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Developing a CONTAM Model Wrapper for Increased Capabilities Within SUMMIT

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*Exceptional
service
in the
national
interest*



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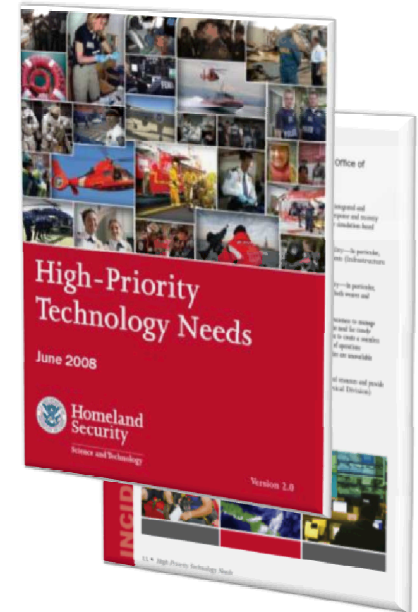
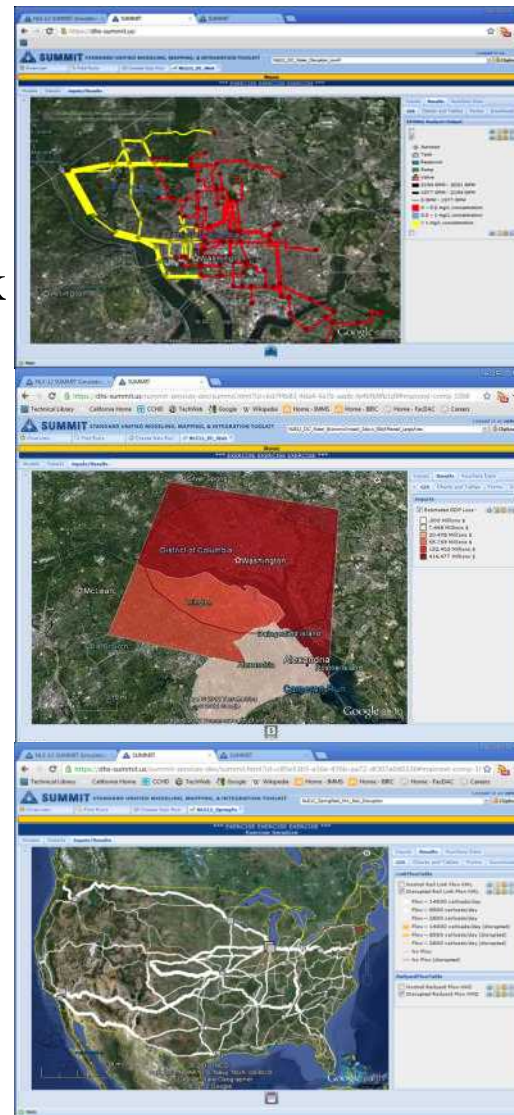
Presentation Content

