

## ABSTRACT DETAILS

**Title of Paper: The Northrop Grumman Global Disease Surveillance Platform (or GDSP™) Prototype**

### SUBMISSION INFORMATION:

**Sector:** Information Technology

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### PAPER INFORMATION:

#### Abstract of Proposed Paper:

Population density and worldwide travel mobility increase the potential rate of disease spread, especially for easily transmitted diseases having emergent properties outside of normal population immunity. Early detection of epidemics of infectious diseases requires both real-time data and real-time interpretation of data (Mohtashemi et. al 2006). Web-based and other electronic information transmission systems provide accessible and resilient pathways over which information can rapidly move around the globe (Irvin et. al 2003). A rich variety of information processing capabilities, proven in other domains, can be tailored to assimilate information electronically received, positioning those monitoring the situation and those directing the response to act more knowledgeably. The platform provides an innovative merge between two Northrop Grumman domains, Northrop Grumman Information Technology (NGIT) and Northrop Grumman Mission Systems (NGMS). The approach taken integrates technology from other domains which have surveillance missions, specifically intelligence processing that can be converted for global disease surveillance. The platform synergizes these two domains and adds a GIS visualization process that provides early event detection and situation awareness in real-time. The Northrop Grumman Global Disease Surveillance Platform (or GDSP™) prototype was developed to provide responding organizations with timely access to critical information and equipped with a visualization process which offers situational awareness and makes timely analysis and response possible. Construction of the platform prototype focused on three specific areas: data acquisition and indexing, a data query user interface, and situational awareness/visualization and response. Data acquisition and indexing are responsible for processing data consumed by the platform. Data fusion components index, tag, and analyze both structured and unstructured data that link similar information together. The situation awareness components provide the platform with the ability to detect anomalies, clusters of potential events, predict the rate and spread of a disease outbreak, and provide the analysts and decision makers with tools, methodologies and processes to investigate the event and further enable and evaluate the timely and appropriate response. Various visualization, geospatial and spatio-temporal analysis and tools are key components that the platform supports. An implementation of a national early event detection and situational awareness system is fundamental to mitigate the threat of a pandemic (MMWR 2005). Preparedness planning and improved cooperation between localities, regions, states, and countries may be needed to share experience, and to enhance coherence of approaches (Mounier-Jack & Coker 2006). This paper will discuss 1) potentially useful information sources which include case definitions for influenza 2) applicable technology solution, 3) architect and design a robust platform prototype system and 4) construct and demonstrate a prototype of key functionality.

#### Unique technical contribution:

GDSP™ provides a unique blend of expertise and synergy between two Northrop Grumman sectors (NGIT and NGMS). NGIT brings important insight to data and analysis tools that health officials need in order to diagnose public health threats early. From their experience, NGMS provides a framework for how these data and tools can be integrated for ease of use, collaboration among analysts, and heightened situational awareness. The platform synergizes these two sectors along with a GIS visualization process that provides early event detection and situation awareness in real time.

**Technical contribution supports customer needs by:**

Any customer who is authorized to see public health/health data, and mostly have syndromic surveillance systems that need to be enhanced so that their results (e.g., statistical alarms) can be made more actionable. GDSP™ may also be positioned directly to the Government and Health Maintenance Organizations (HMOs). Potential Government customers include the CDC's BioSense, and DHS' National Biosurveillance Integration System (NBIS). Finally, HMO's including Kaiser and the Blues may well find GDSP™ very useful for in-depth analysis of what causes outbreaks as well as some chronic diseases, and thus help to limit their treatment costs and forecast and balance patient loads so that their services are saturated but not exceeded during outbreaks such as annual respiratory outbreaks. Metro Emergency Management sites (such as Los Angeles' Terrorism Early Warning group) are also possible GDSP™ customers. GDSP™ can take aggregated and anonymized Public Health data, and transform them into meaningful input for Public Safety's Crisis Response and Consequence Management systems. This keeps underlying Personal Health Information private, while distributing the top level data to managers with an appropriate need-to-know.

**Technical contribution supports Northrop Grumman technology needs by:**

Our deep experience in relevant information handling technologies applied in other domains with our detailed understanding of the nuances of public health domain information to develop an approach to shortening an important portion of the outbreak response timeline. The presentation of acquired information within its physical world context, and in a fashion that encourages collaboration, both among central co-located experts, and experts distributed in time and location. A second important aspect is the coupling of initial surveillance analysis to response planning, and the subsequent application of these surveillance analysis approaches to simultaneously monitor the spread of the outbreak and the effectiveness of response. This provides a means to orchestrate adaptation of response methods based on effectiveness and outbreak propagation.

**Technical contribution supports Northrop Grumman business needs by:**

Further position Northrop Grumman as a thought leader and advanced contributor and innovator in the fields of: 1. Bio/syndromic -surveillance systems at all levels (local -> regional -> national -> global) 2. Biosecurity and bioterrorism preparedness and response 3. Public health disease surveillance and response.

**Relation to current Northrop Grumman project/program:**

Currently an R&D internally funded effort by Northrop Grumman.

**Patent/patent application information:**

Global Disease Surveillance Platform (GDSP™), and Corresponding System and Method, subject for potential patent (application submitted July 25th, 2006- Taha Kass-Hout and Massimo Mirabito). GDSP™ is a global effort tackling national and global public health threats; such as pandemic influenza, monitoring, detection and enabling timely response. "A computer-implemented method for identifying and assessing public health events, and a corresponding system and apparatus, includes capturing public health-related information from structured and unstructured sources, where the information is contained in one or more documents, extracting meta-data from the captured public health-related information, creating an index of the extracted meta-data; archiving the meta-data and the documents, where the index links meta-data to its associated document, processing the extracted meta-data according to one or more detection algorithms to determine if an anomaly exists, and where an anomaly exists, providing a public health event notification, and monitoring and evaluating the responses to the public health events."

**Intended audience:**

Technologists, scientists, public health and health professionals, informatics specialists.

**Information regarding invention disclosures submission:**

Yes, inventors: Taha A. Kass-Hout and Massimo (Max) Mirabito, July 2006. Please also refer to Patent Application information provided above.

**Anticipated issues related to public release of information contained in the proposed paper:**

None.