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AECAT: From Compliance to Risk-Informed Decision Support

Practical Application

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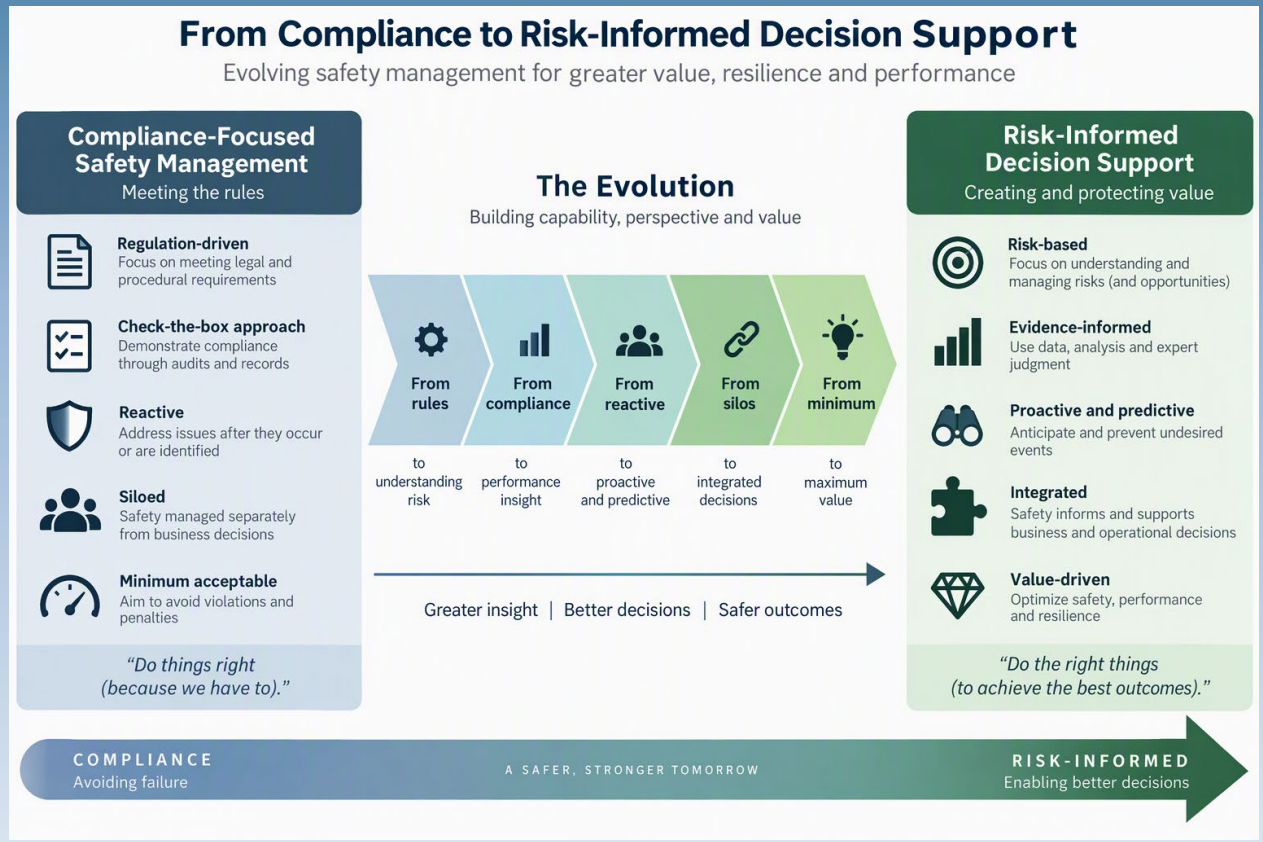
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Why AECAT?

Traditional QD compliance answers: Compliant or Not Compliant

AECAT answers: What happens if an event occurs? Who is affected? What infrastructure is impacted?

Enables risk-informed decisions when compliance alone is insufficient.



