

Thrust 4: Supporting Analysis and Decision-Making in Group Work

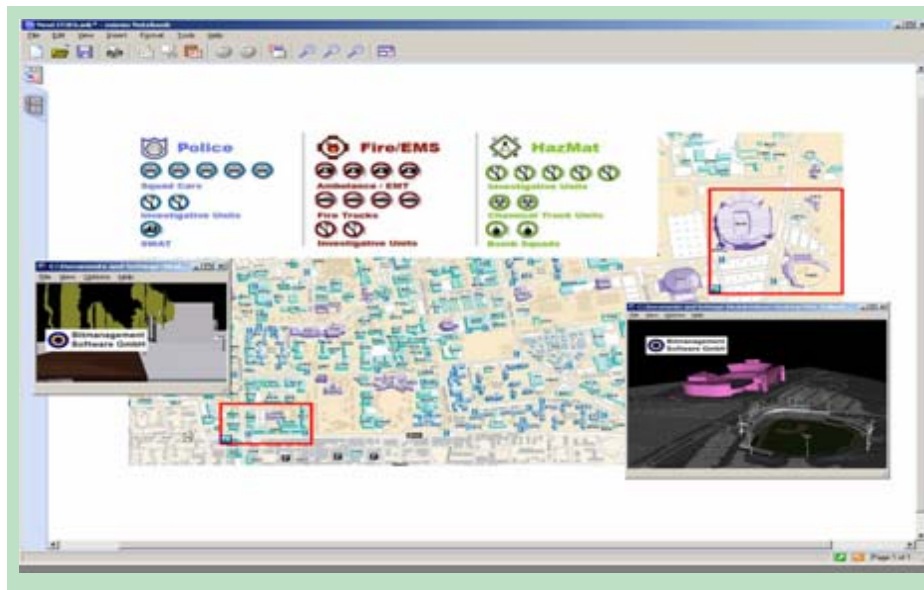
Understanding group work with map-based technologies

NEVAC R&D to support group analysis and decision-making has two core components. First, we are developing a better understanding of the impediments to successful distributed and collaborative work on complex tasks. We approach this component through theory-based laboratory and field studies of group work with visual information technology with a particular emphasis on the use of geographic maps. Second, we are developing and testing specific collaborative geo-visual analytics technologies to support selected collaborative tasks, informed by both laboratory and field studies.

To understand group-work with geospatial information technologies, our research focuses on two main areas. The first examines the impact of geo-collaborative tools on team communication and response in emergency situations. This work is supported through controlled experiments using the NeoCITIES Geo-Tools scaled world simulation. We are specifically interested in scientifically understanding how perceptual anchoring and information complexity management impact team cognition and the formation of a common operational picture. The second part of our research seeks to understand analysts' strategies to sift, filter, and organize heterogeneous information during the process of solving complex sense-making tasks. An important goal in this regard is to identify which visual tools and interfaces best support sense-making tasks, particularly group work in time-pressured analytical/decision-making situations. One focus of this work is on supporting transactive memory (a theory explaining how memory is distributed among artifacts and members of groups).

Informed by our understanding of group work, we are developing collaborative visual analytics tools and user interfaces to better support it. These tools focus on support for distributed, shared work enabled by collaborative maps and related visual display technologies. A brief introduction follows on the next page.

Benefit: NEVAC research in group work is identifying impediments to successful distributed and collaborative, visually-enabled work in the domains of crisis management and threat assessment and developing specific geo-visual analytics technologies to support collaborative tasks in these domains. Anticipated outcomes include knowledge to support better design of geo-collaborative technologies and implementation of advances in new web-based applications supporting both training and practice.



Transactive Memory: The prototype transactive memory system uses Mimio™, a commercial whiteboard application, MSN instant messenger, and interactive 3D models.

Funded by: The Department of Homeland Security, the National Science Foundation and the Office of Naval Research.

Early Development

Lab Prototype

Commercial Product

Jan 2008 – tools within this thrust cover a range from early development, through lab prototypes

Visual Analytics Tools and User Interfaces to Support Groups

Drawing from a wide-range of visual analytics methods and informed by our theoretical understanding of group work, NEVAC is designing and implementing visual analytic tools and environments to support group work. The current focus is on three specific challenges: (a) supporting collaborative visual-computational analysis of multivariate geographic / statistical data, (b) collaborative web-mapping portals to support group work on situation assessment and decision making in the context of disaster management; and (c) supporting collaborative information foraging and sense-making with heterogeneous information used by multi-source analysts in threat assessment activities.

