



***DARPA*Tech**

2002 Symposium

Transforming
Fantasy



Roger Gibbs
Program Manager



Chem/Bio Defense Systems: Immune Buildings

DARPA Tech 2002

Roger Gibbs

Special Projects Office



Immune Building Motivation

- ▶ Force protection remains a significant technical challenge



Immune Building Motivation

- ▶ Force protection remains a significant technical challenge
- ▶ Buildings are a major target for attack
 - Visible target for anti-US sentiment
 - Military bases are critical to operations, including staging and power projection
- ▶ Future attacks may use bio or chem weapons in place of explosives

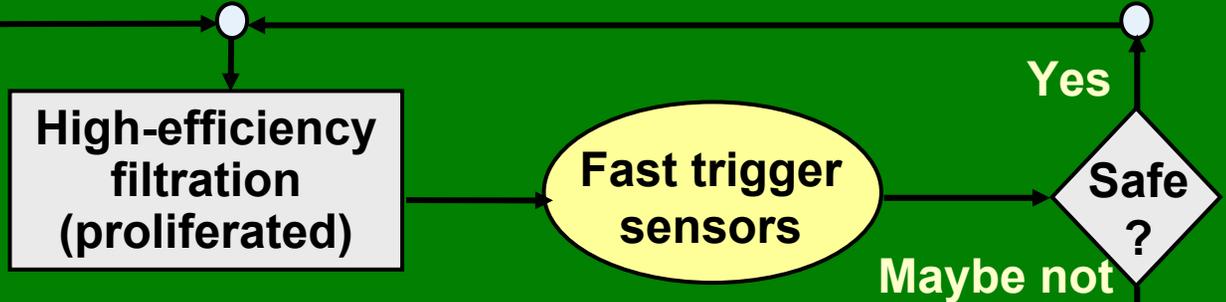


Immune Building Program

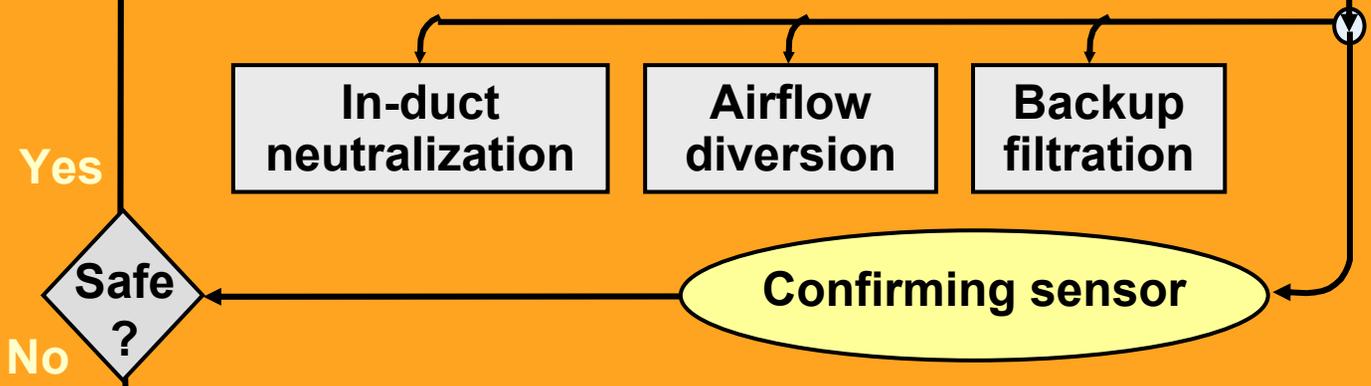


