

# A Small Group Task Framework for Collaborative Tabletop Displays

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## Abstract

This position paper describes our research, development, and testing of a task framework for small group collaboration on tabletop computer displays. Currently, there is a lack of foundational research in the area of evaluation of co-located collaborative displays. While some guidelines have been proposed for distributed collaboration, researchers exploring co-located collaboration have approached evaluation in a very ad hoc manner. In particular, when evaluating collaborative systems, the choice of task will have a significant impact on the effectiveness of the collaboration. The framework we propose will enable researchers to make well-informed choices related to tasks for future work in this area.

## Research Vision

The purpose of our research project is to validate a new framework for co-located collaborative tasks and to explore which of these framework factors are best suited to this type of collaboration.

Previous research in the area of computer support for co-located collaboration has been limited by a lack of guidelines. In general, we found that while many technologies for computer-supported co-located collaboration, and specifically tabletop collaboration, have been proposed, evaluations of these systems are few and far between.

The choice of task will have a significant impact on the effectiveness of the collaboration, regardless of the type of computer support provided. While generic frameworks for collaborative tasks do exist, none provide specific insights into tasks for computer-supported collaboration, and in particular for co-located interactions. For example, McGrath has developed a generic framework for collaborative tasks[1], but it is not specific to tasks for computer supported collaboration. Also, McGrath's framework, which has overlapping requirements for task categories, is not easily applicable to some tasks.

We propose an alternative task framework that is specific to computer-supported co-located collaboration. Through a series of formal user studies, we plan to test

the validity of this framework and identify effective task characteristics for computer-supported, co-located collaboration on tabletop displays.

## Workshop Issues

This workshop is timely in that it will contribute significantly to our current research and help shape our ongoing work on a task framework for co-located collaboration.

We surveyed 142 articles on the subjects of large screen displays such as walls, tables, and rooms, as well as papers dealing with co-located collaboration. We categorized these articles in three ways: author or research lab, type of task (office use, visualization, home use, etc.), and focus of paper (evaluation, systems, etc.). This allowed us to gain insight into what work had been done previously in the area of evaluation and tasks for co-located collaboration.

Using this insight, we developed a framework for describing co-located collaborative tasks. The proposed task framework highlights six aspects of these types of tasks:

1. *Number of objects*: The number of objects that users interact with during the task.
  - One
  - Few
  - Many
2. *Goal of task*: The expected result (or lack thereof) of the task.
  - Specific
  - Semi-specific
  - Open-ended
3. *Level of collaboration*: The amount of collaboration between users afforded by the task.
  - Required
  - Encouraged
  - Neutral
4. *Object ownership*: Specifically, ownership as enforced by the system or task rules.

- Individual
  - Mixed
  - Shared
5. *Level of concurrency*: The degree to which users can or do interact concurrently in the task.
- Serial
  - Low degree
  - Moderate degree
  - High degree
6. *Participant roles*: Whether or not the participants have equal or different roles.
- Same
  - Different

In the course of our research we also noted several issues that, while not directly related to the framework, are important when considering co-located collaboration on tabletop displays:

*1. Different workspaces vs. same workspace*  
Whether users interact in the same workspace (e.g. electronic whiteboard) or in different workspaces (e.g. separate networked systems in the same room)

*2. Two vs. few (small group) participants*  
The number of participants in a task may have a significant effect on the interactions and outcome. In particular, having two participants (a pair) is very different from having three or more (a small group).

*3. Motives for large displays - size (magnification) vs. size (complexity) vs. context*  
Size (complexity) - The task/display is too complex to be completed on a small screen so it needs to be enlarged in order to see all the details.  
Size (magnification) - The task/display is too small to be useful on a small screen so it needs to be magnified.  
Context - Different parts of the task/display need to be seen in context and a small display is not large enough to show this context.

We are eager to hear any comments that workshop participants may have about our proposed framework, and are also interested in general discussions involving choice of task and evaluation methods for tabletop displays.

### Current Research Direction

The validity of the proposed framework will be determined through a series of formal user studies. The first study in the series was run in October 2002.

Eight pairs of participants were asked to complete several magazine cover layout tasks. These tasks were

not computer-based, and were performed at a round table with magnetic pieces (headlines and pictures) and a magnetic board on which to arrange the pieces. The round table was chosen so that participants would not feel compelled to “choose a side” of the table, but would rather be encouraged to move around the table as they were working. Additionally, the use of a magnetic surface and pieces will allow us to expand to a vertical display, if so desired for future research.

Framework factors that remained static during the study tasks were:

*Level of Collaboration*: Encouraged  
*Object Ownership*: Shared  
*Level of Concurrency*: High Degree  
*Participant Roles*: Same

The task varied on two aspects of the framework:

*Number of Objects*: Few/Many  
*Goal of task*: Specific/Semi-specific

We plan to develop further studies with computer-supported tasks based on the results of this first series of formal user studies. Our overall research goal in developing and testing this tabletop display small group task framework is to better understand which task characteristics are effective for co-located collaboration and subsequently develop a set of quality metrics and/or heuristics to evaluate computer-supported, co-located collaboration.

### Authors' Backgrounds and Motivations

Karen Parker is a Masters candidate in Dalhousie University's Faculty of Computer Science. She is pursuing thesis research in the area of tabletop displays for co-located collaboration.

Kori Inkpen is a professor in Dalhousie University's Faculty of Computer Science. She was previously a faculty member at Simon Fraser University, where she worked with the Edge Lab on many collaborative computing projects, including several involving tabletop displays.

### References

[1] McGrath, J.E. (1984). *Groups: Interaction and Performance*, Englewood Cliffs, NJ: Prentice Hall.