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

# Propagating Uncertainty Through Building Models

**Michael Sohn** Lawrence Berkeley National Laboratory **David Lorenzetti** Lawrence Berkeley National Laboratory

Uncertainty plays a major role when predicting health effects of indoor exposure to chemical and biological agents. Uncertainty can arise due to lack of knowledge about the agent release, and about the airflow and transport properties of the building. Model simplifications, and variability in the physical transport, also contribute to uncertainty. Finally, health effects models may explicitly account for variance in the agent exposure predictions.

We report on research to propagate uncertainty through building models. For operational reasons, our primary concern is making the building model respond to variance predicted in the outdoor plume. However, the same approaches apply to other sources of uncertainty, for example, in the building airflows. Our work covers both analytical and numerical (e.g., Monte Carlo) approaches to variance propagation.

This work has implications for all building models embedded in DTRA modeling toolkits such as HPAC and HEAT. This includes both single-zone building models, such as the Berkeley Lab's IceBox code, and multi-zone models, such as NIST's CONTAM tool. In this presentation, we will discuss the current uncertainty estimation method used for linked outdoor-indoor and effects calculations in HPAC and the Integrated Urban (IU) module within Hazard Estimation and Assessment Toolkit (HEAT). We will also discuss planned updates to the uncertainty propagation procedures, and the expected benefits for HPAC and IU users.

This research was funded in part by the Defense Threat Reduction Agency and performed under U.S. Department of Energy Contract number DE-AC02-05CH11231. The views expressed in this paper are solely those of the authors.