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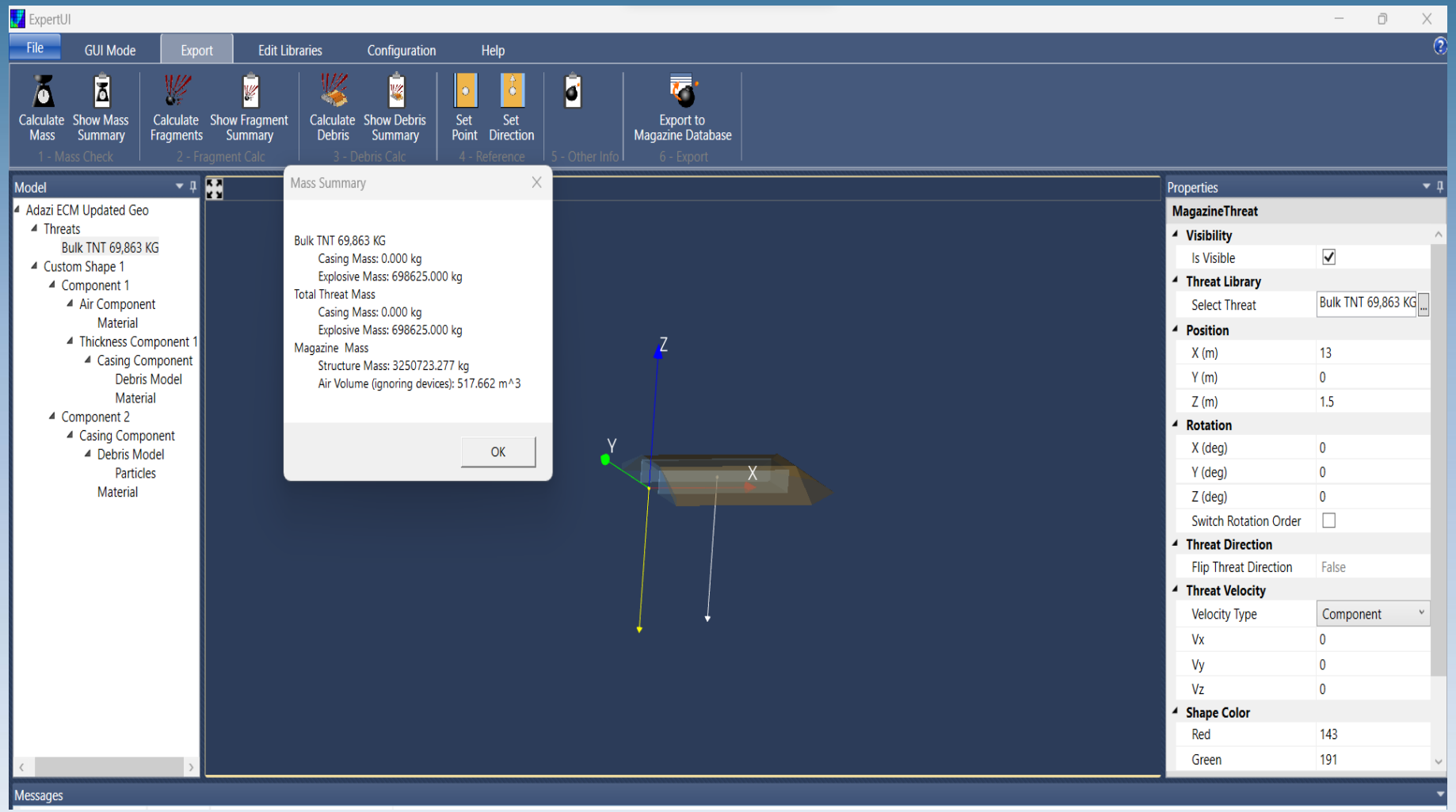
Multinational Ammunition Storage - Latvia



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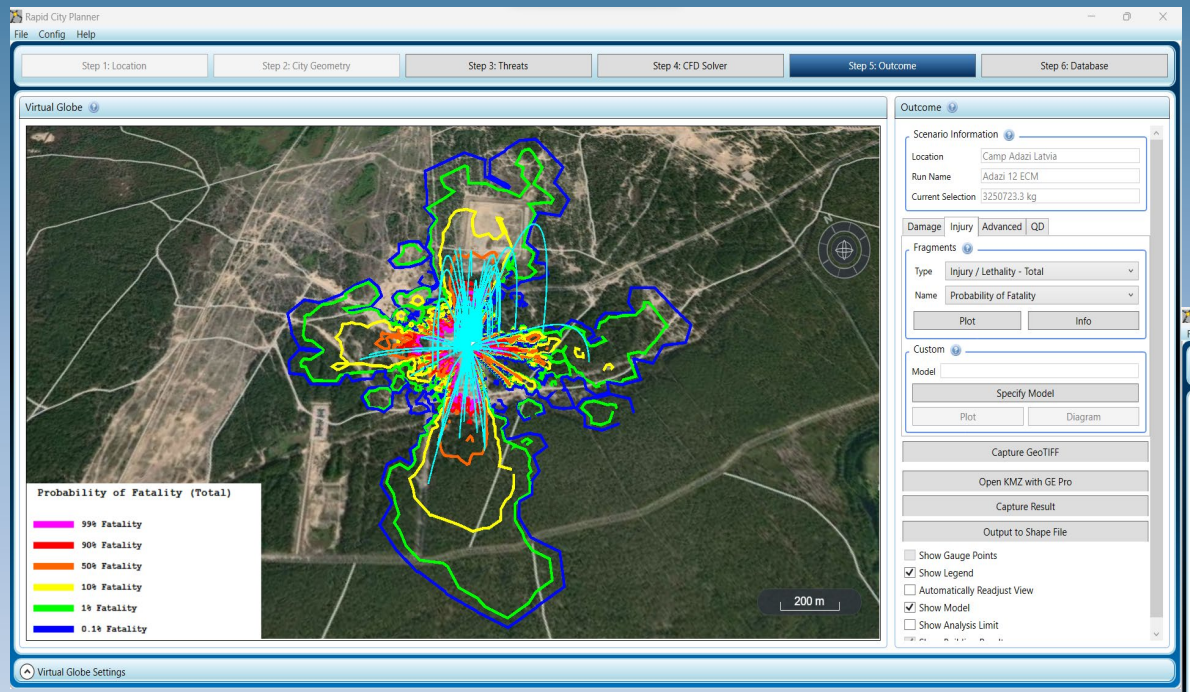
Maximum HD 1.1 NEQ per magazine

