National Biosurveillance Integration Center

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Office of Health Affairs
Department of Homeland Security

Agenda

Why national biosurveillance?

How does NBIC do biosurveillance integration?

What is the NBIC operations impact?

Pilot projects

Why National Biosurveillance Integration?

- Acute, emergent biological events can be caused by
  - Biological agents
  - Chemical agents
  - Radiological agents
  - Environmental conditions
- Impacting
  - Human health
  - Animal health
  - Agriculture
  - Environment, ecology, and water

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National Biosurveillance Integration Center

- National Biosurveillance Integration Center (NBIC)

  - Chartered by the Implementing Recommendations of the 9/11 Commission Act of 2007 (Public Law 110-53)

  - Housed in the Department of Homeland Security

  - Coordinates comprehensive national biosurveillance and situational awareness

  - Collaborates with the interagency community to acquire, integrate, analyze, and disseminate information pertaining to emerging biological events and their impact on US interests in order to:

    - Provide indications and warnings to NBIS partners

    - Provide situation awareness to NBIS partners

- NBIC Mission

  - "[The mission is] to <u>disseminate alerts and other information</u> to Member Agencies and, in coordination with (and where possible through) Member Agencies, to agencies of State, local, and tribal governments, as appropriate, <u>to enhance the ability of such agencies to respond to a biological event of national concern</u>" – P.L. 110-53

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National Biosurveillance Integration System

- National Biosurveillance Integration System (NBIS)

  - Chartered by the Implementing Recommendations of the 9/11 Commission Act of 2007 (Public Law 110-53)

  - <u>Interagency community</u> providing national biosurveillance and situational awareness

  - Provides the collective framework to acquire, integrate, analyze, and disseminate information pertaining to emerging biological events and their impact on US interests

- NBIS Mission

  - National Biosurveillance Integration System (NBIS) <u>enhances the identification, location and tracking of biological events potentially impacting homeland security</u> by uniquely integrating information and data and leveraging interagency communications and relationships. NBIS supports prevention and mitigation of such events by providing timely notifications and ongoing situational awareness to enhance response of government agencies. (June 30, 2010)

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National Biosurveillance Integration System (NBIS)

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NBIC Strategic Vision and Mission

Strategic Vision

Advance the safety, security, and resilience of the nation by leading an integrated biosurveillance effort that facilitates early warning and shared situational awareness of biological events.

Mission

Enable early warning and shared situational awareness of acute biological events and support better decisions through rapid identification, characterization, localization, and tracking.

Strategic Plan Outline

1. State of Biosurveillance

- Background
- Continued challenges (collaboration, information integration and sharing, analysis, user-defined reporting)
- Purpose of the strategic plan: Establishing a shared understanding NBIC and NBIS missions

National Biosurveillance Integration Center Strategic Plan

November 2012

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2. NBIC Current Operations

- Continuous biosurveillance: A daily NBIS collaboration
- Real-time biosurveillance decision support capabilities

3. Path toward Implementation

- Outline of vision, mission, goals, strategic objectives, and activities
- Activities include pilot efforts executed through an emergent strategy approach

https://www.dhs.gov/publication/nbic-strategic-plan

NBIC Strategic Goals and Objectives

GOAL 1

Build and maintain enduring processes to support interagency collaboration and operations through the NBIS and other partnerships.

Objectives

Maintain interagency working group

Continue to evolve Concept of Operations with NBIS Partners

Provide the infrastructure for integration of systems and partners

Provide technical assistance to contributing partners

GOAL 2

Enhance federal government ability to rapidly identify, characterize, localize, and track a biological event of national concern.

Objectives

Consolidate information from available relevant surveillance systems maintained by NBIS partners

Seek state, local and private sector information to enhance coverage of critical gaps

Incorporate an IT system that uses the best available tools to identify, characterize, localize, and track biological events of national concern

GOAL 3

Enhance federal government ability to disseminate alerts and other information to partners and stakeholders.

Objectives

Mature and strengthen real-time communication and 24 hour support to the NOC

Implement and execute information sharing with intelligence entities

GOAL 4

Mature and strengthen NBIC into a world-class biosurveillance analysis and integration organization.

