



Developing a CONTAM Model Wrapper for Increased Capabilities Within SUMMIT

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*Exceptional
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Presentation Content

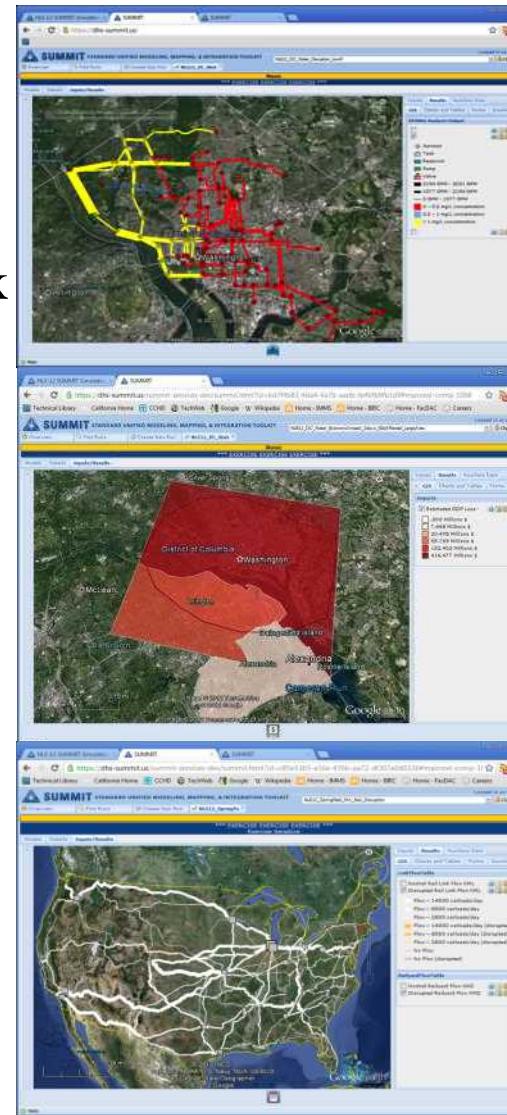
- Motivation
- What is SUMMIT?
- Overview of HazDAC
- Overview of SUMMIT capability
- Future Directions of SUMMIT

Motivation: Why Do We Care About...



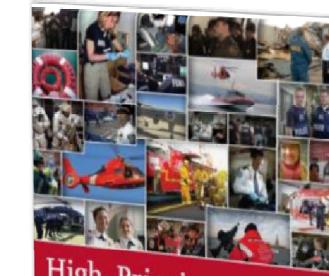
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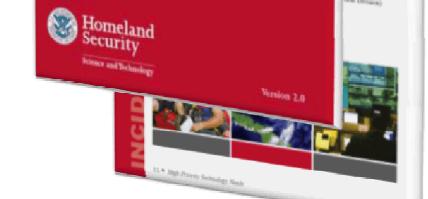
Homeland Security

