HCI studies in Management Information Systems

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Human-Computer Interaction (HCI) is gaining momentum in many IT fields as computing technology increasingly impacts individuals, businesses, society, commerce and government throughout the world. More recently, the Association for Information Systems (AIS) recognized the need to promote HCI in the Management Information Systems (MIS) field. The first step taken by AIS was to approve the creation of the Special Interest Group on Human-Computer Interaction (AIS SIGHCI). This group was established in 2001 and has run successful tracks and workshops at major MIS conferences since then. A recent conference was the Americas Conference on Information Systems (AMCIS'03) at which the organizers of the HCI mini-track proposed publishing extended versions of the best papers in this special issue.

There are three reasons for producing this special issue. The first is to make BIT readers aware of the work of the AIS SIGHCI members; the second is to tell readers about some of this work; and the third is to encourage future collaboration between AIS SIGHCI and the international HCI community. To achieve these goals and to position the group and its work, we

will first briefly describe the historical development and current status of the Management Information Systems discipline and the kind of Human-Computer Interaction research that is being conducted in MIS. We then describe the AMCIS conference from which the papers were selected. Finally, we conclude by calling for better communication and collaboration among HCI scholars in different disciplines.

This BIT special issue builds on the "HCI and MIS: Shared Concerns" special issue of the International Journal of Human-Computer Studies (Zhang and Dillon 2003) that features the best papers from the HCI mini-track at the previous year's conference (AMCIS'02). Together, these two special issues are part of a long-term outreach effort of AIS SIGHCI to enhance communication among scholars with HCI interests who work in related fields.

Management Information Systems (MIS)

The MIS discipline started as applied Computer Science in the 1970s and gradually developed into a more social science oriented discipline (Baskerville and Myers 2002). It now has its unique identity, core journals, conferences, and an official association with 4000+ members worldwide. Historically, there are several other terms used by different departments, universities, regions, countries, journals, societies and associations to represent this discipline. These terms include computer information systems, business computing science, information technology, information management, decision support systems, electronic data processing, information resource management, and information systems (Carey, Galletta, Kim, Te'eni, Wildemuth and Zhang 2004).

Davis (1974) gave one of the earliest definitions of MIS, in which he described MIS as 'an integrated man/machine system for providing information to support the operation, management, and decision-making functions in an organization'. At the first International Conference on Information Systems (ICIS), Keen (1980) defined MIS as 'the effective design, delivery and use of information systems in organizations'. In a MIS text by Ahituv and Neumann (1986), they stated that: 'MIS is the systematic study of information systems. An information system is a set of components (people, hardware, software, data, and procedures) that operate together to produce information that supports the operation and management functions of an organization'. Laudon and Laudon (2003) defined MIS as 'the study of information systems focusing on their use in business and management'.

One of the main distinguishing features of MIS revealed in these definitions is that MIS has a *business-application* and *management orientation*. In order to encourage quality work in the area, MIS emphasizes development, application and validation of relevant theories and models. It also draws from other disciplines including: Computer Science, Organization Science, Management Science, Cognitive Psychology, Social Psychology, Organizational Psychology, Sociology, Management, Accounting, Marketing and Economics (Nolan and Wetherbe 1980, Culnan and Swanson 1986, Baskerville and Myers 2002). Over the past several decades, MIS has developed its own research emphasis and research tradition (Baskerville and Myers 2002). MIS research examines more than just the technological system (e.g. hardware, software, data, networks), or just the social system (e.g. people, business processes, politics, economics, psychology, culture, organization, management), but the interactions between the two (Lee 1999,

2001). To do this, MIS research draws heavily on the theoretical foundations of the behavioural and social science disciplines in addition to business and management.

Readers who are interested to find out more about the origins, goals and research of the MIS community are encouraged to consult overview articles such as Nolan and Wetherbe (1980), Culnan (1986), Culnan and Swanson (1986), Alavi and Carlson (1992), and Baskerville and Myers (2002). Nolan and Wetherbe (1980) proposed a comprehensive framework for research in MIS while Culnan and Swanson (1986) reviewed the nature of the MIS field. Culnan (1986) used a co-citation analysis to identify the sub-fields that constitute MIS research and the reference disciplines of these sub-fields. Alavi and Carlson (1992) examined published MIS articles to identify popular research topics, the dominant research perspective, and the relationship between MIS research and practice. Baskerville and Myers (2002) examined the MIS field and observed a steady shift of MIS research from a techno-centric focus to a better balance of technology/ organizational/ management/ social focus. Baskerville and Myers (2002) also broadly define the MIS domain as 'the development, use and application of information systems by individuals, organizations and society'.