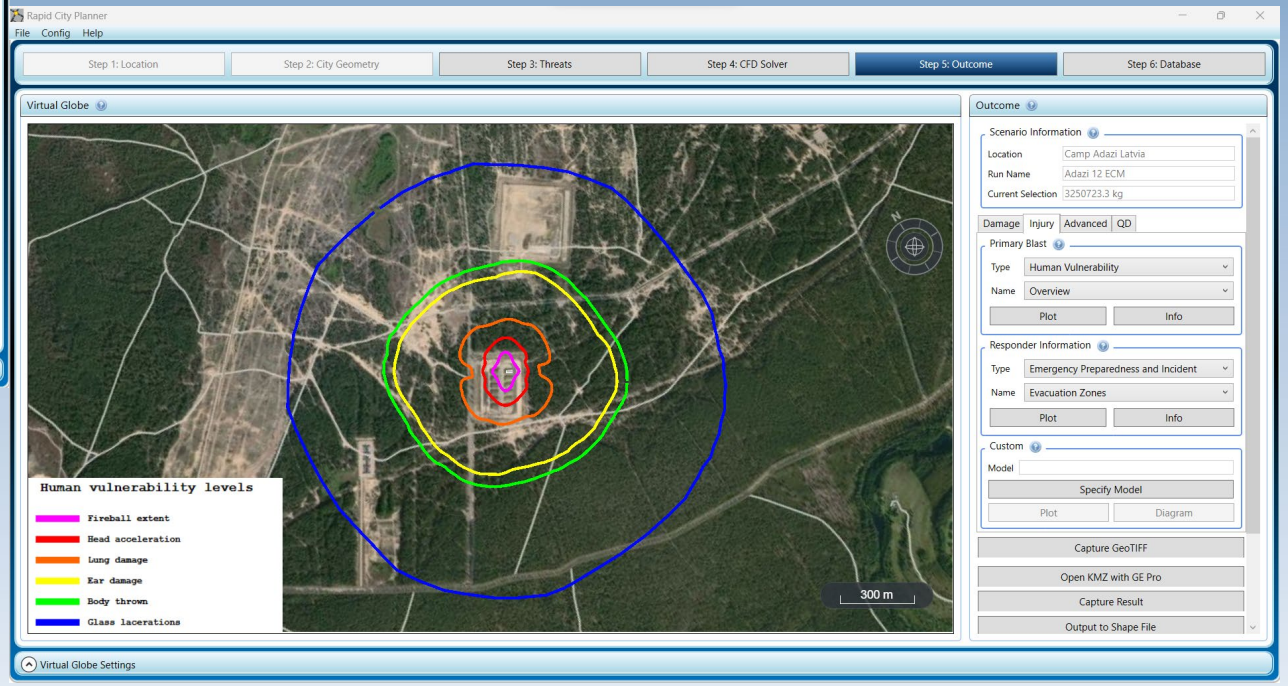


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AECAT Results





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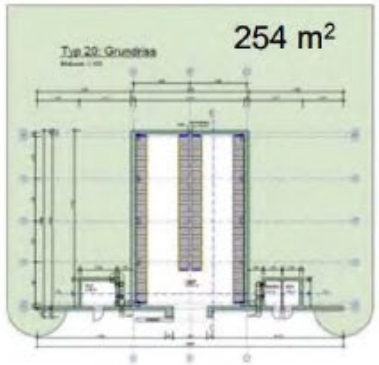
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Proposed Standardized ECM Test

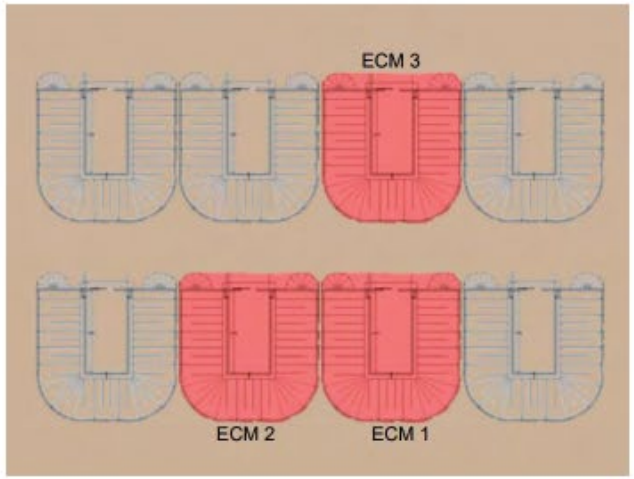
Ammunition and Explosives Consequence Analysis Tool (AECAT)

Example Scenario #3: Standardized ECM 146 (Germany)

- Scenario: Explosive event in standardized ECM 146 (Type 20)
  - 75,000 kg TNT (uncased, HD 1.1)
  - 12.7 m x 12.7 m x 7.1 m
  - 0.6 m earth covering (min.)
  - 0.5 m RC wall thickness
- Fast ECM debris effects modelling
- Two trial scenarios considered
  1. ECM 1 (PES) in isolation
  2. ECM 1 (PES) with ECM 2/ECM 3 (ES)