Science and Technology

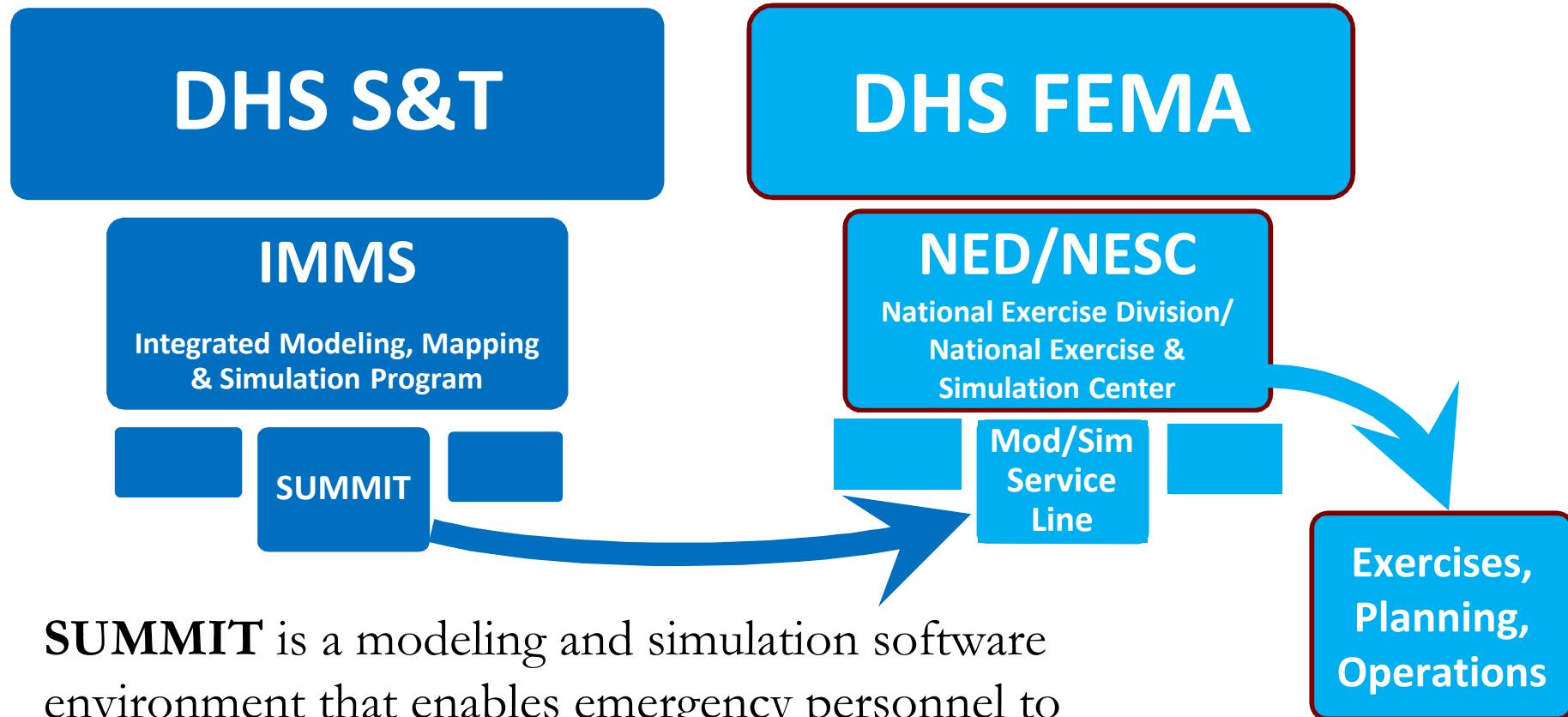


High-Priority Technology Needs

June 200



What is SUMMIT?

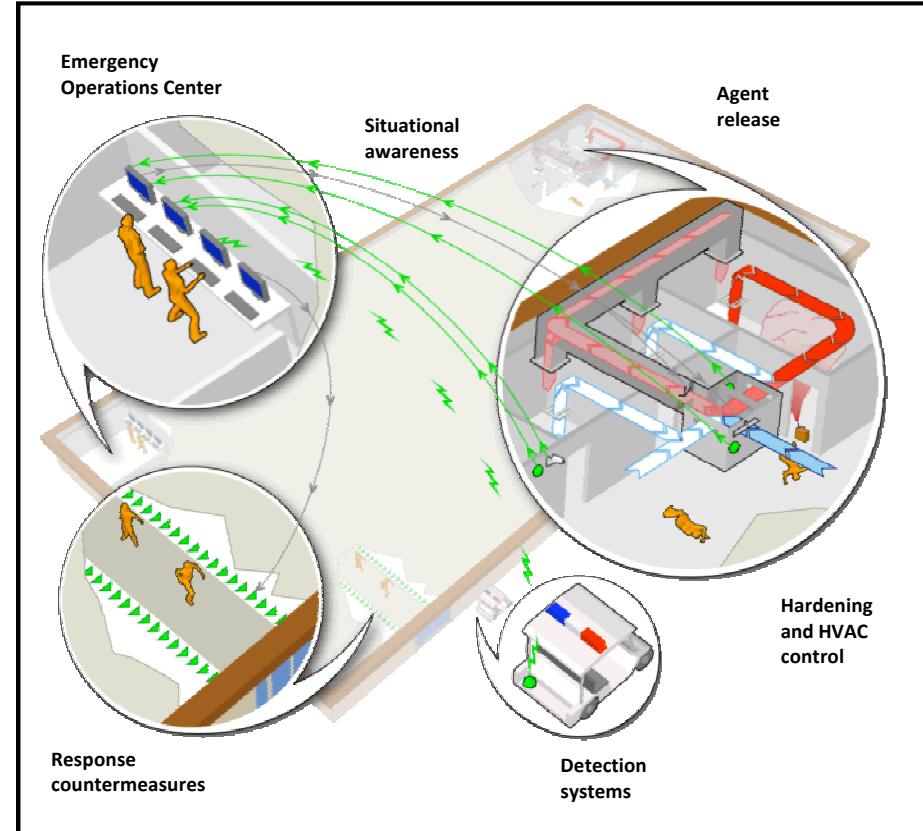


SUMMIT is a modeling and simulation software environment that enables emergency personnel to seamlessly access integrated suites of modeling tools and data sources for planning, exercise, or operational response

