BioSense Strategic Plan Draft

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KEY TERMS AND DEFINITIONS

The following table provides definitions for terms relevant to this document.

Term	Definition
BioSense Program	The BioSense Program refers to the Centers for Disease Control and Prevention BioSense Program.
BioSense project	The BioSense project refers to the BioSense Redesign project.
BioSense system	The BioSense system is the Centers for Disease Control and Prevention BioSense Program plus all BioSense users, stakeholders, etc.
BioSense application	The BioSense application refers to the BioSense information systems.
BioSense 1.0	BioSense 1.0 refers to the BioSense information system launched in 2003.
BioSense 2.0	BioSense 2.0 refers to the BioSense information system that will be launched in November 2011.

1. INTRODUCTION

1.1 Introduction to BioSense Redesign

In 2003 the Centers for Disease Control and Prevention (CDC) launched the BioSense system as a nationwide integrated system to detect (early on) and assess bioterrorism-related illness that would receive automated data feeds from hospitals and medical facilities operated by the U.S. Department of Veterans Affairs (VA) and Department of Defense (DoD). In the years that followed, BioSense added syndromic data from state health departments, anti-infective prescription data, and laboratory data from selected vendors. The system currently has approximately 105 facilities reporting emergency department (ED) data directly and 8 health departments sending data from 571 hospitals.

Yet as the system developed over the years, the original conception of BioSense became either technically or logistically infeasible or at odds with needs and priorities of key public health stakeholders. From these early years of development, some important lessons were gleaned:

- **Direct reporting of hospitals and states to CDC proved to be both too logistically and politically challenging for BioSense to implement.** The intense level of stakeholder engagement and coordination required to recruit hospitals (the original goal) so that the system had sufficient national coverage exceeded the means of the BioSense Program. Perhaps more importantly, direct reporting by hospitals to CDC undermined the traditional jurisdictional boundaries and reporting structures for public authorities in the United States. Data shared with CDC should flow through local and state public health structures so that these data are available for local decision making and response.

- **The BioSense design and implementation did not adequately consider the needs of public health stakeholders—most prominently epidemiologists and health officers.** Despite CDC's earnest efforts to encourage use of BioSense, state and local public health practitioners did not adopt the system, an indication that it did not meet users' needs. Findings from the BioSense evaluation show that state and local users viewed other systems, such as Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE), as more functional and valuable for public health surveillance than BioSense. A Government Accountability Office (GAO) report issued in 2005 noted that "CDC's BioSense application, which is aimed at detecting early signs of disease outbreaks, is available to state and local public health agencies, but according to the state and local officials with whom we spoke, it is not widely used, primarily because of limitations in the data it currently collects" (http://www.gao.gov/products/GAO-05-308).

- **The resources required to manage, synthesize, and analyze enormous amounts of raw clinical data from one central hub at CDC were not sustainable over the long term.** It became clear within the first few years of implementation that a distributed, open (network of networks) model of computing was the best way to ensure that the system could continue to acquire and integrate

new sources of data. This open model would also promote greater transparency, agility, and innovation.

- **BioSense was not well integrated with other national preparedness initiatives of the time.** It was launched for its own specific purposes, but was similar to those of other national bioterrorism systems (e.g., BioWatch), syndromic systems (e.g., Real-time Outbreak and Disease Surveillance [RODS] and ESSENCE), and state-developed systems (e.g., North Carolina Disease Event Tracking and Epidemiologic Collection Tool [NC DETECT]). Thus, yet another silo was added to a proliferation of systems designed to protect the nation's health from threats. No single system can be expected to meet all the surveillance needs for all threats, yet little thought was given to how to integrate or link these systems so that the whole would be greater than the sum of its parts.

- **BioSense was unable to demonstrate any superior utility for early detection, but proved its value for situational awareness and routine public health surveillance**. BioSense did not initially detect a number of national and regional outbreaks (e.g., *Salmonella* in peanut butter, *E. coli* in spinach, H1N1), but once these events were detected, BioSense assessed the scope and magnitude of these outbreaks. BioSense further demonstrated its utility for other types of public health surveillance, such as chronic conditions like asthma and injuries due to inclement weather. The vast amount of clinical data BioSense collected also represented untapped potential for monitoring health care quality when combined with other sources of data. One example is coordinating with Meaningful Use requirements that the Centers for Medicare & Medicaid Services (CMS) established as part of the health IT adoption provider incentives.

Given these challenges, an initiative to redesign the BioSense Program was initiated in June 2010 to address these challenges and transform BioSense into a multiuse, all-hazard surveillance system that would better serve a wide range of stakeholders.

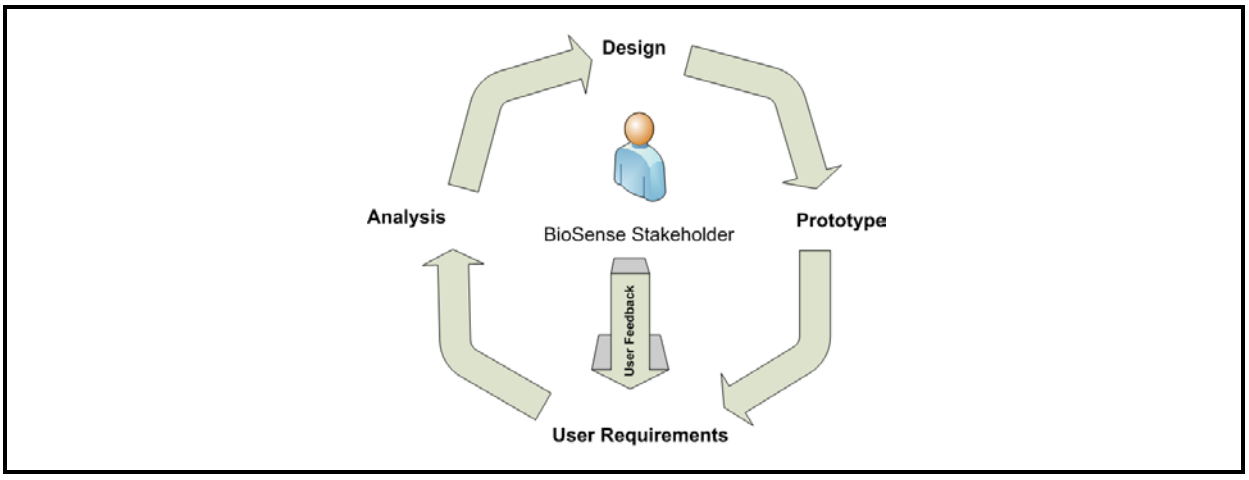
Lessons Learned from BioSense 1.0

- Direct reporting of hospitals and states to CDC is too logistically and politically challenging to be feasible.
- The design and implementation of BioSense 2.0 must consider the needs of epidemiologists, health officers, and other public health.
- Managing, synthesizing, and analyzing large volumes of clinical data at the CDC level is not sustainable.
- BioSense must be integrated with other surveillance and preparedness initiatives.
- BioSense 1.0 is useful for situation awareness and monitoring, but is not superior for event detection.

1.2 Guiding Principles for BioSense Redesign

To implement the redesign of the BioSense system and Program, CDC adopted a user-centered design (UCD) methodology. The Usability Professionals' Association (UPA, 2011) defines UCD as "an approach to design that grounds the process in information about the people who will use the product." Applied to the BioSense Redesign, UCD means that state and local users, as well as technical and other experts are actively engaged in planning, designing, developing, and testing the new BioSense system and BioSense application. Figure 1-1 illustrates how the UCD process is embedded in the BioSense Redesign.

Figure 1-1. User-Centered Design in the BioSense Redesign



1.3 BioSense Redesign Vision

The BioSense Redesign vision is to create a new BioSense 2.0 that will integrate local- and state-level data into a cohesive "picture" that supports regional and nationwide public health situation awareness, and is built on existing state and local situation awareness capability. The BioSense Program's updated vision features a community-owned (local, state, and federal) governance model and technical environment that allows users to control their data, while encouraging collaboration. Accordingly, the redesign is intended to ensure that the BioSense Program can provide multipurpose value and timely data for regional and national public health situation awareness, routine public health practice, and health outcomes and public health improvement.

