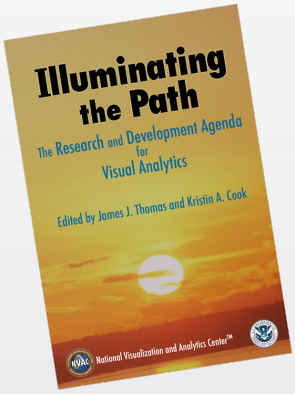
Pacific Northwest NATIONAL LABORATORY

National Visualization and Analytics Center™

VISUAL ANALYTICS FOR LAW ENFORCEMENT

Scalable Reasoning System technology provides law enforcement investigators with powerful yet approachable mobile and web-based visual tools to discover patterns, trends and relationships in vast amounts of complex incident data. Mobile interfaces allow investigators to access data remotely, share new information instantly with colleagues, and create and maintain team situational awareness through location-based information push.



Illuminating the Path, a Research and Development Agenda for visual analytics, was developed to define the directions and priorities for future research and development programs focused on visual analytics tools. This R&D Agenda provides a coordinated technical vision for government and industrial investments and ensures that a continued stream of technology and tools enter the hands of analysts, border personnel and emergency responders.

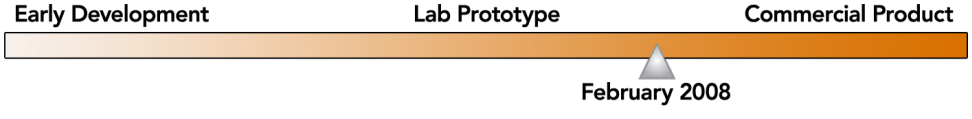
MISSION NEED

Law enforcement investigators need to detect patterns, trends, and entities of interest in streaming incident data. The amount of heterogeneous information available through federated law enforcement query services, however, makes this difficult. Another need for investigators is the ability to collect new information in the field, such as interviews, photographs, and video, and to share this information instantly with colleagues for incident investigation. To address these needs, the Pacific Northwest National Laboratory (PNNL) and the National Visualization and Analytics Center (NVAC) are transitioning advanced web-based and mobile incident analysis and collaboration technologies to front-line law enforcement and counter-terrorism personnel at the San Diego-area Automated Regional Justice Information System (ARJIS) and the Port Authority of New York and New Jersey. PNNL and NVAC have developed a suite of analytic capabilities including identification of temporal, spatial, and topical incident patterns and threat trends. Called the Scalable Reasoning System, or SRS, the toolkit offers novel location-based services and watch-and-warn techniques for access to key information conducive to decision-making and collaboration in the field. SRS is optimized for tactical, daily use with anytime, anywhere access to shared data and analytic resources. Currently, ARJIS users query for data by supplying a name or other identifier. But when these searches return many results, it can be difficult to determine if a suspect has outstanding warrants or if there are attributes—like a common vehicle description—that connect multiple crimes, especially when running a query from the field. SRS addresses this problem. With SRS clustering and analysis tools deployed via web browsers and PDAs, search results from many different data providers can be integrated and presented in visual groups that reveal their hidden structure.

TECHNOLOGY DELIVERY

Through SRS, NVAC's law enforcement analytics suite provides an online "dashboard" interface to regional and national law enforcement data sources. An initial deployment is being delivered for the 11,000 users of the ARJIS network. The dashboard provides users with a

Mobile and web-based technology deployed via NVAC's Scalable Reasoning System provides law enforcement investigators and first responders with visual tools that aid discovery, collaboration, and situational awareness.



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real-time, intuitive, and individually tailored picture of incident characteristics based on locations, topics, people, or other attributes of interest. Users can rapidly identify connections among people, vehicles, modus operandi, and locations.

SRS provides analytic techniques that automatically identify patterns and relationships in distributed, multijurisdiction law enforcement data and presents these results quickly and succinctly to users. Structured and unstructured incident data from local, state, and federal sources can be seamlessly integrated into a single clear picture.

A mobile interface to SRS is also being deployed as part of the existing ARJIS PDA program. Mobile investigators can capture data—including photos, video, audio, and text—in the field and instantly make it available to team members. As they record field data, SRS automatically retrieves additional relevant information to help build situational awareness. Teams have access to real-time asset tracking and "blue force mapping," allowing continual awareness of the locations and activities of each member.

SRS also merges analytic environments—those used to generate insight—with collaborative tools that help communicate that insight. Other versions of SRS allow users to perform graphical hypothesis development and testing, evaluate alternative hypotheses, and share their reasoning strategies with colleagues in the office and in the field.

EVALUATION AND IMPACT

Extensive user evaluation will be performed as part of this pilot, and feedback and field results will be used to optimize the transition of SRS to other organizations. Beginning in the first quarter of CY2008, teams of pilot testers from local and federal law enforcement (e.g., Border Patrol, San Diego Harbor Police) will start operational evaluation of SRS. The tools developed for ARJIS, including a web-based incident analysis portal, will be transferred to the Port Authority of New York and New Jersey, extending the operational reach of this technology. Other local, state, and federal operational customers will be identified as well. This work is also advancing the state of the art in visual analytic platforms. SRS uses leading edge service-oriented architectures and web-based technologies to provide advanced and customizable visual analytical tools that can be rolled out quickly to large user bases. SRS also establishes a framework for integrating VAC partner technologies into customized applications via a lightweight service library.

New lightweight development paradigms provide unique visualization and interaction opportunities that allow analytical tools to be seamlessly integrated into a common operating environment. These new visual analytic techniques can be adapted to the analyst's environment whether he or she is in the office, using a mobile appliance, or working at a large wall-mounted touch screen. This provides all analysts with the same tools regardless of where they are, while at the same time allowing customization based on user and context.

Visualization and Analytics Center

VAC Consortium Members Provider Level

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ABOUT PNNL

Pacific Northwest National Laboratory is a Department of Energy Office of Science national laboratory where interdisciplinary teams advance science and technology and deliver solutions to America's most intractable problems in energy, national security, and the environment. PNNL employs 4,000 staff, has a $855 million annual budget, and has been managed by Ohio-based Battelle since the Lab's inception in 1965.

Contact
Jim Thomas
National Visualization and Analytics Center Director
Pacific Northwest National Laboratory
P.O. Box 999, MSIN K7-10
Richland, WA 99352
Phone: (509) 375-2210
jim.thomas@pnl.gov
nvac.pnl.gov

For more information, contact
Bill Pike
Phone: (509) 375-2689
william.pike@pnl.gov

Richard May
Phone: (509) 375-6976
richard.may@pnl.gov

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