Systems Architecture

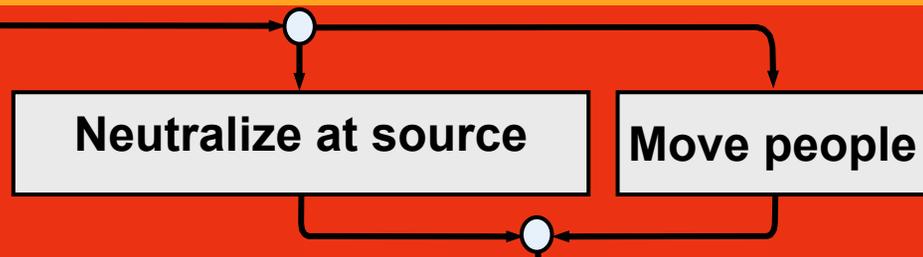
Normal Operation



Possible Attack



Confirmed Attack

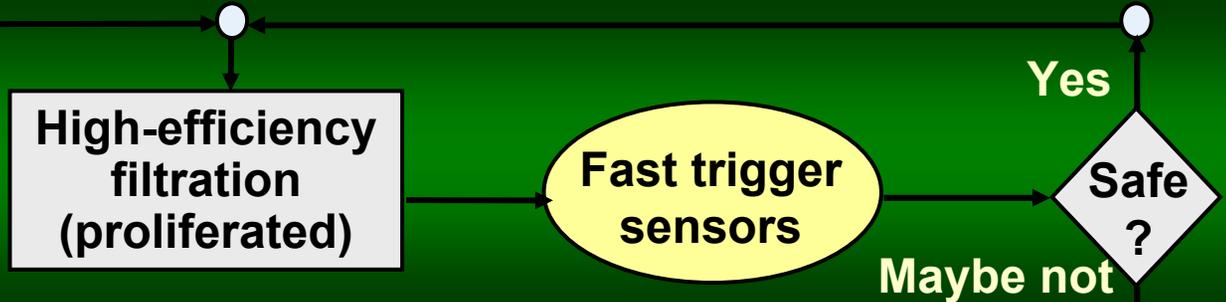


Post Event

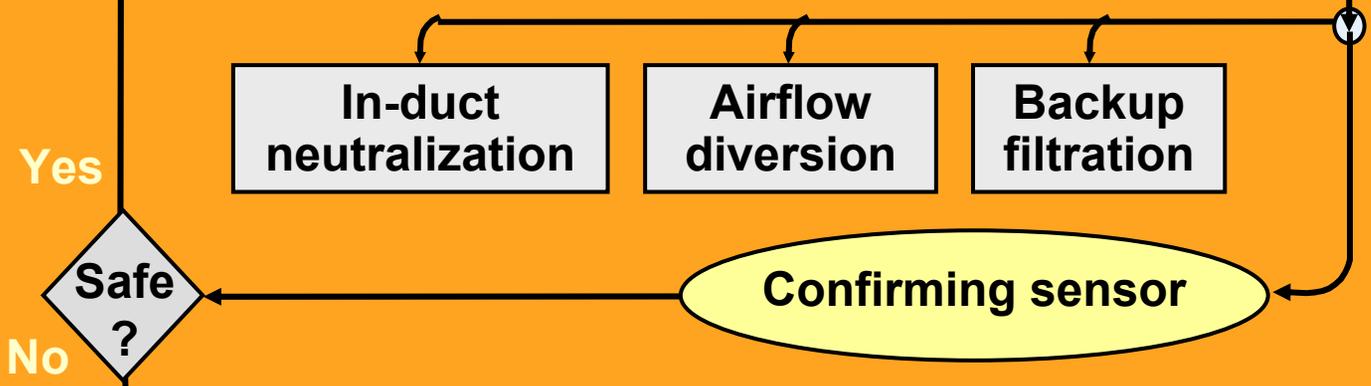


Systems Architecture

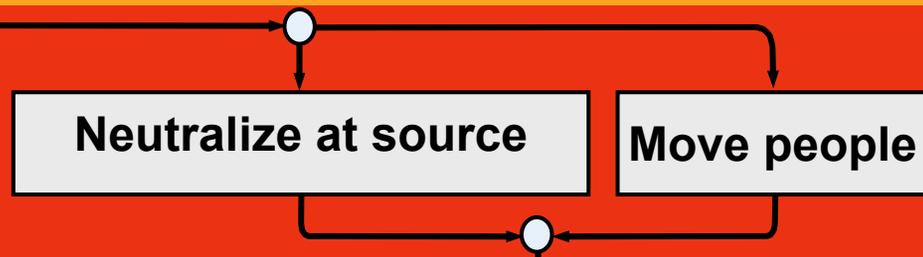
Normal Operation



Possible Attack



Confirmed Attack