Objectives

Recruit, develop, and retain a multi-disciplinary federal analytic staff to develop and operate the NBIC

Recruit technical expertise in bio-specific data analysis and interpretation

Support professional growth and development through training opportunities
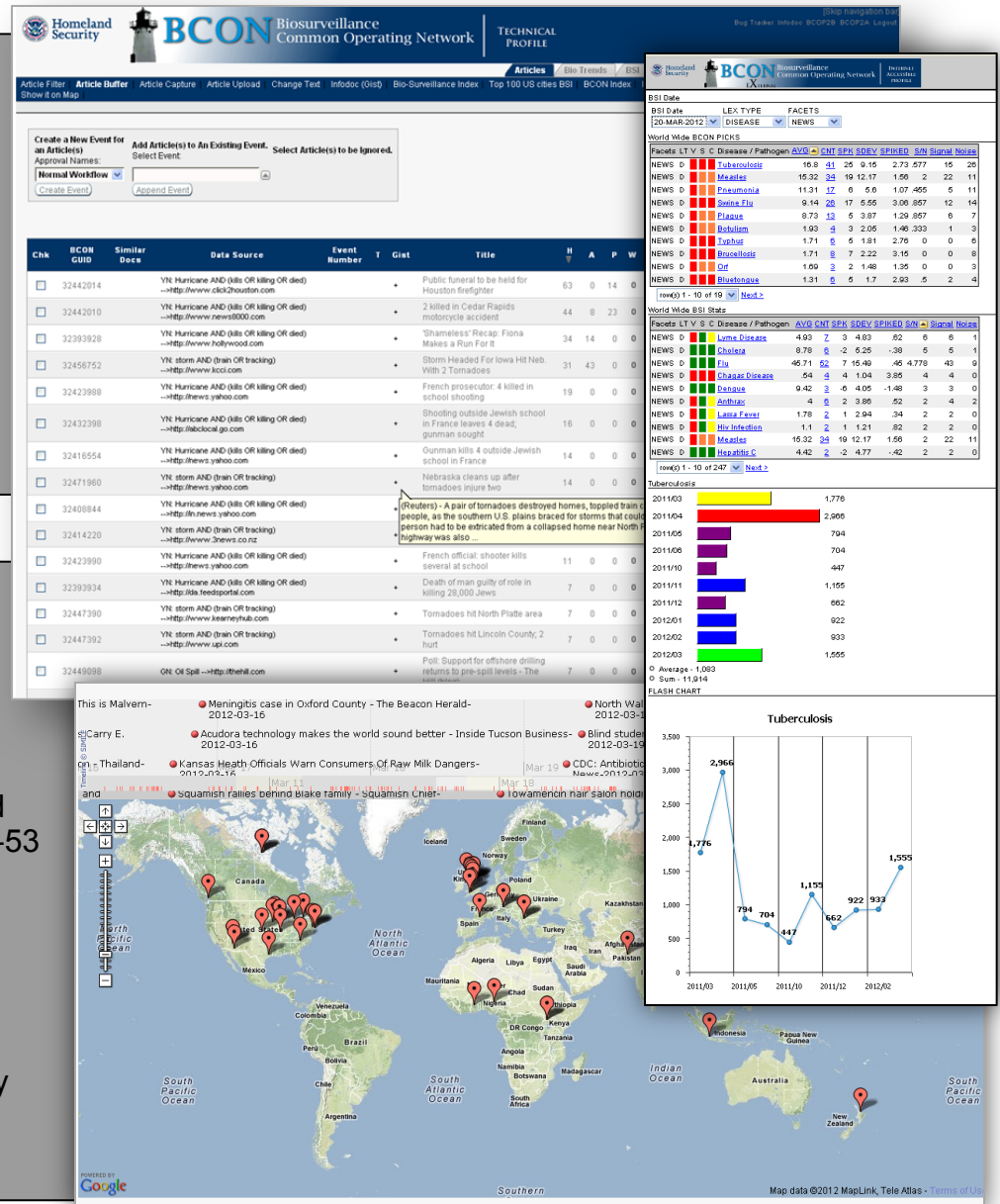
Biosurveillance Common Operating Network (BCON)

System Status Overview

- 7m maintained published content factors:
- 24k sources
- 10k articles per day
- 2 minute acquisition frequency
- Over 30 integrated subsystems
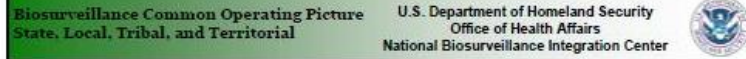- 8k taxonomy terms
- 6k search terms