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

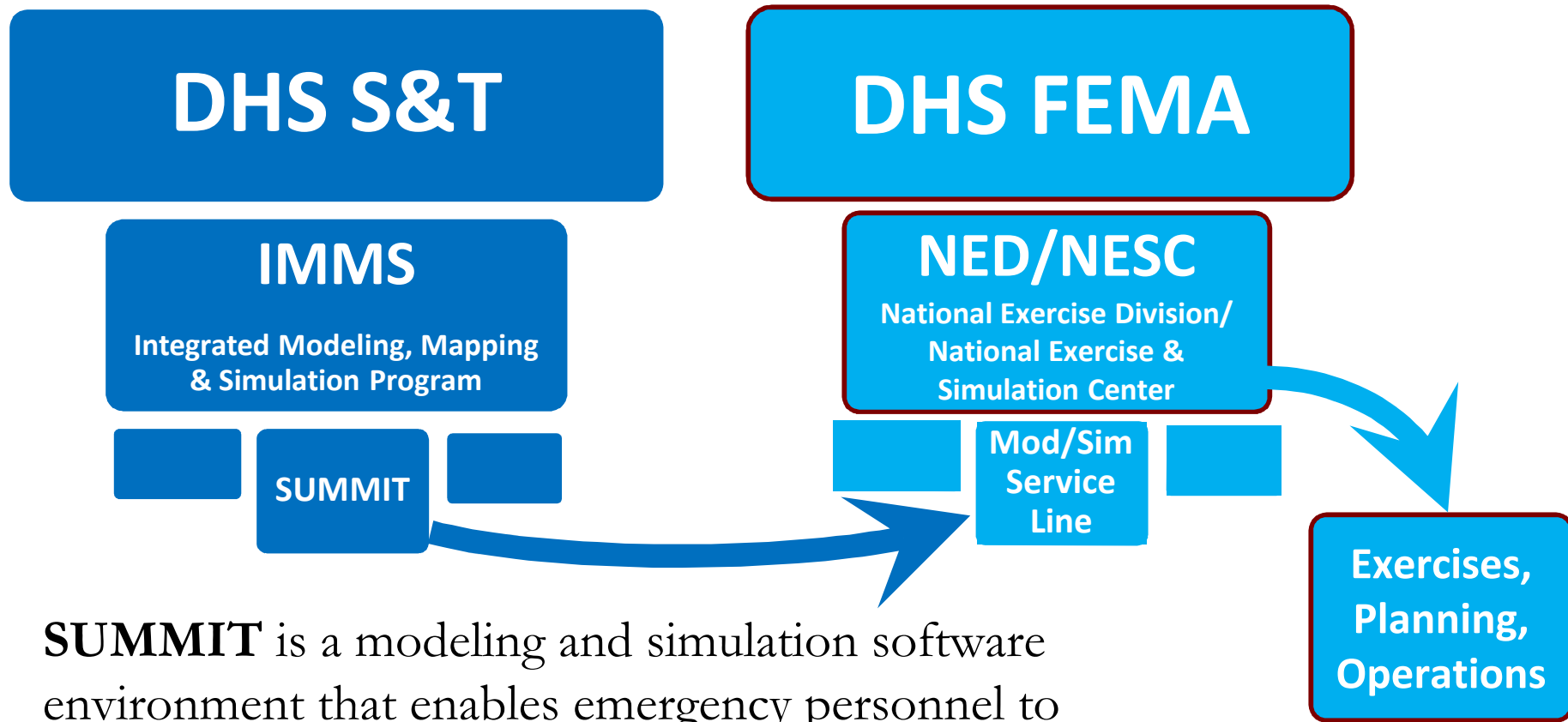
Motivation: Why Do We Care About...

SUMMIT

- Not a simple, complex
- Not a simple, complex
- For information models in
- A browser control
- Inputs and outputs



What is SUMMIT?