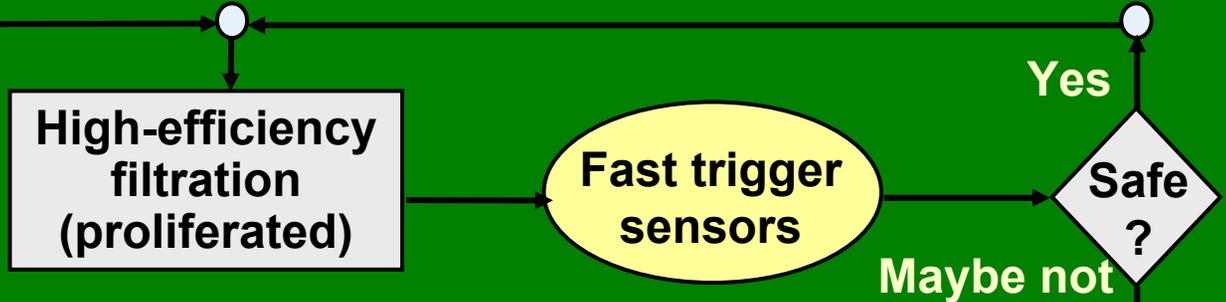


Post Event

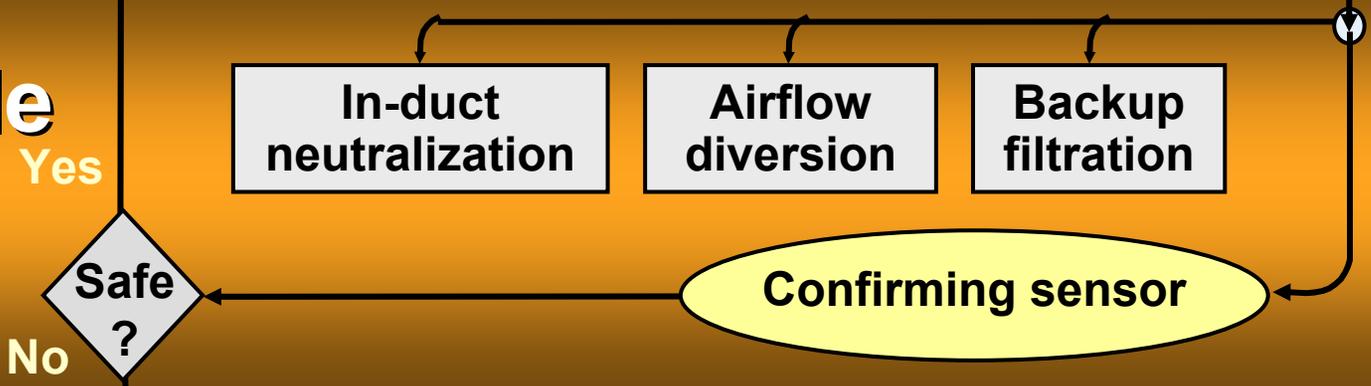


Systems Architecture

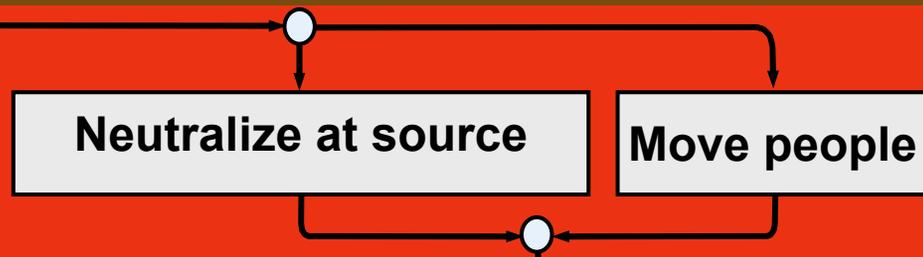
Normal Operation



Possible Attack



Confirmed Attack

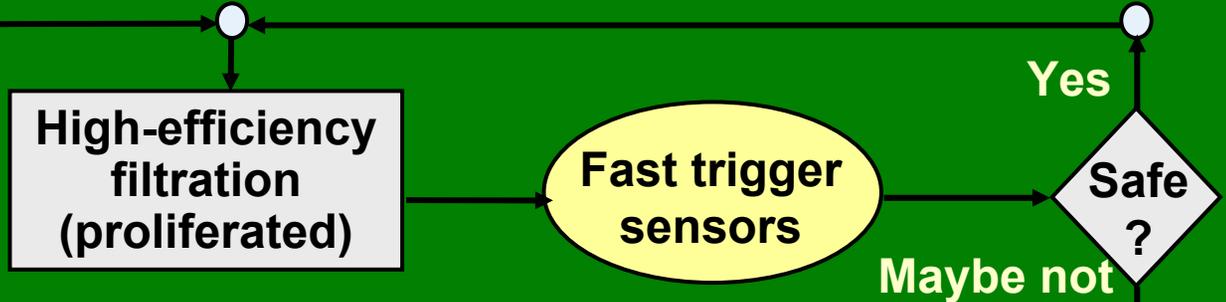


Post Event

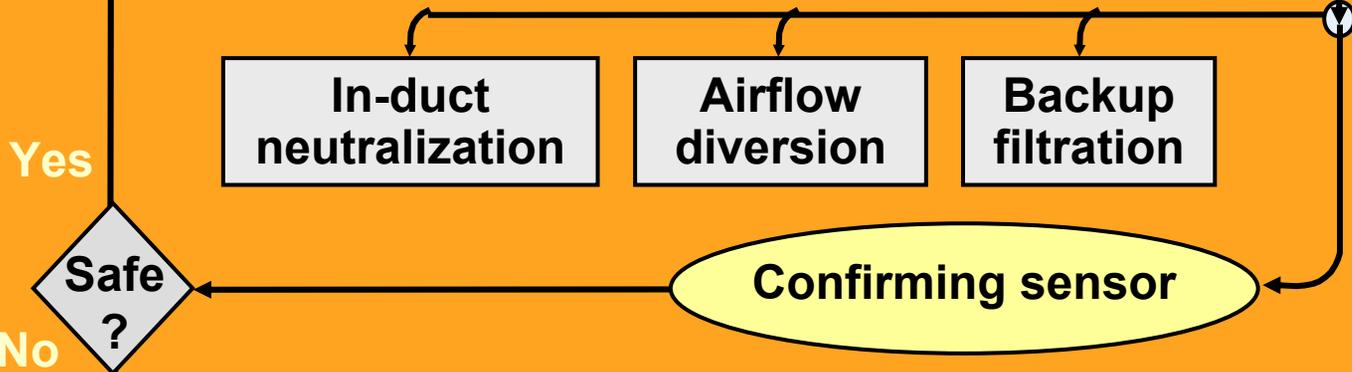


Systems Architecture

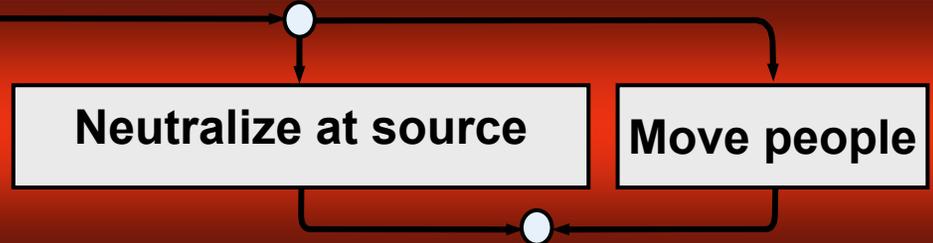
