

Argus: A Global Detection and Tracking System for Biological Events

James M. Wilson V, MD

Argus Research Operations Center, ISIS Center, Georgetown University Medical Center

Objective. This paper describes Project Argus, a novel foreign biological event detection and tracking system.

Background. Currently, official notification of international health threats is provided by the World Health Organization (WHO), in partnership with the Global Outbreak Alert and Response Network (GOARN), and supported legally through WHO's promotion of the International Health Regulations. WHO and GOARN utilize a service called the Global Public Health Intelligence Network (GPHIN) to scan media articles globally for references to disease outbreaks and epidemics. GPHIN is limited, however, by the volume of media material that can be processed in multiple languages. Additional limitations may prevent WHO from detecting and assessing a rapidly spreading epidemic, including the lack of a proper public health infrastructure in the country experiencing an outbreak, the involvement of a previously uncharacterized pathogen, or the WHO Member State's unwillingness to report the event. [1, 2] Unofficial mechanisms also exist for reporting international health threats, such as ProMED, a not-for-profit organization that relies on volunteers throughout the world who submit information about infectious diseases and surrounding issues. Most of these reports are media articles. In an attempt to display only the most relevant information, all submissions are processed by a group of volunteer moderators with substantial field expertise. This approach is limited by the number of staff available to process the volume of reports submitted throughout the world in multiple languages. [3, 4]

Methods. The purpose of Project Argus was to create and implement a global biological event detection and tracking capability that provides early warning alerts. The Argus analytic team consists of multilingual analysts that utilize proprietary state of the art online media processing software designed in collaboration with the MITRE Corporation combined with innovative open source analysis. We cover 34 languages with global sourcing. Identification of biological events is performed using a taxonomy of nearly 200 indicators coupled to a heuristic staging model called the Wilson—Collmann Scale. Once an event is identified, analysts then evaluate the report for possible posting as a Warning, Watch, or

Advisory. The framework for alerting was derived heavily from the natural disaster and meteorological communities. Reporting requirements for both event detection and alerting were developed by Argus and then reevaluated on a quarterly basis by the US government for constant operational refinement.

Results. Argus currently manages between 2,200 to 3,300 active, socially disruptive biological event case files with update report threading for approximately 175 countries and over 130 disease entities. This past influenza season, the Argus team issued nearly 3,000 event reports across 128 countries and 27 languages, which included 181 Advisories, 58 Watches, and 38 Warnings. We identified hundreds of reports of a possible H3N2 drifted virus escaping the current vaccine compilation beginning eight months ago in a multitude of countries and collaboratively worked with CDC to track this important finding. This information ultimately contributed to the decision process by the World Health Organization and its partners to change the southern hemisphere influenza vaccine to include an updated H3N2 strain.

Conclusions. In summary, Project Argus has changed the expectations for biological event detection. The Argus methodology has been reduced to practice on a global scale and is now recognized as a novel professional analytic discipline by the US government.

References.

1. Heyman DL, Rodier G. Global surveillance, national surveillance, and SARS. *Emerg Infect Dis*. Available from: URL: <http://www.cdc.gov/ncidod/EID/vol10no2/03-1038.htm> [accessed 2003 Feb].
2. World Health Organization. Global outbreak alert and response network [online]. Available from: <http://www.who.int/csr/outbreaknetwork/en/> [accessed 2005 May 23].
3. Woodall J, Calisher CH. ProMED-mail: background and purpose. *Emerg Infect Dis*. 2001;7(3 Suppl):563.
4. Madoff LC, Woodall JP. The internet and the global monitoring of emerging diseases: lessons from the first 10 years of ProMED-mail. *Arch Med Res*. 2005 Nov-Dec;36(6):724-30.