End–User Computing, Development and Software Engineering: New Challenges

Ashish Dwivedi
University of Hull, UK

Steve Clarke
University of Hull, UK
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End-User Computing: Innovations and New Understanding

Chapter 1
Contrasting IT Capability and Organizational Types: Implications for Firm Performance........ 1
Terry Anthony Byrd, Auburn University, USA
Linda W. Byrd, Auburn University, USA

The Resource-Based View (RBV) has become one of the most popular ways to examine the impact of IT on firm performance. An increasing number of researchers are using the theoretical underpinning of the RBV to ground their research in investigating this relationship. This paper follows in this tradition by developing multidimensional measures for two dimensions of IT capability, inside-out IT capability and spanning IT capability. In this regard, the authors relate these dimensions to firm performance as profit ratios and cost ratios. Inside-out capability is the IT resources deployed from inside the firm in response to market requirements and opportunities. However, spanning IT capability involves both internal and external analysis and is needed to integrate the firm's inside-out and outside-in IT competences. This study also makes an exploratory comparative assessment of the relative impact of inside-out IT capability and spanning IT capability, while analyzing the differences on the impact of IT capability in diverse types of organizations. Finally, the authors give evidence that different dimensions of IT capability may have different effects on performance measures.

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Steven Walczak, University of Colorado Denver, USA
Richard Mann, Cardinal Health, USA

Communities of practice have been heralded as a powerful knowledge management tool, especially for geographically disparate workgroups. Research into knowledge management (KM) in healthcare organizations is a needed research focus, given that differences exist in knowledge and knowledge management processes between healthcare and other organization types. The research presented in this paper examines the effectiveness of communities of practice as a knowledge sharing tool in a large and geographically disparate healthcare organization. Findings suggest that job role affects community
members' perceptions of the benefit and impact of communities of practice as well as their participation in such communities.

Chapter 3
Culturally Compatible Usability Work: An Interpretive Case Study on the Relationship between Usability Work and Its Cultural Context in Software Product Development Organizations

Netta Iivari, University of Oulu, Finland

This paper analyzes how organizational culture is intertwined with usability work in software (SW) development organizations. Usability is an important quality characteristic of software products and systems. However, the development of usability is challenging in SW development. Organizational culture has been argued to affect usability work in SW development organizations, thus, this paper takes a culture-oriented approach in the analysis of usability work in two SW development organizations operating in the product development context. First, based on a literature review, a definition of usability work is offered. An interpretive view of organizational culture, acknowledging its recent critique, is then introduced and utilized in the empirical analysis. The empirical results suggest that differences exist in how usability work is modified and interpreted in the organizations with divergent cultural contexts, those advocating different motives and practices for usability work. Finally, the importance of understanding the cultural context into which usability work is introduced is emphasized, and it is argued that culturally compatible strategies to usability work should be adopted.

Chapter 4
Studying the Documentation of an API for Enterprise Service-Oriented Architecture

Brad A. Myers, Carnegie Mellon University, USA
Sae Young Jeong, Carnegie Mellon University, USA
Yingyu Xie, Carnegie Mellon University, USA
Jack Beaton, Nokia, Inc., USA
Jeff Stylos, Carnegie Mellon University, USA
Ralf Ehret, SAP, AG, Germany
Jan Karstens, SAP, AG, Germany
Arkin Efeoglu, SAP, AG, Germany
Daniela K. Busse, SAP Labs, LLC, USA

All software today is written using application programming interfaces (APIs). We performed a user study of the online documentation of a large and complex API for Enterprise Service-Oriented Architecture (eSOA), which identified many issues and recommendations for making API documentation easier to use. eSOA is an appropriate testbed because the target users include high-level business experts who do not have significant programming expertise and thus can be classified as “end-user developers.” Our study showed that the participants’ background influenced how they navigated the documentation. Lack of familiarity with business terminology was a barrier for developers without business application experience. Both groups avoided areas of the documentation that had an inconsistent visual design. A new design for the documentation that supports flexible navigation strategies seems to be required to support the wide range of users for eSOA. This paper summarizes our study and provides recommendations for future documentation for APIs.
Chapter 5
Mutual Development: The Software Engineering Context of End-User Development

