

Bio Research Programs

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Introduction

Billions of dollars are spent each year in the attempt to protect the population from harmful terror events, natural disasters, and dangerous pathogens.¹ The fear of a biological attack or even a naturally occurring infectious disease outbreak has prompted the need to redesign how information is shared regarding infectious disease, terror attacks, and naturally occurring events. According to the GAO report from September 2004, *Emerging Infectious Disease: A Review of State and Federal Disease Surveillance*, state and federal governments use surveillance to detect possible outbreaks, verify reports on reported cases of disease outbreaks, and to monitor current outbreaks. Many enhancements are still needed to improve the way information is collected and communicated.² Since infectious disease affects the entire world and not just the United States, enhancing information sharing systems all over the world aids public health enablers to organize information, educate the public, and avoid the chaos associated with an attack or outbreak.³

The purpose of this paper is to look at the different bio research programs that are currently running or being developed. These programs have been designed to help improve communication and coordination in the time of a health crisis or terror attack, not only in the United States but also abroad. The following programs were determined by the authors to be the most relevant of the US government efforts:

- Bio Alert
- Bionet
- BioPortal
- Biosense
- Biosheild
- BioSTORM
- BioWatch
- The Epidemic Information Exchange (Epi-X)
- Electronic Surveillance System for Early Community Based Epidemics (ESSENCE II)
- Global Emerging Infections System (GEIS)
- Global Public Health Intelligence Network (GPHIN)
- Guardian
- Health Alert Network (HAN)
- Homeland Security Centers of Excellence
- Laboratory Response Network (LRN)
- National Biosurveillance Integrations Center (DHS IAIP)

- National Electronic Disease Surveillance System (NEDSS)

Methodology

First a list of existing programs was developed from input by several key program reviewers from the Department of Homeland Security, Department of Defense, the Defense Threat Reduction Agency (DTRA), and the Department of Health and Human Services, etc... The programs that made the list were unclassified and suggested by professionals in the bio defense field. Using the list, the following questions were researched using open source materials:

- What is the program?
- What agency sponsored/awarded it?
- How much money was given and over how much time?
- Who are the performers or supporters of the program?
- The answers to the questions were summarized and organized into the following list

This list is not exhaustive, but represents what is currently available from open source information.

Bio Alert

- **Program:** A data sharing program that uses computational models of emerging diseases to design software that will help protect the US from bioterrorism attacks. The main focus is to create sources that detect possible epidemics, bioterror attacks, and in some cases prevent the events from occurring. These models can be designed to address many possible
- **Agency/award:** National Institute of General Medical Sciences, a part of the National Institutes of Health (NIH)
- **Funding:** \$18.8 million research grant⁴
- **Performers:** RTI International - RTI will lead a diverse group of experts from technology leaders SAS (using MIDAS technology) and IBM, and academic leaders from Duke and Emory universities.⁵

Bionet

- **Program:** Develops interoperable military and civilian concepts of operation, integrates military and civilian capabilities to detect and characterize a biological event. It provides common situational awareness to ensure timely, effective, and consistent response actions.⁶
- **Agency/award:** DHS, Defense Threat Reduction Agency
- **Funding:** \$23 million for FY2003⁷

- **Performers:** Military – Navy Region Southwest, Naval Health Research Center, Camp Pendleton Marine Corps Base, Miramar Field, NORTHCOM, City of San Diego - Director of Homeland Security, Fire and Life Safety Services, Police Department, County of San Diego - Office of Emergency Services, Department of Public Health, US Coast Guard - Joint Harbor Operations, FBI, San Diego Regional Network for Homeland Security, California Office of Emergency Services, California State Department of Public Health.⁸

BioPortal

- **Program:** A system that provides integrated, Web enabled access to a variety of data sources related to infectious disease. Currently, the program is focusing on two infectious diseases, West Nile Virus and Botulism. BioPortal also makes available advanced surveillance and alerting mechanisms, a set of data analysis, predictive modeling, and information visualization tools tailored for disease surveillance.⁹
- **Agency:** National Science Foundation Digital Government Program
- **Funding:** \$800,000 (2003-2004)¹⁰
- **Performers:** New York State Department of Health, California Department of Health Services, National Wildlife Health Center.

