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# “Local Remote” Collaboration: Applying Remote Group Awareness Techniques to Co-located Settings

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**Abstract**

Co-located environments have long been considered ideal for many types of group work, such as planning, decision-making, and design, since they provide a rich communication environment (e.g. delay-free voice communication, face-to-face interaction, eye gaze, and non-verbal communication), as well as promote awareness and coordination through the use of shared artifacts. However, the recent move towards multi-device ecologies in co-located settings, such as the use of multiple personal devices (e.g., laptops, tablets) or multiple personal devices in conjunction with larger, shared displays, such as digital walls or tabletops, can interfere with these common co-located communication and collaboration strategies, as various group members mentally and/or physical shift their focus to their personal devices rather than to their collaborators or to any physically shared artifacts. Group communications and coordination can easily breakdown in these scenarios as the lack of a physically shared group focus of attention can limit awareness of other's activities and task progress. In this workshop, researchers and practitioners will explore design techniques that can be used to address this issue, and improve group awareness in these co-located multi-device ecologies. This will be accomplished through group presentations, brainstorming sessions, and small-group breakout sessions.

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### **Author Keywords**

Design, Human Factors, Collaboration

### **ACM Classification Keywords**

H.5.3 [Information interfaces and presentation (e.g., HCI)]: Group and Organizational Interfaces.

### **Themes and Goals**

Co-located environments are considered ideal for many types of group work, such as planning, decision-making, and design, since they enable rich, multi-channel communication, such as delay-free, full-duplex voice communication, face-to-face interaction, eye gaze, and non-verbal communication [5]. In addition, co-located settings also facilitate group coordination and awareness by enabling the use of physically shared artifacts and workspaces [7, 13].

Advanced in wireless networking, mobile computing devices, and interactive large-screen surface computers have fueled the development of computer-supported collaboration systems that involve a wide range of personal and shared computing devices used together in a multi-device ecology in co-located settings. Examples include co-located collaboration involving multiple, personal tablet computers (tablets) [9, 10], personal laptops or tablets used in conjunction with a nearby digital wall [1, 2, 6, 11, 15], and personal tablets used in conjunction with a digital tabletop [3, 4].

Our experiences developing and studying a variety of multi-device ecologies [3, 11, 12, 15, 14] have shown that individual group members can quickly lose touch with their collaborators' activities when they engage in independent work on a personal (or a different display) from their collaborators. For instance, when people

engage in a collaboration command and control activity in a multi-device ecology, one person may perform several map-based activities on a personal tablet. In stressful, or time-pressured environments, it is easy for this person to become completely engrossed in their own work and personal, perhaps panned or zoomed in, view of the shared workspace and thus be unaware of related activities being conducted by others sitting beside them or across the table from them.

In these scenarios, we have found it useful, even required, to begin to incorporate interface concepts commonly used in the remote collaboration to 'add back' the awareness features that often 'come for free' in a co-located workspace. For example, we have explored the use of radar views [8] (often called 'mini-maps' in gaming applications), which are commonly used in synchronous distributed collaboration to provide awareness of where you are working relative to your remote collaborators in a virtually shared workspace.

Given the parallels to remote collaboration scenarios, these co-located multi-device ecologies can be thought of as 'local-remote' collaborative settings from a technology perspective. However, it is still unclear which design techniques, from the vast body of remote collaboration literature, are the most effective, and in which types of multi-device configurations are they effective? Though similar, local-remote collaborative settings do not have all the same limitations, from a collaboration perspective, than remote collaboration scenarios. People still have high quality voice communication and they can still look up and interact face-to-face with their collaborators when necessary. However, there is still a great deal to be gained by explicitly incorporating some of the awareness and coordination support that exists in remote collaboration

tools. In particular, explicit design for coordination and awareness may help people better transition between independent and shared work in such settings.

A major challenge in this space is knowing how to strike the right balance between explicitly incorporating design support for communication, coordination, and awareness and relying on the group's co-presence to support some of these key aspects of collaboration. In distributed groupware, there is a classic tradeoff between providing sufficient awareness information and cluttering the interface to the point where it interferes with the individual's task. This workshop aims to explore the design challenges inherent in this tradeoff. Topics of interest include (but are not limited to):

- Application of existing remote groupware design in co-located multi-device ecology applications
- Adaptation of existing remote groupware design in co-located multi-device ecology applications
- Studies of communication, coordination, or awareness in co-located multi-device ecologies
- Studies of communication, coordination, or awareness in co-located single-device settings that shed light on sources of collaborative breakdowns during co-located group work involving technology
- New, co-located specific interface and interaction design concepts for supporting communication, coordination, and/or awareness in multi-device ecologies

### **Activities**

This one-day workshop will be structured to provide maximum time for group discussion and brainstorming.

