Awareness in Synchronous Collaboration Between Tabletop and Handheld Displays

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Tabletop and Handheld Linked by Wireless Network

Tabletop in command centre

Handheld for field personnel

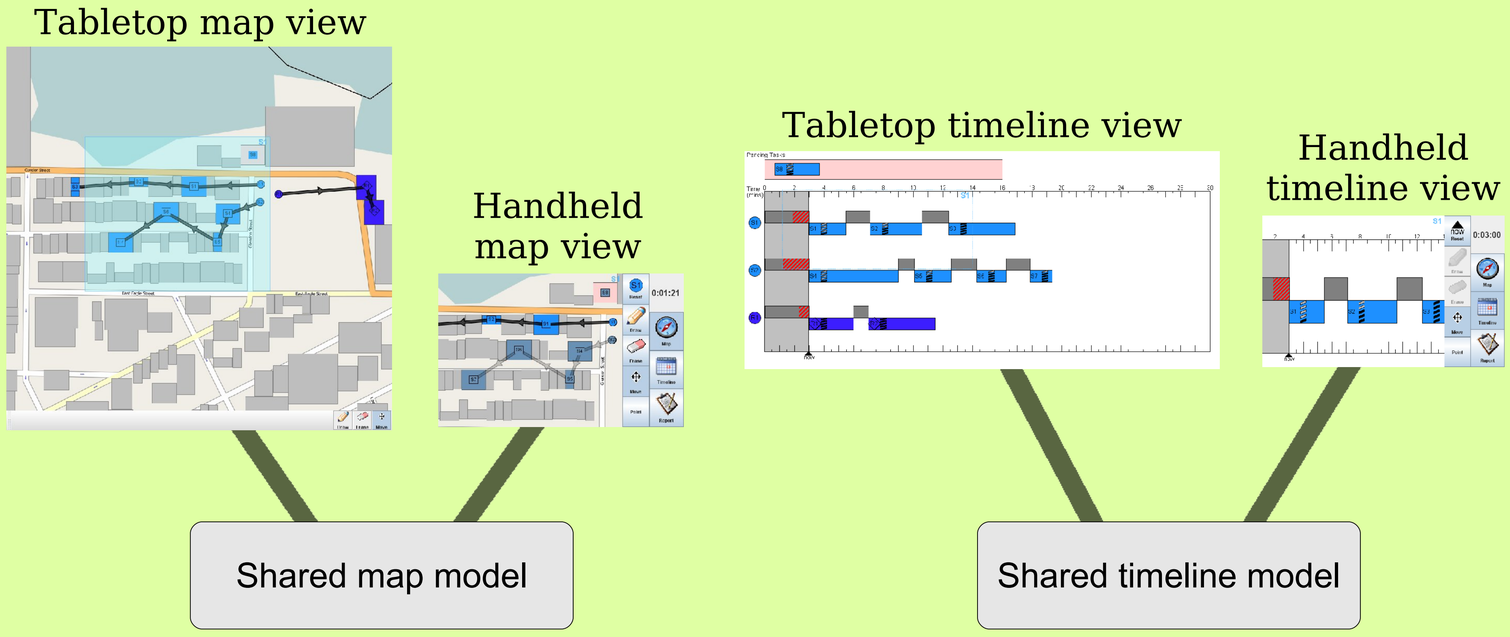
Many examples of teamwork involve **remote communication**.

In a command centre, someone can exploit the benefits of a large **tabletop** display.

Out in the field, one is restricted to using a small **handheld** device.

Synchronous collaboration between these devices can complement the existing voice communications.

Shared Visual Workspaces Complement Voice Communications



In our scenario users must share spatial and temporal information. We present this in 2D **shared workspaces**: map and timeline.

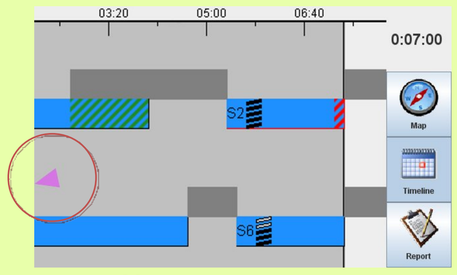
The **asymmetry** between devices means users cannot have identical views, so we use relaxed WYSIWIS (Stefik 1987). There is a tradeoff between designing the views for the individuals, and designing them for collaboration (Gutwin 1998).

We employ the **model-view-controller** paradigm. The tabletop can view and control everything, but the handheld is restricted

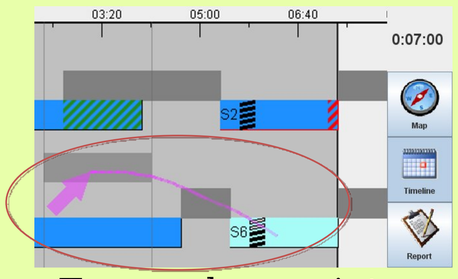
Workspace Awareness Allows Synchronous Collaboration

Visibility regions (Gutwin 2004) on tabletop show where handhelds are looking. They can be dragged by the tabletop user

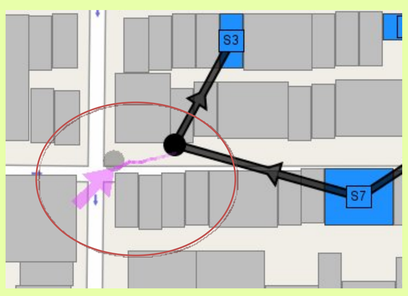
Telepointers allow gesturing and consequential communication



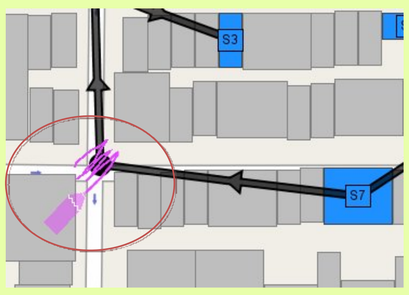
Off-screen pointer locations are indicated on the handheld



Traces show pointer movement



Feedthrough shows dragging of objects



Sketch-based input keeps control at the pen

We have aimed to make an **expressive interface** (Reeves 2005) that acts simultaneously as a workspace and a communication medium.

The next step is **testing** with our urban search and rescue scenario.

Our **hypothesis** is that this synchronous visual communication will improve the process and outcome of collaboration, thus justifying the extra network demand.

Sponsors/Collaborators

Humans and Automation Lab, MIT
http://web.mit.edu/aeroastro/www/labs/halab/

Thales Research and Technology
http://web.mit.edu/aeroastro/www/labs/halab/

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References

Gutwin, C. and Greenberg, S., “Design for Individuals, Design for Groups: Tradeoffs Between Power and Workspace Awareness”, Proc. CSCW 1998, pages 207–216.

Gutwin, C. and Greenberg, S., “The Importance of Awareness for Team Cognition in Distributed Collaboration” in E. Salas et al. (Eds) Team Cognition: Process and Performance at the Inter- and Intra-individual, APA Press, 2004.

Reeves, S., Benford, S., O’Malley, C., and Fraser, M., “Designing the Spectator Experience”, Proc. CHI 2005, pages 741–750.

Stefik, M. et al., “WYSIWIS Revised: Early Experiences with Multiuser Interfaces”, ACM Trans. Office Information Systems 5:2, pages 147–167, 1987.