Biosense

- **Program:** is a data sharing program that facilitates surveillance of unusual patterns or clusters of diseases around the United States. It is designed to detect potential terrorism events early by sharing data with state and local health departments. With the creation of this program, lag time between reporting has been greatly reduced. Biosense is an integrated part of the BioWatch Project (described later), utilizing environmental data. All the information obtained from Biosense is collected at the CDC's Biointelligence Center¹¹
- **Agency/award:** CDC
- **Funding:** Part of \$130 million allocated to CDC's Biosense (Bio- Surveillance Initiative)¹²
- **Performers:** CDC, Public Health Information Network (PHIN)

BIOSHIELD

- **Program:** A program that assists in providing aid to developing and producing drugs and vaccines that protect against biological weapons and deadly pathogens. This special program also allows long-term authority for the government to buy new drugs from private companies. The Food and Drug Administration will be allowed to speed up the approval process on drugs and vaccines during a time of an attack or event.
- **Agency/award:** DHS
- **Funding:** \$2.5 billion for 2005, \$5.6 Billion over 10 years.¹³
- **Performers:** DHS, FDA, pharmaceutical industry experts, NIH

BioSTORM

- **Program:** Biological Spatio-Temporal Outbreak Reasoning Module, a research program to develop and evaluate intelligent systems for epidemic detection and characterization.¹⁴
- **Agency/Award:** Stanford Medical Informatics, Stanford University¹⁵
- **Funding:** DARPA, The Canadian Institutes of Health Research (exact funding data unavailable)¹⁶
- **Performers:** Veridian Systems, the Palo Alto Veteran's Affairs Hospital, the San Francisco Department of Public Health, State of California Department of Public Health.¹⁷

BioWatch

- **Program:** An early warning system for bio-threats consisting of an environmental sensor system deployed in major cities across the nation. It helps to quickly detect trace amounts of airborne pathogens such as anthrax in time to take protective actions, including the distribution of life-saving pharmaceuticals.¹⁸ There are currently 4,000 atmospheric monitoring stations to detect atmospheric pollutants.¹⁹ BioWatch is also known as the Urban Monitoring Program.
- **Agency/award:** DHS, Science and Technology (S&T) Directorate
- **Funding:** \$118 million²⁰
- **Performers:** Project BioWatch is a cooperative effort among DHS, EPA, and the CDC's Laboratory Response Network.

Epi-X - The Epidemic Information Exchange

- **Program:** Epi-X is used to update public health professionals on reports of infectious disease and bioterror events. It also can provide updates on discussions and alerts involving public health issues.²¹
- **Agency/award:** CDC
- **Funding:** 1.8 million but \$10 million (per year) is needed to fully implement Epi-X²²
- **Performers:** CDC officials, state and local health departments, poison control centers, and other public health professionals...

ESSENCE -- Electronic Surveillance System for Early Community Based Epidemics

- **Program:** ESSENCE is designed to bring together health indicator data from both military and civilian communities. By evaluating non-traditional data sources new analytical techniques are developed to identify abnormal health conditions. ESSENCE (II) has been expanded to include data from purchases of medicines at pharmacies and mental health after stressful terror attacks.²³
- **Agency/award:** Department of Defense
- **Funding:** Part of the *GEIS*²⁴

- **Performers:** Collaboration between the Department of Defense Global Emerging Infections System and The Johns Hopkins University Applied Physics Laboratory under sponsorship of the Defense Advanced Research Projects Agency (DARPA).²⁵

GEIS – Global Emerging Infections System

- **Program:** GEIS supports global surveillance, training, research, and response to emerging infectious disease threats to strengthen its global disease reduction efforts through: centralized coordination; improved preventive health programs and epidemiological capabilities; and enhanced involvement with military treatment facilities and United States and overseas laboratories.²⁶
- **Agency/award:** 1996 DOD-GEIS was established by the Assistant Secretary of Defense (Health Affairs) in coordination with the Military Departments and is overseen by a flag level Board of Directors made up of representatives of Health Affairs, the Military Services, the Joint Staff, the CINCs, and the Director of Defense Research and Engineering.²⁷
- **Funding:** \$10 million in 2004 and \$11 million in 2005.²⁸
- **Performers:** DoD-GEIS consortium in the US includes the US Army Center for Health Promotion and Preventive Medicine, Aberdeen Proving Ground, Maryland; the US Army Medical Research Institute of Infectious Diseases, Fort Detrick, Maryland; and The Naval Environmental Health Center, Norfolk, Virginia. DoD-GEIS has established strong working relationships with the US CDC and international health agencies. US Collaborators include: Defense Threat Reduction Agency (DTRA), Defense Advanced Research Programs Agency (DARPA) Center of Excellence, Disaster Management, Hawaii, Tripler Army Medical Hospital, Unconventional Concepts, Inc.²⁹

GPHIN - The Global Public Health Intelligence Network (GPHIN)

- **Program:** In 1998 an alert system was developed that capitalized upon the latest emerging information technologies; monitoring global media sources 24/7; and aggregating information for analysis on a near real time basis. The expanded capabilities of GPHIN are to include data on food, water, radiation, product safety, and therapeutics.³⁰ GPHIN is available in 6 different languages.³¹
- **Agency/award:** Health Canada, in collaboration with the World Health Organization (WHO)³²
- **Funding:** Data not available
- **Performers:** Health Canada, in collaboration with the World Health Organization (WHO), as well as international governments.

