Software package coordinates response to biological threats

Having the necessary information at hand is key to saving lives in any biological event – whether it be flu or a biological release. Argonne scientists are using their skills in software integration to provide a decision-making system for state and local emergency managers.

The system – Biological Warning and Incident Characterization (BWIC) – is currently being tested in three major U.S. cities. It is a support system for timely warning attack assessment, communications, and effective response in the event of a biological attack. Funded by the Department of Homeland Security, BWIC is an integral part of the agency's BioWatch program.

Argonne computer scientists have taken a diverse group of computer modeling programs – written in a variety of computer languages by research teams at a number of national laboratories – and integrated them to work seamlessly for an entire emergency response team. They also developed the main BWIC Situational Awareness Tool, which keeps the emergency manager apprised of the latest estimates determined by analysts using modeling components.

"The BWIC package," explained Pam Sydelko, "is designed to be an easy-to-use collaborative modeling and analysis system." Sydelko is Director of the Center for Applied Integrative Systems in Argonne's Decision and Information Sciences Division.

SOFTWARE INTEGRATORS – Argonne computer scientist Kathy Lee Simunich (left) and Pamela Sydelko, Director of the Center for Applied Integrative Systems in Argonne's Decision and Information Sciences Division, view the output from an air dispersion model that depicts the potential impact of a biological agent release.

"BWIC is built upon a highly modular and flexible computer framework we've developed here to integrate diverse computer modeling tools (written in disparate computer languages) so that they seem like one seamless decision support system with one consistent user interface," Sydelko said.

The package provides a common view of the event as it evolves to all agencies involved. Cities will have an assigned set of BWIC users, and each will have access to his or her personal BWIC analysis workspace. A special user, called the BWIC

Operational System Supervisor (BOSS), will have access to all of the information as well as specialized tools for exporting data and information to other jurisdictions and agencies; other users may have access to only certain data or analysis tools, as needed. Analysts with specific expertise such as public health, environment, or emergency management can perform their own analysis, view each other's analysis results, and update the BOSS command screen with information.

DRILL – The Biological Warning and Incident Characterization system helps emergency response agencies track and assess biological attacks and direct emergency responders, like those participating in the drill above.

How it works

As part of the BioWatch program, biological data are collected regularly from many stations around a city and then are processed and entered into the system. If a hazardous bioagent is found, local and state responders go to work using BWIC to begin assembling data to support decision makers.

Analysts use modeling components and gather information in their "sandboxes" that are available to others who might need to see their latest estimates. For example, the public health officer posts updates that show which hospitals are receiving patients with symptoms that fit the biological agent detected.

Then, the environmental expert uses the data to refine the air dispersion model to make estimates of what areas may be affected next. As the situation evolves, each update is sent to the emergency commander.

Argonne's role

Argonne's role was to develop the BWIC Situational Awareness Tool and to integrate all the component parts into a software package that works together easily.

Several other national laboratories also played important roles in bringing the BWIC program together, including Sandia, Pacific Northwest, Oak Ridge, Lawrence Livermore, Los Alamos, Lawrence Berkeley, and Y-12.

"BWIC allows the people who need to know the information to have it as soon as possible," Sydelko explained. "It provides for timely and reliable warning and supplies tools to identify the population at risk."

The BWIC system is updated with live data from BioWatch and Postal Service Bio-Defense System monitoring and meteorological data at the local level. It provides these data for use in a variety of modeling and analysis tools. These tools include:

- Geographical Information System maps
- Air dispersion models
- Day and night population information based on census data
- Epidemiological forecasting tool
- Subway and facility interior models
- Links to public health surveillance information

For more information, contact:

Pamela Sydelko
Decision and Information Sciences Division
Argonne National Laboratory
630-252-6727
psydelko@anl.gov

UChicago ▶
Argonne LLC

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