Normal Operation



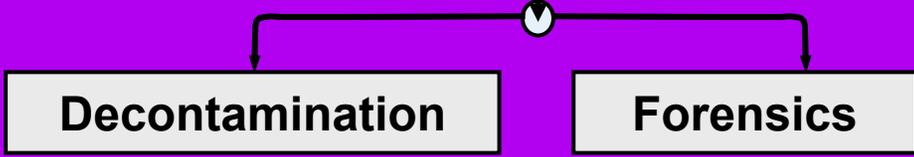
Possible Attack



Confirmed Attack

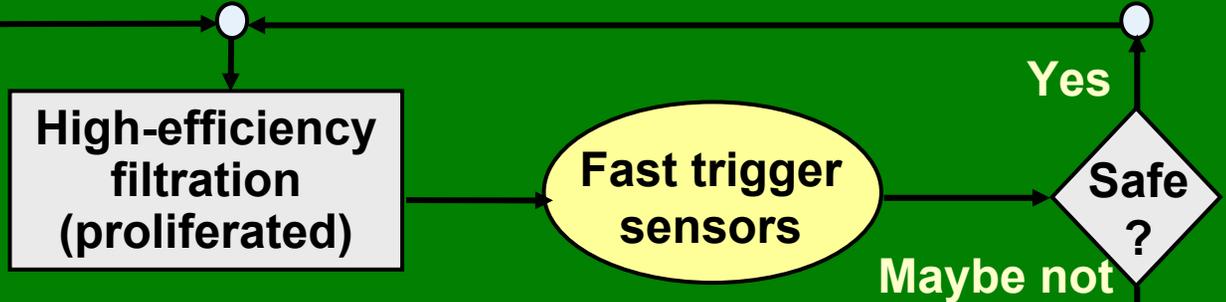


Post Event

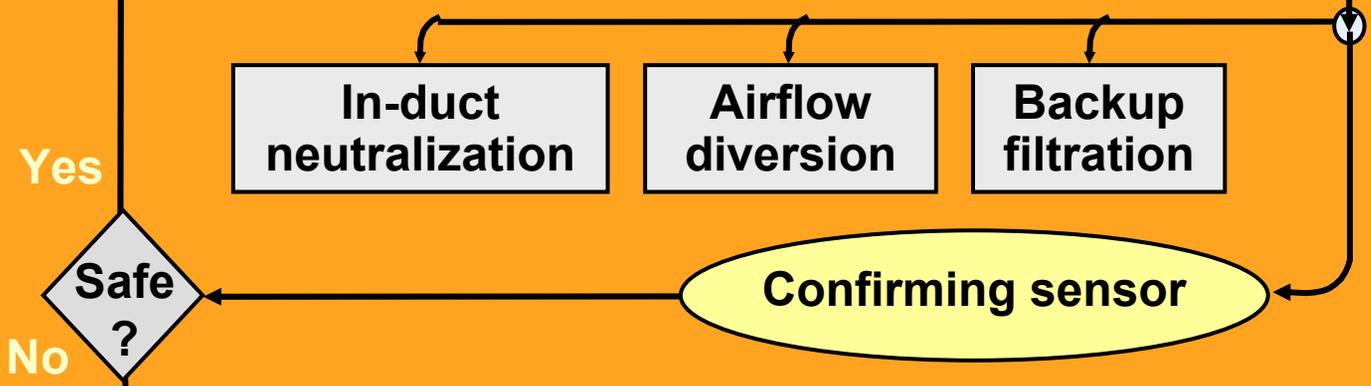


Systems Architecture

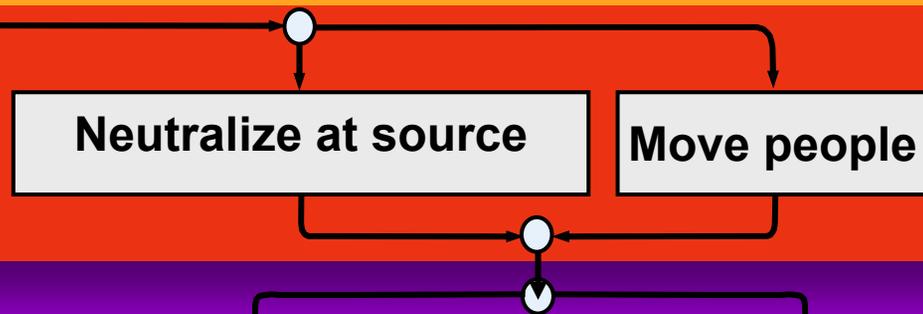
Normal Operation



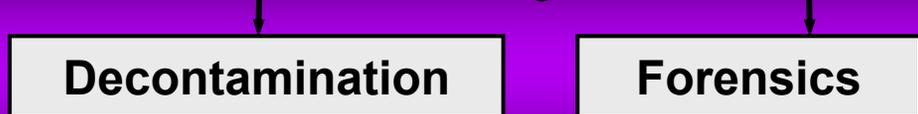
Possible Attack



Confirmed Attack