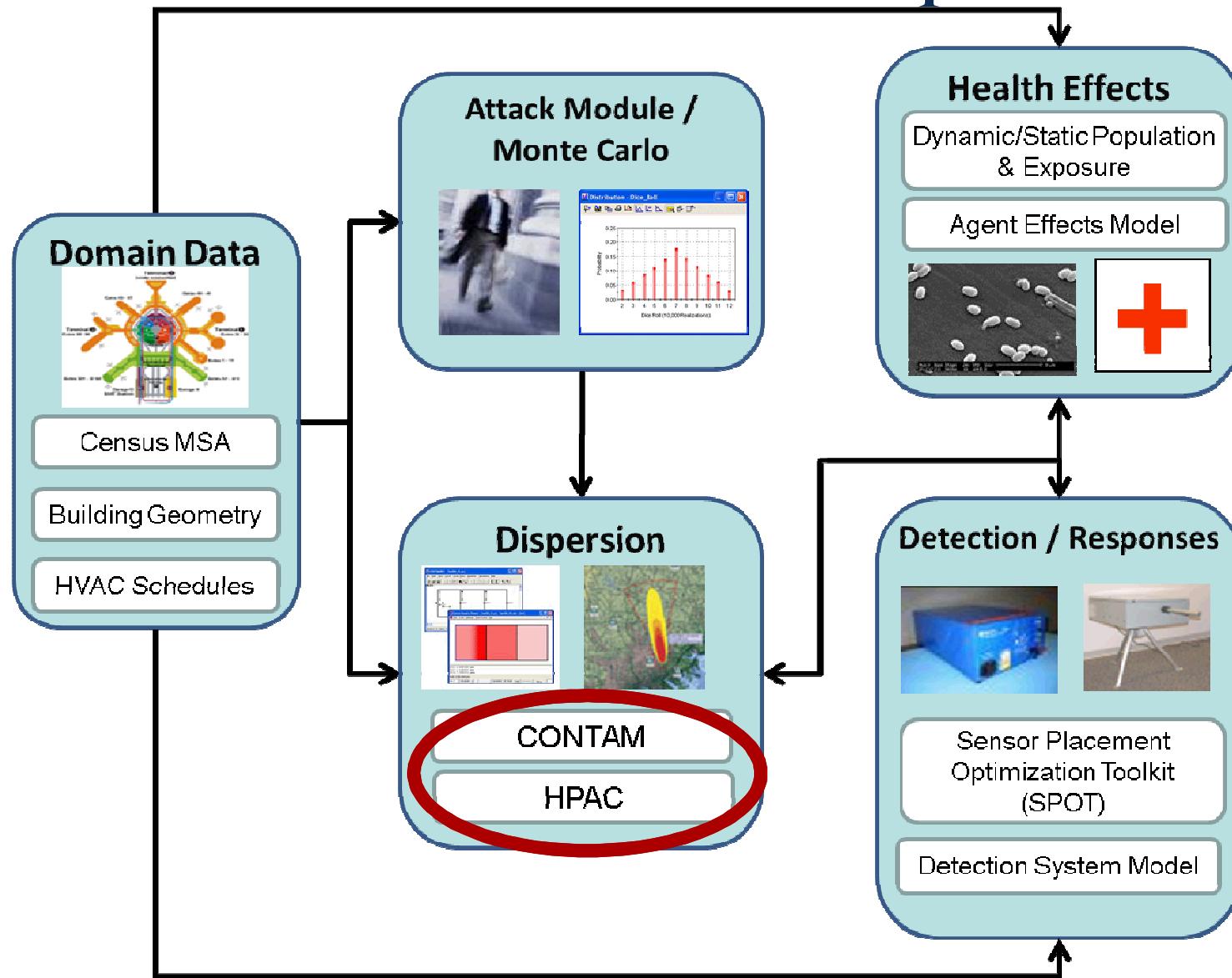
Motivation: Why Do We Care About...

Hazardous

- To determine the best countermeasures and actions during an emergency
- To reduce risks
- To reduce effects



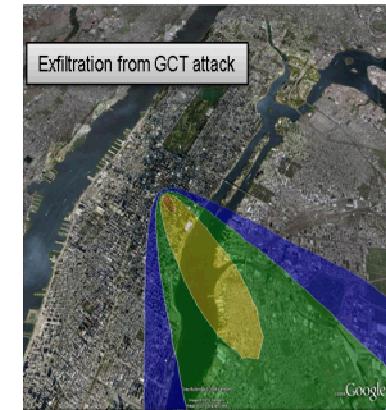
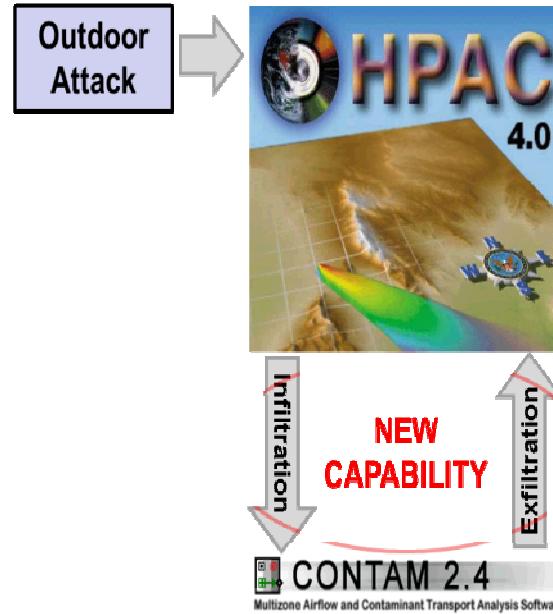
Overview of HazDAC Components