Type 20





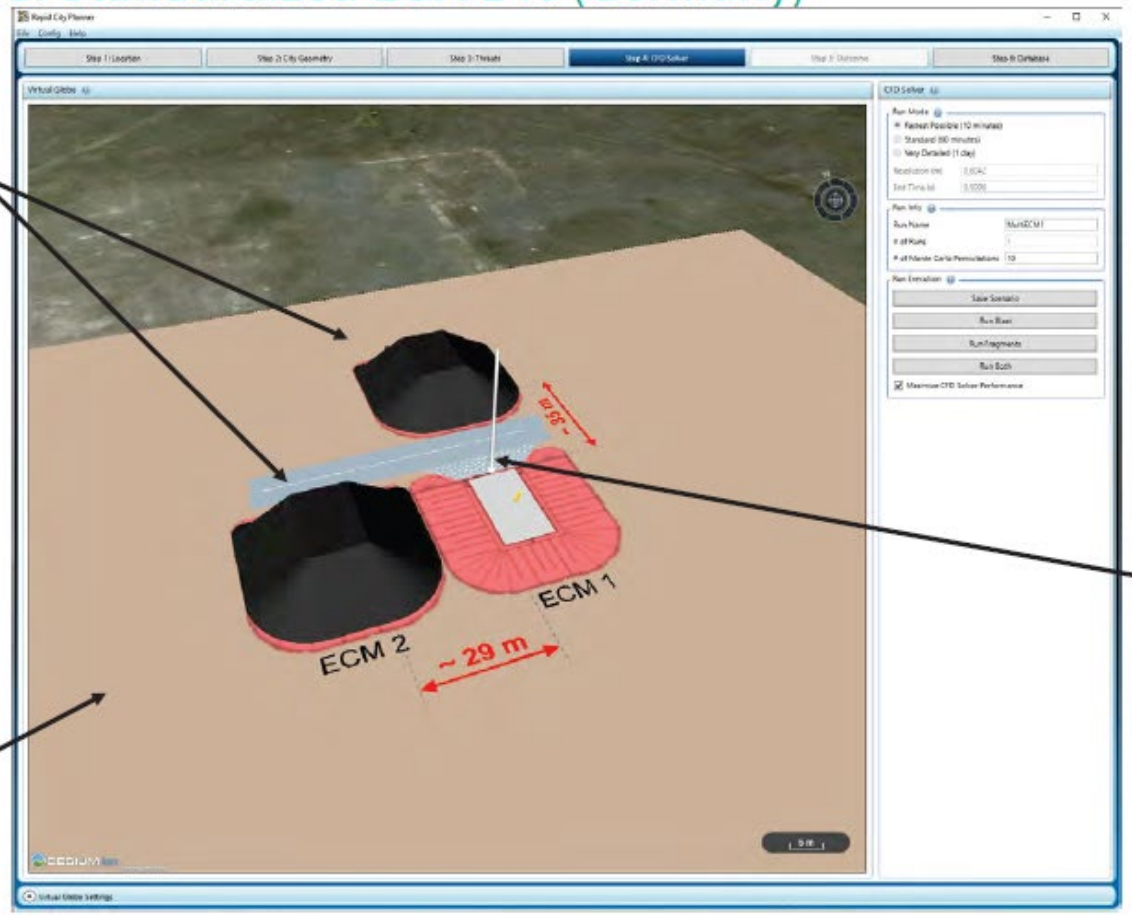
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Example Scenario #3: Standardized ECM 146 (Germany)

Detailed magazine geometries (ES)



Detailed magazine model placement (PES)