1.4 Structure of the BioSense Redesign Strategic Plan

This strategic plan describes the current surveillance environment in the United States, the current BioSense Program and technical infrastructure, and the steps required to achieve the new BioSense vision. The report outlines national and regional priorities for public health surveillance systems, current tools for public health surveillance, and current surveillance

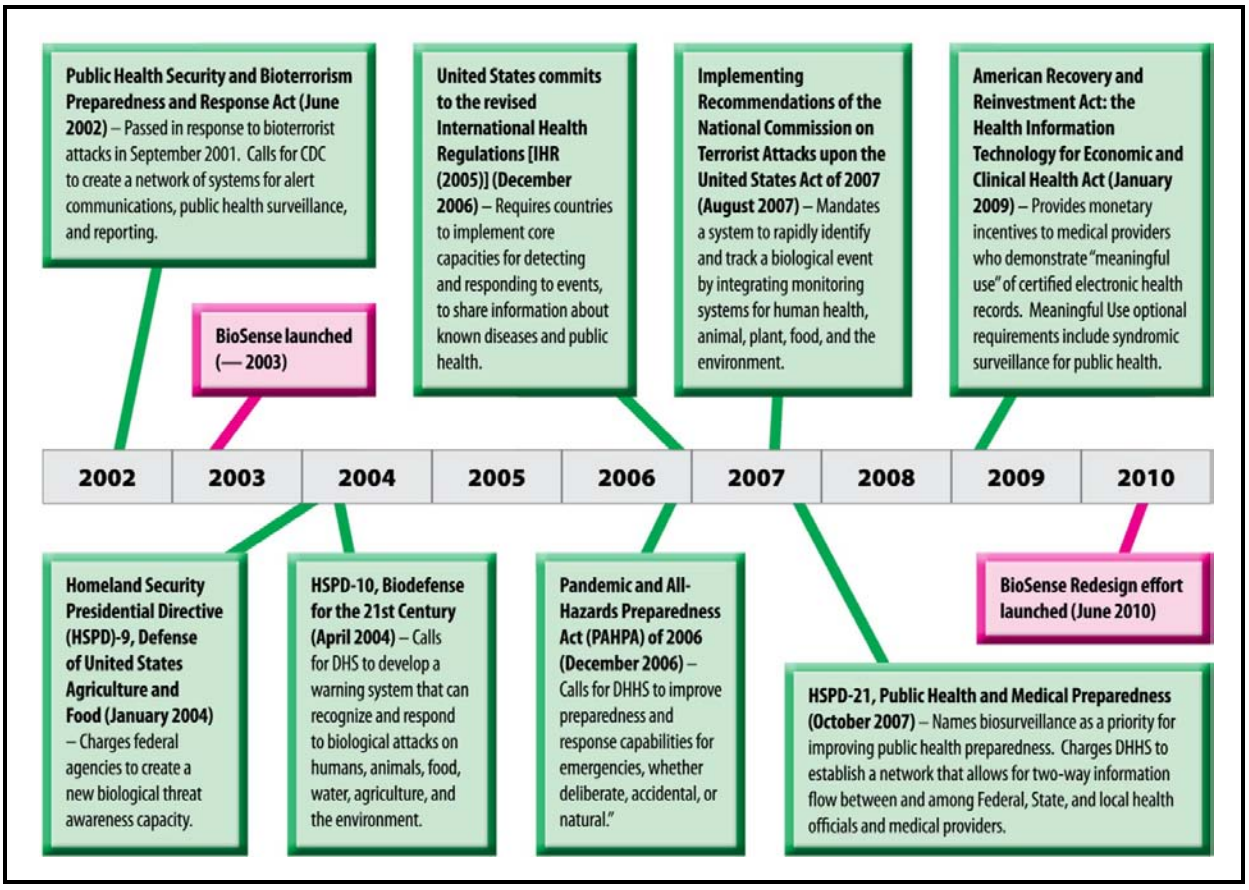
workflow and practices. It then summarizes the user requirements identified to date that will inform the redesign effort. Next, it describes the current technology infrastructure and the plans to move to a cloud-based model. Finally, the report outlines the path ahead for BioSense, specifically the framework and timeline for developing specific objectives. This document will guide the redesign effort over the next 2 years.

2. NATIONAL AND REGIONAL PRIORITIES FOR PUBLIC HEALTH SURVEILLANCE SYSTEMS

2.1 National Priorities

The legislative mandates and objectives described in Figure 2.1 have shaped and affected BioSense. Key themes underlying these mandates and objectives are the need to develop or enhance systems to protect the public from natural and manmade hazards and the need to integrate, collaborate, and exchange information and data across these systems.

Figure 2-1. Major Legislative Events Affecting BioSense



Four policy initiatives have been especially influential in the BioSense Redesign: the National Biosurveillance Strategy for Human Health (the Strategy), the Homeland Security Presidential Directive-21 (HSPD-21), the Pandemic and All-Hazards Preparedness Act (PAHPA), and the Health Information Technology for Economic and Clinical Health (HITECH) Act (part of the American Recovery and Reinvestment Act (ARRA) of 2009). We describe each initiative in the following section.

The Strategy, updated in 2010, details a path for improving public health surveillance through 6 priorities and 85 objectives. BioSense 2.0 supports all six priorities:

- **Electronic health information exchange:** strengthening and expanding multidirectional health information exchanges with healthcare and public health entities.
- **Electronic laboratory information exchange:** strengthening information exchanges between and among clinical and public health laboratories and between laboratories and public health programs for use in investigations.
- **Unstructured data:** leveraging digital information (e.g., text and image) that is not in a database format for human health biosurveillance.
- **Integrated biosurveillance information:** generating actionable health intelligence by increasing access to information resources and synthesizing multiple streams of information into one coherent picture.
- **Global disease detection and collaboration:** ensuring the United States' ability to contribute to and participate in global disease detection and response through increased global capacity and coordinated international action.
- **Biosurveillance workforce of the future:** addressing the need for a workforce that is available, prepared, and collaborating to adapt to evolving threats and crises.

BioSense 2.0 is directly aligned to key provisions of PAHPA that call for the Department of Health and Human Services (DHHS) to "establish a near real-time electronic nationwide public health situational awareness capability" based on an interoperable network of systems (PAHPA, 2006). A similar policy directive, HSPD-21, calls for "a nationwide, robust, and integrated biosurveillance capability, with connections to international disease surveillance systems, in order to provide early warning and ongoing characterization of disease outbreaks in near real-time." (HSPD-21, 2007)

Most recently, BioSense 2.0 offers health departments a unique opportunity to acquire or enhance their surveillance capabilities through provisions of the HITECH Act. The HITECH Act calls for the creation of incentive programs to help physicians achieve Meaningful Use of electronic health records (EHRs). The HITECH Act and related activities will enhance the adoption and use of EHRs and change public health practice directly and indirectly. In a direct sense, the Meaningful Use objectives specifically targeted at public health, namely immunization reporting, electronic laboratory reporting, and syndromic surveillance, will accelerate the flow of electronic data for these purposes from clinical settings to public health departments. An increase in the volume of these data to public health departments can enhance the power and timeliness of surveillance information (Overhage, Grannis, & McDonald, 2008) and foster innovation (Mandl et al., 2004).

2.2 Regional Priorities

Public health jurisdictions routinely share information and collaborate for surveillance. People commonly live, work, attend school, and seek medical care in different jurisdictions, and so public health agencies have developed protocols for sharing information. For

example, a person might live in New Jersey, but work in New York or seek medical care in Philadelphia. Alternatively, the presence of a person with infectious tuberculosis on a cross-country flight would require dozens of public health jurisdictions to cooperate in tracking and notifying individuals who were potentially infected. In addition, common travel patterns may also impact the spread of disease and require collaboration across state and local public health authorities during influenza season or with other communicable diseases. The Association of State and Territorial Health Officials (ASTHO) notes that surveillance systems are needed to "allow for simultaneous and/or sequential reporting of time sensitive health data, to be coordinated among local, state, territorial, tribal, and federal public health authorities." However, regional sharing is often on an ad hoc or as-needed basis.

Public health surveillance practitioners have indicated that BioSense can provide great value as a tool for regional surveillance. Public health authorities often have access only to information from their state; a regional perspective can aid public health officials in planning for increased use of emergency departments and allocating resources that might be needed during an outbreak. Having a nationwide system would also alleviate the need for state health departments to execute data-sharing agreements with many other parties. For example, in the Washington, DC, metropolitan area people regularly commute and seek medical care in Maryland, Virginia, West Virginia, Delaware, Pennsylvania, and New Jersey (depending on where they live and work). A regional surveillance solution would alleviate the need to execute dozens of one-off agreements and reduce the burden on public health agencies at the state, county, or local level. By developing and executing data-sharing and use agreements and providing public health professionals with state, local, and regional views of surveillance data, BioSense can create value and improve public health practice.

2.3 Role of BioSense in Supporting National and Regional Public Health Surveillance Priorities

The BioSense Program's mission is to support and improve the nation's public health surveillance infrastructure and the human capacity required to monitor (with minimal lag) the scope and severity of all-hazards threats to the public health; and to support national, state, and local responses to those threats. BioSense 2.0 will track health problems as they evolve and give public health officials data, information, and tools needed to better prepare for and coordinate responses to safeguard and improve the health of the American people. BioSense has been an important public heath tool for enhancing situation awareness and response during recent events, such as the H1N1 pandemic, the Deepwater Horizon disaster in the Gulf of Mexico, and the earthquake and tsunami in Japan. BioSense capabilities were employed in these events to track the spread of disease, injuries, and exposure to radiation and contaminants.