CONTAM & HPAC: Exfiltration Events

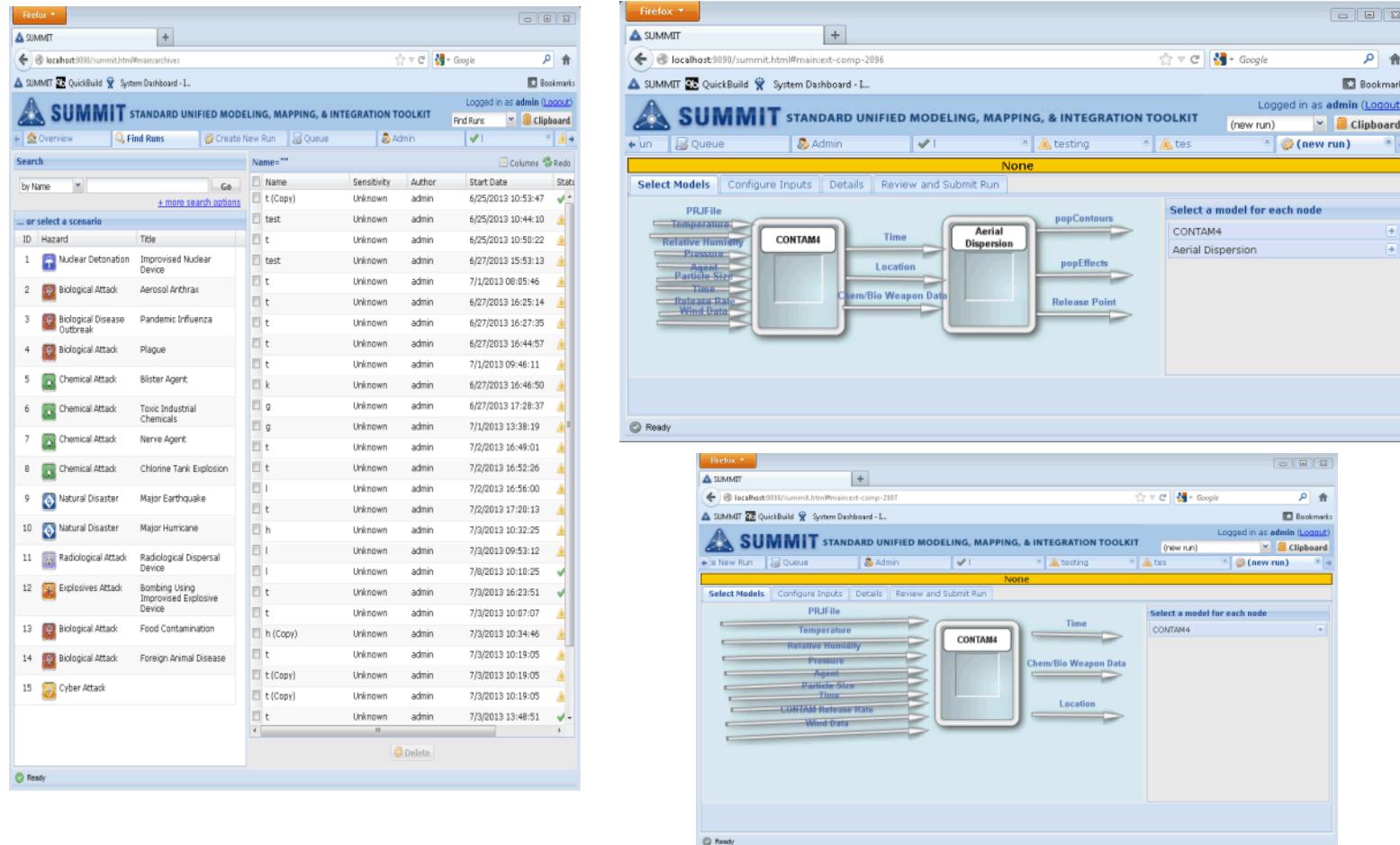
- CCW: Contaminant release of interest inside a building or structure
- HPAC: Hazardous atmosphere dispersion and biological information
- Exfiltration: Contaminants moving outdoors to the outdoors

Linking of indoor and outdoor dispersion codes is a capability unique to Sandia



SUMMIT Capabilities- BBC

- BBC (Browser Based Client) lets a user log in based on permissions, discover modeling and simulation tools, and examine the results

