

Application of epidemiologic and economic models for dynamic preparedness and training simulators

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This presentation covers the development of the Dynamic Preparedness System (DPS) prototype – an integrated, fully distributed, multi-purpose system for emergency managers that supports the overall emergency response lifecycle by featuring training, operational, and analytical functionality as it relates to the intentional or unintentional introduction of into an agricultural environment. Currently, there are modeling resources that forecast the spread of a foreign animal or zoonotic disease, predict the consequences of implementing various controls and counter-measures to the outbreak, and forecast the economic costs associated with such outbreaks and control methods. What is missing is a system that assesses the vulnerabilities of an animal-based agriculture operation to a disease outbreak. Such a system would identify vulnerabilities and allow the user to undertake “what-if” analyses to determine how best to reduce/mitigate these vulnerabilities and/or reduce the impact if an outbreak should occur. In addition, once an outbreak occurs, whether naturally occurring or human-induced, responding presents a complex challenge that very quickly involves several levels of decision makers (local, state, and federal). A need exists for a consolidated view of the incident being presented to the full array of decision makers with synchronized data being represented from multiple distributed sources. Such an integrated view with these diverse data representations provides a useful tool for training, operational (incident management), and analytical applications. In this presentation, the underlying principles that support the development of such a system are presented and leveraged work at Texas A&M University supporting other incident response venues is discussed. The essential high-level requirements established for DPS are as follows:

- An overarching framework with a well-documented application programmer’s (API) interface for the integration of training, analytical, decision support, and resource management tools, as appropriate.
- Modularized design to support component integration from diverse group of tool providers including both legacy and newly developed tools.
- An integrated view serving as a common operational picture that reflects the aggregate (or filtered) output of included suites of tools for maintaining situational awareness.
- Fully compliant with the National Incident Management System (NIMS) and is scalable from county to regional to national command centers.
- Suite of complementary tools (exercise management, after action review) to support training requirements.

A fundamental feature of the DPS prototype is provisioning for a common framework that allows the integration of maps, map overlays, reports, decision support tools, models (e.g., epidemiological and transportation), and video feeds that are dynamically updated. It is the integration of the epidemiological and transportation models that greatly extend this incident management tool beyond what is currently available. This capability is broad spectrum and is intended to support the full range of incident management activities – planning, preparation, response, mitigation, and recovery. The DPS prototype will be used in an aggressive campaign of interaction with identified stakeholders as a vehicle to further refine user requirements.