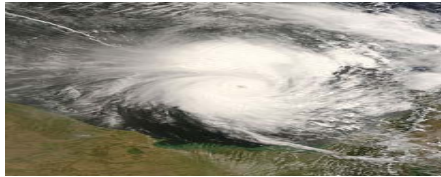


Motivation & Rationale

On May 2, 2008 Cyclone Nargis, the second deadliest named cyclone of all time hit Myanmar. Millions of people were affected by Cyclone Nargis. It was estimated that one million people would die without aid from other countries.



USPACOM embarked on a humanitarian mission to help the those affected by Cyclone Nargis. As part of this mission the need arose to **assess the threat of disease breakout in Myanmar** and dynamically **simulate the impact of both medical and nonmedical interventions**.



The Gryphon Infectious Disease Simulator was a natural fit for the challenges faced by USPACOM. Gryphon helps end users predict the effectiveness and cost of various medical and nonmedical intervention strategies on disease spread. It can help decision makers decide how best to mitigate the impact of disease outbreak.



Purpose

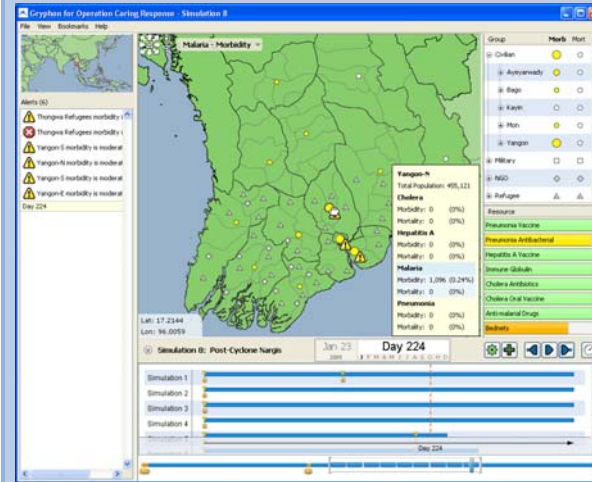
Gryphon is a course of action planning tool for helping decision makers better understand disease spread and how to mitigate the effects of a disease outbreak in their area of responsibility.

How does it work?

Gryphon's patented simulation engine combines standard SEIR differential equations with agent based systems. At each time step, differential equations are solved for each location and each disease. In order to spread the disease between locations, individuals from each location are allowed to travel based on airline data or proximity to nearby locations.

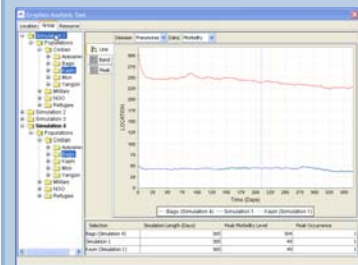
Creating Gryphon Models for OCR

Pre and post cyclone population data for refugees, civilians, military, and non-governmental organizations (NGO's) were gathered from WHO reports and other sources. Cholera, Pneumonia, Malaria, and Hepatitis A were selected as representative diseases as their methods of transmittal are typical of diseases encountered during relief operations. For each disease several medical and nonmedical interventions suggested by domain experts have been incorporated. Examples include vaccines, antibacterials, hand washing campaigns, and insecticide-treated bed nets.



Timeline of the simulation

Alerts can be set to warn the user when specific locations reach high levels of morbidity.



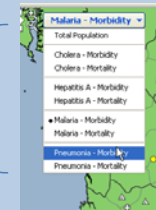
Run multiple simulations with and without interventions and compare the results.

Monitor specific locations or groups of people.

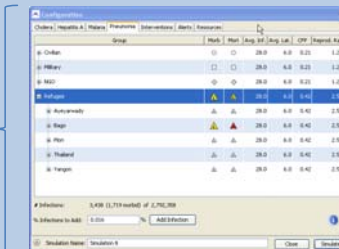
Monitor resources used for interventions

Replay previous simulations.

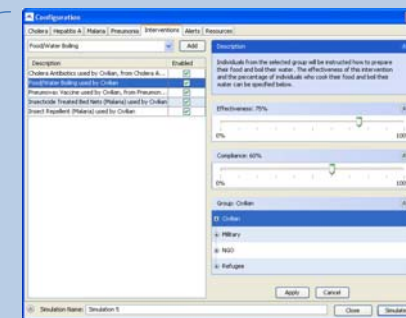
See the spread of multiple diseases.



Customize disease parameters or use standard disease templates.



Apply various interventions to see how they might mitigate the affects of the disease.



Accomplishments

The following enhancements were added to Gryphon in just 12 weeks:

- the ability to simulate multiple diseases simultaneously.
- models of Myanmar both before and after the cyclone.
- four new diseases and seventeen corresponding interventions.
- the ability to model the seasonality of diseases.
- the ability to export data to CSV.
- the ability to add and configure resources used by interventions.
- updated web service interface for third party software.
- many user interface improvements.

Results

In early September 2008, Gryphon OCR was successfully delivered to Alion Science and Technology Corporation who will transition it to USPACOM. USPACOM will use this technology to help with subsequent natural disasters. Alion is currently pursuing transitioning OCR into the U.S. military.

Next Steps

The Gryphon platform can be used to model scenarios ranging from the entire world down to the deck of a ship. However, adding new scenarios currently requires the skills of an advanced computer programmer who understands the internal algorithms of Gryphon. Quantum Leap Innovations is working on a tool to simplify and streamline the process of creating new scenarios in Gryphon. This tool will give non-programmers the ability to create new Gryphon scenarios using custom data.