

NeoCITIES transactive memory system for geo-collaboration in emergency crisis management

Bimal Balakrishnan & Varun Adibhatla

North-East Visualization and Analytics Center &
College of Information Science and Technology, Penn State University

Project scope

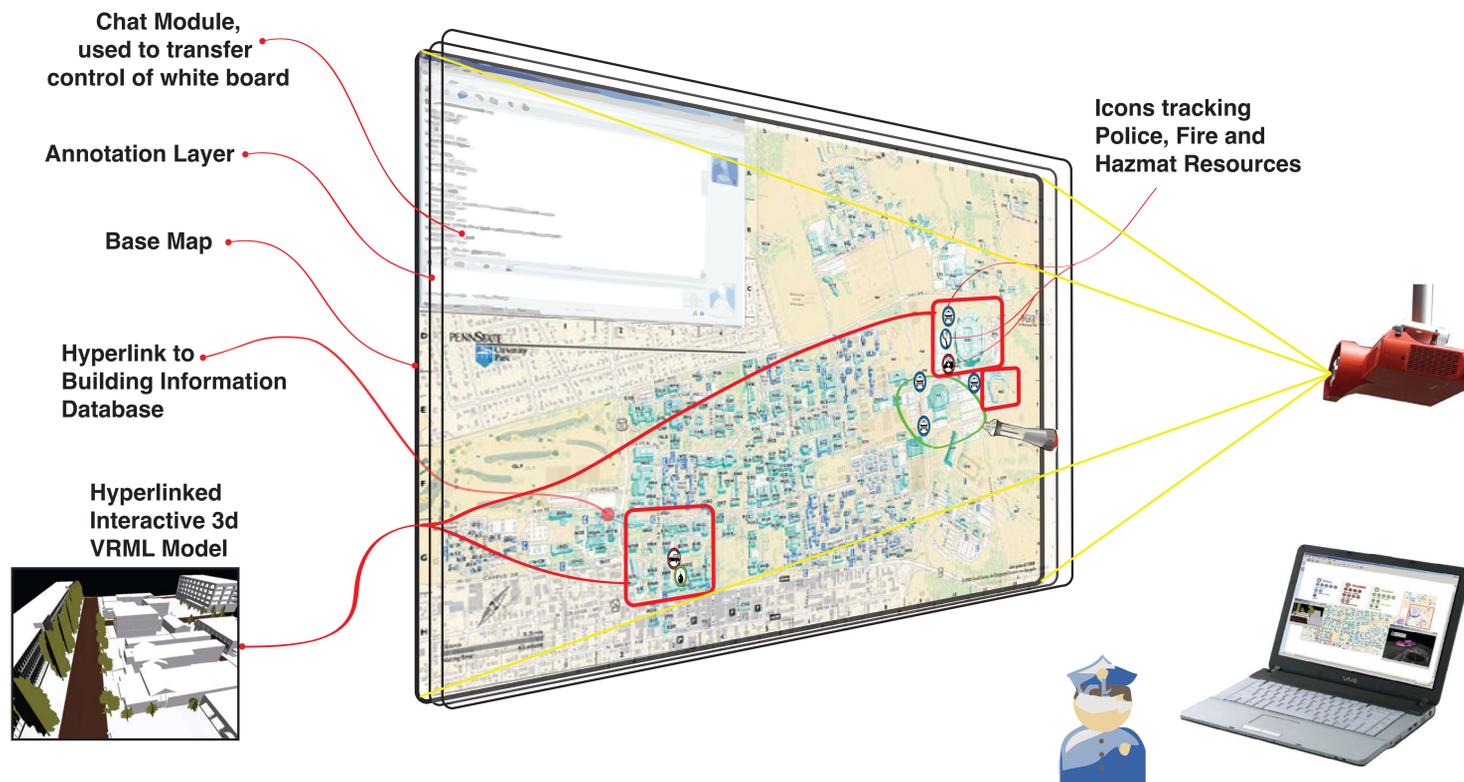
In emergency crisis response situations where multiple response teams are involved, attaining a common operational picture is a major challenge – especially when the command centers are in distinct locations. Transactive memory exists as people interact with others to access, store or retrieve joint memories that represent historic or situational knowledge. Our project demonstrates a proof-of-concept for a Transactive Memory system to facilitate decision-making and resource allocation by emergency personnel during a crisis scenario. This work builds on our prior research involving NeoCITIES scaled world simulation.

NeoCITIES scaled world simulations

NeoCITIES is a team resource allocation problem, which abstracts emergent situations involved in real-life emergencies. Crisis management is conducted through the joint interaction of a Police team, a Fire/EMS team, and a Hazardous Materials team. Teams must assess individual events in a given crisis scenario, interact with team members according to their roles and allocate sufficient resources to successfully tackle an event.

Relevance to DHS

The NeoCITIES transactive memory system works as a visual communication-collaboration aid for emergency response teams to maintain a common operational picture. It can be also be used in training emergency response personnel by simulating crisis scenarios and as a tool to quickly compare various response options. Thus our work is relevant to the areas of Emergency Preparedness and Response as well as Communications and Interoperability.



Features of the NeoCITIES transactive memory system

Rapidly deployable Command Center unit that can be shared with personnel on field as well as other department command centers.

Field Units can access information from the Command Center through the chat module as well as update their location, file reports, and interact with the base map.

Design features of the prototype

Our interactive prototype for the transactive memory system uses Mimio - a commercial white board application and MSN instant messenger and VRML browsers. The prototype provides an interactive environment on a shared platform to externally represent and keep track of emergency service resources of the three teams - both spatially and temporally. It enables key players to benefit from each other's knowledge and expertise in responding to crisis situations through perceptual anchoring.

Key features of the prototype interface include: a shared campus map which can be annotated, a communication/chat module and the ability to track location of resources visually. The elements in the map, especially the buildings are hyperlinked to their interactive 3d models to plan evacuation strategies, identify potential hiding points etc.

Prototype evaluation

We are planning focus group discussions and knowledge elicitation sessions with emergency crisis management domain experts. This will help further improve the prototype and prepare ground for developing a fully functional transactive memory system. We also plan to integrate other work within our research group on use of mobile devices and spatial annotations into this prototype.

References

- Wegner, D. M. (1987). Transactive memory: A contemporary analysis of the group mind. In B. Mullen & G. R. Goethals (Eds.), *Theories of group behavior* (pp. 185-207). New York: Springer-Verlag.
- McNeese, M.D. et al (2005). The NeoCITIES Simulation: Understanding the design and experimental methodology used to develop a team emergency management simulation. *Proceedings of the Human Factors and Ergonomics Society 49th Annual Meeting*.

Acknowledgements

This project was funded through the Regional Visualization and Analytics Centers (RVACs) by the Department of Homeland Security, Science and Technology Directorate, Office of University Programs.

Dr. Michael D. McNeese and Dr. Alan MacEachren for guidance on this project as faculty advisors.

Contact Information

Bimal Balakrishnan Varun Adibhatla
bimalbal@psu.edu vxa136@psu.edu
USE Lab, 314 IST Building,
University Park, PA 16802