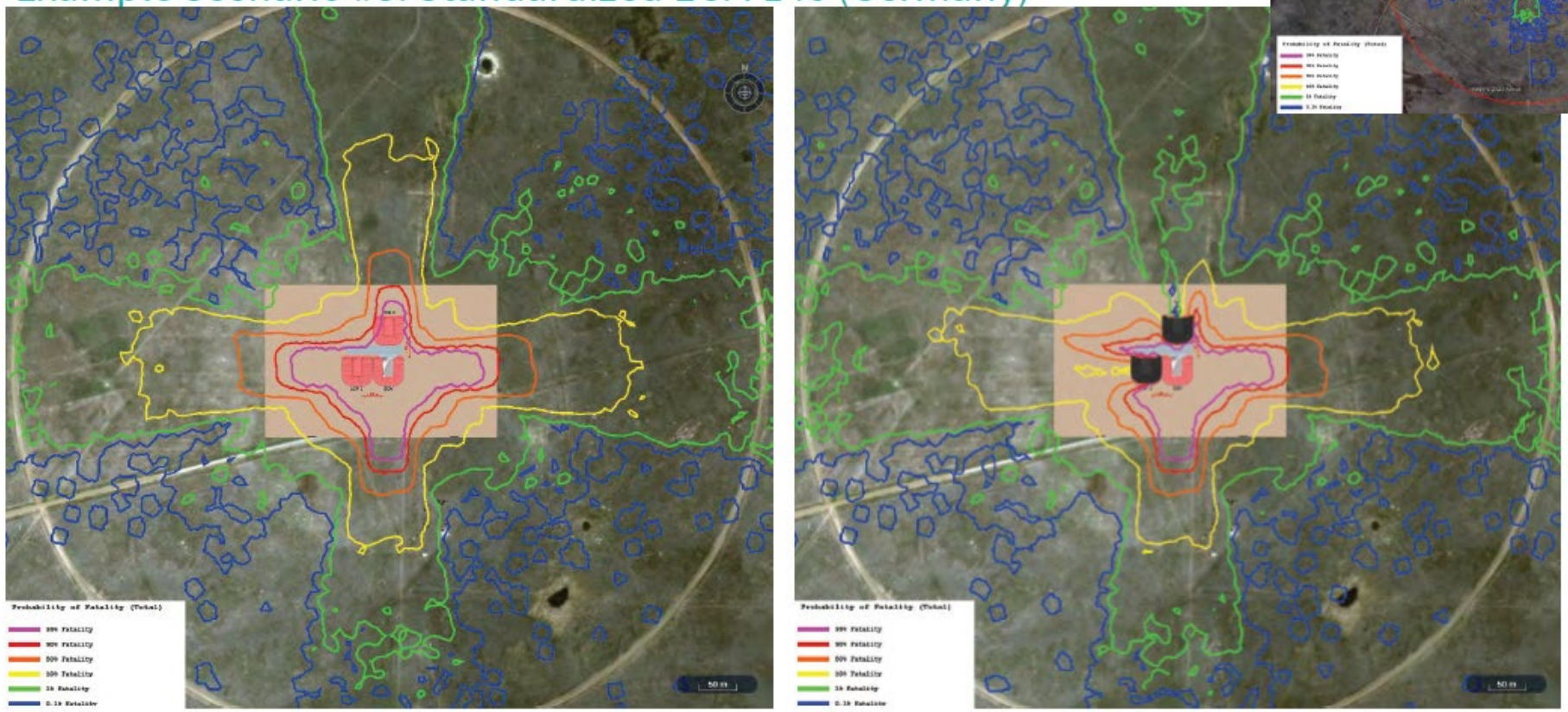
Geolocated scenario imagery

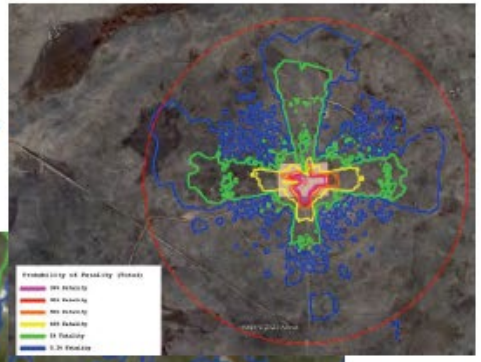
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Ammunition and Explosives Consequence Analysis Tool

Example Scenario #3: Standardized ECM 146 (Germany)





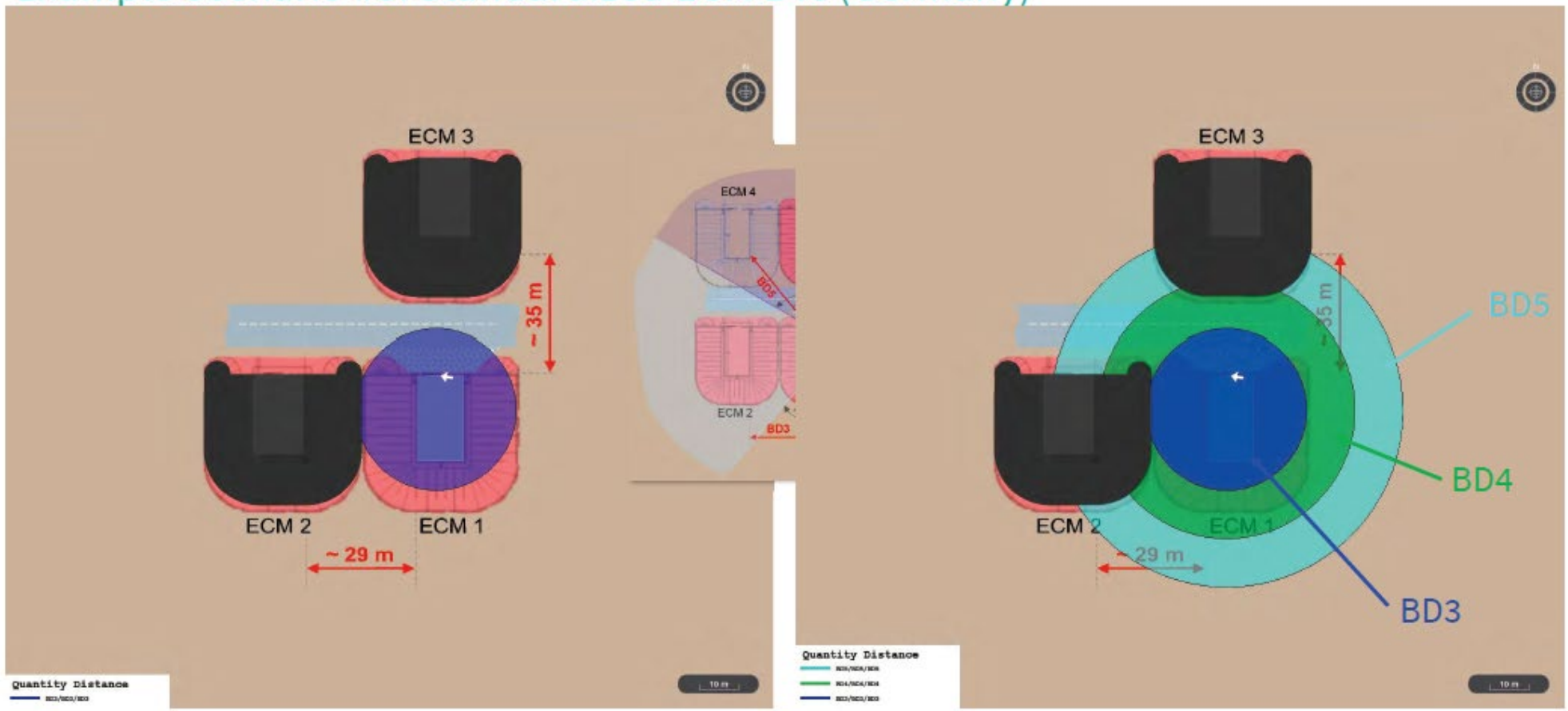
Probability of fatality contours for single ECM in isolation (left), and multi-ECM configuration (right)

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Example Scenario #3: Standardized ECM 146 (Germany)