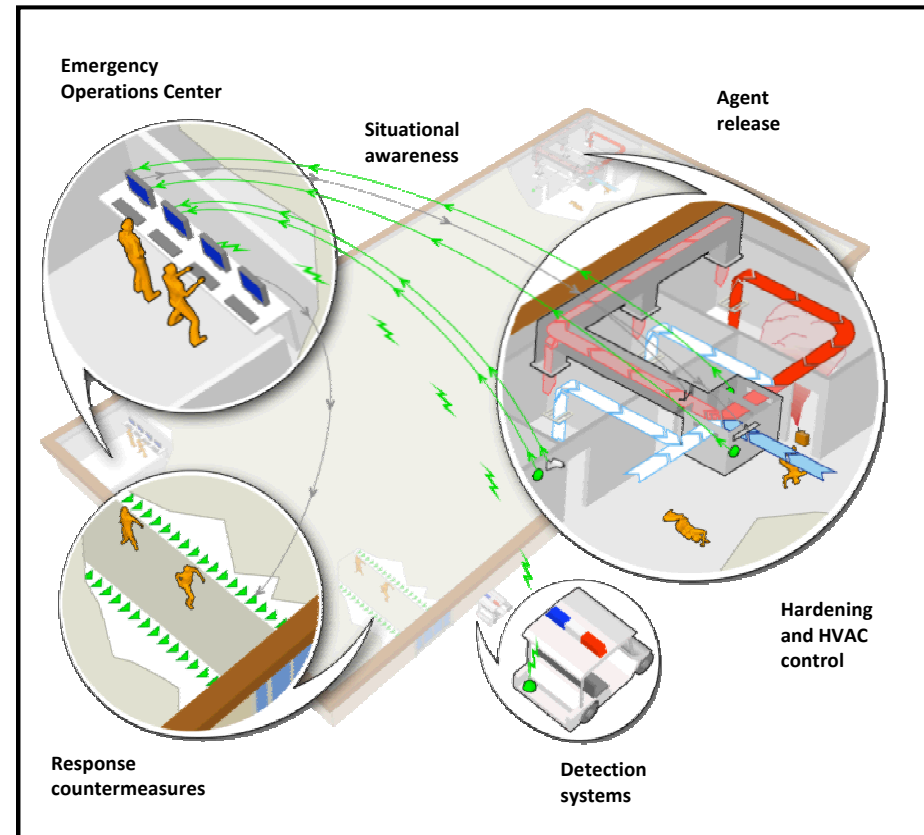


SUMMIT is a modeling and simulation software environment that enables emergency personnel to seamlessly access integrated suites of modeling tools and data sources for planning, exercise, or operational response

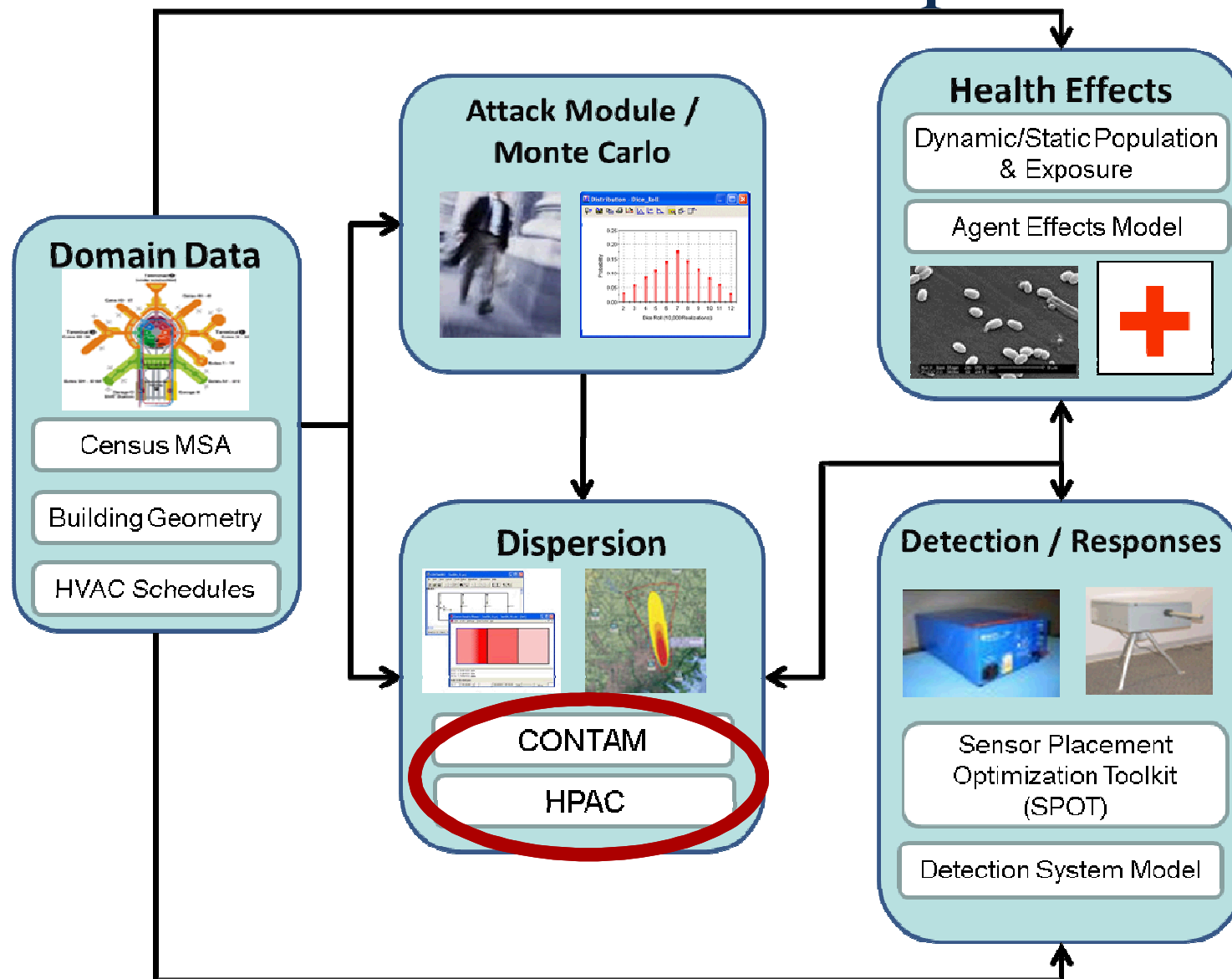
Motivation: Why Do We Care About...