Human-Computer Interaction (HCI) research in MIS

There have been many attempts to define HCI (e.g. Shneiderman 1987, 1992, 1998, ACM 1992, Dix, Finlay, Abowd and Beale 1993, 1998, 2004, Preece, Rogers, Sharp, Benyon, Holland and Carey 1994, Preece, Rogers and Sharp 2002, Shneiderman and Plaisant 2004). For example, Myers, Hollan and Cruz (1996) stated that HCI is a study of how people design,

implement and use interactive computer systems and how computers affect individuals, organizations and society. In identifying HCI research directions, Myers *et al*. (1996) discussed several strategic themes such as universal access to distributed information, lifelong learning, e-commerce, information visualization and computer-mediated communications. They highlighted technological trends relating to ubiquitous computing, the different modalities such as speech, handwriting and natural language, 3D and virtual reality, and the limitations of network bandwidth. They also discussed design and evaluation methods and tools, and the need to study not only issues concerning the use of interactive systems by individuals, but also by multiple-persons, groups and organizations.

More recently, Olson and Olson (2003) defined HCI as the study of how people interact with computing technology. They identified two important aspects of HCI: design of computer systems and evaluation of systems in use. They further discussed research in HCI under six broad categories: the science of HCI (e.g. cognitive modelling, distributed cognition), user interface developments (e.g. mobile devices, immersive environments, ubiquitous computing), usability methods, the workplace, computer supported cooperative work (e.g. voice and video conferencing tools, repositories of shared knowledge, social filtering, trust in people when communicating via technology) and the larger social context (e.g. psychological and social costs of the digital divide). They emphasized multiple levels of analysis for evaluation: the individual, the group, the organization, and the industry or societal sector.

Like the field of MIS, HCI is also fundamentally interdisciplinary. It draws on cognitive, social and organizational psychology, and other social sciences such as sociology and

anthropology, and related fields such as communication, management, operations research, management science, computer science and ergonomics. Interestingly, MIS and HCI have more in common than might be expected of two communities that have had relatively little interaction until now. Both draw on a similar set of reference disciplines and address similar research questions and issues. HCI research in MIS has almost as long a history as the MIS field. But it is only recently that HCI research is gaining great attention in MIS and becoming a focal research stream in the MIS discipline (Zhang, Benbasat, Carey, Davis, Galletta and Strong 2002).

In order to recognize, promote and advance HCI research in the MIS field, Ping Zhang from Syracuse University and Fiona Nah from the University of Nebraska-Lincoln founded the Special Interest Group on Human-Computer Interaction within the Association of Information Systems in 2001 (http://melody.syr.edu/hci/). This group provides a forum for the MIS community to discuss and develop a range of issues related to the history, reference disciplines, theories, practices, methodologies, techniques, new developments and applications arising from interactions between humans, information, technologies and tasks. These issues are usually studied in the business, managerial, organizational and cultural contexts. In summary, 'Human Computer Interaction (HCI) or Human Factors studies in MIS are concerned with the ways humans interact with information, technologies, and tasks, especially in business, managerial, organizational, and cultural contexts' (Zhang *et al*. 2002).

The mission of this new AIS SIGHCI is two-fold:
(1) To facilitate the exchange, development, communication and dissemination of information among AIS members.

(2) To promote research related to human-computer interaction within business, managerial and organizational contexts among AIS members and to the larger community of practitioners and scholars.

AIS SIGHCI therefore encourages research that looks beyond human-computer interfaces. It strives to promote understanding the relationships between people (e.g. management, users, implementers, designers, developers, senior executives, vendors, consultants), technology (i.e. at individual, group, enterprise/organizational, inter-organizational, industry, national or global level), tasks (e.g. complexity, types, single vs. multi-user) and contexts (e.g. business, commercial, education, government). Further information about AIS SIGHCI, including services provided and future conferences planned, can be found at: http://melody.syr.edu/hci/.

