

Science and technology enabling integrated global biosurveillance

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Objective

To review observations and conclusions from a recent global biosurveillance conference, provide an assessment of the scientific and technical capabilities and gaps to achieve an effective and sustainable integrated global biosurveillance (InGBSV) system, and recommend research and development priorities enabling InGBSV.

Introduction

Life science and biotechnology advances have provided transforming capabilities that could be leveraged for InGBSV. Global infectious disease surveillance holds great promise as a tool to mitigate the endemic and pandemic infectious disease impacts and remains an area of broad international interest. All nations have significant needs for addressing infectious diseases that impact human health and agriculture, and concerns for bioenergy research and environmental protection. In January 2011, Los Alamos National Laboratory, Department of State and the Defense Threat Reduction Agency co-hosted the 'Global Biosurveillance Enabling Science and Technology' conference. Guided by the National Strategy for Countering Biological Threats and joined by major government stakeholders, the primary objective was to bring together the international technical community to discuss the scientific basis and technical approaches to an effective and sustainable InGBSV system and develop a research agenda enabling a long-term, sustainable capability.

The overall objective of the conference was to develop a technology road map for InGBSV, with three underlying components: (1) identify opportunities for integrating existing biosurveillance systems, the near-term technological advancements that can support such integration and the priority of future research and development areas; (2) identify the required technical infrastructure to support InGBSV, such as methodologies and standards for technology evaluation, validation and transition; and (3) identify opportunities, and the challenges that must be overcome, for partnerships and collaborations.

Methods

To achieve the objectives, the conference was structured to review the current state of biosurveillance, identify core components for a comprehensive capability and scientific and technical bases to support this capability and explore the critical improvements needed to enhance the existing regional and global disease outbreak prediction capabilities. Open discussion time was planned in order to engage broad participation during the conference to recommend approaches to establishing an effective international network, propose implementation strategies and the measures of effectiveness and identify the challenges that must be overcome in the next 3–5 years in order to establish an initial biosurveillance capability that will have significant positive impact on biothreat nonproliferation, economy and public health.

Results

We will report the principle observations from the conference. All participants were keenly aware of the complexity of developing an InGBSV, passionate about and committed to pursuing biosurveillance and supportive of the initial focus on application of existing information technology tools. It was largely agreed that:

- Scientific understanding of pathogen and pathogen-human-environment interaction is the foundation for integrated InGBSV;
- Emerging technology being developed by the R&D community for basic and applied life science advancement provides tremendous support for InGBSV;
- InGBSV can be 'jump started' with initial focus on information science and technology applications and integration;
- Challenges were recognized as multidimensional, but opportunities for developing a GBSV exist and are invigorated by international health security policies;
- Formulating unconventional partnerships and establishing an advanced concept demonstration is an effective near-term path forward.

Conclusions

An effective integration of existing technologies can provide great potentials to pursuing the opportunities afforded by establishing and operating an integrated global biosurveillance system (Fig. 1). A common appreciation is also evident for the challenges associated with planning, obtaining necessary resources and establishing the desired functional biosurveillance capability.

Keywords

Global biosurveillance; technology integration; scientific foundation; information science and technology

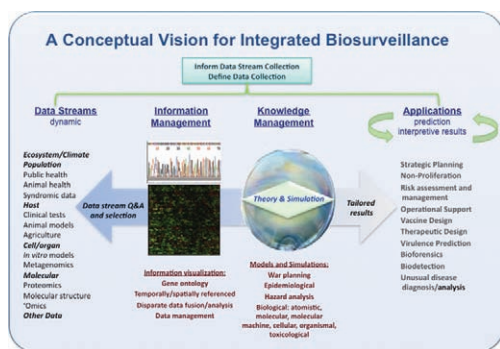


Fig. 1. A conceptual vision for integrated global biosurveillance linking existing technologies and activities through information management and social networking.

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