Anders I. March, University of Oslo, Norway
Renate Andersen, University of Oslo, Norway

The article presents and analyzes data from a case study in customer-initiated software product development. We have observed and participated in system development activities in a commercial software house (company) over a period of two years. The company produces project-planning tools for the oil and gas industry, and relies on interaction with customers for further development of its products. Our main research question is how customers and professional developers engage in mutual development mediated by shared software tools (products and support systems). We have used interviews with developers and customers as our main source of data, and identified the activities (from use to development) where customers have contributed to development. We analyze our findings in terms of co-configuration, meta-design and modding to name and compare the various stages of development (adaptation, generalization, improvement request, specialization, and tailoring).

Section 2
Approaches, Frameworks and Techniques for End-User Computing

Chapter 6
WOAD: A Framework to Enable the End-User Development of Coordination-Oriented Functionalities

Federico Cabitza, Università degli Studi di Milano-Bicocca, Italy
Carla Simone, Università degli Studi di Milano-Bicocca, Italy

In this article, we present WOAD, a framework that was inspired and partly validated within a 2-year observational case study at a major teaching hospital. We present the WOAD framework by stating its main and motivating rationales, outlining its high-level architecture and then introducing its denotational language, LWOAD. We propose LWOAD to support users of an electronic document system in declaratively expressing, specifying and implementing content- and event-based mechanisms that fulfill coordinative requirements and make users aware of relevant conditions. Our focus addresses (a) the user-friendly and yet formal expression of local coordinative practices based on the work context; (b) the promotion of awareness of both these conventions and the context to enable actors to quickly respond; (c) the full deployment of coordination-oriented and context-aware functionalities into legacy electronic document systems. We give examples of LWOAD mechanisms taken from the case study and discuss their impact from the EUD perspective.

Chapter 7
Self-Determined Adoption of an ICT System in a Work Organization

Eija Korpelainen, Helsinki University of Technology, Finland
Matti Vartiainen, Helsinki University of Technology, Finland
Mari Kira, Helsinki University of Technology, Finland

This descriptive single case study examines the process and implications of the self-determined adoption of an internet-based meeting system in a global company. Self-determination theory and structuration theory are used as theoretical lenses to understand the adoption and use of an ICT system. The data were collected using qualitative semi-structured interviews with eleven system users and analyzed using a
content analysis approach. The research shows that the self-determined adoption of ICT systems has benefits like user motivation and satisfaction. Problems in such adoption relate to users’ experiencing uncertainty regarding the organizational legitimization of the system and support for its use. Employees and organizations are likely to benefit from self-determined adoption because it promotes employees’ motivation and initiative-taking. However, a shared understanding of self-determination and organizational support for it are required.

Chapter 8
A Model of System Re-Configurability and Pedagogical Usability in an E-Learning Context: A Faculty Perspective

Jianfeng Wang, Mansfield University of Pennsylvania, USA
William J. Doll, The University of Toledo, USA
Xiaodong Deng, Oakland University, USA

Course management systems (CMSs) enable institutions to engage users efficiently, increase enrollment without major facilities investments, and serve geographically dispersed student markets on an ongoing basis. The full benefits of technology cannot be realized if faculty do not adopt the new technology and use it to achieve their instructional design objectives. From a faculty perspective, pedagogical usability of the software is an important factor affecting technology adoption and effective implementation. Pedagogical usability is measured using Chickering and Gamson’s seven principles of good educational practice. In a distance learning context, this paper provides an initial exploratory study of how faculty perceptions of CMS software characteristics like content re-configurability, interaction re-configurability, and modularity design help faculty implement good pedagogical principles. Additionally, a model is presented that links CMS software design characteristics like content re-configurability, interaction re-configurability, and modularity design with the pedagogical usability assessments of faculty. This model is tested using a sample of 56 faculty members using WebCT at a mid-western university.