Hazl

- T...e
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o...uring an
- T...best
re...cks
- T...ef



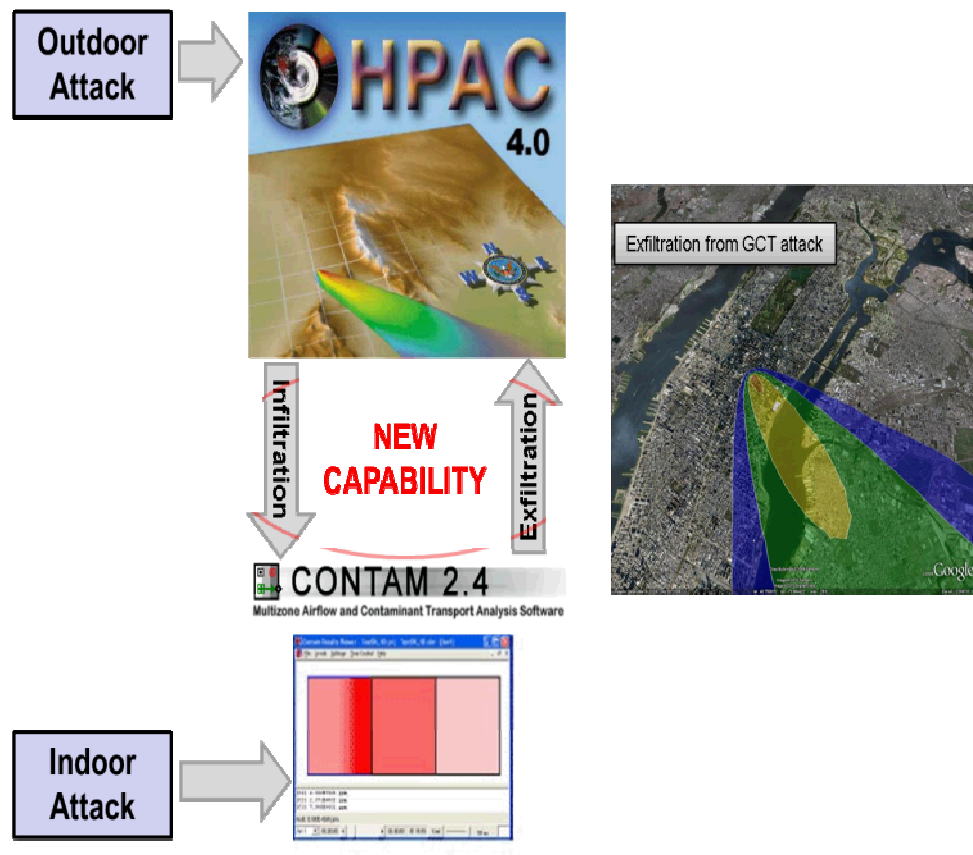
Overview of HazDAC Components



CONTAM & HPAC: Exfiltration Events

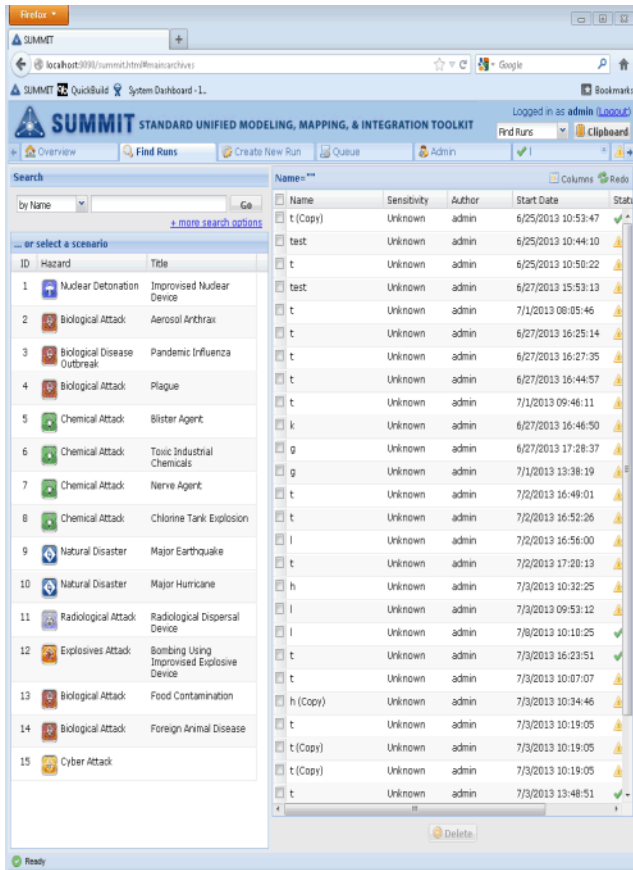
- CO₂ release of 1000 kg inside a building to determine the effect of ventilation rates on the concentration of CO₂ inside the building.