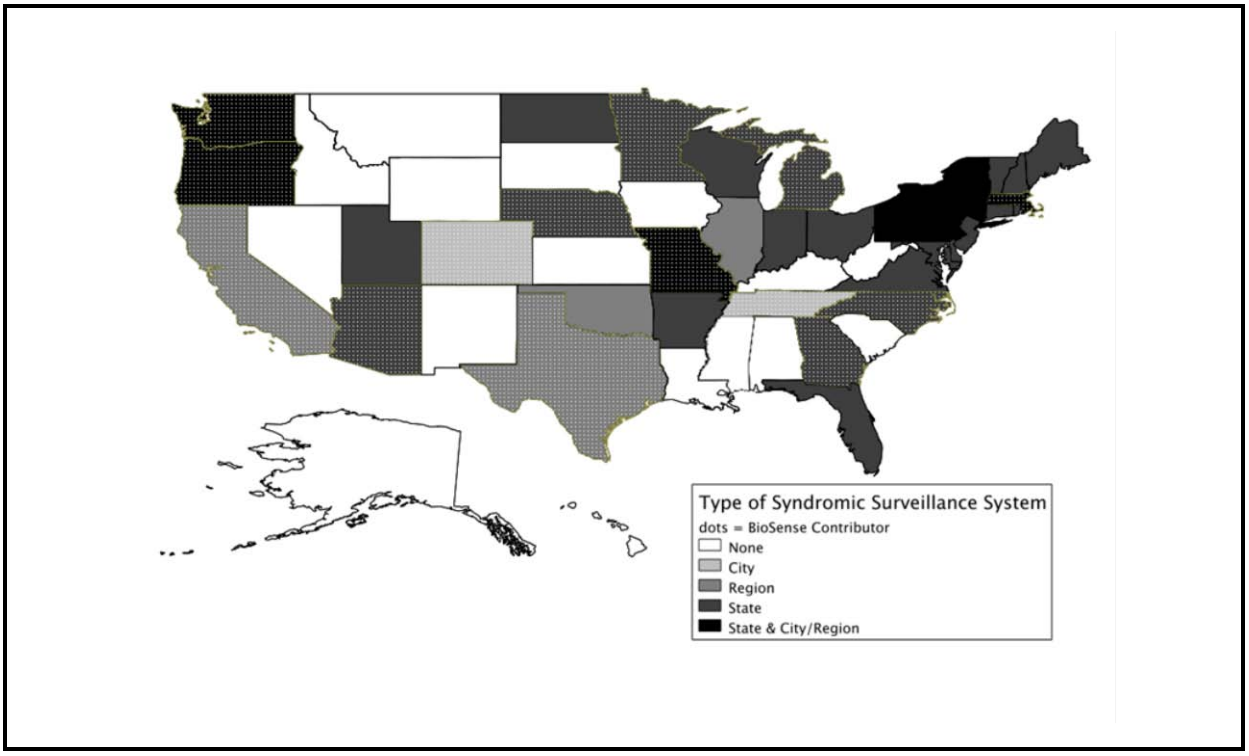
3. TOOLS FOR PUBLIC HEALTH SURVEILLANCE

3.1 Use of Syndromic Surveillance in the United States

Public health practitioners have long sought methods to enhance and improve disease surveillance. The terrorist attacks and anthrax outbreak of 2001 provided a fresh impetus for improved public health surveillance within the United States. In response to these attacks, public health jurisdictions worked to develop syndromic surveillance systems.

However, the adoption of syndromic surveillance has been slow, at best, in the ensuing decade. An environmental scan conducted for BioSense Redesign in 2010 identified 44 jurisdictions, including 28 states, 12 regions (one or more counties within a state), and 4 cities that have EDs reporting to any syndromic surveillance system. Of these jurisdictions with syndromic surveillance, 15 reported that they participate in BioSense (either by directly sending data or indirectly through some other system) as shown in the map in Figure 3.1. ED coverage within these systems is also highly variable, and only 11 of the jurisdictions have an ED coverage rate of 75% or higher.

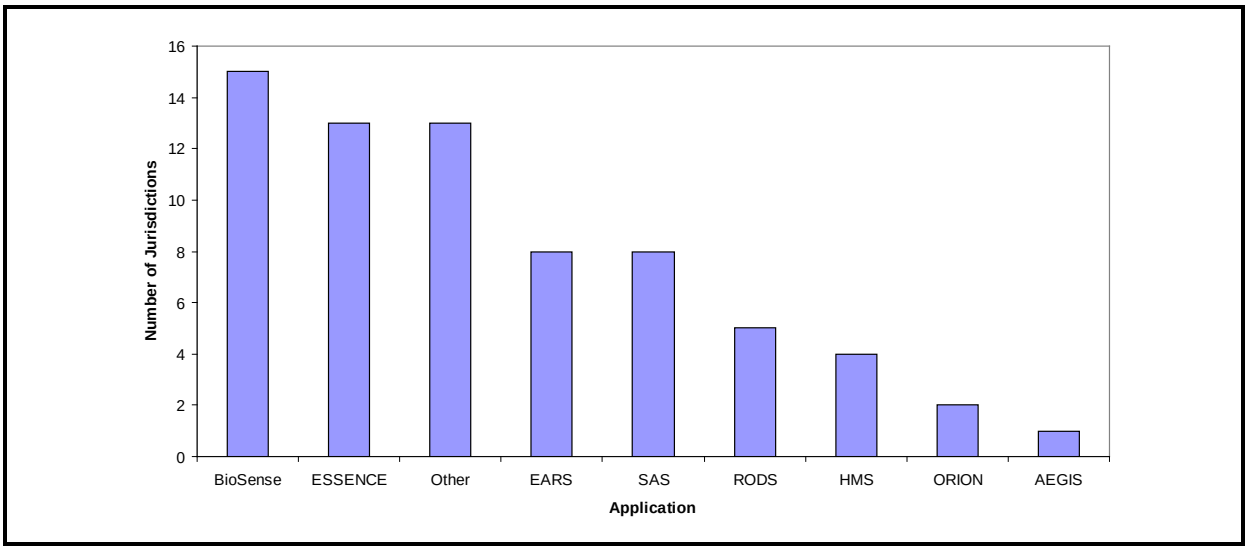
Figure 3-1. Jurisdictions with Syndromic Surveillance in the United States Participating in BioSense



As indicated by Figure 3-2 a variety of syndromic systems are currently used. BioSense is the most commonly used system, followed by ESSENCE. The environmental scan also found that, of the majority of jurisdictions, 27 (59%) use a single surveillance application, 15 (33%) use a combination of two surveillance applications, and 4 (9%) use three different applications.

These data suggest that syndromic surveillance needs to expand to ensure greater utility for situation awareness and response, and since BioSense is one of the most prevalent systems in use, it is well positioned to lead that expansion.

Figure 3-2. Surveillance Applications Used, Represented in Surveillance Coverage Map (49 Jurisdictions)*



*Includes five jurisdictions with no syndromic surveillance system.

3.2 BioSense as Tool for Public Health Surveillance

BioSense currently receives data from more than 50,000 facilities, including private hospitals, VA, and DoD medical outpatient facilities; national laboratories; and pharmacies as shown in Table 3-1. Percentages of total facilities contributing to BioSense are highest for VA hospitals (87.7%), pharmacies (88.2%), and DoD medical outpatient facilities (64.0%). The coverage of private hospitals and hospital systems is low at 16.3%, and even lower for national laboratories at 15.3%.

Increasing the ED coverage in BioSense remains a central challenge for the redesign and is pivotal to the success of BioSense 2.0. Thus, categorizing regions in terms of their potential contribution to BioSense is essential for directing recruitment efforts strategically. Characteristics related to the capacity to join BioSense 2.0 include the existence of a syndromic surveillance system, regional technical infrastructure (e.g., existence of a regional health information exchange), and types of software used in the EDs in the

jurisdiction. Characteristics related to the value of the information include total population and population density in the jurisdiction, participation of neighboring jurisdictions in BioSense, and other considerations about the jurisdiction from a preparedness perspective.

Table 3-1. Characteristics of Current BioSense Facilities

Type of Facility	Number of Contributing Facilities	Percentage of Total Facilities in the United States	Type of Data Currently Processed through the BioSense Application
VA hospitals	925	87.7	Outpatient
DoD healthcare facilities	362	64.0	Outpatient
Private hospitals and hospital systems	661	16.3[a]	Primarily ED (health departments' data feed), with deeper clinical data from directly reporting hospitals (e.g., outpatient, ED, inpatient, census, laboratory, radiology, pharmacy)
National laboratories	2,780	15.3[b]	Test orders
Pharmacies	49,365 (27,000 active pharmacies)	88.2[c]	Prescription sales

[a] American Hospital Directory (2010). Hospital statistics by state. Accessed at http://www.ahd.com/state_statistics.html

[b] Manta (2011). 18,127 Medical laboratories in the U.S. Accessed at http://www.manta.com/mb_35_D0047000_000/medical_laboratories

[c] Quezi (2011). How many pharmacies are there in the United States? Accessed at http://quezi.com/4157

The usage statistics provide a partial picture of BioSense performance. Over the past 3 years, an average of 232 entities have used BioSense for an average 575 hours per year. Table 3-2 summarizes usage statistics for calendar years 2008 through 2010 and provides information through May 30, 2011. Assuming a consistent level of usage throughout the year, the annual totals for 2011 will likely be similar to those for 2010.