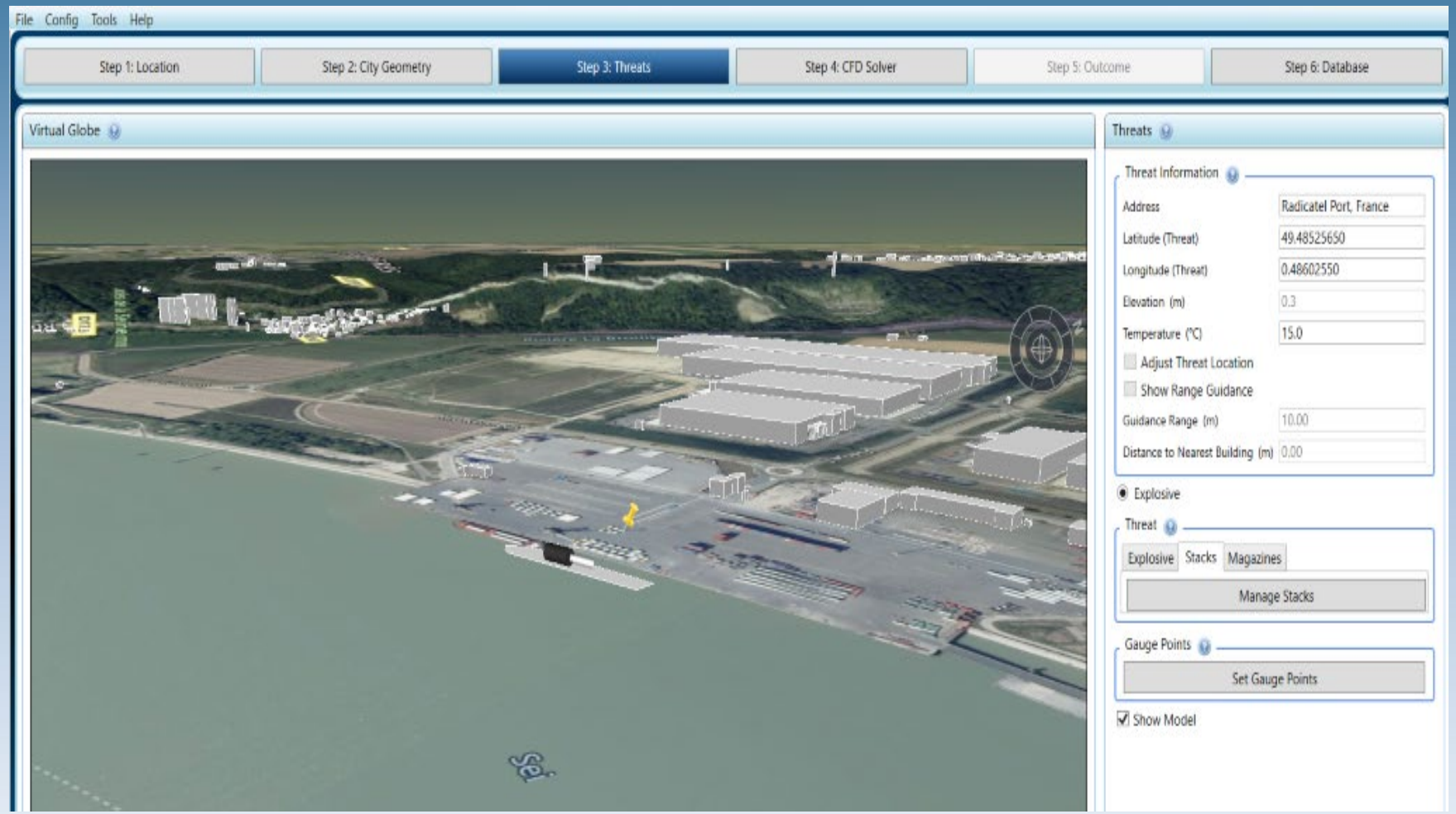


Cratering estimate BD3 (left), and IMD values for side-to-side (BD3), front-to-rear (BD4), and front-to-side (BD5) (right)

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Hypothetical Port Assessment

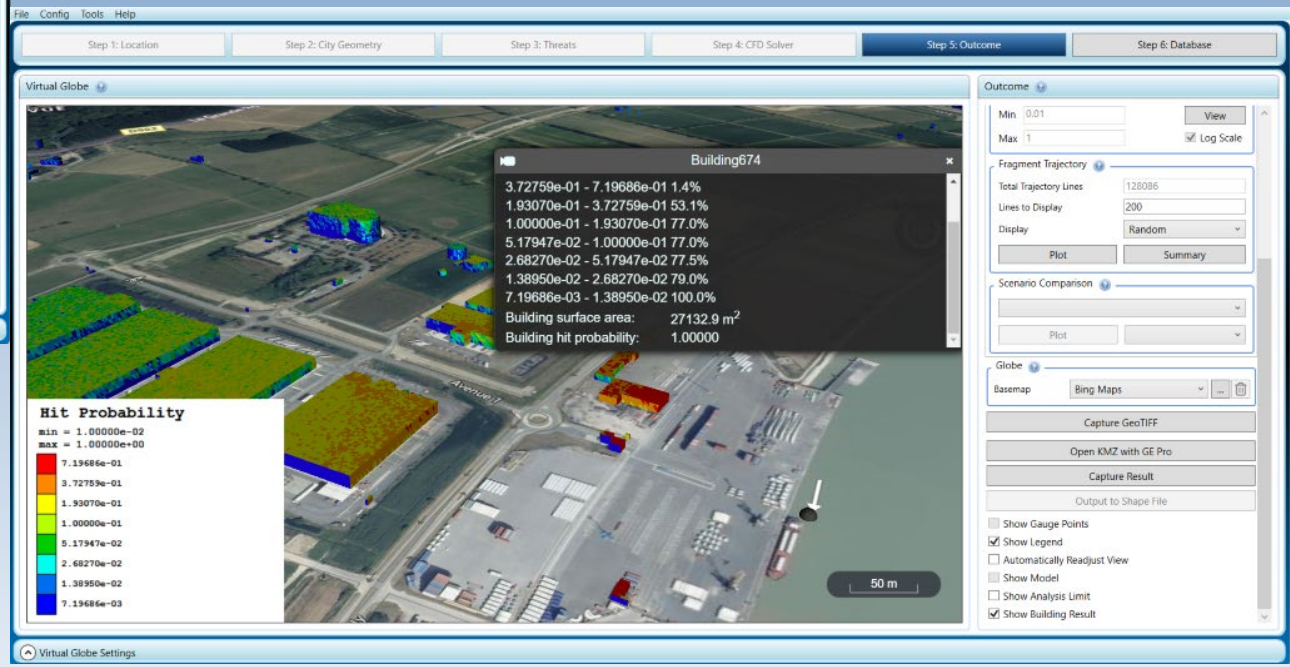


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Blast and Fragment Hazard Impacting Port Infrastructure





