

Oak Ridge National Laboratory

# Biosurveillance Symposium

Computational Methods  
for Biosurveillance  
*- Shaping the Future Together*

June 27, 2012 • Washington, DC USA



*Symposium Co-Organizers*

# Biosurveillance Symposium

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Conveniently Timed and Co-Located With

Technological Advances In Detection & Identification of Biological Threats

20th International Conference

# Biodetection Technologies 2012

June 28-29, 2012 • Washington, DC USA

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# Biosurveillance Symposium

## Symposium Agenda

June 27, 2012 • Washington, DC USA

### Wednesday, June 27, 2012

9:00 **Welcome and Opening Remarks**

**Richard Stouder, Oak Ridge National Laboratory (ORNL)**

9:10 **Computational Methods for Biosurveillance Video**

9:15 **Introduction to the Biosurveillance Initiative**

**Robert Cottingham, Oak Ridge National Laboratory (ORNL)**

9:30 **A Systematic Evaluation of Traditional and Non-Traditional Data Streams for Integrated Global Biosurveillance**

**Alina Deshpande, Research Scientist, Los Alamos National Laboratory (LANL)**

Living in a closely connected and highly mobile world presents many new mechanisms for rapid disease spread and in recent years, global disease surveillance has become a high priority. In addition, much like the contribution of non-traditional medicine to curing diseases, non-traditional data streams are being considered of value in disease surveillance. Los Alamos National Laboratory has been funded by the Defense Threat Reduction Agency to determine the relevance of data streams and data integration schemes for an integrated global biosurveillance system through the use of defined metrics and methodologies. Specifically, this project entails the evaluation of data streams either currently in use in surveillance systems or new data streams having the potential to enable early disease detection, using the novel concept of a disease specific surveillance window. In addition, the integration of useful data streams to facilitate early disease detection will also be evaluated using the same metrics. An overview of this project will be presented, together with some preliminary results of data stream evaluation. This project will help gain an understanding of data streams relevant to early warning/monitoring of disease outbreaks.

9:50 **Real-time Disease Outbreak Characterization for Medical Planning**

**Karen Cheng, Applied Research Associates**

Biosurveillance analysis of morbidity time-series are confounded by the intricacies of real data including widely varying background levels, seasonal trends, and weekly cycles. We discuss structural models for the analysis of biosurveillance-related time series data. Structural modeling has been used in a wide variety of fields, ranging from econometrics to environmental studies. We use these methods for detection of anomalies related to disease outbreaks, and for the subtraction of the epidemic curve from noisy data, resulting in an isolated epidemic curve. This capability is critically important to support the fitting of epidemic models for near-term prediction and medical countermeasure assessment.

10:10 **Integrated Surveillance Systems: From Better Diagnostics to Predictive Systems**

**Harshini Mukundan, Research Scientist, Los Alamos National Laboratory (LANL)**

With resurgence of infectious diseases and anti-microbial resistance, the need for integrated surveillance systems can hardly be over-emphasized. Los Alamos National Laboratory is a multi-faceted facility with expertise in biosensors and fieldable diagnostics, genomics and sequencing, data stream evaluation and epidemiological modeling, high-throughput networked laboratory systems, among others. The presentation will cover LANL's approach to bio-surveillance, outlining some recent advances in the areas of sequencing, epi-modeling and diagnostics, while addressing the technological gaps that need to be addressed for the realization of such an effort.

10:30 *Refreshment Break*

11:00 **KEYNOTE ADDRESS**

**Challenges and Lessons Learned Developing a National Biosurveillance System**

**Robert Hooks, formerly DHS, Office of Health Affairs, currently Director, CBRNE Technologies, TASC**

This presentation will address the challenges and important considerations to operating a national biosurveillance system and a discussion of the experiences sharing and providing the information to decision makers using a series of real-world examples. The talk will also include laying out the fundamental building blocks of an effective biosurveillance system and an approach to successfully make progress in working this complex problem. Mr. Hooks is currently the Director of CBRNE Technologies, TASC.