Chapter 9
End-User Software Engineering and Why It Matters

Margaret Burnett, Oregon State University, USA

End-user programming has become ubiquitous; so much so that there are more end-user programmers today than there are professional programmers. End-user programming empowers—but to do what? Make bad decisions based on bad programs? Enter software engineering’s focus on quality. Considering software quality is necessary, because there is ample evidence that the programs end users create are filled with expensive errors. In this paper, we consider what happens when we add considerations of software quality to end-user programming environments, going beyond the “create a program” aspect of end-user programming. We describe a philosophy of software engineering for end users, and then survey several projects in this area. A basic premise is that end-user software engineering can only succeed to the extent that it respects that the user probably has little expertise or even interest in software engineering.

Chapter 10
End User Development and Meta-Design: Foundations for Cultures of Participation

Gerhard Fischer, University of Colorado, USA

The first decade of the World Wide Web predominantly enforced a clear separation between designers and consumers. New technological developments, such as the participatory Web 2.0 architectures, have emerged to support social computing. These developments are the foundations for a fundamental
shift from consumer cultures (specialized in producing finished goods) to cultures of participation (in which all people can participate actively in personally meaningful activities). End-user development and meta-design provide foundations for this fundamental transformation. They explore and support new approaches for the design, adoption, appropriation, adaptation, evolution, and sharing of artifacts by all participating stakeholders. They take into account that cultures of participation are not dictated by technology alone: they are the result of incremental shifts in human behavior and social organizations. The design, development, and assessment of five particular applications that contributed to the development of our theoretical framework are described and discussed.

Chapter 11
Investigating Technology Commitment in Instant Messaging Application Users

Y. Ken Wang, University of Pittsburgh at Bradford, USA
Pratim Datta, Kent State University, USA

Although much research in the IS field has examined IS adoption, less is known about post-adoption behavior among IS users, especially when competing alternatives are available. Incorporating commitment theory from social psychology and management science literature, this paper proposes an IS continuance model that explains why some IS technologies enjoy continued use after adoption and others are often relegated to the basement as shelfware. This paper uses a technology commitment perspective to unravel why adopted technologies experience mixed success. Specifically, the authors argue that IS continuance may be best understood by investigating user commitment toward specific technologies. Three components of technology commitment, that is, affective commitment, calculative commitment, and normative commitment, are used to formulate a research model. The model is empirically tested in the context of instant messaging software. Results show a strong support for the model and explicate commitment differentials among users across different brands of instant messaging software. The study ends with a discussion of the results and their implications for research and practice.

Section 3
End-User Computing: Evidence from Practice

Chapter 12
Appropriation Infrastructure: Mediating Appropriation and Production Work

Gunnar Stevens, University of Siegen and Fraunhofer FIT, Germany
Volkmar Pipek, University of Siegen and Fraunhofer FIT, Germany
Volker Wulf, University of Siegen and Fraunhofer FIT, Germany

End User Development offers technological flexibility to encourage the appropriation of software applications within specific contexts of use. Appropriation needs to be understood as a phenomenon of many collaborative and creative activities. To support appropriation, we propose integrating communication infrastructure into software application that follows an “easy-to-collaborate”-principle. Such an appropriation infrastructure stimulates the experience sharing among a heterogeneous product community and supports the situated development of usages. Taking the case of the BSCWeasel groupware, we demonstrate how an appropriation infrastructure can be realized. Empirical results from the BSCWeasel project demonstrate the impact of such an infrastructure on the appropriation and design process. Based on these results, we argue that the social construction of IT artifacts should be tightly integrated in the material construction of IT artifacts in bridging design and use discourses.
Chapter 13
Entering the Clubhouse: Case Studies of Young Programmers Joining the Online Scratch Communities
Yasmin B. Kafai, University of Pennsylvania, USA
Deborah A Fields, University of California, Los Angeles, USA
William Q. Burke, University of Pennsylvania, USA

Previous efforts in end-user development have focused on facilitating the mechanics of learning programming, leaving aside social and cultural factors equally important in getting youth engaged in programming. As part of a 4-month long ethnographic study, we followed two 12-year-old participants as they learned the programming software Scratch and its associated file-sharing site, scratch.mit.edu, in an after-school club and class. In our discussion, we focus on the role that agency, membership, and status played in their joining and participating in local and online communities of programmers.