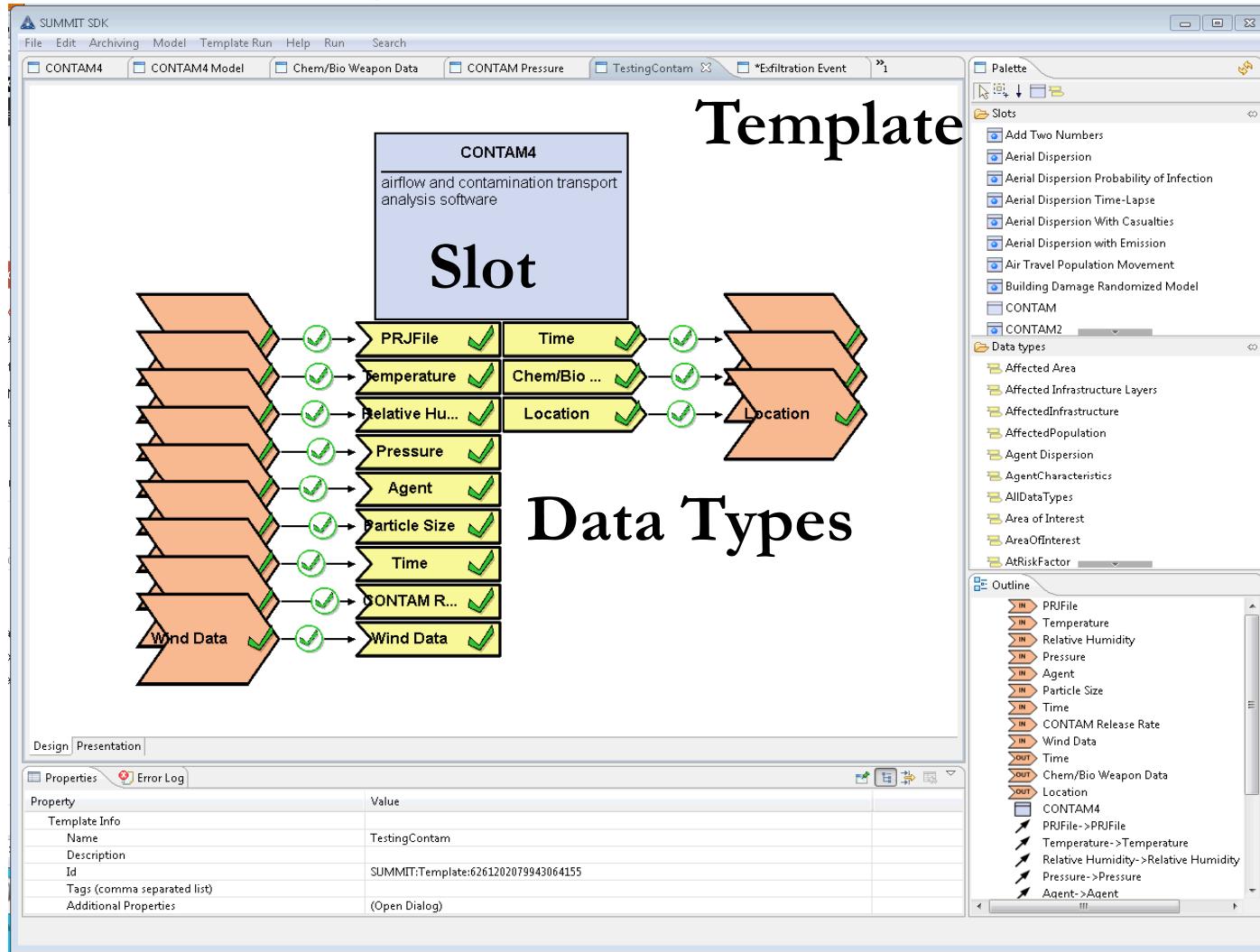


The screenshots illustrate the SUMMIT BBC interface, showing the following components:

- Left Screenshot (Scenario List):** A table listing 15 scenarios. Each scenario has a checkbox, ID, Hazard, Title, Author, Start Date, and Status. The scenarios include Nuclear Detonation, Biological Attack, Chemical Attack, and Natural Disaster.
- Middle Screenshot (Flowchart):** A flowchart titled "None" showing the "Aerial Dispersion" process. It starts with "CONTAM4" and "Aerial Dispersion" nodes. Inputs to "CONTAM4" include PRJfile, Temperature, Relative Humidity, Pressure, Agent, Particle Size, Time, Data/Geo Data, Wind Data, and Chem/Bio Weapon Data. Outputs from "CONTAM4" include Time and Location. Inputs to "Aerial Dispersion" include Time, Location, and Chem/Bio Weapon Data. Outputs from "Aerial Dispersion" include popContours, popEffects, and Release Point.
- Right Screenshot (Simplified Flowchart):** A simplified version of the flowchart. It shows "CONTAM4" and "Aerial Dispersion" nodes. Inputs to "CONTAM4" include PRJfile, Temperature, Relative Humidity, Pressure, Agent, Particle Size, Time, and Wind Data. Outputs from "CONTAM4" include Time and Location.

