

# Capstone Address

## Visualization as a Medium for Capturing and Sharing Thoughts

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### ABSTRACT

As we work in our offices and labs to push the science of visualization forward, in Iraq, visualization technology is saving the lives of civilians and soldiers. The commanding general of a 30,000-person division in Iraq credits visualization-aided thought-sharing for providing his staff and subordinate commanders with insight and a level of situational awareness never achieved in his 30-year career. He boasts of never having caused his eight brigade commanders to risk their lives to cross a dangerous region to jointly analyze information and make decisions.

The general and unit commanders under his leadership are using a collaborative visualization application called “Command Post of the Future”, which is built on the CoMotion system. CoMotion, a descendent of the 12-year Visage and SAGE research programs, is used to visualize and interact with data. More importantly, it is used to visually capture and pool thoughts, interpretations, concerns, and plans among distributed teams. This is an historic departure from the conventional data-centric approach to visualization. While visualization is an excellent tool for expressing complex data, its most profound power is in helping people get inside each others’ heads, to read each other’s minds with minimal need to verbally communicate, to band together into a single, distributed thinking organism.

We’ve seen this visual pooling of thoughts amplify thinking and reasoning for different teams of people grappling with complex problems – whether maintaining security and rebuilding a war-torn country, collaboratively analyzing business opportunities, or for assisting teams of physicians and patients treating cancer. In this talk, I’ll describe these experiences and sketch the basic principles and research challenges that are emerging.

### BIO

Steve Roth is Associate Professor in the School of Computer Science, Carnegie Mellon University, where he has a joint appointment in the Human-Computer Interaction and Robotics Institutes. Roth is also the President of MAYA Viz, Ltd., a company he founded in 1998 to create visualization software to enable collaborative analysis and decision-making in information-intensive environments.

Over the past 20 years, his research has focused on basic problems of representing, interacting with, and collaboratively analyzing information using visualization systems. He led the SAGE project at CMU, an approach to the automatic design of visualizations and multimedia (text and graphic) explanations of quantitative data. Together with colleagues at MAYA Design, Inc, Roth created Visage, an “information-centric” visualization system. Visage evolved into a commercial product called CoMotion, which combines visualization, interactive data exploration, and synchronous and asynchronous collaborative analysis. Through scientific explorations and commercial applications, Roth’s experience with visualization has spanned investment banking, cancer treatment, energy exploration and transportation, and recently, military operations in Baghdad. His current interests are in thought visualization, the next step in the natural evolution from graphics to scientific visualization to information visualization. Roth has published numerous papers on visualization, human computer interaction, and computer-based instruction, served on editorial and scientific boards, and organized and chaired professional conferences.