Capabilities

- National and Worldwide Situational Awareness
- Natural Language Processing
- GIST reporting
- Geo-Temporal Visualization
- Documented Information categorization tracking and scoring by public health domain according to PL110-53
- Graphical Analytics and Data Visualization
- Real-time Crowdsourcing / Social Networking
- Information Sharing
- Automatic Infodoc generation
- Intelligent Event Detection
- Biosurveillance Statistical Index Reporting Capability
- Event tracking and SME collaboration capability
- Independent taxonomy management

NBIC Reports

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Biosurveillance Common Operating Picture State, Local, Tribal, and Territorial	U.S. Department of Homeland Security Office of Health Affairs National Biosurveillance Integration Center

Blue text (including underlining) indicates new information.

Significance: Public Health
Who: N/A
What: Fungal Meningitis
Where: U.S.
Date of Incidents: N/A
Dates of Previous Reports: 4Oct12, 9Oct12, 12Oct12, 16Oct12, 18Oct12, 5Nov12
Date of Report: 04 December 2012
CIR[1]: 1, 4

Executive Summary

As of Monday 3 December 2012 (2:00 PM EDT), the ongoing outbreak of fungal infections linked to steroid injections has resulted in 541 total cases (including 36 deaths) in 19 states. The cases are afflicted by a myriad of issues including fungal meningitis, stroke due to presumed fungal meningitis, other central nervous system-related infections meeting the outbreak case definition, peripheral joint infections, and epidural abscesses. The fungal form of meningitis is uncommon and is not communicable person-to-person. Most of the infected cases had received an epidural steroid injection with a contaminated product. The Massachusetts compounding pharmacy (the New England Compounding Center, NECC) that prepared the injectable steroid (methylprednisolone acetate, MPA) linked to the outbreak, has recalled all of its products in circulation and voluntarily suspended operations. Ameridose LLC, which is a Massachusetts-based compounding pharmacy that shares ownership with NECC, has suspended operations and recalled all of its products due to FDA concerns regarding lack of sterility assurance at its facility. The CDC and FDA have not received any reports of infections related to these recalled products.

The U.S. Food and Drug Administration (FDA) now suspects fungal contamination is possible in all of the supposedly sterile products made by NECC on or after May 21, 2012. According to the CDC, as many as 14,000 patients across 23 states may have been injected with the potentially contaminated steroid products, although not everyone who received the medicine will become sick. The CDC and FDA have advised health care practitioners not to use any of the company's products out of an abundance of caution. The CDC, FDA, and state health departments are working collaboratively in this ongoing investigation. More meningitis cases are expected to be identified in coming days and weeks.

Background

Fungal meningitis is a rare form of meningitis which usually occurs in immunocompromised people, not healthy individuals. Meningitis is normally seen as a result of bacterial or viral infection. Meningitis is caused by the inflammation of the meninges, which are protective membranes covering the brain and spinal cord. Symptoms associated with fungal meningitis include moderate to severe headache, nausea, dizziness and fever. Other symptoms can include slurred speech, unsteady gait, urinary retention, weakness, and/or sensory deficit.[2] The CDC lists the following symptoms as reasons for concerned patients to promptly contact their physician: new or worsening headache, fever, sensitivity to light, stiff neck, new weakness or numbness in any part of the body, slurred speech, and increased pain, redness or swelling at the injection site or a new neurological deficit consistent with a deep brain stroke.[3][4]

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[1] Critical information requirements (CIRs): 1) Anomalous levels of disease in humans, animals, or plants. 2) Actual or planned intentional misuse of a CBRN agent. 3) RFIs among NBIS Member Agencies. 4) High visibility biological events. 5) Disasters that may cause major casualties, evacuation, sheltering, or significant infrastructure damage
[2] https://news.tn.gov/node/9678
[3] http://www.cdc.gov/hai/outbreaks/patients/faq-meningitis-outbreak-patients.html
[4] http://www.cdc.gov/media/releases/2012/t1011_meningitis_outbreak.html

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Variant Influenza Viruses in Humans