Guardian

- **Program:** Guardian provides 200 DoD installations with an integrated CBRN protection and response capability to protect personnel, maintain critical military operations, and restore critical operations as quickly as Possible.³³

- **Agency/award:** DoD
- **Funding:** \$1 billion (2003) over the next 5 years³⁴
- **Performers:** Serves as the centralized manager for equipping Army Installation Support Teams, Army Reserve Recon/Decon Teams and the National Guard Civil Support Teams.³⁵

HAN – Health Alert Network

- **Program:** Nationwide network of public health agencies providing communities with rapid and timely access to emergent health information; service on a 24/7 basis; provides distance learning capabilities. The current system is being phased into the overall PHIN messaging component.³⁶
- **Agency/award:** CDC, DHS
- **Funding:** \$90 Million (2001)³⁷
- **Performers:** Cooperative agreement includes 50 states, and 8 US territories plus NYC, LA County, Chicago and DC. NACCHO also supports HAN.

Homeland Security Centers of Excellence

- **Programs:** Universities will support relevant research of the nation's best and brightest academic scholars in pursuit of homeland security related disciplines, the nation's best experts, and focus it's most talented researchers on a variety of threats that include agricultural, chemical, biological, nuclear and radiological, explosive and cyber terrorism, as well as the behavioral aspects of terrorism.³⁸
- **Agency/award:** DHS
- **Funding:** \$70 million in fiscal year 2004 for the Science and Technology Directorate's Office of University Programs.³⁹
- **Performers:** University of Southern California, University of Wisconsin, New York University, North Carolina State University, Carnegie Mellon University and Cornell University, Texas A&M University and the University of Minnesota, University of Texas Medical Branch, University of California at Davis, and University of Maryland, Michigan State University, North Dakota State University, Georgia Institute of Technology, Rutgers University, Harvard University, University of Tennessee, Purdue University and North Carolina State University.⁴⁰

Laboratory Response Network (LRN)

- **Program:** LRN is an integrated national and international network of laboratories that are fully equipped to respond quickly to acts of chemical or biological terrorism, emerging infectious diseases, and other public health threats and emergencies.⁴¹
- **Agency/award:** CDC
- **Funding:** \$118 Million⁴²

- **Performers:** 120 Labs, partnerships with the following organizations: The Association of Public Health Laboratories; The Federal Bureau of Investigation (Department of Justice); The American Association of Veterinary Laboratory Diagnosticians; The American Society for Microbiology; The Environmental Protection Agency; The US Department of Agriculture; The Department of Defense; The US Food and Drug Administration; The Department of Homeland Security.⁴³

National Biosurveillance Integration Center - DHS IAIP

- **Program:** The biosurveillance initiative is part of an interagency effort that crosses multiple sectors, including food supply, environmental monitoring, and human health surveillance. The Information Analysis and Infrastructure Protection (IAIP) is included to integrate, in real-time, biosurveillance data collected from sensors throughout the country by fusing this data with information from health and agricultural surveillance along with other terrorist-threat information from the law enforcement and intelligence communities. DHS Department of Science and Technology (S&T) will also be part of the center. A key component of this initiative will be an expansion and deployment of the next generation of technologies related to the BioWatch Program, a bio-surveillance warning system. The center also includes Biosense and the Laboratory Response Network (LRN).⁴⁴
- **Agency/award:** Information Analysis and Infrastructure Protection (IAIP. DHS Department's Science and Technology (S&T)⁴⁵
- **Funding:** \$129 Million for Biosurveillance.⁴⁶ \$11 million for IAIP and \$65million to enhance current environmental monitoring activities (S&T)⁴⁷
- **Performer:** DHS

NEDSS - National Electronic Disease Surveillance System

- **Program:** NEDSS is an initiative that promotes the use of data and information system standards to advance the development of efficient, integrated, and interoperable surveillance systems at federal, state and local levels.⁴⁸ It is a major component of the Public Health Information Network (PHIN).
- **Agency/award:** NACCHO – National Association of City and Community Health Officials
- **Funding:** \$27 million to NEDSS (2003)⁴⁹
- **Performers:** CDC, NACCHO

CONCLUSIONS

Biodefense has become extremely important especially after the threat of bioterror attacks was made “real” in the United States. The major concentration of the above mentioned programs is either on communication or monitoring public health issues. Although communication and surveillance programs only attribute to a small portion of

biodefense related research programs, such programs are key in that the U.S. government is investing millions in them in hopes of finding the best way to protect people from infectious disease and prepare them for bioterror attacks.

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