Origins of this special issue

AIS SIGHCI sponsored the "HCI Studies in MIS" mini-track at AMCIS'03 from which the papers in this special edition were selected. This mini-track was the most popular and largest at AMCIS'03. It attracted forty paper submissions of which twenty-seven were accepted for presentation. The final program of AMCIS'03 included ten HCI sessions that ran throughout the entire conference: eight regular paper sessions each featuring three papers, one mentored round table session with three papers by doctoral students, and one HCI panel discussion on the role of HCI in MIS curriculum. The papers covered a variety of HCI topics including Website usability, online consumer behaviour in Web environments, conceptualisation of online shopping

experience, cognitive style in decision support environments, Website personalization for relationship management, consumer trust in online shopping, credibility of online information, user frustration in the workplace, social cues and personality in decision making environments, and social and usage process motivation in Internet use. From the twenty-four accepted regular papers, the authors of the eight best papers were invited to extend and submit their work for consideration in this special issue. Two rounds of rigorous double-blind reviews yielded the three papers in this special issue.

Introduction to the papers

The majority of MIS studies emphasize the development and/or testing of theories related to issues in some specific contexts such as in the business, education and organizational settings. This emphasis is reflected in HCI studies in MIS. Among the three papers in this special issue, the first and third articles were conducted in a laboratory context while the second article was conducted in simulated educational and commercial contexts. As a coincidence, these three papers all adopted the experimental paradigm of research. Another coincidence is that all three studies examine issues in Web-based environments. However, given the pervasive and influential nature of the Web, perhaps it is not so surprising that these researchers chose to focus on issues relating to the Web. These articles address: (i) the effects of small screen size; (ii) text-background colour combinations; and (iii) page loading latency on Web users' behaviour and perceptions.

The first paper entitled "Size and structure matter to mobile users: an empirical study of the effects of screen size, information structure, and task complexity on user activities with standard Web phones" by Minhee Chae and Jinwoo Kim examines the depth/breadth tradeoffs in mobile Internet devices. Due to the small screen size of mobile devices, the potential for mobile business applications and m-commerce transaction systems is limited. In this experimental study, Chae and Kim studied whether task complexity moderates the effect of horizontal depth and screen size on user navigation activities and perceptions. The results show that horizontal depth and screen size are not only important factors influencing a user's navigation activities and subjective perceptions, but their importance and effect also increase as task complexity increases.

The second paper entitled "The impact of Web page text-background colour combinations on readability, retention, aesthetics, and behavioural intention" is co-authored by Richard Hall and Patrick Hanna. In this paper, the impact of Web page text-background colour combinations was studied in both educational and commercial contexts. The findings suggest that colours with greater contrast ratio generally lead to greater readability but not retention, while preferred colours (i.e. blue and chromatic colours) lead to higher ratings of aesthetic quality and intention to purchase. This study provides theoretical implications for research in text-background colour combinations, and provides very useful practical implications and guidelines for educational, business and commercial settings.

The third paper entitled "A study on tolerable waiting time: how long are Web users willing to wait?" is authored by Fiona Fui-Hoon Nah. The research was motivated by the large variation of estimates (i.e. from 1 to 41 seconds) of Web users' tolerable waiting time (TWT) in

the literature. Instead of assessing Web users' TWT based on their perceptions such as attitudes and intentions, this study determines their TWT based on actual behaviour (i.e. at which point do users give up the wait for Web page download). The study also empirically evaluates whether the presence of feedback during Web page download affects Web users' TWT. The findings show that the presence of feedback extends Web users' TWT, and that the typical Web users' tolerable waiting time for information retrieval (focused search) tasks is approximately 2 seconds.

The way forward

The three selected papers in this special issue depict only a small set of research issues that are covered in the AMCIS'03 HCI mini-track in particular and in the HCI area in general. Nevertheless, we hope that the three papers in this special issue and this editorial introduction will provide readers with some interesting insights about the research interests and methods that are used by scholars from the MIS and related fields. We also hope that readers will see comforting similarities with their own work as well as interesting differences that inspire them to delve further into the MIS literature and the work of AIS SIGHCI.

