

ABSTRACT

EpiSentry™: simulation-based threat identification, response management and decision support for outbreaks and pandemics

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Objective

Traditional real time surveillance systems such as RODS and ESSENCE have focused on the task of threat detection; however, experience with the use of these systems in pandemic and disaster response settings suggests that a more common application is threat characterization and response management. This paper describes EpiSentry™: a novel second generation real-time surveillance software system under development at Lockheed Martin that uses simulation to aid in threat characterization, response management and to provide decision support for disease outbreaks or bio-terror events.

Introduction

The 2009 H1N1 novel flu pandemic demonstrates how a rapidly spreading, contagious illness can affect the world's population in multiple ways including health, economics, education, transportation, and national security. Pandemic disease and the threat of bio-terrorism are prompting the need for a system that integrates disparate data, makes optimal use of the breadth of available health-related analysis and predictive models, and provides timely guidance to decision makers at multiple levels of responsibility.

Methods

Lockheed Martin Corporation is currently developing the EpiSentry™ rapid decision environment. EpiSentry™ integrates epidemiological situational assessment and predictive analysis tools with a decision support system to provide guidance on pandemic and bio-terror investigations (Figure 1).

The project is using an agile development methodology to address the technical challenges of integration of surveillance, simulation and planning capabilities in a series of progressively more advanced software solutions. Challenges include:

- Ability to extrapolate relevant information from non-traditional data sources before data from traditional surveillance streams may even be available.

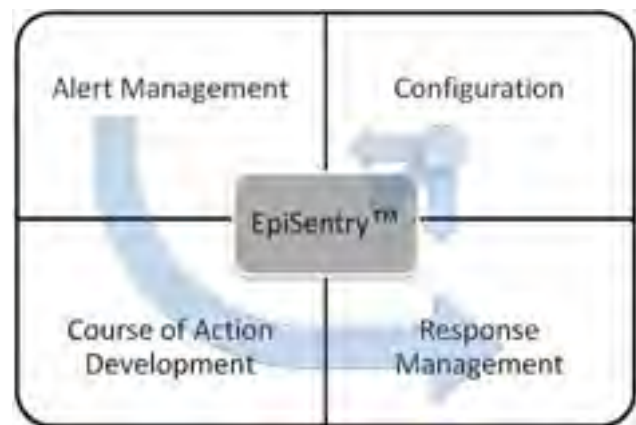


Figure 1 The EpiSentry™ framework provides an integrated configurable alert management, course of action development, and response management capability.

- Estimation (from both traditional and non-traditional surveillance data) of population-level parameters, with modeling of disease spread and impacts of countermeasures.
- Development of workflow tools for collaborative investigation and response planning.

As part of its solution, EpiSentry™ employs geospatial visualization and data fusion techniques, integrates open source monitoring and trending solutions, develops an enhanced disease mobility module, and leverages a decision analytical framework to provide the user with evidence projections of the risks and benefits of different action plans.

Results

Although still in development, we believe EpiSentry™ will significantly advance contemporary response management. A system built around EpiSentry™ will be part of a bold strategy to meet information needs for the management of

outbreaks. It will provide an integrated, end-to-end, and collaborative solution that enables the use of advanced algorithms and simulation software to monitor and identify outbreaks from disparate data sources, plan intervention strategies, and monitor the effectiveness of the chosen course of action.

Conclusions

EpiSentry™ is a new type of surveillance system that combines data analysis and outbreak modeling, and

response-planning software systems. Although promising, further work is needed to define the benefits of this integrated approach.

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