Prior to the workshop, position statements will be distributed to workshop participants, to ensure that each person is familiar with the experiences and goals of each attendee. 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 research concerns related to 'local-remote' CSCW.

The day will be divided into four sections (separated by the morning break, lunch, and the afternoon break). The first section will involve participants giving very brief introductions of themselves and their interests and experiences in this research area, as well as the key outstanding research issues in this area that they would like to see addressed by the CSCW community. The group will then discuss these outstanding issues and choose several of these topics to discuss in the next two sessions. The second session will propose research questions in small groups, moderated by the workshop organizers. The research questions will be reported back before the lunch break, and will form the basis for the formation of new small groups, which will develop research approaches to those questions in the third session. In the fourth session the large group will reconvene and summarize any directions or advances identified from the breakout discussions. Finally, the workshop will end with a short discussion to define the immediate next steps for the group, including a poster of the workshop outcomes to share with other conference attendees, and (if warranted) a collection of papers to be submitted to a journal or a publisher.

### **Participation**

Eighteen to twenty-four people will participate in the workshop, including 2-3 student participants. Submissions

must be in electronic form (in PDF format), including name, contact information, and full address of the author, and should be emailed to the organizers (an appropriate email address will be created if the workshop is accepted). Accepted submissions will be included in informal workshop proceedings, and made available on a workshop website. A submission template will be available for download on this website.

#### *General Participation*

Interested attendees should submit a short position paper (2 – 4 pages, max. 2000 words) structured into the sections shown below: Ten to fifteen participants will be invited to participate in the workshop based on reviews of the position papers.

- **Interest & Experiences:** a description of the author's interest and experiences related to the design of co-located groupware systems, and multi-device ecologies in particular.
- **Open Research Issues:** a short discussion of outstanding research issues the author feels are important to address to help designers provide effective local-remote collaboration experiences.
- **Workshop goals:** the author's motivation for attending the workshop and the goals he/she hopes to achieve as a result of the workshop.
- **Bio:** the author's current affiliation(s) and background.

The members of the workshop organizing committee will review the position papers, recruiting additional reviewers from the co-located CSCW community if needed. Submissions must be in electronic form (PDF format).

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 be requested to read all accepted position papers.

#### *Student Participation*

Two to three students (in addition to those who submit full workshop position papers) will also be invited to participate. This will provide students pursuing research in this area a unique opportunity to interact with key researchers in the field and help define future directions. Students will need to submit a one-page paper describing their interest in the area of local-remote collaboration and their motivation for wanting to participate.

#### **Organizers**

*Stacey Scott* is an Assistant Professor of Systems Design Engineering at the University of Waterloo in Canada. She has been research co-located collaboration technologies for 15 years. She has co-organized four previous CSCW workshops (2000, 2002, 2004, 2006).

*T.C. Nicholas (Nick) Graham* is a Professor of Computing Science at Queen's University in Canada. He has a wide range of interface and infrastructure design for CSCW systems, including digital tabletop displays and multi-device ecologies. He has organized several ACM conferences and workshops, including ACM Interactive Tabletops and Surfaces 2014.

*James (Jim) Wallace* is an Assistant Professor of Public Health Informatics at the University of Waterloo in Canada. His research focuses on collaborative multi-display environments and public displays. He has developed several groupware infrastructures for supporting co-located collaboration.

Mark Hancock is an Assistant Professor of Management Sciences at the University of Waterloo in Canada. His research focuses on interface and interaction design for multi-touch computers, including tabletop displays. He specializes in touch interaction for interacting with 3D objects on a 2D touch surfaces.

Miguel Nacenta is a Lecturer of Computer Science at the University of St. Andrews in the UK. His research focuses on information visualization and interaction design for various computing platforms including multi-display environments and digital tabletops. He has co-organized several conference events, including co-organizing an EICS 2011 workshop and being Program Co-Chair of ACM ITS 2013 & 2014.

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