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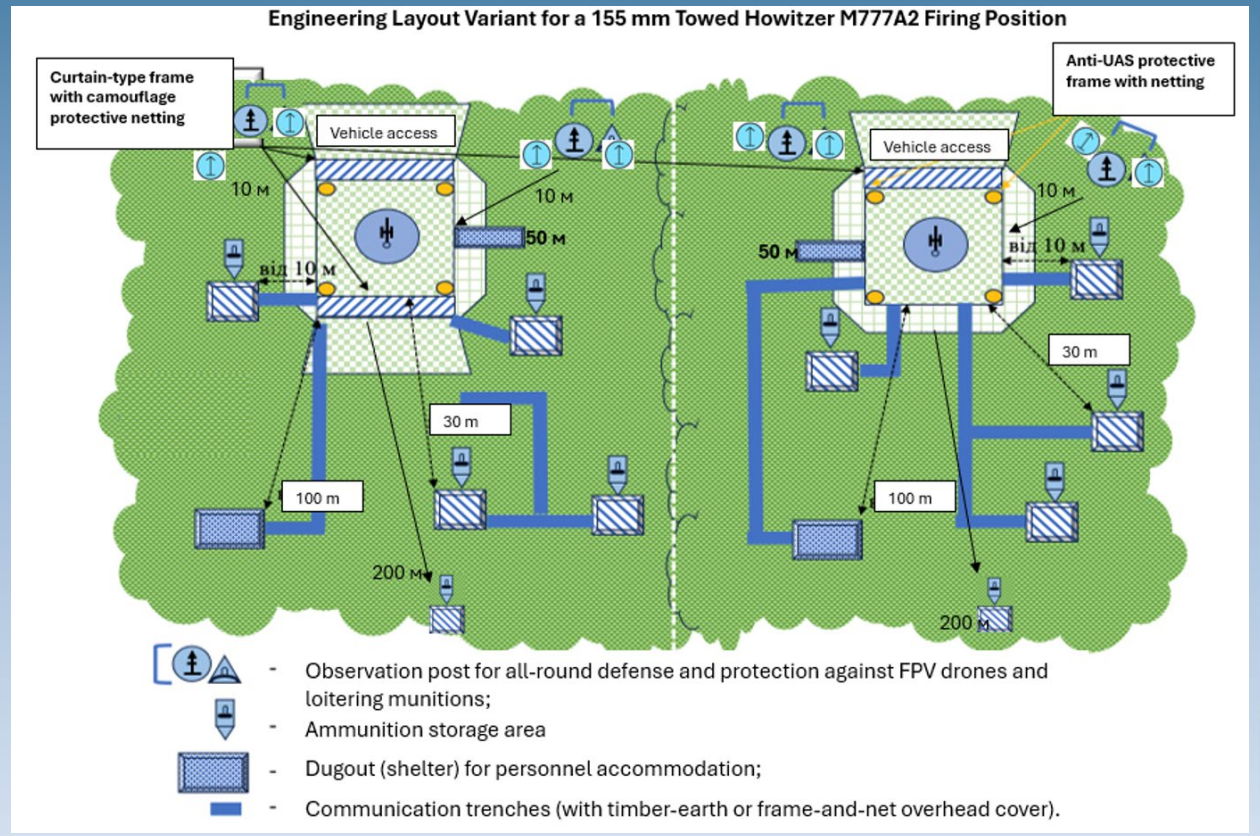
Artillery Position Assessment: Propagation and Soldier Risk

Decision Question

- Will an enemy strike cause propagation?

AECAT will be used to assess

- Blast
- Thermal effects
- Fragment hazards
- Soldier exposure
- Decision Support:
- Siting, layout and risk reduction.



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AECAT System Architecture and Analytical Workflow

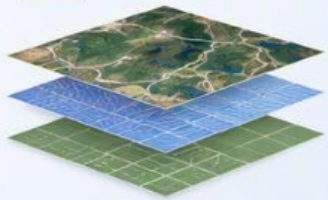
Ammunition and Explosives Consequence Analysis Tool

DATA
MODELS
ANALYSIS
DECISIONS
SAFER COMMUNITIES

INPUT DATA

Integrate mission, environmental, and community data

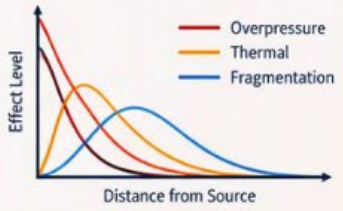
- Inventory
- Munition Data
- Site Layout
- DEM / Terrain
- Population
- Infrastructure



HAZARD MODELS

Characterize explosive effects and hazard footprints

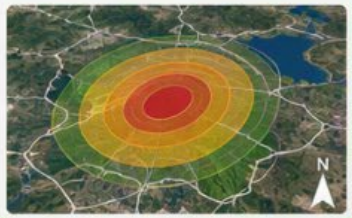
- Explosion (Overpressure)
- Fragmentation
- Thermal Radiation (Heat)
- Debris (Air Blast)
- Toxic Effects (If Applicable)



