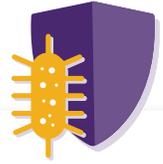




PennState

Applied Biological and
Biosecurity Research Laboratory



Layered Risk Modeling Analysis

Prototype tool for determining capacity investment options

Overview

The project goal is to develop a visual analytic to determine the effectiveness of a health care network to detect and respond to disease outbreaks. The analytic solution will comprise a suite of web-based tools that will determine appropriate health care network improvements by leveraging network flow models and ROI statistical analysis in measurements of population health, disease outbreak detection, and outbreak response. We anticipate enhancing the analytic to accommodate agent-based and disease specific models by integrating ARTEMIS with agent-based malaria models developed by Maciej Boni, a Penn State Biology Professor.

Objectives / Goals

We propose to create a novel computational tool integrated into a visual analytic suite that monitors biological sample analysis, information reporting flow, and transportation networks throughout the Guinea Healthcare System. The tool will optimize infrastructure investment, both for future projects and in near real time, in order to minimize risk of a disease outbreak be it naturally occurring or through the actions of bioterrorists.

Objective 1: Develop a deterministic computational tool that models infectious disease sample flow (biological analysis and transportation between Guinea health facilities) in order to determine the risk of an outbreak progressing undetected.

Objective 2: Develop an optimization algorithm that assesses the implications of infrastructure and/or personal investment strategies, planning, and responses on disease control in Guinea

Objective 3: Create a visual analytic suite that assists DoD decision makers in understanding the output of our risk model for Guinea. The user-centered analytic solution will facilitate informed DoD decision making to prepare for, and respond to, infectious disease threats or bioterrorism

Mission Area:

Community Engagement Driving
Health Security

Type: Software Prototype

Region: Africa

Countries: Guinea

Status: In Development



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Technical Approach

We have narrowed the scope of this project to completing our stated objectives using Guinea – a location in which we have built relationships and obtained access to the data required to build the computational tool – as a prototype. The visual analytic will be designed to accommodate additional healthcare systems and infectious diseases provided the input data meets appropriate analytic benchmarks. Our final deliverable will be mutually beneficial to the international community and the Chemical Biological Defense Program. We are uniquely positioned to deliver a TRL 8 product due to our extensive expertise in network analysis and our existing relationships with international partners: Fondation Mérieux, Pasteur Institute, as well as a Data Use Agreement and existing healthcare facility survey data from Guinea gathered from a previous project.

Partners

Funders:

- Seeking

Implementation / Scientific:

- Fondation Mérieux