideal system would allow for decision-making by both humans and intelligent modules, including cross-vetting of decisions and suggestions.

POSTERS

A diverse set of work presented in the posters session included field research on IT management software deployment, studies on policy-based IT automation, complexity management in middleware systems, challenges in data mining models, design of dashboards for lifecycle management, analysis of workflow management systems, and an analysis of the SAGE salary survey regarding teamwork among IT staff.

PAPERS: SECURITY

- ***Network Authentication Using Single Sign-On: The Challenge of Aligning Mental Models***
  Rosa Heckle, Wayne G. Lutters, and David Gurzick, University of Maryland, Baltimore County

Information security is of particular concern to healthcare organizations. The authors made an ethnographic study of single sign-on technology use in healthcare. They found that often users' mental model of how the single sign-on technology functions was incorrect. They argued that a significant factor contributing to this result was the inappropriate presentation of the technology to healthcare professionals by the IT staff. Specifically, they identified a mismatch between the system model and user mental models, which were formed by users' past experiences, word-of-mouth, and various brochures and presentations during the introduction of the technology. From the beginning, the IT staff took the simplistic view that users only cared whether they would still authenticate as they had in the past; staff therefore focused on backend considerations of the technology. Users, however, believed that they would have one password across all their applications. This led to significant user dissatisfaction with the technology and in turn brought the problem to the attention of the help desk. Recognizing the misalignment of mental models eventually led to improved satisfaction.

- ***Guidelines for Designing IT Security Management Tools***
  Pooya Jaferian, David Botta, Fahimeh Raja, Kirstie Hawkey, and Konstantin Beznosov, University of British Columbia

The usability of security management tools is critical for the effectiveness of security staff. The authors presented a survey of design guidelines for security management tools based on prior work and their own studies. They identified several categories, including task-specific organizational complexity, technology complexity, and general usability guidelines. Those guidelines included: making tools combinable; supporting knowledge sharing; using different presentation and interaction methods; using multiple levels of information abstraction; providing customizability; helping task prioritization; providing communication integration; facilitating archiving; providing appropriate UI for diverse stakeholders; flexible reporting; supporting large workflows and collaboration; making manageable, easy-to-change configurations; and supporting rehearsal and planning, automatic detection, and error messages. They also identified the relationships between these suggestions and provided some information to help users identify the importance of these guidelines to their own tools.

PANEL

- ***Designing for Complexity: New Approaches to System Administration UIs***
  Jeff Calcaterra, IBM Systems & Technology Group; Eddie Chen, BMC; Luke Kowalski, Oracle Corp.; Ian Lucas, Microsoft Management & Services Division; Craig Villamor, Salesforce.com

The closing panel of the conference included senior interface architects and designers from several major hardware and software vendors. The panelists briefly outlined recent interface challenges facing their companies and products, including those related to large-scale computer deployments. Lively audience discussion followed the panelists' presentation, which focused on the trade-offs between command-line and graphical tool designs, the need to design tools that can adapt to changing conditions, and designing future tools in light of the fact that contemporary system administration more often focuses on managing system behavior than on maintaining some specific system state.