
A Call for Collaborative CS + IS HCI Studies

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Abstract

As a researcher who started in theoretical AI and now leads a research group called Interactive Visualizations for Real-Life Systems at a business university, I have worked and published with people from the Computer Science and the Information Systems communities. My journey from theoretical AI to applied HCI has taught me the value of methods and contributions of both the CS and the IS fields. They are highly complementary. In my own research, I have been combining different methods and contribution types using design research methodology as a framework. While most impactful projects in HCI can arise from CS + IS collaboration, they are rare and should be promoted and encouraged.

Author Keywords

Design research, human-computer interaction, collaboration

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI):

Introduction

My first introduction to the field of Human Computer Interaction happened when I was a postdoc doing



Figure 1: from [1]. "In the middle Emacs window, the user has entered a set of citations in the text of a paper. The body of the citation command displays the status of the searches, the first of which is completed. The user is browsing the paper list from one of the incomplete searches in the front window. The rear window is showing the first paper from the list, retrieved by a single keystroke." [1]

research in Human-Computer Collaboration. Writer's Aid [1] was the first user interface that I created, utilizing the AI planning and knowledge representation techniques I developed for my PhD thesis. Writer's Aid worked in parallel with a person editing a manuscript, by autonomously identifying, finding and downloading papers related to the writer's supplied keywords. The autonomous mode in which Writer's Aid operated supported an innovative user interaction model. In this model, the writer could initiate a search for related papers by entering a citation, and then could review the collected references and papers at any time, while editing the paper. This interaction model was designed from the start and the planning algorithms behind it had to be extended to satisfy the requirements of the unobtrusive integration of the autonomous agent into the work of a human user.

What developing Writer's Aid taught me was that

- placing technology into the context of a concrete task creates unique requirements on such technology stemming from the integration of data and algorithms with the human activity, and
- these requirements are often not trivial and often lead to the discovery of new algorithms and representations.

For example, to adapt the planning algorithm to the context of assisting a writer with citations, it had to be extended to interleave planning with gradual execution of partially incomplete plans. The requirement that results of the search be available as soon as possible necessitated this extension.

CS and IS Perspectives

When I demonstrated Writer's Aid [1] to a department colleague, who was an IS researcher that had done work in search and query interfaces, he asked why I thought this approach would work. My response was that it made sense and it was useful for me and about a dozen people who had used the interface in a simple evaluation study. My colleague was not satisfied with the answer, because it was too limited in its consideration of the work context; what seemed obvious to me was questionable for him.

Since that time, I have been fortunate to work with many open-minded people on both CS and IS sides. These interactions shaped my understanding and appreciation of the strengths of both communities. My collaborations with IS colleagues have taught me that, although the two communities often find themselves wondering about each other's values and methods, the two fields produced research that is complementary in the way it studies systems:

1. CS research is aimed at pushing the envelope on what's possible: solving new kinds of problems, doing it faster, more effectively, using new kinds of hardware, etc.
2. IS research aims to address what's needed, what works and what doesn't in the context of real people using systems in their work.

This complementarity can and should be exploited to achieve research of greater impact, because

- without considering problems associated with the realities of placing new HCI solutions into the context of work practice, the novel techniques and

approaches will remain confined to the university labs, and

- without a thorough consideration of the technology and what it makes possible, the studies of the impact from using systems will be incomplete and outdated.

Most interesting and valuable studies address both concerns, yet they are very hard to conduct and publish, because the two communities are disjoint and there are very few places and programs that encourage this kind of combined research. Yet, such blended studies would lead to advancements in both academic fields as well as to a faster progress in the actual practice of HCI.

Combining the CS and IS Methodologies in Design Studies

In my work I have experienced such collaboration, for example, within the scope of the study of improving usability of Enterprise Planning Systems (ERP) via human-computer collaboration [2], [3]. Our study used the framework of combined behavioral and design research in IS from Hevner et al. [4]. It employed a variety of methods, from field studies and theoretical analysis of the results, to design, development, laboratory experimentation with and user testing of the novel interfaces [5]. The contributions produced in the process of this design research study include a categorization of common ERP usability problems [6]–[8], design principles for improving usability of ERPs based on human-computer collaboration [9], novel user interfaces and algorithms [10], as well as a new usability inspection method [11], [12].

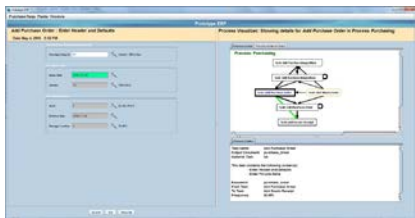


Figure 2: (from [5]) "ERP prototype with the Interactive Process Visualization component on the right" [5]

Design study frameworks have been also articulated within the CS HCI community ([13], [14]). Seldmair et al. [14] acknowledge the qualitative field work is an integral component of design studies in Visualization/HCI.

