



**Homeland
Security**

Science and Technology

Summary

U.S. Department of Homeland Security



System Assessment and Validation for Emergency Responders

The U.S. Department of Homeland Security, Preparedness Directorate, Office of Grants and Training (G&T) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders in performing their duties. The mission of the SAVER Program is to

- Provide impartial, practitioner relevant, and operationally oriented assessments and validations of emergency responder equipment.
- Provide information that enables decision-makers and responders to better select, procure, use, and maintain emergency responder equipment.
- Assess and validate the performance of products within a system, as well as systems within systems.
- Provide information and feedback to the user community through a well-maintained, Web-based database.

The SAVER Program established and is supported by a network of technical agents who perform the actual assessment and validation activities. Further, SAVER focuses primarily on two main questions for the emergency responder community, “What equipment is available?” and “How does it perform?”

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Data Mining and Analysis Tools: Technology Review and Product Selection Guide

Analysts and emergency responders require methods to search through information in large, disparate databases to find changing patterns that might indicate or predict a future event or expose associations and connections. Data mining and analysis tools provide this capability by using intelligent methods to extract knowledge from structured data resulting in a rule, or set of rules, that can be used to predict future events, find new associations between events, or organize related data in new ways. As a SAVER Program technical agent, the Space and Naval Warfare Systems Center (SPAWARSSYSCEN), Charleston has been tasked by the U.S. Department of Homeland Security, Preparedness Directorate, Office of Grants and Training to conduct a study on data mining and analysis tools.

SPAWARSSYSCEN’s assessment focused on data mining and analysis needs of emergency responder organizations. The study documented the operational needs of the emergency responders, mapping the operational needs to software functionality requirements; documented software tools that met their operational needs; and developed a data mining and analysis tools software selection process. The study found that data mining and analysis is important to emergency responders at the federal, state/regional, and local levels, data sharing is a prerequisite to effective data mining, and there are a variety of data mining software applications available for emergency responders.

This is a summary of the contents of the Data Mining and Analysis Tools: Technology Review and Product Selection Guide. The report should be reviewed for the full discussion and recommendations. The complete report can be found on the SAVER Web site (www.dhs-saver.info).

Report Findings

Homeland Security Data Mining and Analysis Environment

Emergency responders often engage in preventing, preparing for, or responding to a critical incident. In each case, a need exists to merge related facts that indi-

vidually mean nothing, but together provide a database from which to mine actionable information.

The data mining and analysis cycle begins with emergency responders requesting information from the local data analyst. The analyst runs a query or data mining program against the accessible data such as a local or regional server farm. The results are sent to the emergency responders and the cycle repeats. If the request is too complex or requires access to additional data, a regional fusion center may perform additional queries or data mining and analysis to satisfy the emergency responders' requests (figure 1).

The biggest impediment to data mining is the human resistance to sharing information. Figure 2 visually models data sharing between the federal, state/regional, and local levels. Federal organizations operate at the strategic level and are the gatherers and keepers of the bulk of the nation's classified information. State agencies, regional fusion centers, agencies in large cities, and other mid-range organizations play a role in the consolidation of

multi-source data below the national level and comprise the operational level. Small police, fire, and emergency medical service departments and other emergency responder officials and organizations, including the individual officer who needs actionable information to do his or her job, operate at the tactical level. These individuals play a vital role in the war on terrorism. They can provide critical information to the system and require information in return to assist in performing their jobs. However, they face the most challenging task of getting the data needed to do their jobs. Even the best information technology will not improve information sharing if information continues to be so highly protected.

Implementing a Data Mining System

Data mining and analysis is a resource-intensive process that, when done correctly, can reveal important facts and aid in the prediction of possible events or actions.