The trends indicate decreasing usage in every category except servicing sites reporting. So although more sites are reporting, the number of users and their time with the system appear to be decreasing. These trends could mean users may be finding the system less useful or they may be becoming more efficient in their use. In the absence of usage data from other systems, it is not possible to draw any firm assessment from these trends alone for what constitutes good use, poor use, or even average use.

Table 3-2. BioSense 1.0 Program Operations Performance and Utilization Metrics

Performance Metric	CY 2008	CY 2009	CY 2010	CY 2011[a]
Distinct users (#)	256	233	209	164
Application logins (#)	4,868	5,100	3,812	2,531
Application session time (minutes)	42,837	37,603	22,994	16,032
User administration (certificates)	671	607	531	332
Servicing sites reporting (#)	1,880	1,963	2,155	1,010
Number of records received	162.1M	179.4M	393.2M	500.8M

[a] As of September 29, 2011.

3.3 Current and Potential BioSense Stakeholders and Users

A key strategy of the BioSense Redesign is to deepen the engagement of current stakeholders and users, while also reaching out to new ones. Currently, a narrow range of individuals and organizations in state, local, and territorial health departments and hospitals and the CDC, DoD, and VA use BioSense. Users are primarily epidemiologists or researchers and, during events, public health officials. BioSense may be valuable to a much wider range of individuals and organizations than current users. As part of the user requirements gathering process, we have identified a substantial list of stakeholders and users who may benefit from the information and services BioSense provides (see the list in Table 3-3). Potential users include organizations and individuals responsible for emergency or public health preparedness, environmental health, chronic disease, and injury control. BioSense 2.0 can also provide an important public service.

Table 3-3. Current and Potential BioSense Stakeholders and User Groups

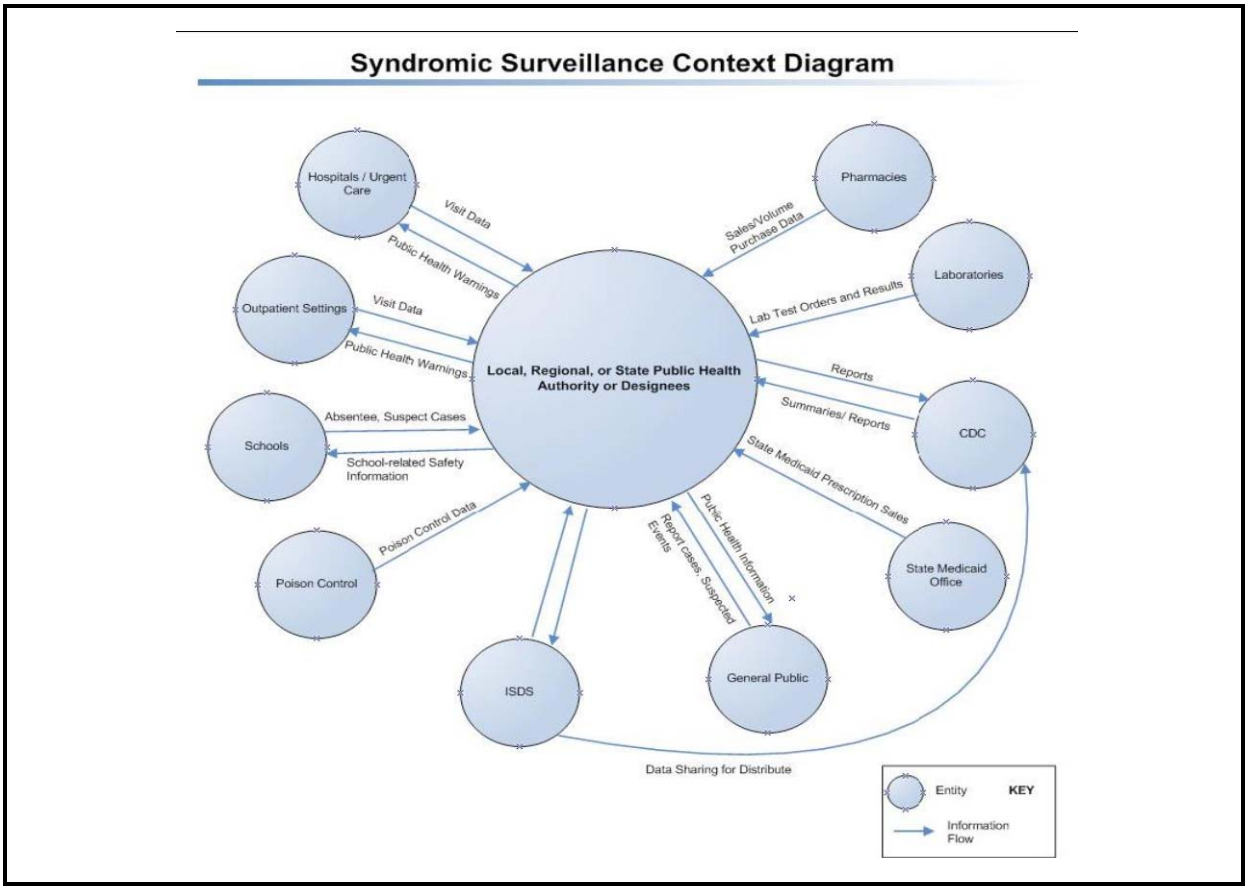
Stakeholders	Specialties
50 state health departments	▪ Data analysts *
Local health departments (large city or county health department)	▪ Epidemiologists* ▪ Preparedness coordinators ▪ Health directors and health officers* ▪ Health informatics specialists* ▪ Public health nurses ▪ Environmental health specialists ▪ Health communication specialists
Hospitals	▪ Infection control managers* ▪ Preparedness coordinators ▪ Data managers ▪ Nurses
Emergency preparedness and response	▪ Preparedness coordinators ▪ Directors of emergency operations ▪ Preparedness trainers ▪ Public health nurses ▪ HAZMAT specialists ▪ Case investigators ▪ Health communication specialists
First responders (city or county)	▪ Fire rescue ▪ Emergency Medical Services (EMS) ▪ HAZMAT specialists ▪ Emergency operations ▪ Police
CDC BioSense Program	▪ Leadership* ▪ Staff*
Other CDC Programs	▪ CDC chronic disease and injury programs*
BioSense Redesign governance bodies	▪ Technical Expert Panel (TEP)*
BioSense partner associations	▪ ASTHO* ▪ Council of State and Territorial Epidemiologists (CSTE)* ▪ National Association of County and City Health Officials (NACCHO)* ▪ International Society of Disease Surveillance (ISDS)*
Public	▪ N/A

*Current stakeholder or user.

4. BIOSENSE IN THE WORKFLOW OF PUBLIC HEALTH SURVEILLANCE

The BioSense system and the BioSense application have both been designed to support the workflow and business processes of public health organizations. ISDS has launched an initiative to define the Meaningful Use of information in public health syndromic surveillance, culminating in a recently published preliminary report entitled "Core Business Model and EHR Requirements for Syndromic Surveillance" (ISDS, 2011). The purpose of the document is "...to provide a comprehensive description of PHSS [Public Health Syndromic Surveillance] and explain why certain data elements are valued and included as part of the recommended minimum syndromic surveillance message" (2011). The report describes the data that are needed from various health-related entities (e.g., providers, public health clinics, laboratories) to conduct syndromic surveillance, as well as the primary activities that take place while conducting syndromic surveillance. Figure 4-1 illustrates the central entities engaged in syndromic surveillance in ISDS's context diagram: local, regional, and state public health organizations.

Figure 4-1. Business Context Diagram for PHSS



Source: The International Society for Disease Surveillance (ISDS). (2011). Core Business Processes and EHR Requirements for Syndromic Surveillance. Brighton, MA.

Table 4-1 shows the business processes and task sets associated with syndromic surveillance described in the ISDS report and describes the mechanism BioSense offers to support these activities. Key areas where BioSense can contribute include population monitoring, maintenance of data-sharing partnerships, and quality assurance. The BioSense Redesign project has coordinated closely with ISDS and has used the report to guide design decisions to ensure that BioSense can be seamlessly integrated into the current and future work flow of public health organizations.

Table 4-1. BioSense Contributions to Public Health Work flow

Business Process	Task Set	BioSense Contribution
Conduct Syndrome-based Population Health Monitoring	Collect and process data	Data from reporting sites are processed and delivered to public health agencies through the BioSense application.
	Characterize, interpret, and analyze data	The BioSense application allows users to develop unique syndromes; specify individual criteria for monitoring syndromes; and download the de-identified raw data for further analysis using the tool of their choice.
	Notify and engage partners/leadership	The BioSense system provides an environment for sites choosing to share data. Leaders collaborate through the BioSense communication tools. Public health analysts define and set alarm thresholds; view and annotate search queries.
	Conduct reach-back	BioSense communication tools allow reporting sites to receive messages related to relevant health trends in their communities and share those across jurisdictions.
Establish and Maintain Data-Sharing Partnerships	No task set specified	The BioSense system provides a framework for establishing data-sharing agreements and facilitating data stream connectivity.
Conduct Data Quality Assurance	No task set specified	The BioSense system supports development of new methods and techniques to ensure data quality.

