

Sharing and Visualizing Infectious Disease Datasets Using the WNV-BOT Portal System

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1. Project Background

Infectious disease outbreaks are critical threats to public health and national security. Information systems play a central role in developing an effective comprehensive approach to prevent, detect, respond to, and manage infectious disease outbreaks of plants, animals, and humans.

Currently, a large amount of infectious disease data is being collected by various laboratories, health care providers, and government agencies at all levels. Despite significant data integration and reporting efforts from the federal government, existing infectious disease information systems do not fully interoperate. Data sharing and reporting/alerting across jurisdictions are far from efficient and typically involve extensive human interventions. Funded by the National Science Foundation through its Digital Government Program and the Intelligence Technology Innovation Center, we have been developing scalable technologies and related standards and protocols to deal with these data sharing and dissemination challenges and conduct research to significantly improve the data analysis and exploration environment used by infectious disease researchers, practitioners, and policy makers. Initiated in October 2003, our project has been focused on two prominent infectious diseases: *West Nile Virus* (WNV) and *Botulism*. These two diseases were chosen as our first target because of their significant public health and homeland security implications and the availability of related datasets in both New York and California states.

After an intensive 4-month research and system development effort, we have completed a research prototype called the *WNV-BOT Portal* system. This system provides integrated, Web-enabled access to a variety of distributed data sources related to WNV and Botulism. It also provides advanced information visualization capabilities as well as predictive modeling support.

2. WNV-BOT Portal System Overview

The WNV-BOT Portal system has been developed to integrate infectious disease datasets on WNV and Botulism from New York, California, and several federal data sources. Figure 1 illustrates the main

components of the system and shows the main data flows between them and the underlying WNV/Botulism data sources.

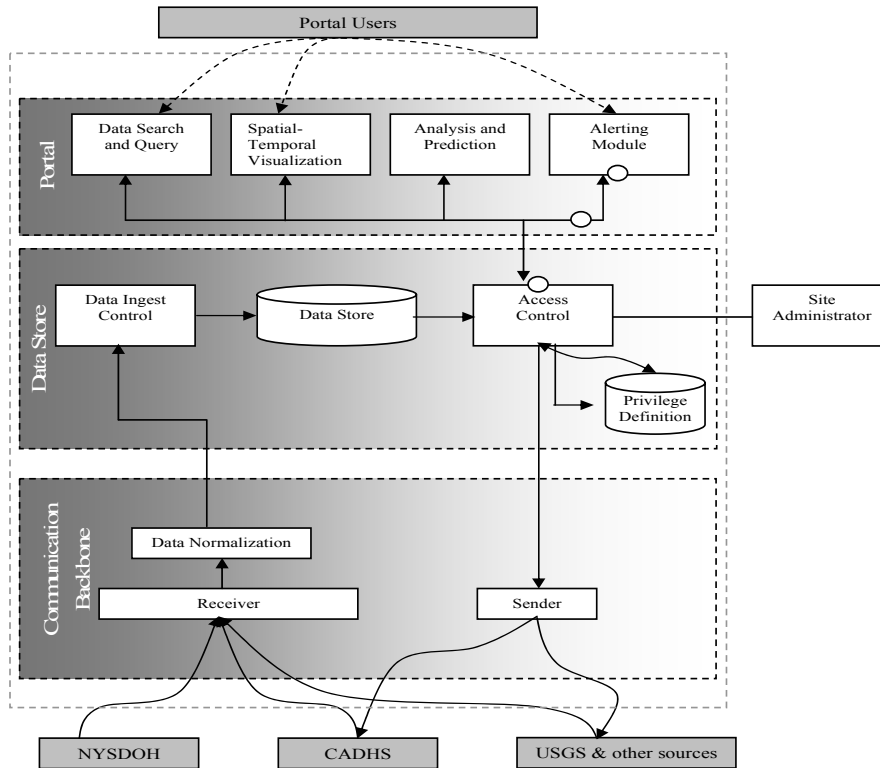


Figure 1. WNV-BOT Portal System Overview

3. Demo Plan

We will demonstrate the key functionalities of the WNV-BOT Portal system. We plan to emphasize the following aspects of the WNV-BOT Portal system through system demonstration.

- The scalable design of the Portal’s internal data store based on Health Level Seven (HL7)/XML standards
- Real-time data feed from state public health systems to WNV-BOT Portal using both “push” and “pull”-based approaches
- Two complete use case scenarios to illustrate the entire Web-enabled process of accessing, querying, and analyzing infectious disease datasets collected from distributed sources. Both scenarios will involve the use of a spatial-temporal visualization tool that has been integrated into WNV-BOT Portal. This tool can be used to visualize a number of spatial temporal datasets simultaneously. It provides three integrated and synchronized views: periodic, timeline, and GIS. The periodic view provides the user with an intuitive display to identify periodic temporal patterns. The timeline view provides a 2D timeline based on Gantt chart along with a hierarchical display of the data elements organized as a tree. The GIS view displays cases and sightings on a map.