Early collaboration with state entities

- Early communication was established with the Ohio Department of Health in July 2012 following reports of H3N2v
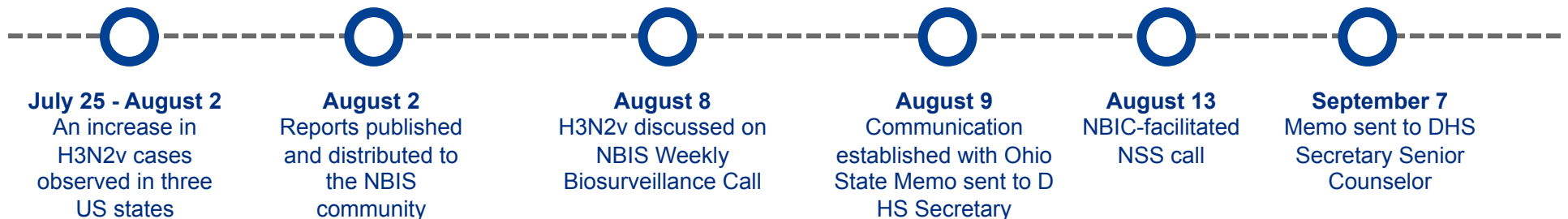
Interagency communication

- At the request of the NSS, NBIC facilitated a call with SMEs from USDA, CDC, and representation from 11 other federal agencies

- Redistributed potential Public Health Emergency of International Concern (PHEICs), originally issued by the Department of Health and Human Services (HHS), to NBIS partners

Senior leadership awareness

- NBIC drafted a report for the Secretary of DHS and Senior Counselor to the Secretary of DHS

NBIC Value

Early communication with state health officials provided initial local biosurveillance information. NBIC linked portions of USDA and CDC with unique authorities to share information with each other and the interagency regarding human and animal health

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July 25 - August 2	August 2	August 8	August 9	August 13	September 7
An increase in H3N2v cases observed in three US states	Reports published and distributed to the NBIS community	H3N2v discussed on NBIS Weekly Biosurveillance Call	Communication established with Ohio State Memo sent to DHS Secretary	NBIC-facilitated NSS call	Memo sent to DHS Secretary Senior Counselor

Biosurveillance Functions During Hurricane Sandy

Transition to Special Event Tempo

- Worked with partners to gather and integrate information related to Hurricane Sandy response and recovery efforts (FEMA operations briefing, ESF 8 conference call, OHA senior leadership meeting)

- Worked with partners to gather and integrate information related to Hurricane Sandy response and recovery efforts across all domains

Specialized Reports and Biosurveillance

- Added additional taxonomy terms in BCON to closely monitor events associated with Hurricane Sandy

- Created multi-domain biosurveillance daily report for Senior DHS Leadership to monitor events related to Hurricane Sandy

- Created special report focused on human health threats associated with natural disasters

NBIC Value

Following a significant natural disaster, NBIC provided critical integrated information to senior leadership

October 22
A tropical depression forms in the southern Caribbean Sea off the coast of Nicaragua.

October 29
Hurricane Sandy makes U.S. landfall and NBIC begins daily reporting

November 8
NBIC informs the Secretary of DHS of biosurveillance issues before her trip to NY post-hurricane

Little League World Series Williamsport, PA

Collaboration with State entities

- Pennsylvania Department of Health and the PA State Police requested global biosurveillance information from OHA through the PA Fusion Center

Information Dissemination to State entities

- Provided critical biosurveillance information within 24 hours of request for situational awareness to local authorities

- Provided up-to-date information on significant issues in the countries of the Little League World Series participants
  - Ebola outbreak in Uganda
  - Hand, Foot, and Mouth Disease in Japan and Taiwan
  - Tuberculosis in Uganda and Taiwan

NBIC Value

In preparation for a significant international event, NBIC provided critical information which was previously unavailable to state agencies

Tuesday July 31, 2012
Request received by NBIC to provide potential health threats on incoming countries for LL World Series

Wednesday August 1, 2012
NBIC provides report on the LL World Series biosurveillance concerns