5. END USER REQUIREMENTS FOR BIOSENSE REDESIGN

In the base year of the BioSense Redesign project (2010 to 2011), a series of activities were undertaken to gather information from BioSense users (current and potential) and stakeholders about how they use syndromic surveillance in state and local public health practice, their surveillance needs and challenges, and their requirements for a new BioSense system. This information was critical to guiding the strategic direction of the BioSense Program and developing the specifications for the new BioSense application and system. A full description of the methods and findings of these activities can be found in the *BioSense Redesign End User Requirement Gathering Annual Report 2011.*

In this section, we summarize the needs, barriers, and challenges that users articulated and their implications for the BioSense Redesign in seven areas: governance, policy and guidance, communication, workforce and capacity, data, information technology (IT) infrastructure, and application attributes and design. We discuss the steps taken by the BioSense Redesign to address these user needs.

5.1 Governance

Stakeholders strongly indicated the need to involve state and local representatives, as well as professionals from the public health surveillance arena in the BioSense Redesign. The lack of engagement of state and local public health stakeholders was a defining weakness of the initial BioSense development, and so establishing trust and transparency is a key objective of the redesign effort.

In the last quarter of 2010, a TEP composed of 10 representatives from CSTE, NACCHO, ASTHO, ISDS, the VA, academia, and healthcare organizations was convened. This body has an advisory role and guides all aspects of the redesign, including clarifying the mission and purpose of BioSense 2.0.

However, to fully address trust and transparency and to enhance full participation and engagement in BioSense 2.0, an entirely new governance structure is needed, not just an advisory board. In the last quarter of 2011, CDC established cooperative agreements with CSTE and NACCHO to recruit states and localities into BioSense 2.0 and ASTHO to govern the new technical environment. This new governance structure is less CDC centric and gives state and local jurisdictions greater responsibility for and ownership of the BioSense Program via these organizations. These cooperative agreements fulfill another critical user need: a clear indication of CDC's commitment to support state and local participation in BioSense 2.0 through direct resource allocation, policy guidance, and technical assistance.

These association partners began to meet weekly in June 2010 to plan the implementation of BioSense 2.0.

User Requirements for BioSense 2.0 Governance

- Clear mission and purpose
- Trust and transparency
- Clear indication of CDC financial and technical commitments

The partners have also been closely involved in planning Webinars to inform the public health community about BioSense 2.0—the first of which was on August 17, 2011. Additional Webinars will follow in preparation for the launch of BioSense 2.0 in November 2011.

5.2 Policy

In the view of users, the lack of data-sharing policies, Memoranda of Understanding/ Agreement (MOUs and MOAs), and concerns regarding Health Insurance Portability and Accountability Act (HIPAA) rules are key barriers to participation in data sharing with BioSense. Moreover, in the past, CDC has not been forthright regarding how data will be used and shared, resulting in a lack of cooperation and investment in BioSense and a generalized confusion among users about what they are being asked to do.

Yet, the successful pairing of BioSense efforts with ISDS to rapidly develop and deploy the joint Distribute Project for H1N1 surveillance provided two lessons learned that address these concerns and barriers. The Distribute experience demonstrated that, in a time of need, state and local jurisdictions can readily and rapidly share data as long as (1) the environment can support a variety of data types and formats, and (2) the environment is secure and private. These two requirements are now central features of BioSense 2.0.

To promote interjurisdictional communication and collaboration, state and local health departments require data-sharing polices and agreements that provide detailed, user-defined parameters on data sharing and data use, and delineate user roles and responsibilities. These policies and agreements must also provide for cross-jurisdictional sharing of data—a need users strongly articulated, particularly during emergencies or other mass events. A law firm with expertise in data privacy and security has been contracted through the BioSense Redesign project to develop a universal data-sharing agreement that will address these privacy and security requirements. In addition, we will conduct technical assistance Webinars for users about data sharing.

States and localities also need policy guidance and support from BioSense to leverage the syndromic surveillance provisions of Meaningful Use. Joint research by CDC and ASTHO indicates that a majority of public health departments were not well prepared to receive the information required under Meaningful Use. In addition, standards for conducting syndromic surveillance were not available. In response to these findings, ISDS developed a "Meaningful Use 101 and 102" seminar series to educate public health practitioners on the

requirements of the legislation. ISDS in its next release of the PHIN Syndromic Surveillance Messaging Guide (version 1.4) will specify 3 core PHSS business processes , 17 core data elements and 16 optional elements for contemporary syndromic surveillance. The recommended standards

- Define the core objectives of PHSS based on current practice and evidence.
- Define optional objectives that have less common usage but are not rare.
- Describe the model core workflows, inputs, and outputs of PHSS.

User Requirement for Policy

- Robust, transparent, detailed data-sharing agreements that facilitate exchange of data within and across jurisdictions
- Technical support to leverage Meaningful Use

- Provide a holistic picture for understanding how an EHR can add value and efficiently interface with a public health authority.

In addition, the launch date of November 2011 for BioSense 2.O was established so health care providers could meet the provision for syndromic surveillance under the Meaningful Use incentive program, and thus give providers additional inducement to participate in BioSense 2.0. Among the optional measures providers can use to receive incentive payments, is the capacity to stream data to a health department for syndromic surveillance purposes (through BioSense 2.0 or other system) in Stage 1.

5.3 Communication

Public health professionals have multiple responsibilities with diminishing resources. Moreover, they are inundated with information, so competition for their time and attention is fierce. Routine communications from BioSense to users and stakeholders, therefore, must be brief, meaningful, and periodic and use both traditional and emerging forms of communication, such as Smartphones and social media. Users are not currently employing these technologies extensively, but recognized their utility during emergencies and critical events. Hence using BioSense 2.0 to push out information through these emerging communication technologies could add tremendous value to users.

User Requirements for BioSense 2.0 Communications

- Brief, meaningful, and periodic outreach
- Leverage emerging communication technologies and social media
- Compelling messages that convey BioSense 2.0 mission, purpose, and rationale
- Messages that counter negative perceptions and views

More broadly, the BioSense Program must clearly articulate its redefined purpose, mission, and rationale to a diverse set of stakeholders, especially those who still have negative views based on the Program's early history. A Communication Plan was finalized in the last quarter of 2011 and vetted with association stakeholders. It provides strategies and

guidance for communicating the Program's mission and purpose, addressing tough questions, and creating a positive perception.

5.4 Workforce and Capacity Development

State and local jurisdictions face severe capacity restrictions related to workforce and public health surveillance. The majority of the 26 jurisdictions responding to a post on the BioSense Collaboration Web Site reported that they needed additional resources to hire more epidemiologists and obtain more training. Specifically, the following areas of training would enhance capacity to participate in BioSense 2.0:

- Fundamentals of syndromic surveillance
- Surveillance system data management, including
  - Data analysis tools and programming
  - Public health messaging standards (i.e., HL7)
  - Clinical and laboratory taxonomy (e.g., ICD-9 diagnosis codes, CPT codes)
- Data querying and reporting techniques
- Syndromes and case definitions.

User Requirements for Workforce and Capacity

- Epidemiologists skilled in syndromic surveillance and informatics
- Short courses, seminars, and Webinars
- Collaborations with Advance Practice Centers (APCs) and universities
- Materials posted to Collaboration Web Site

Respondents also suggested offering training opportunities through the APCs, universities, and the Collaboration Web Site. In the first quarter of 2011, a basic primer on syndromic surveillance that ISDS developed was posted to the Collaboration Web Site.

5.5 Data Types, Standards, and Quality

The new open paradigm for the BioSense system allows users to freely add any data type they wish to use and share in BioSense 2.0. Although this means that some data types may be available for some states and not others, BioSense could negotiate agreements with large data aggregators and health plans that would allow many states to access data they would not be able to acquire on their own. For many users, this capability represents a significant value of BioSense 2.0.

A diverse array of data types are needed for public health surveillance; however, the most critical for the launch of BioSense 2.0 remain the syndromic data feeds currently in place (e.g., ED, poison control, over-the-counter drug (OTC) sales). New high-priority data types that will add to the utility and value of the system would include lab results and diagnostic and clinical data from electronic medical records (e.g., minimum data elements for Meaningful Use).

Data and information essential and necessary for sharing with partners during an emergency included records of cases, school and work absentee records, lists of essential personal and equipment, and geographic location of the disease, disaster, and vulnerable populations.

State and local jurisdictions use and prefer to send and receive electronic data in the MS Excel .CSV (comma separated values) format. Other common formats include XML, ASCII (text files), SPSS, and SAS. A common frustration in the past, however, has been the need to develop workarounds to translate data in order to share them with other jurisdictions. Since all jurisdictions are highly unlikely to agree to use only one data format, a BioSense environment allowing jurisdictions to freely exchange data in various formats would address a major barrier to the flow of data for public health surveillance.