GIS ENGINE

Process and analyze spatial data

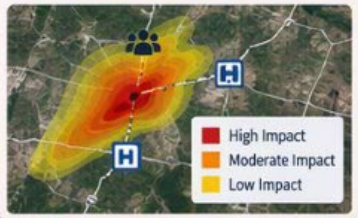
- Spatial Data Management
- Mapping & Visualization
- Terrain Analysis (Line-of-Sight, Elevation)
- Buffer Zones (Hazard Contours)
- Asset Overlay (Population, Infrastructure, Environmental Receptors)



CONSEQUENCE ANALYSIS

Quantify potential impacts to people, assets, and the environment

- Risk Areas (Hazard Zones)
- Population Exposure (Casualties/Displacement)
- Infrastructure Impact (Critical Facilities)
- Environmental Effects (If Applicable)
- Sensitivity & Scenario Studies



REPORTING

Deliver actionable information for decision support

- Maps (Hazard Zones, Impact Areas)
- Dashboards (Interactive Results)
- Risk Reports (Summary & Detailed)
- Decision Support (Mitigation & Planning)



Model Validation & Scenario Refinement

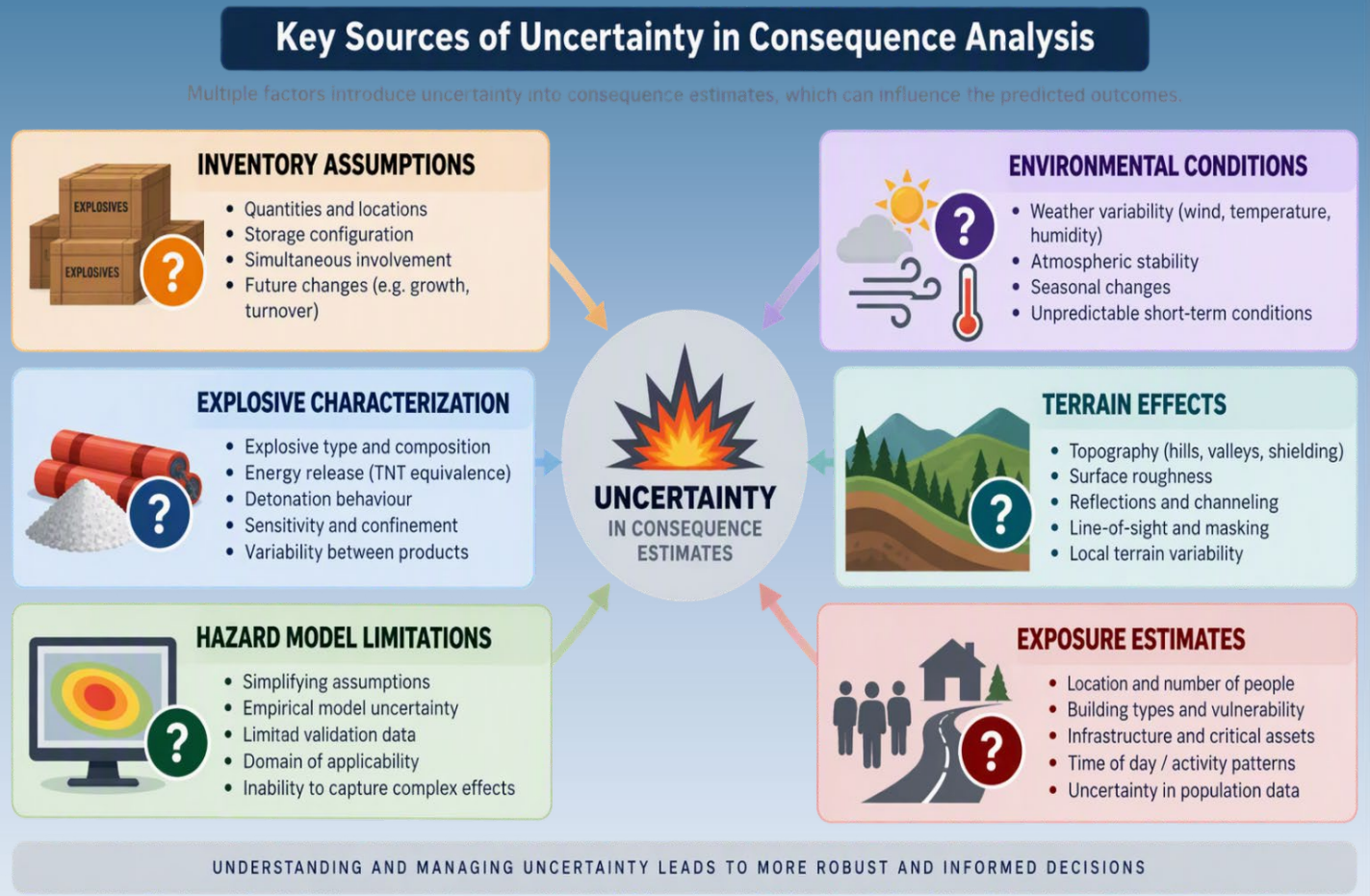
Improve inputs, test alternatives, and support ongoing risk management

Informed Analysis. Safer Tomorrows.

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Model Uncertainties and Limitations

- Inventory and input data uncertainty
- Hazard model assumptions
- Environmental and terrain effects
- Population and infrastructure exposure uncertainty
- Validation and confidence limits
- AECAT supports decisions but does not replace professional judgement



Key Messages

- QD remains essential
- Operational realities often constrain compliance
- AECAT quantifies consequences
- Consequence analysis improves risk understanding
- Outputs provide actionable decision support

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Questions?

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