- HPAC is a tool for the analysis of hazardous materials releases and associated dispersion and transport information.
- Exfiltration from indoor spaces to outdoors

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



SUMMIT Capabilities- BBC

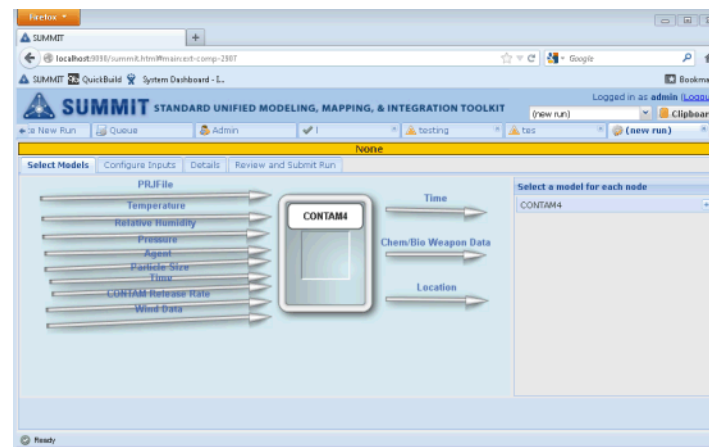
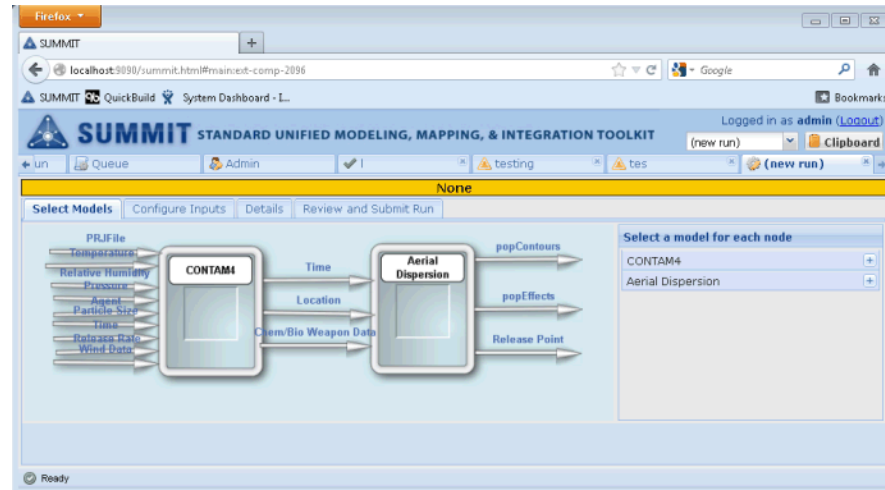
- BBC (Browser Based Client) lets a user log in based on permissions, discover modeling and simulation tools, and examine the results