Meaningful Use, however, has increased the urgency among state and local jurisdictions to adopt common messaging standards. BioSense funded association partners to develop core and optional standards for ED- and urgent-care-based syndromic surveillance that meet Meaningful Use IT requirements. A new contract will extend this process of standards development to "eligible providers" in outpatient settings.

Syndromic surveillance is challenged by methodological and data quality issues that have hindered its widespread adoption, including: delayed data streams (particularly laboratory data) during events or outbreaks; inconsistent case definitions among jurisdictions; and poor specificity of algorithms or lack of a robust baseline, which result in high false alarms rates.

User Requirements for BioSense 2.0 Data Types, Standards, and Quality

- Data types for routine surveillance: ED, OTC, poison control, lab results, diagnostic, 32 Meaningful Use elements
- Data types for emergency surveillance: case records, school/work absenteeism, and essential personnel and equipment
- Common case definitions
- Exchange of data using a variety of formats
- High system performance: sensitivity, specificity, timeliness, and representativeness

The BioSense system can address these challenges by facilitating and funding users to develop and identify methods that enhance the system's performance (e.g., sensitivity, specificity, timeliness, representativeness) and data quality through challenge grants, competitions, and cooperative agreements.

5.6 IT Infrastructure

Diminishing state and local budgets have greatly impacted jurisdictions' ability to acquire and maintain an IT infrastructure that supports the use of syndromic surveillance. Among the resource constraints they face are limited or no technical support to build and maintain equipment and data feeds; old and outdated Web browsers, operating systems, software, and hardware; and rapidly diminishing data storage capacity. Although poorly resourced

states and localities simply never had the infrastructure to initiate syndromic surveillance, more well-resourced states have found that the costs of maintaining their mature systems are becoming untenable. BioSense 2.0 offers these users two distinct advantages.

First, in the cloud environment (described in Section 7), users will have vastly greater storage capacity at no cost to them. The shared, collaborative environment will also offer users access to up-to-date surveillance analytic tools such as ESSENCE, RODS, and SAS.

User Requirements for BioSense 2.0 IT Infrastructure

- Enhanced data storage capacity
- Up-to-date analytic tools known to users
- Up-to-date operating systems

5.7 Application Attributes

Local and state health department stakeholders identified key attributes of a syndromic application that BioSense 2.0 should possess. Foremost, a syndromic surveillance application is a tool to enhance situation awareness that allows jurisdictions to make comparisons on a local, regional, or national level. The application should allow users to track disease trends over time, both prospectively and retrospectively, identify cases, and guide their decisions about where and when to deploy resources. Users also need to be able to examine different data types or data sources to verify or rule out an outbreak. These data types and sources are not restricted to those used in traditional epidemiological investigations, but should also include weather, air quality, and environmental data. During an investigation users need highly flexible applications so they can create or combine syndromes and query the data in multiple ways. Finally, users need to be able to use the application to communicate within and outside their jurisdiction. Such functionality would allow ad-hoc teams composed of different agencies and specializations to interact across distance and time to coordinate their efforts to achieve a common goal.

User Requirements for BioSense 2.0 Application Attributes

- Supports situation awareness
- Provides regional and national views for all hazard conditions
- Allows views of neighboring localities and departments
- Tracks trends prospectively and retrospectively
- Supports varied data types and sources
- Provides contextualized alerts and assessments
- Allows creation or combination of syndromes, querying of data
- Supports interjurisdictional communication and ad-hoc teaming

5.8 Application Design

Statistical analysis, time series analysis, and ability to run and create customizeable queries are design features users view as extremely valuable and critical to BioSense 2.0 utlity. Visualizing data is as important as the ability to run statistical analysis. Maps and time

series displays are the most important visualizations for investigations. Users also want the application to have a consistent look and feel, but also like customizable and preformulated (i.e., ready to view without any customization or preferences entered by the user) views for data.

Users are interested in using innovative technologies, such as desktop widgets, mobile applications, and new mobile technologies (e.g., using iPads when investigating outbreaks in the field), even if they do not currently use such technology extensively. Among Smartphone users, embedded applications, such as "apps" in iPhones and Blackberry, are highly popular. Furthermore, these users prefer to receive alerts related to public health emergencies and outbreaks on their mobile devices because these alerts enable timely responses to such situations. However, users need to control the frequency, volume, and type of alerts (e.g., SMS or e-mail). Users also want to view what their peers are viewing and search for popular views.

User Requirements for BioSense 2.0 Application Design

- Single dashboard to many, providing ease of access
- Mobile-optimized application for use on Smartphones
- Powerful, customizable statistical testing and predictive tools
- Customizable visualization tools
- Functionality to support downloading and exporting of reports and graphics
- Collaboration tools for communication with peers
- A consistent look and feel

A key attribute of the BioSense 2.0 application—the ability to communicate and collaborate with colleagues and peers—can be achieved via a secure portal that facilitates the sharing of resources and information. However, spam, privacy, security, and excessive messaging must be controlled.

6. REDESIGNING THE BIOSENSE APPLICATION AND SYSTEM

The features and requirements that users articulated in the previous section represent the blueprint for BioSense 2.0. Implementing that blueprint requires an entirely different technical architecture from the legacy BioSense system. This system was originally designed to collect real-time streaming data directly from the sources (from sentinel hospitals in large cities, the DoD, and the VA) and manage these data centrally from CDC. The CDC mitigated costs for hospitals by installing computers on the hospitals' premises with software that accessed hospital data, formatted them, and securely sent them to computers located at CDC facilities in Atlanta, GA.

The current BioSense Data Center consists of approximately 70 Dell and Sun computer servers with additional computers to manage data transmission from external data sources and to support data analysis. Each computer hosts commercial off-the-shelf products, including databases, analytic software tools, government-provided off-the-shelf software, and specialty software developed specifically for BioSense. Currently, users access the BioSense system through the CDC Secure Data Network, which requires a digital certificate.

This centralized architecture of the legacy BioSense system has proved cumbersome and costly to maintain and placed significant constraints on the system's capacity to add new data streams and expand its coverage. To meet the growing data requirements for all-hazards situation awareness, a new technical environment was needed and cloud computing offered a compelling alternative.

6.1 Cloud Computing as a Solution to Meet User Requirements and CDC Needs and Constraints

The explosion of inexpensive processors, memory, storage, and bandwidth has resulted in the rise of a new breed of Internet hosting services based on a scalable, fine-grained pay-per-use model. This new cloud model contrasts traditional bulk purchasing for hosting capacity, which fits poorly with common usage patterns for Internet applications. Frequently, applications are used minimally over a long period, and then sudden usage spikes occur because of seasonal patterns such as the holiday shopping season, unpredictable "viral" spread in popularity, or a crisis situation. Therefore, the ability to maintain low costs during minimal usage, while still being able to meet a sudden surge in demand has become essential for many online service providers. This approach is becoming the industry standard and fits well with the BioSense application model. As a public health monitoring system, BioSense will likely experience variable usage patterns, both as adoption increases gradually and with spikes coming during crisis situations or mass gathering events. Furthermore, during the development, testing, and initial rollout of the project, CDC can keep costs low while needs are low, and then scale up without migrating to new infrastructure.

ASTHO, through their cooperative agreement with CDC, is responsible for selecting the cloud vendor using strict criteria designed to benefit state and local health departments. A final selection will be made by mid-October,2011. In addition, ASTHO has hired staff to oversee the the new environment beginning September 1.

6.1.1 Infrastructure as a Service

Cloud computing represents a shift from the high fixed and maintenance costs of traditional IT infrastructure (i.e., purchasing and installing server and network equipment and sustaining costs for electricity and cooling) to a service-based, pay-per-use model. By sharing infrastructure, users, both small and large, can benefit from tremendous economies of scale. With "infrastructure as a service" CDC can even provision and manage IT resources using fully automated software. For example, to launch a new application server to meet increased user demand now requires a few clicks, zero upfront cost, and less than 10 minutes to be up and running. Using physical hardware, a similar operation would require significant upfront costs, logistics, and person hours, and take weeks to months before launch. In the BioSense implementation, we will take full advantage of this new model.