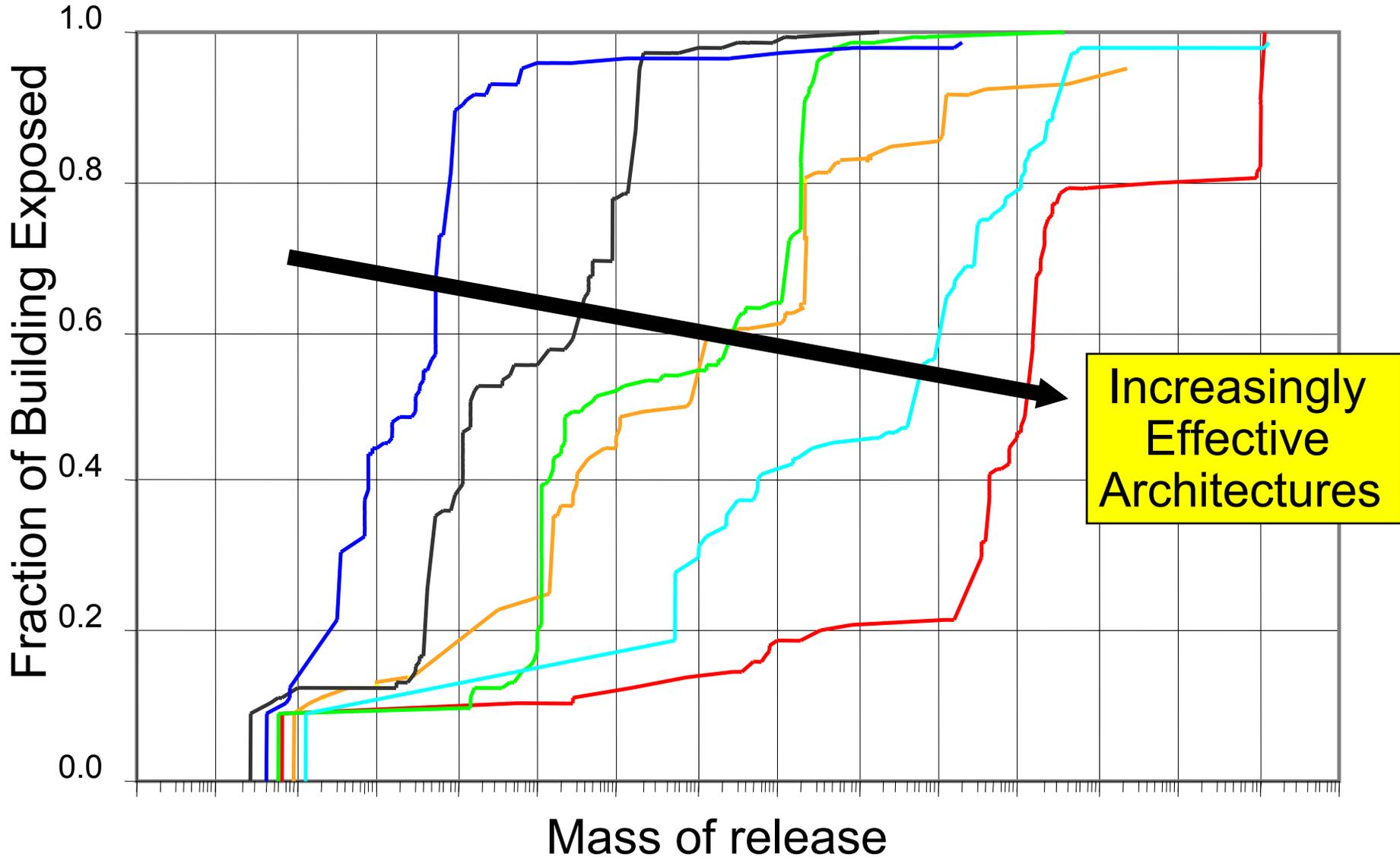
Post Event



Chlorine Dioxide for Decontamination



Sample Results: End-to-End Modeling



Immune Building Demonstration

- ▶ Implement, optimize, and demonstrate a full-scale building protection system
 - FY02 – Select site
 - FY03 – Onsite characterization
 - FY04 – Testing and optimization
 - FY05 – Demonstration



