Co-located Tabletop Collaboration: Technologies and Directions

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Abstract

As computer technology continues to move off the desktop and into the many facets of our lives, the need to support collaboration is growing rapidly. In particular, more appropriate technology is needed to facilitate our face-to-face collaborative activities. Researchers have begun to develop technology that takes advantage of both the affordance of physical tabletops to facilitate small-group collaboration and the experience people have collaborating around tables. There appears to be great potential for this new technology to support our existing co-located collaborative activities as well as activities currently not possible in the physical world. The workshop will focus on exploring this potential by discussing the constraints and possibilities of existing and emerging technologies for supporting tabletop collaboration. We will also focus on identifying future research directions that with further explore the promise of tabletop technology. These goals will be accomplished through brief group presentations, brainstorming sessions, and small-group breakout sessions.

Theme and Goals

Traditional computers do not afford effective group interaction in a face-to-face environment. Often during face-to-face collaboration, technology is quickly abandoned for traditional tools such as flipcharts, post-it notes, and pen-and-paper (Luff *et al.*, 1992). The one-user/one-computer paradigm of the standard computer can inhibit our face-to-face collaborative interactions (Scott et al., 2000). Consequently, researchers have begun to investigate novel environments that better support users' natural collaborative behavior, such as tabletop computer displays.

From an architectural firm to a fashion design studio to a newspaper layout room, tables play an important role in many collaborative activities. A physical tabletop naturally affords collaboration by providing a large, shared workspace that can be easily accessed by those around the table. The open workspace provided by a tabletop facilitates communication, which is essential for workspace awareness and coordination (Hutchins, 1990).

The central goal of this workshop is to identify the fundamental issues related to the support of collaborative tabletop activities with technology. We would like to identify prior tabletop research including existing technology (input and output devices), interaction techniques, user groups, tabletop tasks and applications, and tabletop interaction metaphors. During the workshop, we hope to use this information, along with participants' visions and their knowledge of emerging technologies to map out the research area and identify open issues – particularly those that uniquely apply to tabletop displays. We will examine which of these issues have been explored and by whom, the planned directions of known tabletop researchers, which research issues are not being addressed, and of these, which are the critical issues that need to be addressed before the field can advance.

In the workshop, we would like to discuss advantages and disadvantages of collaborating around a table without technology and explore which of these will still hold with the introduction of technology. Furthermore, we hope to identify the benefits of bringing digital technology to a collaborative tabletop environment. Participants will be asked to share their experiences with tabletop technology, including obstacles they have encountered with tabletop displays (e.g., technological or interface problems) as well as any insightful workarounds or solutions they have used to solve these problems.

Topics of interest include (but are not limited to):

- tabletop interface metaphors and interaction techniques
- shared display groupware in tabletop environments
- tabletop hardware technology that supports collaboration (novel input surfaces and devices, creative display technology, etc.)

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- qualitative and quantitative investigations of tabletop use (with or without technology)

- tangible tabletop interfaces

- multi-modal tabletop environments

- evaluation of tabletop technology (e.g., hardware, software, applications, and interaction techniques)

The goal of this workshop is to bring together individuals who are actively pursing research directions related to the support of face-to-face collaborative tabletop activities. This workshop will allow individuals with complementary research experiences to build a collective understanding of the issues surrounding user interactions in tabletop environments. This workshop is timely given the existence of diverse research in the area, and will help to bring together existing work and define emergent directions.

Activities

This workshop will be run over a full day and will be structured to provide maximum time for group discussion and brainstorming. Prior to the workshop, each participant will be required to read the other participants' position statements to ensure that he/she is familiar with their research in the area and their visions for collaborative tabletop displays. The format of the workshop will be for participants to 'very' briefly present their vision for future directions in this research area. The group will brainstorm a number of discussion topics and then break out into small discussion groups moderated by the workshop organizers. At various points throughout the day we will come together as a group and summarize the breakout discussions.

Participation

A group of ten to fifteen participants will be invited to participate on the basis of proposals submitted prior to the workshop. Proposals should consist of a short paper (max. 2000 words) and be structured into the following sections:

- **Vision:** author's vision of how tabletops can benefit collaboration

- **Workshop issues:** key issues that should be discussed/brainstormed at the workshop

- **Current research direction:** author's ongoing work related to tabletop environments for face-to-face collaboration

- **Bio:** participant's background and motivation for taking part in this workshop

Members of the program committee will review all submitted papers and select participants.

