

NEXT GENERATION CB HAZARD PREDICTION AND CONSEQUENCE ASSESSMENT WITH MULTI-ECHELON DECISION SUPPORT APPLICATIONS

An AI-driven Security Platform For Threat Awareness And Decision Support

Samantha Erwin Pacific Northwest National Laboratory **Lauren Charles** Pacific Northwest National Laboratory

Recent security issues caused by natural and man-made disasters have shifted public and political attention to the lack of situational awareness, predictive capabilities, and information sharing. These events have resulted in increased global risks and need for more timely, accurate, and relevant data to inform event prevention, detection, and response activities. The most effective way to enable better informed, data-driven decisions is through a One Health approach that simultaneously provides real-time situational awareness and early warning of human, animal, plant, and environmental health threats. The Threat Risk Events Analysis, Detection & Surveillance (TREADS) platform, founded on sound data science, engineering, and human-centered computing, enables detection, tracking, characterization, risk assessment, and investigation of events. TREADS focuses on events currently or potentially affecting human, animal, or plant health, including health systems and food security. Multiple disparate data streams are harvested at the speed of relevance, harmonized, and analyzed to provide users with situational awareness, alerting of, and ability to investigate potential, ongoing, and anomalous threats, such as the next pandemic or shortage of medical resources. Various artificial intelligence (AI) and machine learning techniques are applied, including natural language processing and graph analytics. This scalable, flexible platform contains highly tunable, user-specified data sharing permissions. TREADS is a comprehensive situational awareness and predictive platform enabling faster, better-informed investigations, decision-making, and public health response. Data streams include human health, movement, and socioeconomic data; wildlife, agricultural, and companion animal data; global open-source reports related to human, animal, plant, and environmental health threats; scientific literature including case studies; and environmental data such as weather, land use, and topography. Using AI-driven methodology, the data is automatically collected, harmonized, analyzed, and presented to the user through a real-time situational awareness and alerting dashboard, predictive risk assessment visualization, and virtually assisted investigation tool. Early warning of current and potential threats is provided at various geographic resolutions from the individual-level and facility, all the way to the global level. Real-time threat information and data-driven risk predictions are combined with on-the-ground resource availability to support operational decision making for prevention and mitigation of threats. The TREADS platform, developed at PNNL, aims to provide global situational awareness of current and potential threats, assist in early warning of risks at various geographic resolutions, and enhance data-driven investigations by harmonizing across multiple, heterogenous datasets to rapidly uncover key information. Coupling this real-time threat information and data-driven predictions with knowledge of resource availability and on-the-ground status, decision makers can make prescient decisions that best safeguard our global security.