We are addressing the first challenge through extensions to the GeoViz Toolkit to support geo-collaboration. The GeoViz Toolkit is an application version of GeoVISTA *Studio* (a component-based visualization tool building environment) in which a sample of *Studio* components have been integrated into a user-oriented application customization environment and coordinated to support analysis of multivariate relationships in geographic space. Key development goals include support for synchronous contact and message sharing inside the analysis platform as well as support for map-based collaboration among users.

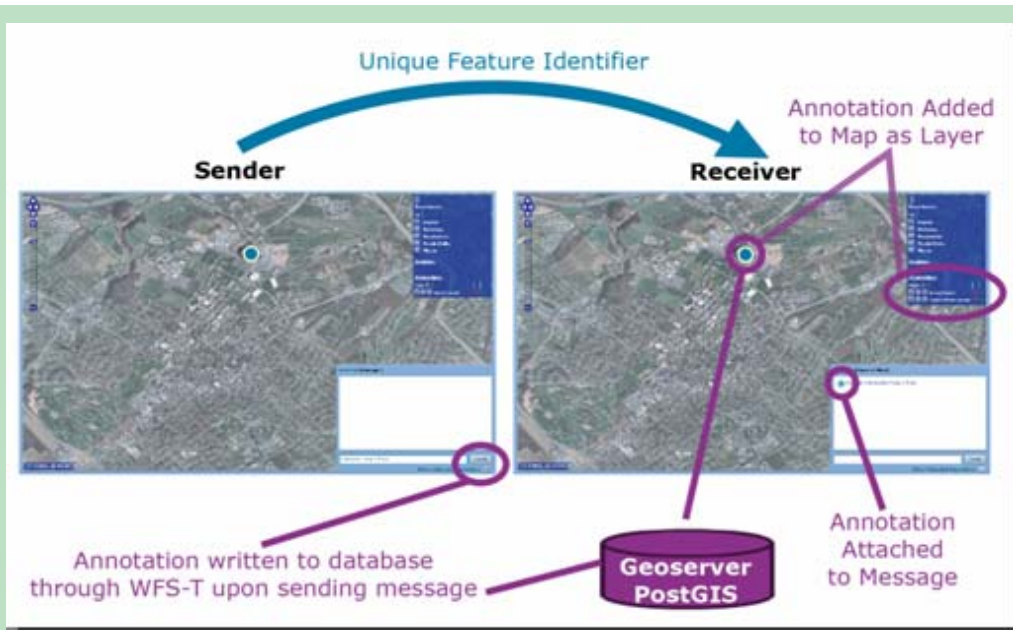
Our work on the GeoCollaborative WebPortal (GWP) is aimed at the development and implementation of methods to support asynchronous work on situation assessment and planning enabled by map-based displays. Specific goals for the GWP include developing strategies for enabling shared spatial annotation and supporting transactive memory to information and knowledge developed over time.

One recent addition to the suite of capabilities is the GeoChat Web Service. This service supports chat linked to map annotations, thus grounding chat in place and reducing the potential for miscommunication.

Current R&D efforts to facilitate information foraging and sense-making with information inputs such as text documents, images, maps, and related artifacts are centered around the development of a Collaborative Workspace. A sub-focus is to develop a strategy through which the state of a person's work can be saved and examined by members of his or her team. A specific goal is to improve our text exploration toolkit, TexPlover by allowing the end-users to save their observations in different categories (like Open Hypotheses, Closed Hypothesis, Deduced Information, Important/Noteworthy Points, Unimportant Leads, etc.).

Improving team cognition and performance

Our research on group work is intended to improve our theoretical knowledge of group work as well as provide new visual analytic tools that can improve team cognition and performance. Our theoretical work emphasizes orientations in perceptual anchoring and the spontaneous access of knowledge, team situation awareness, and analogical problem solving. Through field studies and laboratory experiments, we will improve understanding of visually-enabled group work and further expand theoretical models of distributed and team cognition. At a pragmatic level, our tools strive to enable groups of first responders, policy analysts, or counter-intelligence experts to exploit information resources and pool expertise in order to address complex challenges in understanding terrorism, assessing threats, maintaining border and port security, and responding to emergencies of all kinds.



GeoChat Web Service:
Remote collaboration about features or people in places requires tools to avoid confusion about places being discussed and features in those places. The NEVAC GeoChat web-map service allows distributed collaborators to anchor chat to annotations drawn on shared maps. Links to these geo-annotations are embedded in a GeoChat message sent to other users. Collaborators click on an icon to display the senders' map annotations.