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NBIC Biofeeds: Deploying a New, Digital Tool for Open Source Biosurveillance across Federal Agencies

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Objective

The National Biosurveillance Integration Center (NBIC) is deploying a scalable, flexible open source data collection, analysis, and dissemination tool to support biosurveillance operations by the U.S. Department of Homeland Security (DHS) and its federal interagency partners.

Introduction

NBIC integrates, analyzes, and distributes key information about health and disease events to help ensure the nation's responses are well-informed, save lives, and minimize economic impact. To meet its mission objectives, NBIC utilizes a variety of data sets, including open source information, to provide comprehensive coverage of biological events occurring across the globe. NBIC Biofeeds is a digital tool designed to improve the efficiency of analyzing large volumes of open source reporting and increase the number of relevant insights gleaned from this dataset. Moreover, the tool provides a mechanism to disseminate tailored, electronic message notifications in near-real time so that NBIC can share specific information of interest to its interagency partners in a timely manner.

NBIC is deploying the tool for operational use by the Center and eventual use by federal partners with biosurveillance mission objectives. Core functionality for data collection, curation, and dissemination useful to other federal agencies was implemented, and NBIC is incorporating custom taxonomies for capturing metadata specific to the unique missions of NBIC partners.

Methods

NBIC intends to implement operational use of the capability in FY 2018. The core components of the system are data collection, curation, and dissemination of information deemed important by NBIC subject matter experts. NBIC Biofeeds has captured information from more than 70,000 unique sources published from around the globe and presents, on average, 9,000 new biosurveillance-relevant articles to users each day. NBIC leverages a variety of data feeds, including third party aggregators like Google and subscription-based feeds such as HealthMap, as well as Really Simple Syndication (RSS) feeds and web-scraping of highly relevant sources.

The NBIC biosurveillance taxonomy embedded in the tool consists of more than 600 metadata targets that cover key information for understanding the significance of an active biological event, including etiologic agents, impact to humans and animals (e.g., infection severity, healthcare workers involved, type of host), social disruption, infrastructure strain, countermeasures engaged, and 'red flag' characteristics (e.g., pathogen appearance in a new geographic area, unusual clinical signs). This taxonomy serves as a foundation for data curation and can be tailored by NBIC partners to more directly meet their own mission objectives.

At this time, metadata is predominately captured by NBIC analysts, who manually tag information, which triggers the population of three automatically-disseminated products from the tool: 1) the NBIC Daily Biosurveillance Review, 2) immediate and daily summary email notifications, and 3) custom-designed RSS feeds. These products are meant for individual recipients in the federal interagency and for consumption by other biosurveillance information technology systems, such as the Department of Defense, Defense Threat Reduction Agency (DTRA) Biosurveillance Ecosystem (BSVE). NBIC is working in partnership with DTRA to integrate NBIC Biofeeds as an application directly into the BSVE and further develop the BSVE as an all-in-one platform for biosurveillance data analytics.

To improve the efficiency and effectiveness of gaining insights using NBIC Biofeeds, developers of the tool at the Pacific Northwest National Laboratory (PNNL) are researching and testing a variety of advanced analytics techniques focused on: 1) article relevancy ratings to improve the review of queried data, 2) significance ratings to elucidate the perceived severity of an event based on reported characteristics, 3) full-text article retrieval and storage for improved machine-tagging, and 4) anomaly detection for emerging threats. Testing and implementation of new analytic capabilities in NBIC Biofeeds is planned for this fiscal year.

Results

NBIC Biofeeds was developed to serve as a sophisticated and powerful open source biosurveillance technology of value to the federal government by providing information to stakeholders conducting open source biosurveillance as well as those consuming biosurveillance information. In FY 2018, NBIC Biofeeds will begin operational use by NBIC and an initial set of users in various federal agencies. User accounts for testing purposes will be available to other federal partners, and a broad scope of federal stakeholders can receive products directly from NBIC Biofeeds based on their interests.

Conclusions

NBIC Biofeeds is expected to enable more rapid recognition and enhanced analysis of emerging biological events by NBIC analysts. NBIC anticipates other federal agencies with biosurveillance missions will find this technology of value and intends to offer use of the platform to those federal partners that can benefit from access to the tool and information generated from NBIC Biofeeds.

Keywords

NBIC; Biofeeds; Biosurveillance; Digital

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