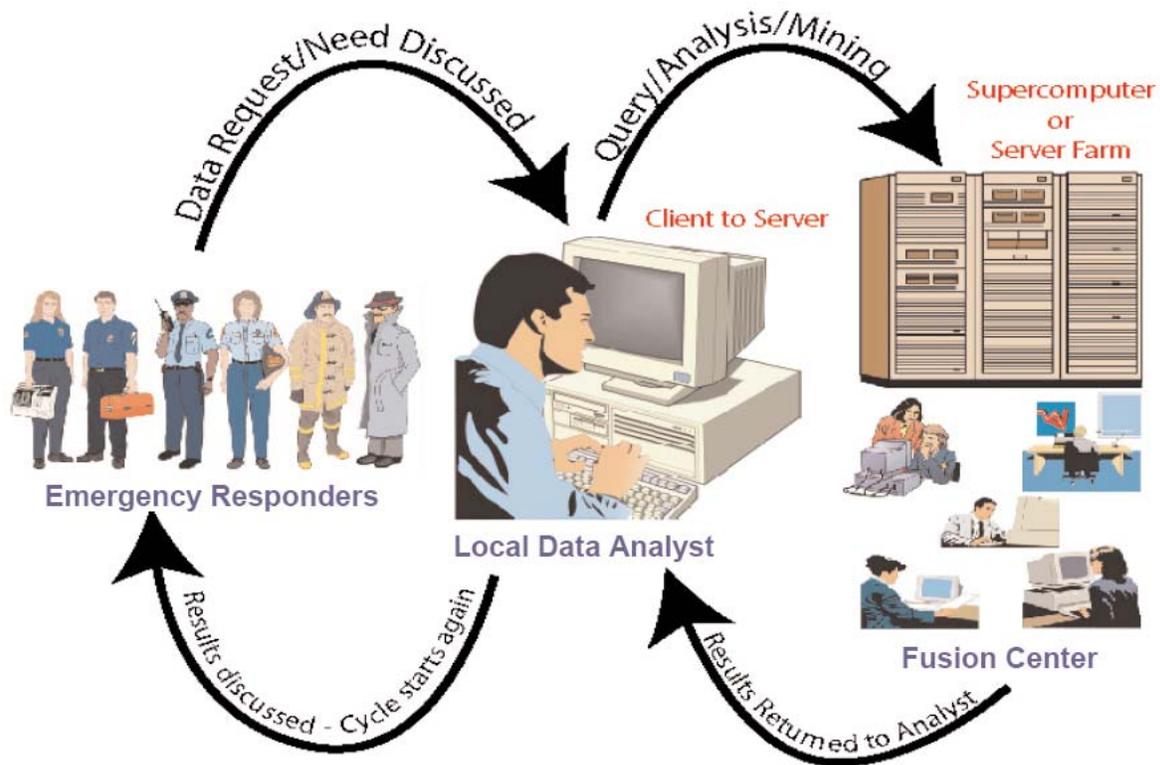


Figure 1. Data Mining and Analysis Cycle for Emergency Responders.

Data mining should be done with deliberate needs and goals. Data analysis activities can range from quite simple and easy to very complex and difficult. The following should be taken into consideration when implementing a data mining and analysis system:

- Determine stakeholders and decision makers.
- Define the problem and data mining and analysis goals.
- Determine data sources needed and accessibility.
- Project planning.
- Current computing infrastructure.
 - hardware considerations such as available storage, memory, and central processing unit.
 - software considerations such as operating systems, network systems, and file compatibility.
 - network architecture and/or access to the Internet.
- Education and experience levels of those who will be using the system.
- A clear understanding of what new actionable information is being sought.

Data Mining and Analysis Tools Summary

The data mining and analysis tools study identified 45 vendors of data mining and analysis tools that can be of value to emergency responder organizations. The vendors completed a survey on their product's functionality. This data is summarized in the full report and can be used as an aid in determining the most appropriate data mining and analysis tool for a responder organization.

Data Mining and Analysis Software Selection Process

To be of use, the emergency responder organizations must be able to determine which data mining and analysis software product(s) meet their data mining and analysis needs. This report provides a step by step process to translate the emergency responder's operational needs to functions that the software should perform. It then gives the users the ability to compare

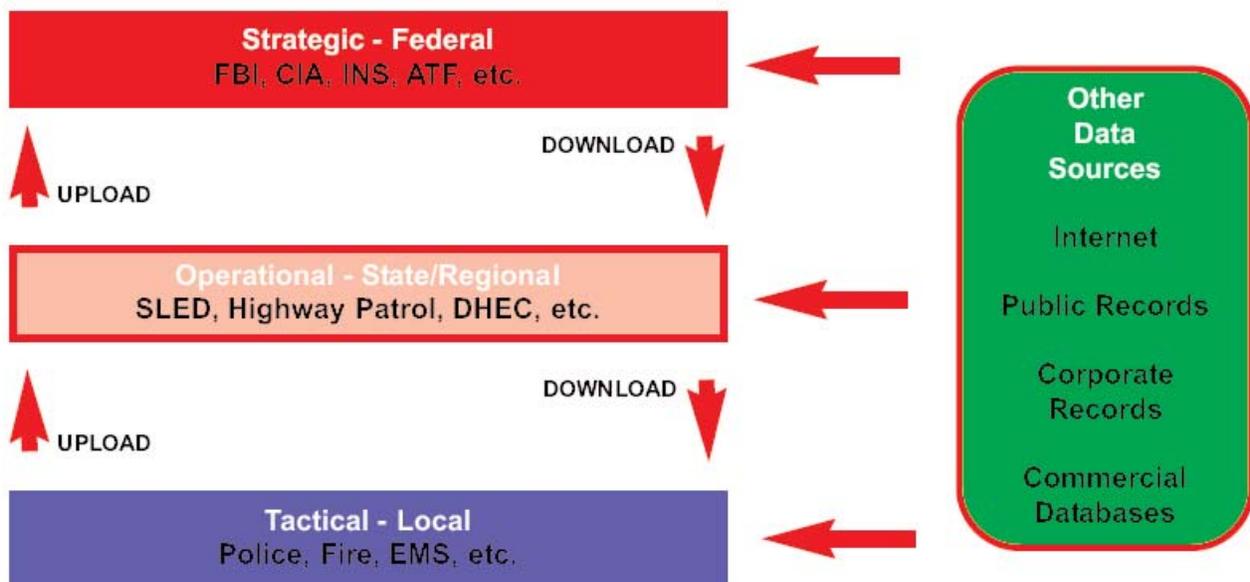


Figure 2. Homeland Security Data Sharing Hierarchy.

these software functionalities to those offered by the vendors, allowing emergency responders to select data mining and analysis tools which best meet their needs.

Conclusions

This study found that data mining and analysis tools would meet the emergency responder's need to search through a large amount of data in various formats to expose associations and connections to known entities in order to locate and capture criminals. The data mining and analysis report identifies 45 vendors who provide data mining and analysis tools with value to emergency responders. The report also includes an overview of the knowledge discovery in databases process and a section that helps the emergency responder organizations determine the data mining and analysis software product(s) that meet their needs. The full report can be found on the SAVER Web site along with other SPAWARSYSCEN reports dealing with the data mining and analysis tools assessment project.

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Opinions or points of view expressed in this document are those of the authors and do not necessarily represent the view or official position of the U.S. Government.

For more information on the data mining and analysis tools project please see the SAVER Web site or contact the SAVER Program Support Office.

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