Toolkit Architecture

THREAT ASSESSMENT PLATFORM

USER INPUTS CASE TO RUN

- Defines building (layout, system)
- Selects release scenario

SOFTWARE CALCULATES CASE

- Configures toolkit for run
- Calculates contamination $c(x,t)$

TOOLKIT OUTPUTS RESULTING THREAT

- Dosage
- Deposition

SUPPORTING MODELS

Architecture module

Room-to-room connectivity

HVAC system dynamics

HVAC component behavior

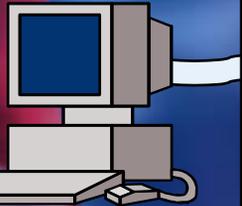
Delivery/release/dissemination

Internal transport

External transport

External-to-internal transport

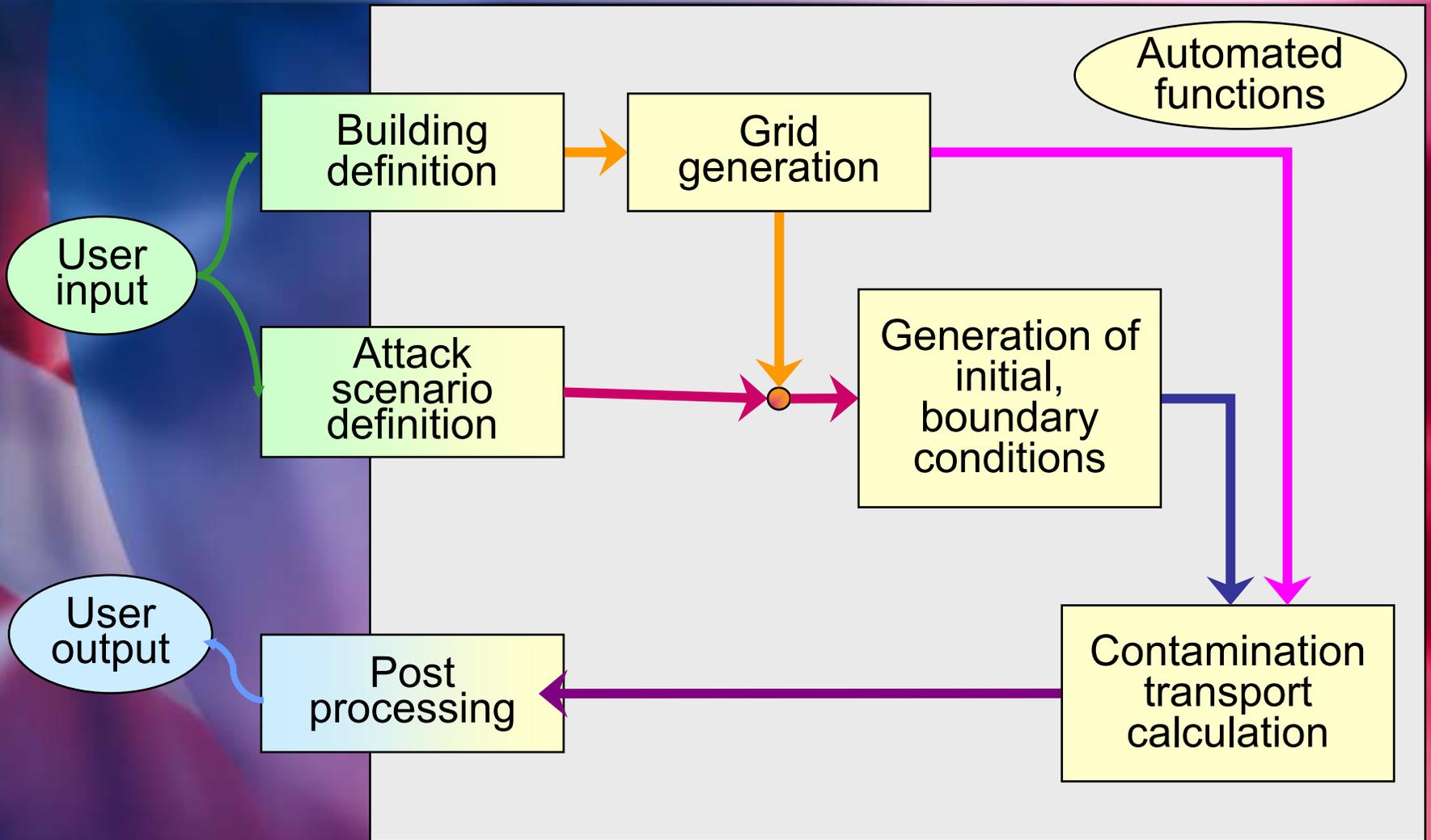
Agent behavior, lethality



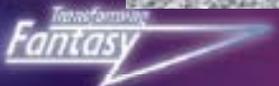
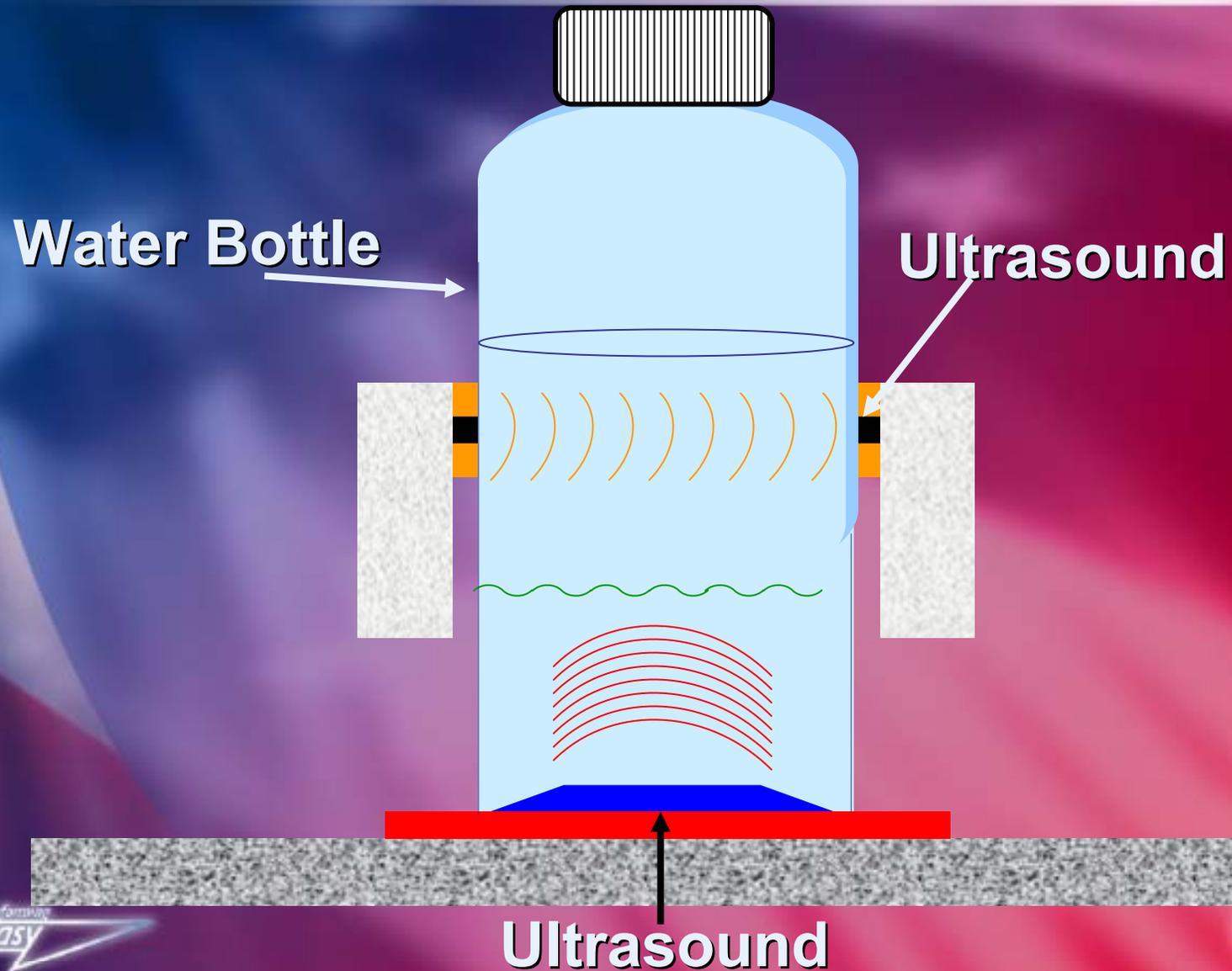
Case 4
Case 3
Case 2
Case 1

Transforming
Fantasy

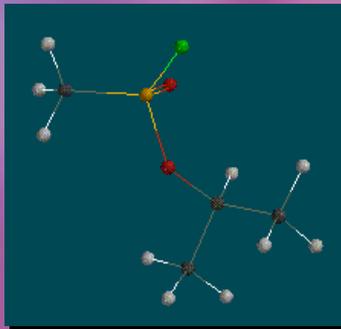
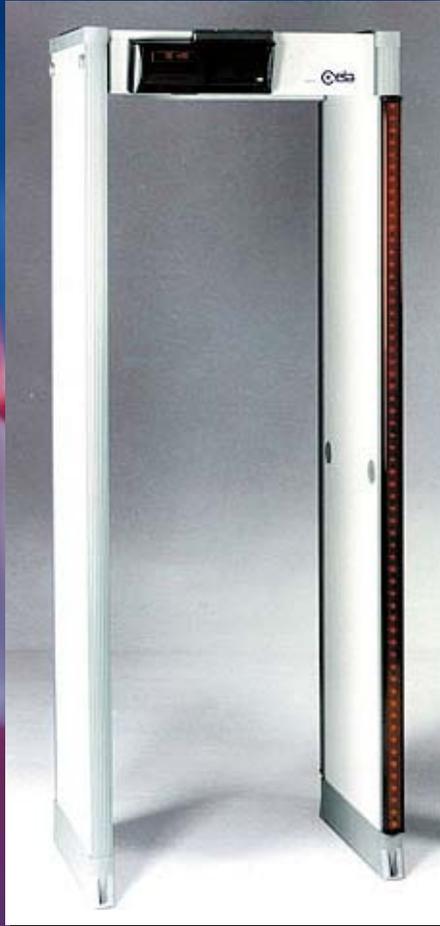
Toolkit Overview



Neutralization



Portal Security





***DARPA*Tech**

2002 Symposium

Transforming
Fantasy