6.1.2 Software as a Service

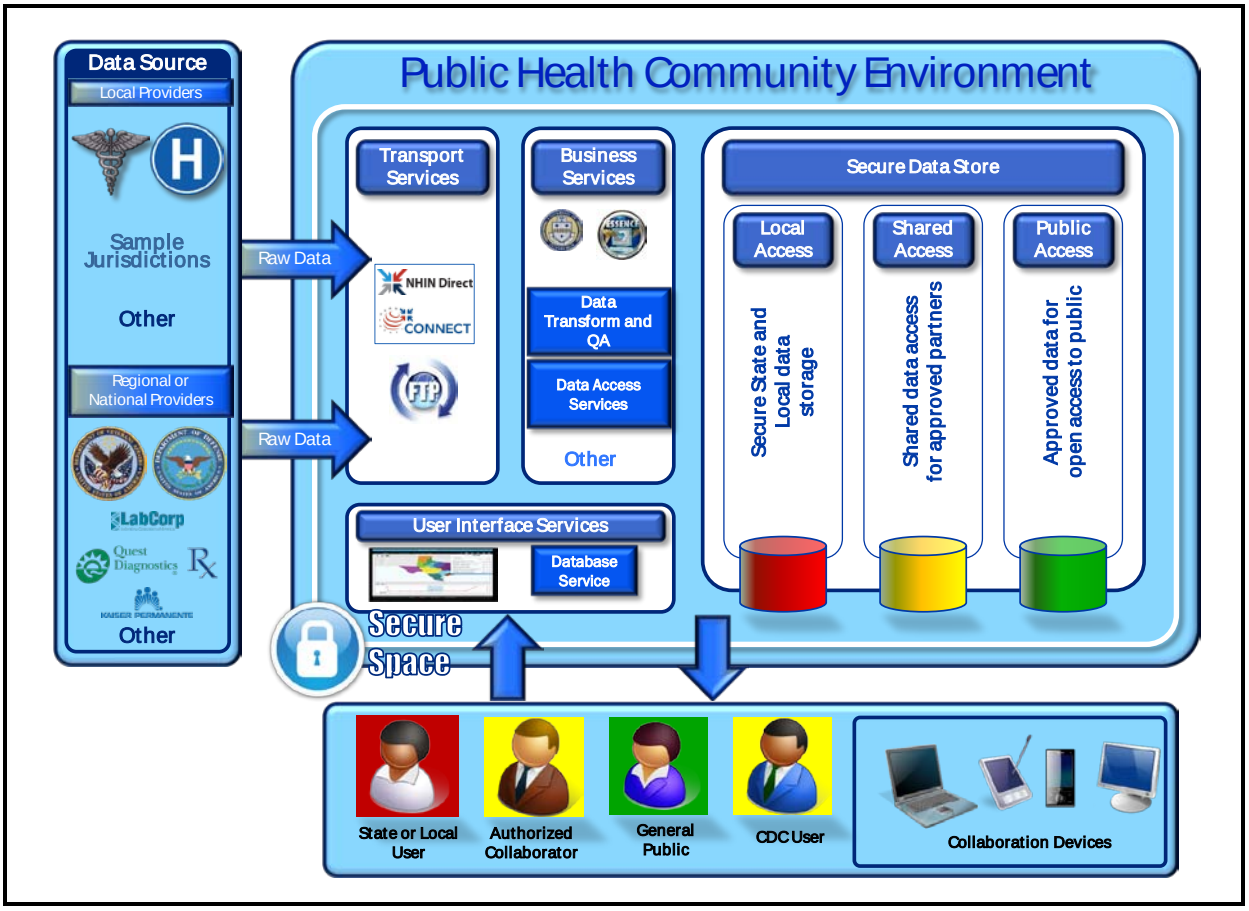
Hand-in-hand with the move to IT infrastructure as a service is the move to software as a service. For BioSense users, namely, state and local health officials and epidemiologists, we will implement all software, such as SAS, R, ESSENCE, and RODS, as Web applications, hosted in the cloud. By providing software as a Web application, we avoid the burden of supporting the installation and upgrade process, whether it is on the desktop or within the health department server systems. No installation is needed because users will simply visit the appropriate Web site and log in. Upgrades and fixes to the software will appear instantly as we apply them to the application on the server side. Where locally installed client software is unavoidable, such as for Web browsers, file transfer, or VPN clients, we will use freely available, industry-standard tools that are well supported by their providers.

6.1.3 Benefits of Cloud Computing for PHSS

For the PHSS use case specifically, cloud computing offers multiple benefits. First, public health surveillance has inherently variable usage demands because of the seasonal effects of many diseases and health concerns, as well as the possibility for crisis situations such as the 2009 H1N1 flu pandemic or the 2010 BP oil spill in the Gulf of Mexico. As outlined above, with cloud computing, BioSense can rapidly scale resources and costs to meet the demand at any given moment. Second, for public health departments that want to participate in and reap the benefits of syndromic surveillance, but lack IT expertise, BioSense can leverage cloud resources to provide them with a hosted solution. It also addresses the state, local, and community public health departments with a "catcher's mitt" that allows them easy access to data at the level of granularity they are authorized, so that

they can develop their own analyses and reports. Also under this "catcher's mitt" scenario, the whole community benefits since BioSense will be able to deploy similar solutions across many health department users. With this approach, costs and development time are dramatically reduced compared to each department developing its own customized systems. Overall, cloud computing offers tremendous opportunity for the BioSense Program: it will allow the Program to execute rapidly, adapt to the changing needs of its user community, and save costs. Figure 6-1 depicts the community-controlled environment of BioSense 2.0 based on the new cloud-based environment.

Figure 6-1. Community Controlled Environment for BioSense 2.0



Defining features of this new environment are

- Capacity to accept a vast variety and amount of data from multiple sources
- Shared governance of state and local jurisdictions under ASTHO
- Data transformation and quality assurance services
- Three tiers of access (local, shared, and public) for multiple kinds of users (state or local user, CDC, a collaborator, and the public)
- Access to powerful analytic software and applications

- Access to collaboration tools to facilitate interjurisdicational communication.

7. THE PATH AHEAD FOR BIOSENSE

Each of the preceding sections articulated core principles and strategic directives. This section outlines the 3-year BioSense Redesign, drawing upon the conclusions reached in the preceding sections. It presents summary aims tied to stakeholder needs, a timeline of key benchmarks for the redesign period, and expected performance outcomes. BioSense 2.0 represents a significant realignment of structure and governance to meet its vision to provide multipurpose value and timely data for regional and national public health situation awareness, routine public health practice, and health outcomes and public health improvement.

7.1 Summary BioSense Program Aims

Drawing upon 8 years of programmatic experience, stakeholder meetings, U.S. Senate's input, GAO reports, and a year of intensive user requirements gathering, the aims of the BioSense Program for the redesign period are clear. It must

- Incorporate state and local public health partners' input into Program design and governance.
- Promote a proactive, collaborative, and transparent community.
- Promote the use of clinical care or EHR records for Meaningful Use and interconnect with health IT systems.
- Move to an open, distributed computing model.
- Improve the utility of the data/data sources.
- Facilitate real-time interjurisdictional and team-based communication.
- Promote the science and the capacity and workforce competency to use new public health surveillance tools and methods.

To achieve these aims, BioSense is changing the way it does business as a Program and as a system. The BioSense Program in the past was driven as an IT, or systems program and suffered from a lack of strong epidemiology/surveillance professional oversight, control, and direction setting. The establishment of cooperative agreements with CSTE, NACCHO, and ASTHO in 2011 and the TEP in 2010 provides much-needed epidemiological and public health guidance and oversight for the Program going forward.

These concrete steps give key stakeholder organizations greater ownership of the BioSense system and represent a significant and positive change. Yet, much more capacity building must occur to achieve high levels of collaboration and participation. The BioSense Redesign in partnership with stakeholder organizations will provide a substantial amount of technical assistance and guidance to develop capacity and workforce competencies for BioSense 2.0.

Moreover, the BioSense Program has also committed additional significant investments for capacity building. In 2010, $3 million in BioSense funding was allocated to state and local jurisdictions through the Epidemiology and Laboratory Capacity (ELC) Cooperative Agreement. Through the consolidation of contracts and effective use of resources and technology options, this investment was more than tripled to $9.5 million in 2012. The latter amount represents a third of the BioSense appropriation. These investments will need to be closely coordinated with related investments in the Public Health Emergency Preparedness (PHEP) Cooperative Agreements and the Meaningful Use incentive program.

The launch date of November 2011 for BioSense 2.0 will allow health departments a means for their local providers (primarily hospitals) to use syndromic surveillance to meet the Stage I requirements of the Meaningful Use incentive program. (http://www.cms.gov/EHRIncentivePrograms/Downloads/Hosp_CAH_MU-TOC.pdf.) Providers who have no means of demonstrating capacity for syndromic surveillance because their health department cannot accept electronic data will be excluded from this requirement and, thus have less incentive to to participate in BioSense 2.0 or any other kind of syndromic surveillance effort. So ensuring that all providers and health departments that wish to participate in syndromic surveillance can do so in Stage 1 is critical to the BioSense 2.0 recruitment effort.

Table 7-1 presents key aims, needs, and BioSense 2.0 solutions articulated in this plan and provides the rationale for the proposed changes and refinements to the BioSense Program, application, and system.