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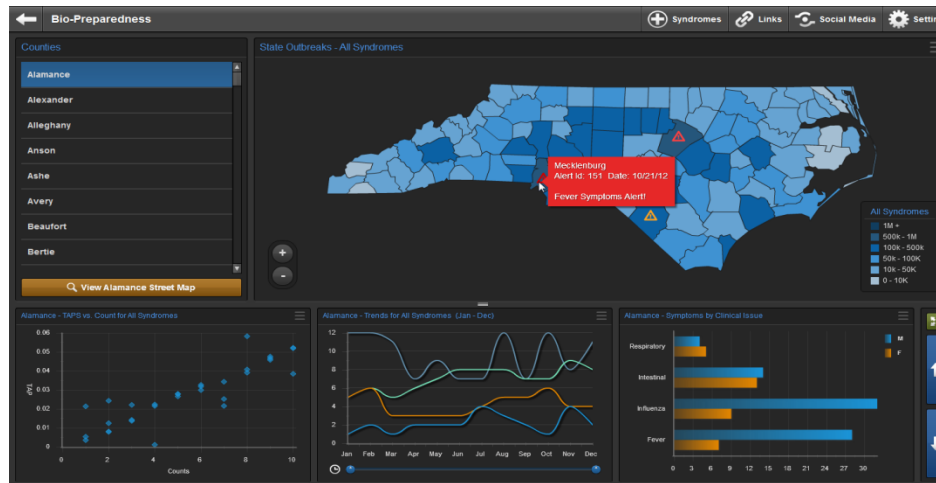
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NBIC Pilot Programs

- National Collaborative for Bio-Preparedness (NCB-P)

  - Analyzes emergency medical service, emergency department, and other novel data sets

  - Seeks to enhance syndromic surveillance, improve situational awareness, better inform policymakers, and gain deeper insight into the quality of healthcare systems
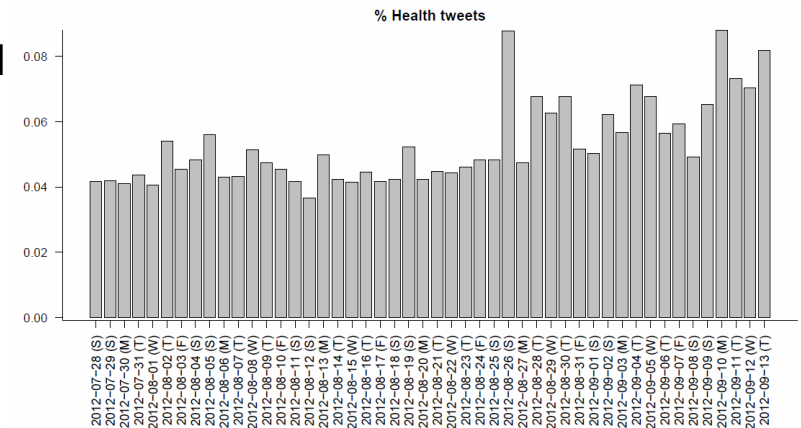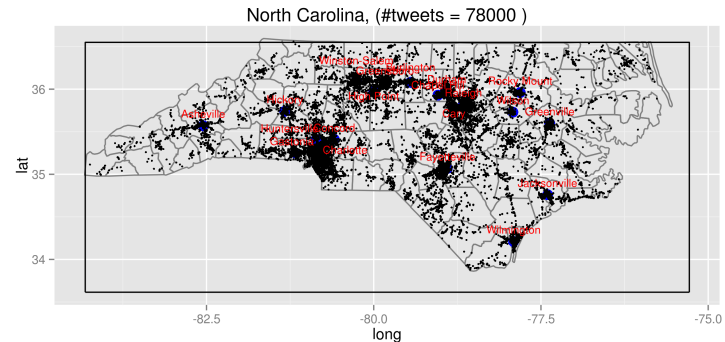

- Food pilot

  - Expands the information collection of PCCs through enhanced coding of food, national guidelines, and training for a food safety help line call center

  - Applies refined analytics to food-related data for possible early indications of a biological event such as food poisoning

- Social Media pilots

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Social Media Pilot – Applied Science

North Carolina, (#tweets = 78000)

- Currently collecting tweets from the state of North Carolina and characterizing data
  - Number of tweets per day; number and accuracy of geo-located tweets; number of users; tweets with links; containing certain "health" terms; percent of health-related tweets