Submissions must be in electronic form (PDF format). Submission should be emailed to sdscott@cs.sfu.ca and must include the name, contact, and full address of the author participant. Only one author per submission will be invited to attend the workshop. If additional authors would like to be considered, separate applications should be submitted. Prior to the workshop, participants will have access to all accepted proposals. Accepted submissions will be included in informal workshop proceedings. A submission template will be available for download on the Web at: http://www.edgelab.sfu.ca/CSCW.

Student Participation

Three to five students will also be invited to take part in the workshop (in addition to the student organizers). This will provide graduate students pursing research in this area a unique opportunity to interact with key researchers in the field and help define future directions. Students will not be required to present research directions, however, if a student wishes to present their work in this forum, they can prepare a submission as outlined above for participants. Students are required to submit a one-page paper describing their interest in the area of co-located collaborative tabletops and their motivation for wanting to take part in the workshop. Submissions must be in electronic form (in PDF format). Student submissions should be emailed to sdscott@cs.sfu.ca and must include the name, contact, and full address of the student.

A/V Requirements

We will require use of a digital projector and screen (or something equivalent to the SMART Boards available at the CSCW 2000 workshops). We will also require flipcharts, masking tape, and colored markers.

References

Hutchins, E. (1990). The Technology of Team Navigation. In J.R. Galegher, R.E. Kraut, and L. Egido (eds.) *Intellectual Teamwork: Social and Technological Foundations of Co-operative Work*. Lawrence Erlbaum Associates, pp. 191-220.

Luff, P., Heath, C., and Greatbatch, D. (1992). Tasks-in-Interaction: Paper and Screen Based Documentation in Collaborative Activity. *Proceedings of Computer-Supported Cooperative Work '92*, pp. 163-170.

Scott, S.D., Shoemaker, G.B.D., and Inkpen, K.M. (2000). Towards Seamless Support of Natural Collaborative Interactions. In *Proc. of Graphics Interface (GI) 2000*. May 2000, Montréal, PQ.

Organizers

Dr. Kori Inkpen, Dalhousie University

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Kori Inkpen is an Associate Professor in the Faculty of Computer Science at Dalhousie University. Her main research interests are in the area support for face-to-face collaboration. In particular, she has pursued research related to multiple input devices in Single Display Groupware, and the exploration of support for users' natural face-to-face collaborative interactions.

Dr. M. Sheelagh T. Carpendale, University of Calgary

Sheelagh Carpendale is an Assistant Professor in the Department of Computer Science at the University of Calgary. Her research interests have been in information visualization and in particular screen real estates issues. She is currently exploring how larger screens in tabletop displays can affect and benefit face-to-face collaborative development and assessment of large information spaces.

Dr. Terry Winograd, Stanford University

Terry Winograd is a Professor of Computer Science at Stanford University. His focus is on human-computer interaction design, with a focus on the theoretical background and conceptual models. He directs the teaching programs in Human-Computer Interaction and HCI research in the Stanford Interactivity Lab.

Student Organizers

Stacey Scott, Simon Fraser University

Stacey Scott is a Ph.D. student in the School of Computing Science at Simon Fraser University. She has a B.Sc. in Computing Science and Mathematics from Dalhousie University. Her focus is on supporting face-to-face collaboration with technology. Stacey's current research interests include CSCW, Shared Display Groupware, and technology to support collaborative tabletop activities.

Karen Grant, Stanford University

Karen Grant is a Ph.D. candidate in the Computer Science Department at Stanford University. She has a B.A. from Harvard University, and a M.S. from LSE and from Stanford. She has produced and designed children's software. Karen's current research interests include human-computer interaction design, tools for collaborative knowledge gathering and organizing, CSCW, and shared tabletop displays.

Regan Mandryk, Simon Fraser University

Regan Mandryk is a Ph.D. student in the School of Computing Science at Simon Fraser University. She has a B.Sc. in Math and Physics from the University of Winnipeg and a M.Sc. in Kinesiology from Simon Fraser University. Her current research interests include computer-supported cooperative play, natural input, and tangible interfaces.

Program Committee

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