The screenshot shows the SUMMIT web interface. On the left, there is a search bar and a list of scenarios. The main area displays a table of runs with columns for Name, Sensitivity, Author, Start Date, and Status.

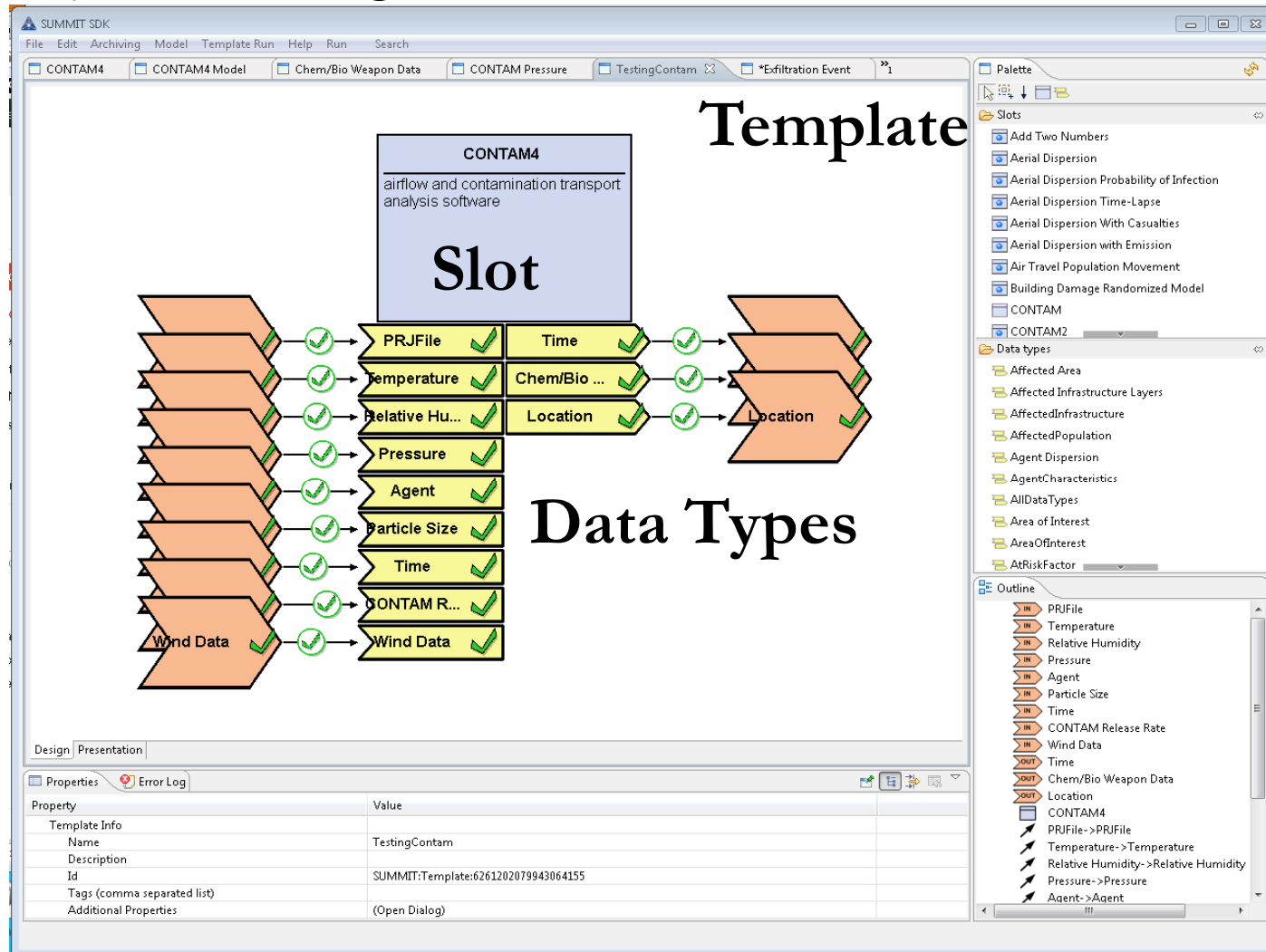
| ID | Hazard | Title |
|----|-----------------------------|---|
| 1 | Nuclear Detonation | Improvised Nuclear Device |
| 2 | Biological Attack | Aerosol Anthrax |
| 3 | Biological Disease Outbreak | Pandemic Influenza |
| 4 | Biological Attack | Plague |
| 5 | Chemical Attack | Blister Agent |
| 6 | Chemical Attack | Toxic Industrial Chemicals |
| 7 | Chemical Attack | Nerve Agent |
| 8 | Chemical Attack | Chlorine Tank Explosion |
| 9 | Natural Disaster | Major Earthquake |
| 10 | Natural Disaster | Major Hurricane |
| 11 | Biological Attack | Radical Dispersal Device |
| 12 | Explosives Attack | Bombing Using Improvised Explosive Device |
| 13 | Biological Attack | Food Contamination |
| 14 | Biological Attack | Foreign Animal Disease |
| 15 | Cyber Attack | |