SUMMIT Capabilities- SDK

- SDK (Software Development Kit) is a standalone desktop application used by scenario designers and model owners



CONTAM Model Wrapping

- Input of CONTAM is a project (.prj) file that includes the layout, building components, and occupant information
- Leverage HazDAC source code and Java API to write the model wrapper for CONTAM

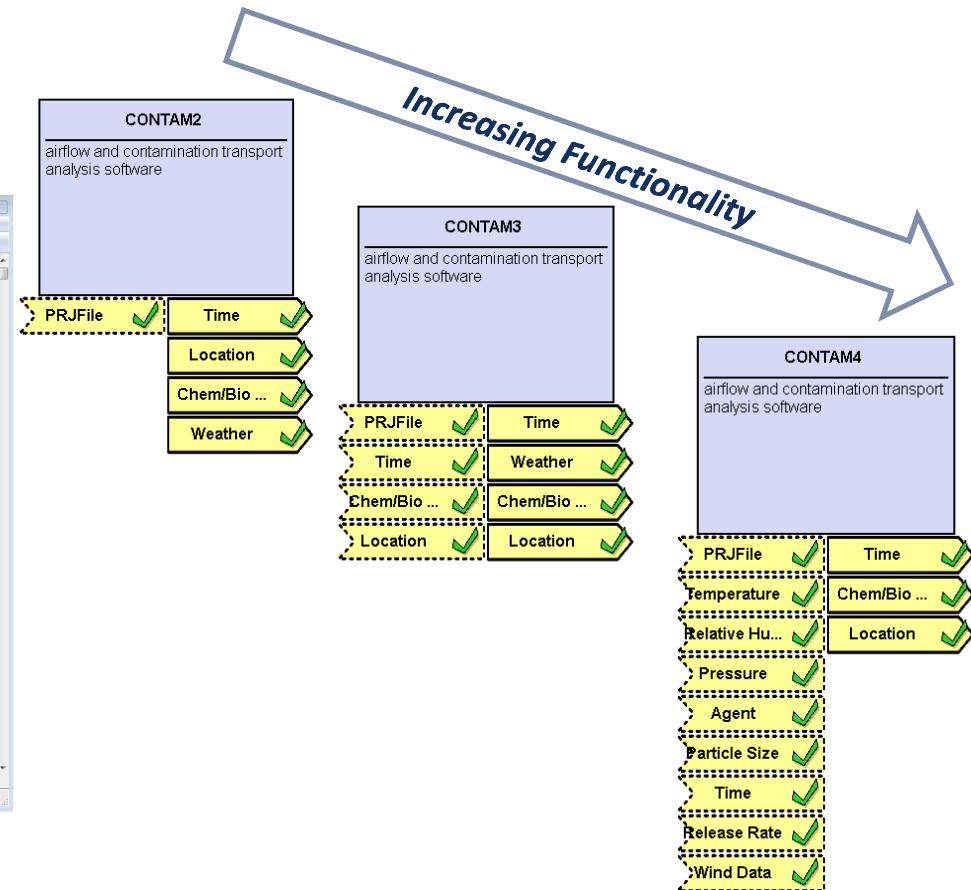
GCt_anth_dry1026_21.prj - Notepad2

```

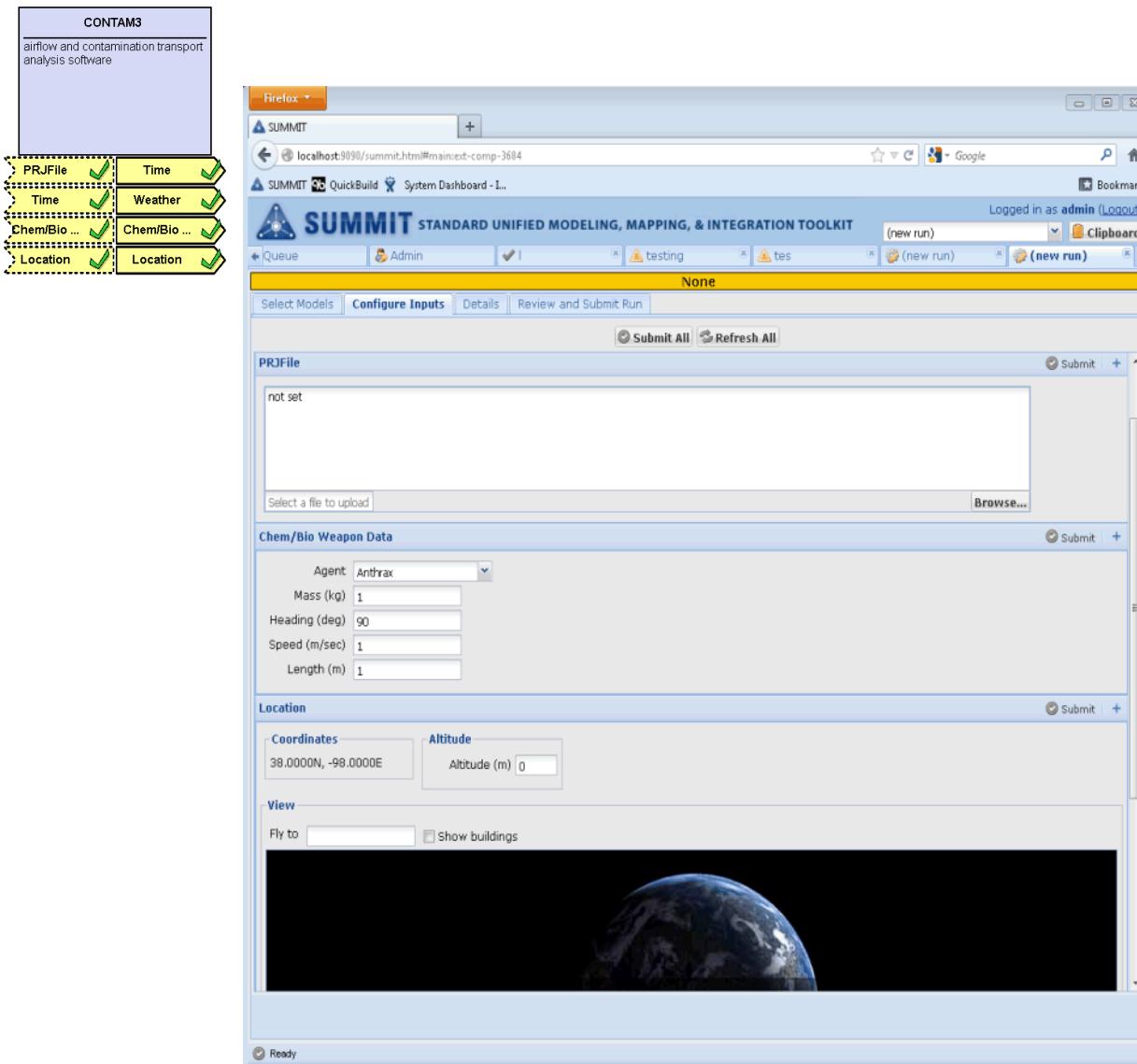
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19 ! latd longtd tznr altd Tgrnd u..
20 40.75 -73.98 -5.00 0 283.15 2 0
21 !sim_af afcalc afmaxi afrcnvg afacnvg afrelax uac Pbldg uPb
22 1 1 30 1e-005 1e-006 0.75 0 50.00 0
23 ! slope rs afmaxi afcnvg afllimit Tadi