11:40 **Open Discussion and Q&A**

12:00 *Lunch*

1:00 **Building an Agile Biosurveillance Architecture**

**Cos DiMaggio, Managing Partner, The Tauri Group, LLC**

While progress has been made to enhance biosurveillance over the past several years, the traditional approach of building a "policy paradigm" tailored to current biological threats perpetuates fragmented roles, responsibilities and programs across multiple Federal, state and local agencies. This inhibits detection, surveillance, information sharing, and effective allocation of resources. Building a BioSurveillance Mission Architecture that evolves, as policy changes, will facilitate understanding of roles and responsibilities, enable development of a National Strategy and provide a structured yet agile framework for making investment decisions that enhance detection and information sharing, and foster timely decision making.

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1:20 **Real-time Epidemic Modeling in the Presence of a Complex Background**

**Karen Cheng, Applied Research Associates**

We present an approach to early-stage epidemic detection and characterization applicable to a wide range of data types encountered in biosurveillance. Our approach uses anomaly detection and model fitting based on Bayesian techniques, and allows us to determine disease parameters (infection rate, number of index cases, start of infection) and most-probable pathogen identification in real-time. This capability is targeted for use by public health officials or military planners to monitor outbreak progression and initialize outbreak models. We present results using data from the Los Angeles area with superimposed realistic simulations of bioterror events.

1:40 **Operational Infectious Disease Forecasting and Biosurveillance: the Experience of the Black Canyon Infectious Disease Forecasting Station**

**James Wilson, Managing Partner, Ascel Bio, LLC**

In August 2010, the first National Weather Service-inspired infectious disease forecasting station in US history was activated in partnership with a rural hospital: the Black Canyon Infectious Disease Forecasting Station (#1). This presentation discusses the operational experience of routinely presenting infectious disease forecast information to healthcare providers, patients, and the public in a rural community. The use of such forecasts to facilitate rapid recognition of unusual infectious disease signatures will be discussed, as well as the impact on medical practice as a proxy to promote community resilience.

2:00 **Broadening Biosurveillance**

**Tim Stephens, Public Health Advisor, National Sheriffs Association**

Biosurveillance continues to be a concept constrained by association with government, moreover a thin slice of government, public health. Private sector groups (food distributors, materials supply chain managers) have superior data management systems, and more invested in learning from data trends. A fully developed national biosurveillance strategy must leverage these resources. A panel of private sector infrastructure and contingent industry sector representatives is proposed to discuss the value chain of biosurveillance.

2:20 **Strategies and Legal Implications of Data Sharing for Biosurveillance**

**David Potenziani, Executive Director, NCB Prepared, University of North Carolina**

For-profit companies and other organizations often assert legal, procedural, and business-related issues that prevent them from sharing proprietary data with academic institutions or governmental agencies. Beyond monetary compensation, other forms of in-kind value propositions may incentivize companies to share data. In addition, data providers may need protection or recourse should data security be compromised. Finally, other factors including protection from data requests by third parties under Freedom of Information and issues of legal recourse may pertain. An approach to overcome challenges to data sharing

for biosurveillance will be described through creation of a non-profit entity, NCB-Prepared.

2:40 **Training Decision Makers to Make Decisions Without Thinking Twice**

**Richard Ohlsen, Research Scientist, Brookhaven National Laboratory**

There are two concepts that emergency decision makers must know: the first report is always wrong, and you cannot wait until you have all the information. Training for decision makers is best based on two theories, High Reliability Organizations and Recognition Prime Decision Making. To understanding the decision process it has to be analyzed for human error points. Then a comprehensive training and exercise program can be put in place to ensure decisions makers become comfortable in making decisions with the information on hand.

3:00 *Refreshment Break*

3:30 **PANEL DISCUSSION: Challenges for the Biosurveillance Community**

- Is it possible to establish a real-time biosurveillance situational awareness? Regional? National? Global?
- What role might the revolution in social media play in biosurveillance?
- How does the biosurveillance community turn data into information and finally into knowledge?
- What is "actionable" information?
- How should a biosurveillance "architecture" connect local to state to federal?
- Should there be a federal lead agency for biosurveillance? If so which agency?
- Is it ultimately possible to predict biothreat events?

5:00 *Concluding Discussion and End of Symposium*

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Venue: Washington Court Hotel  
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