| Name | Sensitivity | Author | Start Date | Status |
|----------|-------------|--------|--------------------|--------|
| t (Copy) | Unknown | admin | 6/25/2013 10:53:47 | ✓ |
| t | Unknown | admin | 6/25/2013 10:44:10 | |
| t | Unknown | admin | 6/25/2013 10:50:22 | |
| t | Unknown | admin | 6/27/2013 15:53:13 | |
| t | Unknown | admin | 7/1/2013 08:05:46 | |
| t | Unknown | admin | 6/27/2013 16:25:14 | |
| t | Unknown | admin | 6/27/2013 16:27:35 | |
| t | Unknown | admin | 6/27/2013 16:44:57 | |
| t | Unknown | admin | 7/1/2013 09:46:11 | |
| k | Unknown | admin | 6/27/2013 16:46:50 | |
| g | Unknown | admin | 6/27/2013 17:28:37 | |
| g | Unknown | admin | 7/1/2013 13:38:19 | |
| t | Unknown | admin | 7/2/2013 16:49:01 | |
| t | Unknown | admin | 7/2/2013 16:52:26 | |
| l | Unknown | admin | 7/2/2013 16:56:00 | |
| t | Unknown | admin | 7/2/2013 17:20:13 | |
| h | Unknown | admin | 7/3/2013 10:32:25 | |
| l | Unknown | admin | 7/3/2013 09:53:12 | |
| l | Unknown | admin | 7/8/2013 10:10:25 | ✓ |
| t | Unknown | admin | 7/3/2013 16:23:51 | ✓ |
| t | Unknown | admin | 7/3/2013 10:07:07 | |
| t (Copy) | Unknown | admin | 7/3/2013 10:34:46 | |
| t | Unknown | admin | 7/3/2013 10:19:05 | |
| t (Copy) | Unknown | admin | 7/3/2013 10:19:05 | |
| t (Copy) | Unknown | admin | 7/3/2013 10:19:05 | |
| t | Unknown | admin | 7/3/2013 13:48:51 | ✓ |



