



Co-located Collaboration on a Large, High-Resolution Display

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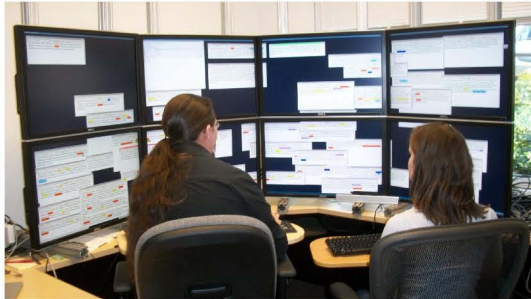


Motivation

Few have studied co-located collaboration, let alone co-located collaboration and the sensemaking process. Here, we define **co-located collaboration** as multiple users working on the same display. Intelligence analysts often must filter through massive amounts of data which may contain large portions of text. As the benefits of *collaboration* [1] and *large displays* [2] have already separately proven themselves, we chose to examine the **sensemaking process** when these two aspects are combined. The environment we created also included *multiple personal input devices* to create a **multiuser workspace**. By observing the user roles adopted, collaborative processes, organization of the space, and perceived ownership or sharing of territory on the display, we hope to contribute valuable insight into the design implications of software.

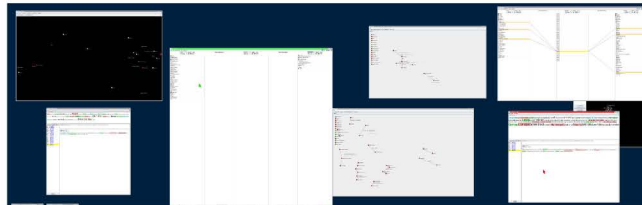
Collaborative Set-Up

- **Large, high-resolution display**
 - 4x2 grid of 30" LCD monitors
 - 10,240 x 3,200 pixels or 32 megapixels
- **Multiple inputs**
 - Mouse and keyboard per user
- **Two users**
 - Role – Intelligence analysts
- **Task: Text analysis**
 - 50 documents
 - Some relevant, some not
 - Who is a threat to the United States? Why?
- **Tools**
 - Jigsaw
 - Text editor

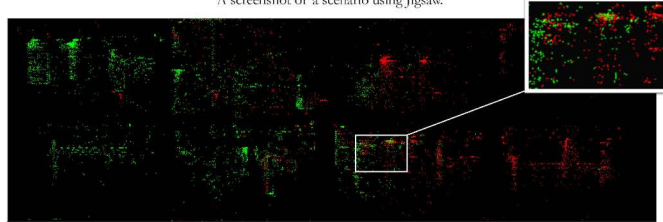


Jigsaw – System designed to support analysts

- Visualizes document collections in multiple views based on entity type
- Supports variety of views, including inl...Can view this information in a variety of manners including interactive graphs, lists, word clouds, and timelines [3]



A screenshot of a scenario using Jigsaw.



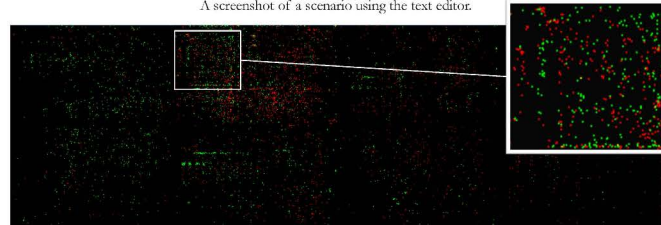
A visualization of all the mouse clicks during the studies using Jigsaw. Green represents the cursor of the user on the left, red represents the user on the right, and yellow for both.

Text Editor

Basic text editor and document viewer that allows search and highlighting.



A screenshot of a scenario using the text editor.



A visualization of all the mouse clicks during the studies using Jigsaw. Green represents the cursor of the user on the left, red represents the user on the right, and yellow for both.

References

- [1] Olson, G. M. and Olson, J. S. 2000. Distance Matters. *Human-Computer Interaction*, 15, 139-178.
- [2] Andrews, C., Endert, A. and North, C. 2010. Space to think: large high-resolution displays for sensemaking. In *Proceedings of the 28th international conference on Human factors in computing systems* (Atlanta, Georgia).
- [3] Kang, Y.-a., Gorg, C. and Stasko, J. 2009. Evaluating visual analytics systems for investigative analysis: Deriving design principles from a case study. In *Proceedings of the IEEE Visual Analytics Science and Technology* (Atlantic City, NJ).

Observations

- **Collaborative use of multi-mouse**
 - Distinguished roles of certain tasks (i.e. highlighting or specific tool use)
 - Low-level support of clicking and manipulating windows
- **Use of space**
 - Use of potential to display information
 - Organization of:
 - View type (Jigsaw)
 - Document subject, date, or geographical location (text editor)
 - Ownership: Individual, shared, and differing perceptions
- **User roles**
 - Forager – *seeks, filters, and extracts information*
 - Sensemaker – *synthesizes information into insight or product*
 - Organizer – *of the information or the space*
 - Tool driver – *specific view in Jigsaw, whiteboard, or scrap paper*
 - Processes for analysis – *independent or cooperative*
- **Processes to find solution**
 - Overview of document content, then follow leads and make connections
 - Detailed review of document content, then connect common threads
 - Combination of these processes
- **Strategies to find solution**
 - Task division, parallel work, and joint work
 - Use of a “sensemaking aid”
 - Scrap paper, whiteboard, or Tablet in Jigsaw
 - Verbal discussion

Work in Progress

- **Analyzing video**
 - We are looking for further details and patterns relating to the observations already acknowledged
- **Visualizing mouse data**
 - Mouse movements and clicks
 - Window focus
 - How this relates to the user’s perception of their space ownership and usage
- **Forming design implications**
 - Based off of feedback from the users and our final conclusions on their use of the space and multi-mouse environment, we will develop *suggestions for the design of applications*. This will be useful for both products that are and are not intended for collaboration as one never knows how the user(s) will adopt a tool.

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