Table 7-1. Alignment of Stakeholder Requirements to BioSense Aims and Solutions

BioSense Aim	Stakeholder Requirement	BioSense Redesign Solution
Incorporate state and local public health input into Program design and governance	▪ Clear mission and purpose ▪ Brief, meaningful, periodic outreach	▪ Kickoff Webinar ▪ Biannual TEP meetings ▪ User requirements gathering ▪ Weekly association calls ▪ BioSense Redesign Collaboration Web site
Promote a proactive, collaborative, and transparent community	▪ Trust and transparency ▪ Clear indication of CDC financial and technical commitments ▪ Compelling messages that convey BioSense2.0 mission, purpose, and rationale ▪ Messages that counter negative perceptions and views ▪ Leverage emerging communication	▪ Model data-sharing agreement developed with partners ▪ Increased BioSense funding to state and local jurisdictions ▪ Detailed Communication Plan and strategies for key stakeholders

technologies and social media

(continued)

Table 7-1. Alignment of Stakeholder Requirements to BioSense Aims and Solutions (continued)

BioSense Aim	Stakeholder Requirement	BioSense Redesign Solution
Promote the use of clinical care and EHR records for Meaningful Use and interconnection with health IT systems	▪ Technical support to leverage Meaningful Use	▪ Feasible set of minimum Meaningful Use data elements for BioSense 2.0 ▪ Engagement with the EHR vendor community
Improve the utility of the data/data sources	▪ Data for routine surveillance: ED, OTC, poison control, lab results, diagnostic, and Meaningful Use data ▪ Data for emergency surveillance: case records, school/work absenteeism and essential personnel, and equipment ▪ Common case definitions ▪ Flexibility to create or combine syndromes and query data ▪ Powerful, customizable statistical testing and predictive tools ▪ Customizable visualization tools ▪ Functionality to support downloading and exporting of reports and graphics ▪ Contextualized alerts and assessments ▪ Track trends prospectively and retrospectively ▪ High system performance: sensitivity, specificity, timeliness, and representativeness	▪ Users determine type and amount of data to share with BioSense 2.0 ▪ Software tools for basic to advanced analytics ▪ Quality assurance checks and audits ▪ Leveraging economies of scale through large data aggregators and health systems ▪ Mapping and graphics tools ▪ Multiple exporting and reporting capabilities ▪ Customized alerts
Move toward an open, distributed computing model	▪ Enhanced data storage capacity ▪ Up-to-date software applications ▪ Up-to-date operating systems ▪ Exchange of data using variety of formats	▪ Cloud-based computing environment ▪ Software services ▪ Infrastructure services ▪ Data transformation services
Facilitate real-time interjurisdictional and team-based communication	▪ Regional and national views for all hazard conditions ▪ Views of neighboring localities and departments ▪ Single dashboard to many, providing ease of access ▪ Mobile-optimized application for use on Smartphones ▪ Collaboration tools for communication with peers	▪ Tiered access for selected users ▪ Smartphone compatible features ▪ Capabilities to share data and reports via multiple devices and applications

(continued)

Table 7-1. Alignment of Stakeholder Requirements to BioSense Aims and Solutions (continued)

BioSense Aim	Stakeholder Requirement	BioSense Redesign Solution
Promote the science and the capacity of the workforce to use new public health surveillance tools and methods	▪ Epidemiologists skilled in syndromic surveillance and informatics ▪ Short courses, seminars, Webinars ▪ Collaborations with APCs and universities ▪ Materials posted to Collaboration Web site	▪ Technical assistance for individuals and groups of users ▪ Challenge grants/awards

7.2 Performance Reporting and Outcome Measurement

The progress toward achieving the aims outlined previously is captured through appropriate, credible performance measures. As shown in Table 7-2, the BioSense Program has two performance measures: (1) Program operations and maintenance, and (2) capacity building. These measures were instituted in recognition that the robustness of the system is predicated on the number of users providing and using the data, the amount of resources provided to state and local levels to participate in BioSense, and the percentage of the U.S. population under surveillance.

Table 7-2. BioSense Performance Measures

Performance Area	Performance Measure
Program Operations and Maintenance	
Participation	▪ Number of distinct users ▪ Number of user administration certificates
System usage	▪ Number of application log-ins ▪ Number of records transmitted ▪ Number of servicing sites reporting
Servicing site “uptime”	▪ Application session time (minutes)
Capacity Building	
Resources	▪ Type and amount of BioSense funding distributed to state and local jurisdictions
Connectivity to the BioSense network	▪ Number of jurisdictions connected to BioSense
ED coverage	▪ Percentage of EDs in BioSense

Since the BioSense Redesign began, these performance measures have been reported in quarterly Risk Management Reports beginning in October 2011. The TEP received an initial briefing on the performance measures in February 2011, but the BioSense Program decided to delay a substantive review until after the completion of the base year when the future

direction and shape of the BioSense would be better defined. In a response to a GAO information request in June 2011, the BioSense Program outlined steps to conduct a formal review and realignment of these performance measures and agreed to establish a workgroup to carry out performance setting tasks by September 30, 2011.

A key consideration of the workgroup is that BioSense 2.0 marks a significant departure from the legacy system, and selection of performance measures can only take place as part of a larger discussion and articulation of the Program's mission, aims, and objectives. The Program's new performance measures should capture the outcomes and impact of BioSense 2.0 on situation awareness and reflect industry standards for technology performance and highlight the Program's new collaborative, user-centered architecture. Areas of performance that are not currently captured include population coverage, availability, utility, usability, and efficiency (including cost, time, and other resource efficiencies).

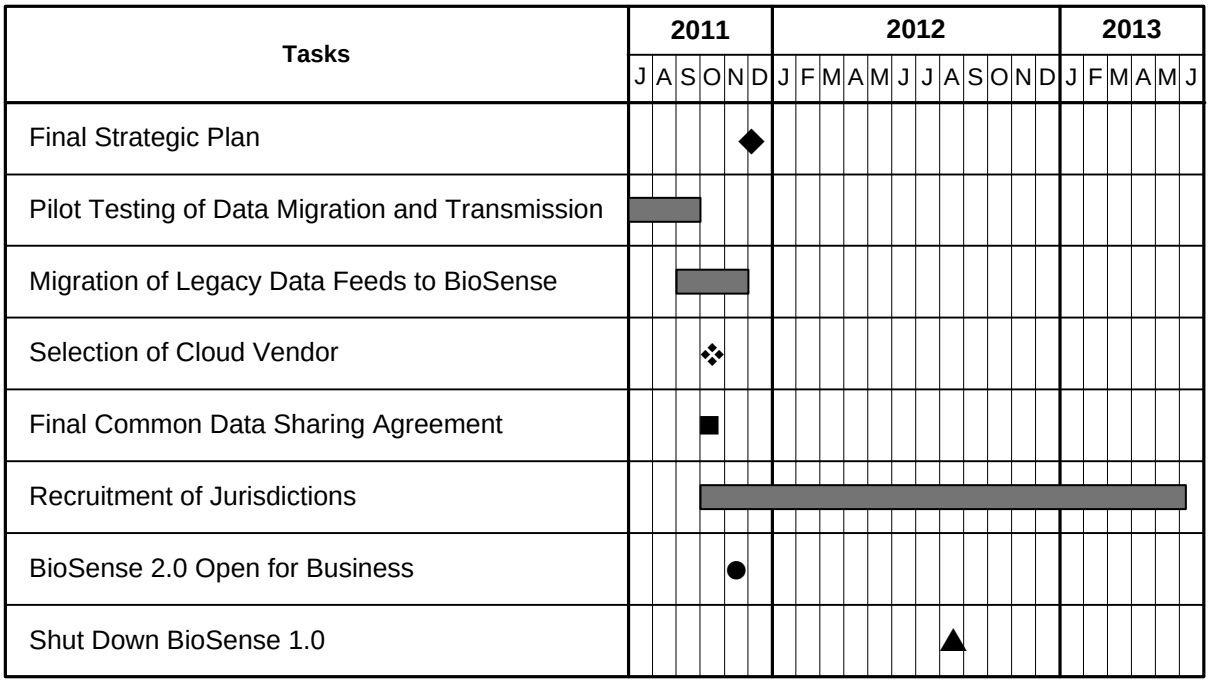
7.3 Timeline of Milestones for BioSense System and Program Redesign

By November 15, 2011, BioSense 2.0 will launch a community-controlled environment (architecturally distributed in a cloud-based model) governed by ASTHO, in coordination with CSTE, NACCHO, and ISDS. State and local health departments can use BioSense 2.0 to host their current syndromic surveillance systems and support potential expansions under the Meaningful Use program. By integrating local- and state-level data into a cohesive "picture," BioSense 2.0 will improve its utility for state and local users and align it more closely to national public health surveillance priorities under Meaningful Use, PAHPA, and HSPD-21, which call for regional and nationwide public health situation awareness, through an interoperable network of systems, built on existing state and local situation awareness capability.

The launch of BioSense 2.0 will be carried out in conjunction with a discontinuation, scaling back, and redirection of the existing "deep" clinical feeds from the hospitals currently reporting into the legacy system. As noted earlier, these feeds are expensive to maintain and many of the hospitals wish to discontinue their participation so they can focus on meeting new Meaningful Use requirements. The BioSense Program is identifying states and localities that wish to continue to receive these deep clinical data and exploring alternative strategies and data-sharing arrangements to allow continued access to these data. Furthermore, addressing the maintenance of deep clinical data feeds will be important for programs at CDC that have to depend on these data.

To achieve the implementation of BioSense 2.0, key milestones will need to be achieved by June 2013, the end of the redesign period. Figure 7-1 presents the timeline for these key milestones.

Figure 7-1. Timeline for Key Milestones



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