While studies that span design, technical and behavioral methodologies exist on both CS and IS sides of HCI, they are rare (e.g. [5], [15]–[17]). The combination of research methodologies and perspectives greatly enriches the understanding of the context of use, required capabilities and applicability of the developed HCI solutions. Finding ways to promote such studies and finding opportunities for collaboration with researchers from different disciplines is my goal for attending this workshop.

References

- [1] T. Babaian, B. J. Grosz, and S. M. Shieber, "Writer's Aid: Using a Planner in a Collaborative Interface," in *Proceedings of International Joint Conference on Artificial Intelligence (IJCAI'2003), Intelligent Systems Demonstrations, 2003*, pp. 1629–1630.
- [2] B. J. Grosz, "Beyond mice and menus," *Proc. Am. Philos. Soc.*, vol. 149, no. 4, pp. 529–523, 2005.
- [3] L. Terveen, "An overview of human-computer collaboration," *Knowl.-Based Syst.*, vol. 8, no. 2–3, pp. 67–81, 1995.
- [4] A. R. Hevner, S. T. March, J. Park, and S. Ram, "Design Science in Information Systems Research," *MIS Q.*, vol. 28, no. 1, pp. 75–105, 2004.
- [5] T. Babaian, J. Xu, and W. Lucas, "ERP prototype with built-in task and process support," *Eur. J. Inf. Syst.*, Sep. 2017.

- [6] H. Topi, W. Lucas, and T. Babaian, "Identifying Usability Issues with an ERP Implementation," in *Proceedings of the International Conference on Enterprise Information Systems (ICEIS-2005)*, 2005, pp. 128–133.
- [7] H. Topi, W. Lucas, and T. Babaian, "Using Informal Notes for Sharing Corporate Technology Know-How," *Eur. J. Inf. Syst.*, vol. 15, no. 5, pp. 486–499, 2006.
- [8] J. Xu and H. Topi, "A Conceptual Model for User-System Collaboration: Enhancing Usability of Complex Information Systems," *Commun. AIS*, vol. 41, 2017.
- [9] T. Babaian, W. Lucas, J. Xu, and H. Topi, "Usability through System-User Collaboration," in *Global Perspectives on Design Science Research, 5th International Conference, DESRIST 2010 St. Gallen, Switzerland, June 2010. Proceedings*, 2010, pp. 394–409.
- [10] T. Babaian and W. Lucas, "Composing Interface Demonstrations Automatically from Usage Logs," in *Enterprise Information Systems - 14th International Conference, ICEIS 2012, Revised Selected Papers*, vol. 141, Springer-Verlag, 2013, pp. 376–392.
- [11] T. Babaian, W. Lucas, and M.-K. Oja, "Evaluating the Collaborative Critique Method," in *Proceedings of the 2012 ACM annual conference on Human Factors in Computing Systems, CHI '12*, New York, NY, USA, 2012, pp. 2137–2146.
- [12] W. Lucas and T. Babaian, "The Collaborative Critique: An Inspection Method for Expert Evaluation of User Interfaces," *Int. J. Hum.-Comput. Interact.*, vol. 31, no. 11, pp. 843–859, Nov. 2015.
- [13] J. Zimmerman, J. Forlizz, and S. Evenson, "Research through design as a method for interaction design research in HCI," presented at the the SIGCHI conference on Human factors in computing systems, New York, NY, 2007, pp. 493–502.
- [14] M. Sedlmair, M. Meyer, and T. Munzner, "Design Study Methodology: Reflections from the Trenches and the Stacks," *IEEE Trans. Vis. Comput. Graph.*, vol. 18, no. 12, pp. 2431–2440, Dec. 2012.
- [15] R. Chang *et al.*, "Scalable and interactive visual analysis of financial wire transactions for fraud detection," *Inf. Vis.*, vol. 7, no. 1, pp. 63–76, 2008.
- [16] Z. Liu, J. Stasko, and T. Sullivan, "SellTrend: Inter-Attribute Visual Analysis of Temporal Transaction Data," *IEEE Trans. Vis. Comput. Graph.*, vol. 15, no. 6, pp. 1025–1032, Nov. 2009.
- [17] W. N. Dilla and R. L. Raschke, "Data visualization for fraud detection: Practice implications and a call for future research," *Int. J. Account. Inf. Syst.*, vol. 16, pp. 1–22, Mar. 2015.