In light of the fast development of technologies and their rapid deployment in organizations, businesses, societies and almost everywhere in people's life, HCI studies have become increasingly important and are gaining attention in many related fields. We hope that this special issue will help to stimulate the 'cross-fertilization' of ideas and creation of synergy between AIS SIGHCI and other HCI groups. By reaching out to the other HCI groups in this way, AIS SIGHCI strives to encourage innovative and high quality research that not only

benefits management and organizations more directly but also stimulates synergetic ideas for future research.

Acknowledgements

References

ACM special interest group on computer-human interaction - curriculum development group, 1992, *ACM SIGCHI Curricula for Human-Computer Interaction* (New York: ACM).

Ahituv, N. and Neumann, S., 1986, *Principles of Information Systems for Management,* 2nd edition (Dubuque, IA: William C. Brown).

Alavi, M. and Carlson, P., 1992, A review of MIS research and disciplinary development. *Journal of Management Information Systems*, **8**(4), 45-62.

Baskerville, R.L. and Myers, M.D., 2002, Information systems as a reference discipline. *MIS Quarterly*, **26**(1), 1–14.

Carey, J., Galletta, D., Kim, J., Te'eni, D., Wildemuth, B. and Zhang, P., 2004, The role of Human-Computer Interaction in the MIS curriculum: a call to action, *Communications of the Association for Information Systems*, **12**, forthcoming.

Culnan, M.J., 1986, The intellectual development of Management Information Systems: a co-citation analysis. *Management Science*, **32**(2), 156-172.

Culnan, M.J. and Swanson, E.B., 1986, Research in Management Information Systems, 1980-1984: points of work and reference. *MIS Quarterly*, **10**(3), 289–302.

Davis, G.B., 1974, *Management Information Systems: conceptual foundations, structure, and development* (New York, NY: McGraw-Hill).

Dix, A., Finlay, J., Abowd, G. and Beale, R., 1993, 1998, 2004, *Human-Computer Interaction* (Harlow, UK: Prentice Hall).

Keen, P.G.W., 1980, MIS research: reference disciplines and a cumulative tradition. *Proceedings of the First International Conference on Information Systems*, December 1980, pp. 9-18.

Laudon, K.C. and Laudon, J.P., 2003, *Management Information Systems: Managing the Digital Firm* (Upper Saddle River, NJ: Prentice Hall).

Lee, A.S., 1999, Inaugural Editor's Comments. *MIS Quarterly*, **23**(1), v-xi.

Lee, A.S., 2001, Editorial. *MIS Quarterly*, **25**(1), iii-vii.

Myers, B., Hollan, J. and Cruz, I., 1996, Strategic directions in Human-Computer Interaction. *ACM Computing Surveys*, **28**(4), 794-809.

Nolan, R.L. and Wetherbe, J.C., 1980, Toward a comprehensive framework for MIS research. *MIS Quarterly*, **4**(2), 1-19.

Olson, G.M. and Olson, J.S., 2003, Human-Computer Interaction: psychological aspects of the human use of computing. *Annual Review of Psychology*, **54**(1), 491-516.

Preece, J., Rogers, Y., Sharp, H., Benyon, D., Holland, S., and Carey, T., 1994, *Human–Computer Interaction* (Harlow, UK: Addison-Wesley).

Preece, J., Rogers, Y. and Sharp, H., 2002, *Interaction Design: Beyond Human-Computer Interaction* (New York: John Wiley & Sons).

Shneiderman, B., 1987, 1992, 1998, *Designing the User Interface - Strategies for Effective Human-Computer Interaction* (Reading, MA: Addison-Wesley).

Shneiderman, B. and Plaisant, C., 2004, *Designing the User Interface - Strategies for Effective Human-Computer Interaction*, 4th Edition (Reading, MA: Addison-Wesley).

Zhang, P., Benbasat, I., Carey, J., Davis, F., Galletta, D. and Strong, D., 2002, Human-Computer Interaction research in the MIS discipline. *Communications of the Association for Information Systems*, **9**(20), 334-355.

Zhang, P. and Dillon, A., 2003, HCI and MIS: shared concerns. *International Journal of Human-Computer Studies*, **59**(4), 397-402.