**NEED**

Numerous mission areas of homeland security require the capability to rapidly assess and assimilate massive amounts of information to effectively ensure public safety and to prepare for and respond to natural and manmade disasters. During a catastrophe, information comes from multiple sources, such as camera images, data from sensors and simulations, and text documents from police and healthcare agencies. The information gathered during a crisis can be crushing if not managed correctly.

**INITIATIVE**

The Department of Homeland Security funds a partnership among 27 universities aimed at turning massive data into actionable knowledge through innovative visual analytics techniques. Purdue’s Center for Visual Analytics for Command, Control and Interoperability Environments (VACCINE) is the lead in this effort. As of January 2014, VACCINE was able to bring in a combined $16,800,485 in contracts, DHS base grant funding and other sources.

**IMPACT**

- VACCINE expanded its use of the Coast Guard Search and Rescue Visual Analytics (cgSARVA) technology to additional areas of the Coast Guard in 2011. The cgSARVA technology was utilized in the Superstorm Sandy recovery last fall to aid in the prioritization of resources and the rebuild activity of the New Jersey coast. In using cgSARVA, the Coast Guard was able to quickly and easily determine how resources could be reallocated with the damage caused to stations in New Jersey, allowing for increased efficiency in the recovery efforts.

- VALET, a Visual Analytics Law Enforcement Toolkit for analyzing spatiotemporal law enforcement data, has been deployed within several law enforcement agencies. VALET allows law enforcement personnel to gain insight into correlations between criminal incidents and factors such as location and time of occurrence. VALET has also been used for analysis and presentation of high-risk alcohol behavior in the Purdue campus area, and the findings were integrated into educational and enforcement programs at Purdue. This past spring, an earth, atmospheric and planetary science class used VALET to examine the destruction and rebuild events associated with the 2007 tornado that leveled Greensburg, Kansas.

- The GARI technology (Gang Graffiti Automatic Recognition and Interpretation) is now being used by the Indianapolis State Police, the Indian Fusion Center Gang Task Force, and gang detectives across Indiana to identify images of gang graffiti and assist in tracking the movement of gangs and graffiti interpretation. A public version of the tool, called C-GAP and to be used for reporting graffiti in your community, will be released this summer.

- New tools and technologies are being developed through our partner universities to improve research capabilities and effectiveness of public safety personnel. Three examples:
  - Jigsaw, a technology developed at Georgia Tech, is a visual analytic system that provides multiple coordinated views to show connections between entities that are extracted from a collection of documents. Currently, more than 150 people and organizations have downloaded the system, including the West Lafayette Police Department, where it is being used to analyze cold cases.
  - An improved prototype system and iPad application based on Florida International’s Integration Framework for Enhancing Emergency Response system continue to be evaluated by personnel at Miami-Dade Emergency Management, and future pilot activities are planned as part of the evaluation process.
  - The Symbology project, which has been ongoing at Penn State University for the past two years, has recently launched the Symbol Store as a web-based interactive tool designed to help mapmakers share point symbols. Until now, there has not been a flexible mechanism for discovering, sharing and previewing these symbol sets among mapmakers.