```

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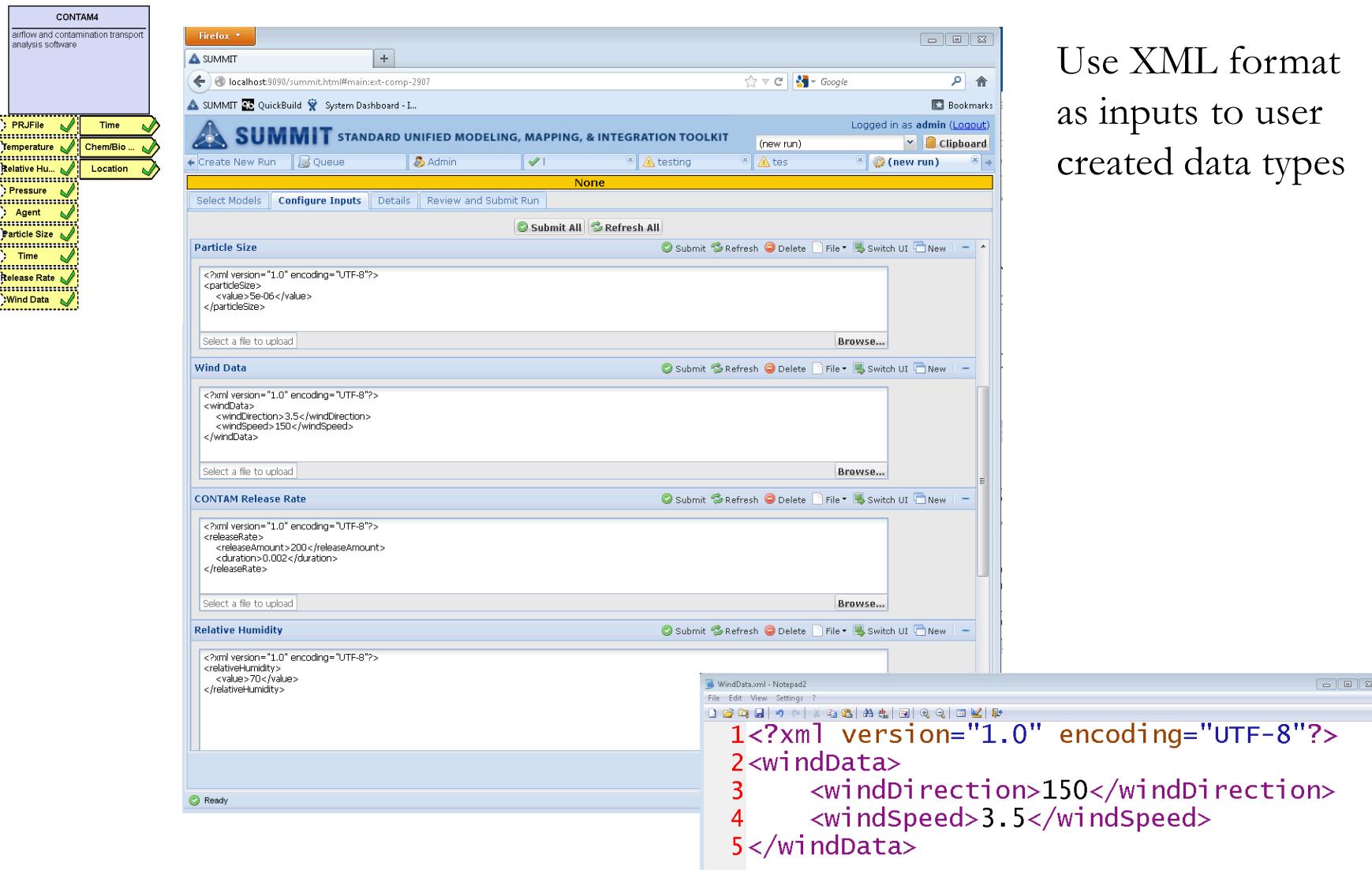
CONTAM BBC User Interface