Chapter 14
Enterprise Systems Training Strategies: Knowledge Levels and User Understanding
Tony Coulson, California State University, San Bernardino, USA
Lorne Olfman, Claremont Graduate University, USA
Terry Ryan, Claremont Graduate University, USA
Conrad Shayo, California State University, San Bernardino, USA

Enterprise systems (ESs) are customizable, integrated software applications designed to support core business processes. This paper reports research contrasting the relative effectiveness of two strategies for ES end-user training that differentially reflect the Sein, Bostrom, and Olfman (1999) hierarchical knowledge-level model. One strategy—procedural—involves training that targets the three lowest knowledge levels of the model (command-based, tool-procedural, and business-procedural); the other—tool-conceptual—involves training that also includes a higher knowledge level (tool-conceptual). A non-equivalent quasi-experimental design was used for groups of senior business students being trained to use an authentic ES. Performance measures were administered during training and ten days after training concluded. Both experiments demonstrated that training involving the tool-conceptual knowledge level leads to superior mental models, compared with training oriented toward lower knowledge levels, as expressed in the recollection and communication of ES concepts. Tool-conceptual knowledge-level training can be used to promote understanding and communication, and should be incorporated into training strategies for ES.

Chapter 15
The Influence of Perceived Source Credibility on End User Attitudes and Intentions to Comply with Recommended IT Actions
Allen Johnston, University of Alabama, USA
Merrill Warkentin, Mississippi State University, USA

Through persuasive communications, information technology (IT) executives hope to align the actions of end users with the expectations of senior management and of the firm regarding technology usage. One highly influential factor of persuasive effectiveness is the source of the persuasive message. This study presents a conceptual model for explaining the influence of source credibility on end user attitudes and behavioral intentions to comply with organizationally motivated, recommended IT actions within a decentralized, autonomous environment. The results of this study suggest that the elements of source competency, trustworthiness, and dynamism are significant determinants of attitudes and behavioral
intentions to engage in recommended IT actions. These findings reveal the importance of these elements of effective communication in persuading end users to follow recommended IT activities and advance IT acceptance and adoption research through the application of persuasive communication theory to the domain.

Chapter 16
Organizing End-User Training: A Case Study of an E-Bank and its Elderly Customers

Harri Oinas-Kukkonen, University of Oulu, Finland
Sari Hohtari, Kemi-Tornio University of Applied Sciences, Finland
Samuli Pekkola, Tampere University of Technology, Finland

Introducing information systems into organizations initiates a change in human behaviors, which is often perceived as obtrusive and distracting. End-user training may help manage this challenge by getting the users familiar with the system and its functionality. However, end-user training is not easy, nor self-evident, as shown in this paper. This is problematic, particularly when organization-wide standards for how to provide training are missing or when the group of end-users is two-layered, that is, both the customers and the staff must be trained. In this paper, the authors describe a qualitative case study of how the end-user training on an e-Bank was organized, and how the training was delivered to its elderly customers. The training model by Simonsen and Sein (2004) is utilized and extended to cover the systems development cycle. The authors argue that an approach that integrates the end-user training with the systems development improves organizational implementation. As a result, this paper makes practical suggestions about the issues related to organizing end-user training.

Chapter 17
A Path Analysis of the Impact of Application-Specific Perceptions of Computer Self-Efficacy and Anxiety on Technology Acceptance

Bassam Hasan, The University of Toledo, USA
Mesbah U. Ahmed, The University of Toledo, USA

Perceptions of computer self-efficacy (CSE) and computer anxiety are valuable predictors of various computer-related behaviors, including acceptance and utilization of information systems (IS). Although both factors are purported to have general and application-specific components, little research has focused on the application or system-specific component, especially in IS acceptance contexts. Thus, little is known about the effects of application-specific beliefs on IS acceptance or how such effects compare with the effects of more general CSE and computer anxiety beliefs. Accordingly, a research model comprising application CSE, application anxiety, perceived ease of use, perceived usefulness, attitude, and intention was proposed and tested via path analysis. The results demonstrated that the direct impacts of application CSE and application anxiety on perceived ease of use and perceived usefulness were almost equal, but in opposite directions. However, the indirect effect of application CSE on attitude and intention was stronger than that of application anxiety.

Compilation of References

About the Contributors

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