DHS Announces Finalists in Biothreat-Spotting Contest



By Jack Corrigan

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A department contest advanced five early warning systems designed to detect biological attacks.

The Homeland Security Department on Wednesday named five finalists in its competition to design an early warning system to keep biological attacks at bay.

Hosted by the DHS Science and Technology Directorate and National Biosurveillance Integration Center, the Hidden Signals Challenge calls on teams to design tools that use existing data sets to identify instances when dangerous pathogens like anthrax or tuberculosis are intentionally or accidentally released into the environment.

The agency said it hopes to use the program as a first step in developing a local- or national-level system for alerting city officials about biothreats in their communities.

The finalist projects include a tool that analyzes commuter data to pinpoint potential outbreaks, a system that alerts officials to spikes in emergency room wait times, and a machine learning tool that overlays emergency room complaints with social media data to spot rare disease cases.

"We were impressed with the diversity of concepts submitted to the challenge," said William Bryan, the senior official performing the duties of undersecretary for science and technology at Homeland Security, in a statement. "The five finalists explore new ways we can uncover emerging biothreats and we are confident they'll inform a system that could enable city-level operators to make critical decisions."

Each finalist will receive $20,000 and advance to stage two of the competition, where they will compete for a $200,000 grand prize. The agency plans to announce the winner in the spring.

Hidden Signals Challenge

About The Challenge

Biothreats are everyone's concern

Whether you're a private citizen, a city administrator, or a government official, we all share a common interest in keeping our communities healthy and safe.

Biothreats occur when harmful pathogens are either naturally or deliberately released, posing a risk to national security and public health. Some of these pathogens can be transmitted from person to person, from inhalation or ingestion; and from exposure to powders, liquids, or aerosols. Infections caused by biothreats can lead to respiratory distress, gastrointestinal issues, and animal and human deaths. Often, biothreats are hard to immediately identify, and their spread can be hard to contain. Learn more about specific biothreats.

The data opportunity

If and when a potential biothreat appears, every minute counts. Local and national officials must work together to assess the level of risk, develop an action plan, and intervene. Currently, there are a variety of systems and tools in place, however these tools largely rely on health data to detect signals. With the increasing proliferation of new technologies and data sources, such as the wealth of open data generated by progressively "smarter" cities and the trends that can now be observed through the aggregation of individual sharing, we now have an unprecedented opportunity. By harnessing these new streams of information, we may be able to identify an emerging problem more quickly and confidently, so we can ultimately resolve it faster.

Are early signals hiding in data we already have? How could we use this publicly-accessible data to help identify emerging biothreats, contain their spread, and save lives?

The Hidden Signals Challenge

The U.S. Department of Homeland Security (DHS) Science & Technology Directorate (S&T), in collaboration with the Office of Health Affairs National Biosurveillance Integration Center, has called upon data innovators from a wide variety of fields—from data science, to civic tech, to epidemiology—to develop concepts for novel uses of existing data that will identify signals and achieve timelier alerts for biothreats in our cities and communities.

DHS intends for this work to be the first step in the design of a local and/or national-level system that could enable city-level operators to make critical and proactive decisions based on the most relevant and actionable insights. The Challenge focuses on large metropolitan areas such as New York, Los Angeles, Washington D.C., Chicago, Boston, and Atlanta as the basis for a proof of concept, but is open to solutions that address all geographic locations.

Stage 1

Following the open submissions period, five (5) finalists were selected by the judges according to official Challenge criteria, and awarded $20,000 in cash prizes each.

Stage 2

In Stage 2, finalists from Stage 1 will further develop their concepts into detailed system designs, with guidance from expert mentors as they compete for an additional $200,000 in cash prizes. At the

end of Stage 2, finalists will submit detailed system designs, which will describe how concepts from Stage 1 are to be implemented in practice.

Sample scenarios

You will find a few sample scenarios below that help bring to life what these threats may look like in practice. Keep in mind that submissions can address a wide range of threats, symptoms, and signals, and are not limited to the scenarios detailed here. To learn more about some of the most urgent threats our cities and communities face today, click here.

Scenario 1

It's 6:30pm on Thursday in New York City, and a subway train is experiencing significant delays due to multiple holds for the removal of sick passengers. All sick passengers have been exhibiting some form of acute respiratory distress, and a few have fainted. Thousands of commuters ride this train daily to and from work; upon reviewing video surveillance from stations along the train line, Metropolitan Transit Authority (MTA) operators have anecdotally noted a lot of people coughing and sneezing from Monday to Thursday. Is this a coincidence? How can data help us investigate this event further? How might the city have noticed this sooner?

Scenario 2

Over the course of five days in May, many residents of Atlanta and the neighboring suburbs have been absent from work, citing fever, nausea, and gastrointestinal issues. While this initially went unnoticed, a few cases of septicemia within this short period of time have begun to draw attention. Of the instances reported, almost all victims had traveled through the Hartsfield-Jackson Atlanta International Airport within the past few days. What other fragments of information might we want to integrate to get a clearer picture and determine whether or not to take action?

Scenario 3

Over the span of a week, Animal Control in New Orleans, Louisiana, has noticed a steady uptick in dead waterfowl. There are also dead fish turning up along the coast of Lake Pontchartrain and Lake Borgne. Upon closer examination of these birds and fish, field workers report similar signs of paralysis, and the early hypothesis is an outbreak of botulism. How could we use data to connect the dots to track the spread among animals? How might we monitor for signs of a spread to humans?