The screenshot shows the SUMMIT BBC User Interface in a Firefox browser. The interface is for the CONTAM3 project, which is described as 'airflow and contamination transport analysis software'. The project setup section shows a 'PRJFile' with a green checkmark, and 'Time', 'Weather', 'Chem/Bio ...', 'Chem/Bio ...', and 'Location' inputs, each with a green checkmark. The main workspace is titled 'SUMMIT STANDARD UNIFIED MODELING, MAPPING, & INTEGRATION TOOLKIT' and shows a 'None' status. It includes tabs for 'Select Models', 'Configure Inputs', 'Details', and 'Review and Submit Run'. Under 'Configure Inputs', there are sections for 'PRJFile' (set to 'not set'), 'Chem/Bio Weapon Data' (Agent: Anthrax, Mass (kg): 1, Heading (deg): 90, Speed (m/sec): 1, Length (m): 1), and 'Location' (Coordinates: 38.0000N, -98.0000E, Altitude (m): 0). A 'View' section allows 'Fly to' and 'Show buildings'. A 3D globe visualization is visible in the background of the workspace. The bottom status bar says 'Ready'.

Project file needs to be uploaded and modified using inputs from existing data types

CONTAM BBC User Interface



The screenshot displays the SUMMIT BBC User Interface, which integrates various modeling tools. On the left, a sidebar lists parameters: PRJFile, Time, Temperature, Chem/Bio ..., Relative Hu..., Location, Pressure, Agent, Particle Size, Time, Release Rate, and Wind Data. The main area shows four input panels: Particle Size, Wind Data, CONTAM Release Rate, and Relative Humidity. Each panel contains an XML code editor, a 'Select a file to upload' button, and a 'Browse...' button. The Particle Size panel shows the following XML:

```
<?xml version="1.0" encoding="UTF-8"?>
<particleSize>
  <value>5e-06</value>
</particleSize>
```

The Wind Data panel shows the following XML:

```
<?xml version="1.0" encoding="UTF-8"?>
<windData>
  <windDirection>3.5</windDirection>
  <windSpeed>150</windSpeed>
</windData>
```

The CONTAM Release Rate panel shows the following XML:

```
<?xml version="1.0" encoding="UTF-8"?>
<releaseRate>
  <releaseAmount>200</releaseAmount>
  <duration>0.002</duration>
</releaseRate>
```

The Relative Humidity panel shows the following XML:

```
<?xml version="1.0" encoding="UTF-8"?>
<relativeHumidity>
  <value>70</value>
</relativeHumidity>
```

Below the interface, a Notepad2 window titled 'WindData.xml' displays the XML code for Wind Data, with line numbers 1 through 5:

- 1 <?xml version="1.0" encoding="UTF-8"?>
- 2 <windData>
- 3 <windDirection>150</windDirection>
- 4 <windSpeed>3.5</windSpeed>
- 5 </windData>

Use XML format
as inputs to user
created data types

Future Directions With SUMMIT



-Continue to increase capabilities within SUMMIT
-Continue to utilize this resource in national exercises or upcoming events (such as the upcoming Superbowl) in order to improve and identify high priority areas that will address the nation's most pressing security needs



Acknowledgements

- **The IMMS/SUMMIT team**
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Questions?