- Machine learning approaches:
  - k-nearest neighbor, linear discriminator, and random forests
  - also considering a hybrid that uses a few simple rules to eliminate obvious errors, combined with one of the above
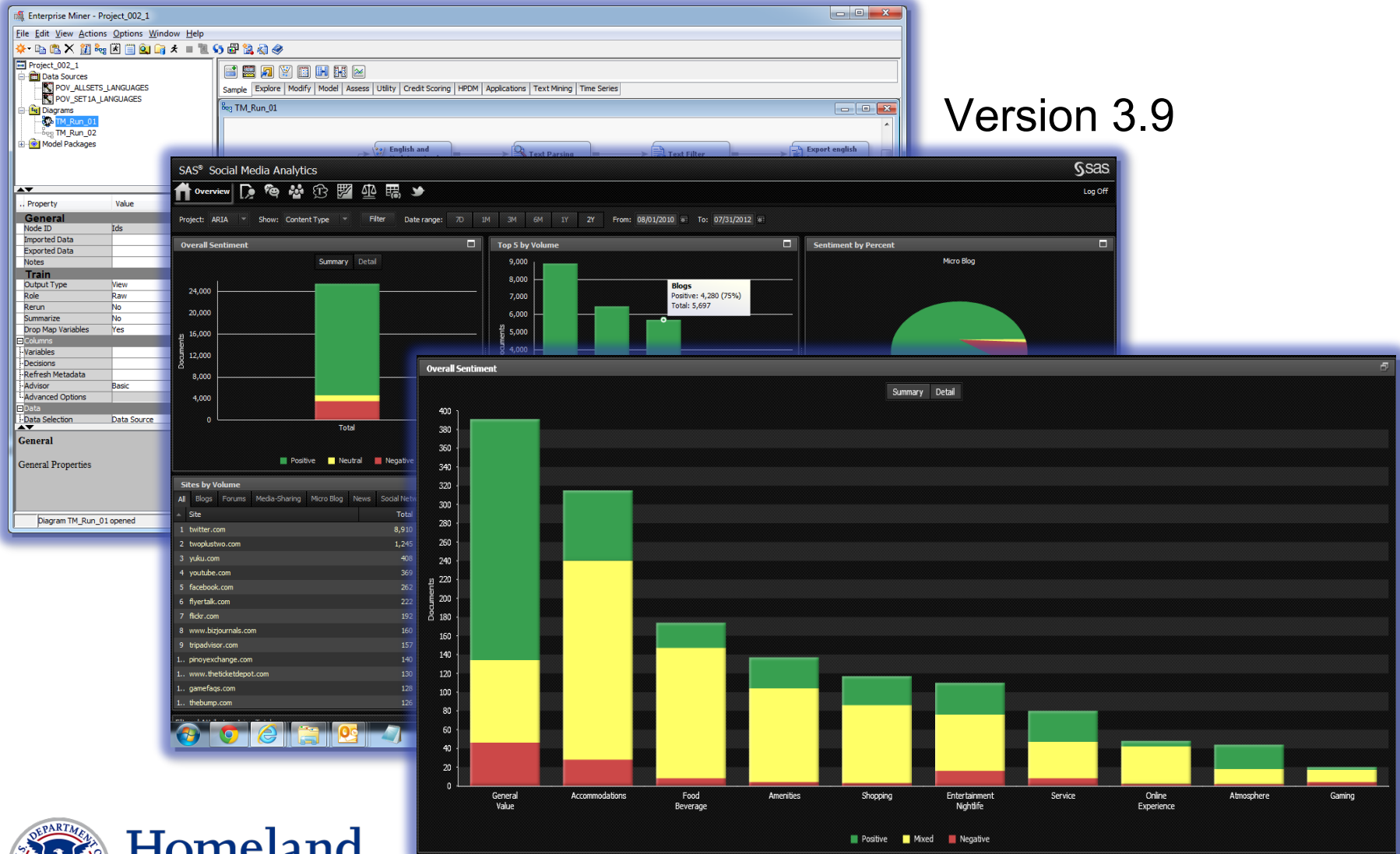

% Health tweets

Social Media Pilot – Operational Capability

- Accenture/SAS

  - Integrates and analyzes data gleaned from unstructured comments or conversations occurring across disparate online/social media sites as well as offline sources

  - Enable NBIC to better understand topics and sentiment around salient topics for the purposes of early warning, situational awareness, and informing engagement decisions

  - SMA Capabilities:

    - Up to 5 Master Search Topics

    - Standard concept and sentiment rules for natural language processing according to classification/taxonomy structure

    - Acquisition, cleansing, and integration of social media data from multiple data sources

    - Up to 3,000,000 documents

    - Daily refreshes of information on the web-based interface

    - Full range of standard reports through a web-based interface and access to 15 OHA analyst

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SAS Social Media Analytics

Version 3.9

Contact Information

- Website:
  - http://www.dhs.gov/national-biosurveillance-integration-center

- Email:
  - NBICOHA@hq.dhs.gov

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