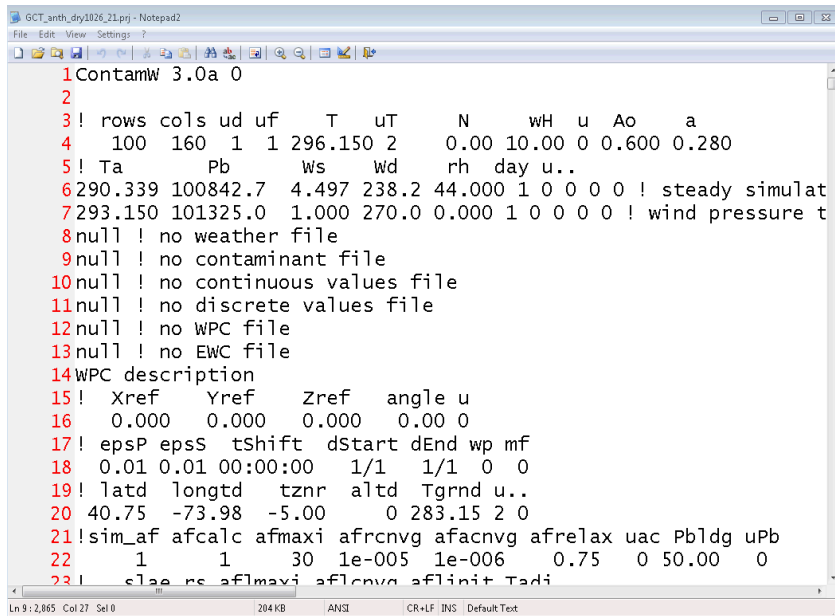
SUMMIT Capabilities- SDK

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



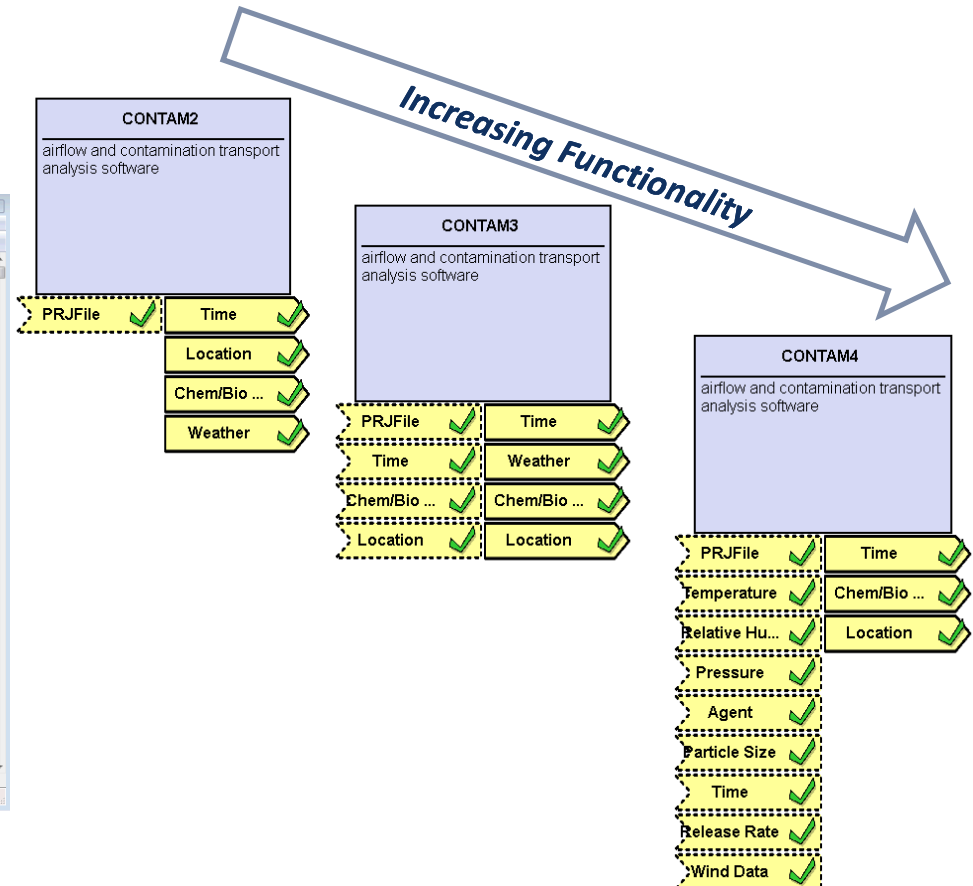
CONTAM Model Wrapping

- 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



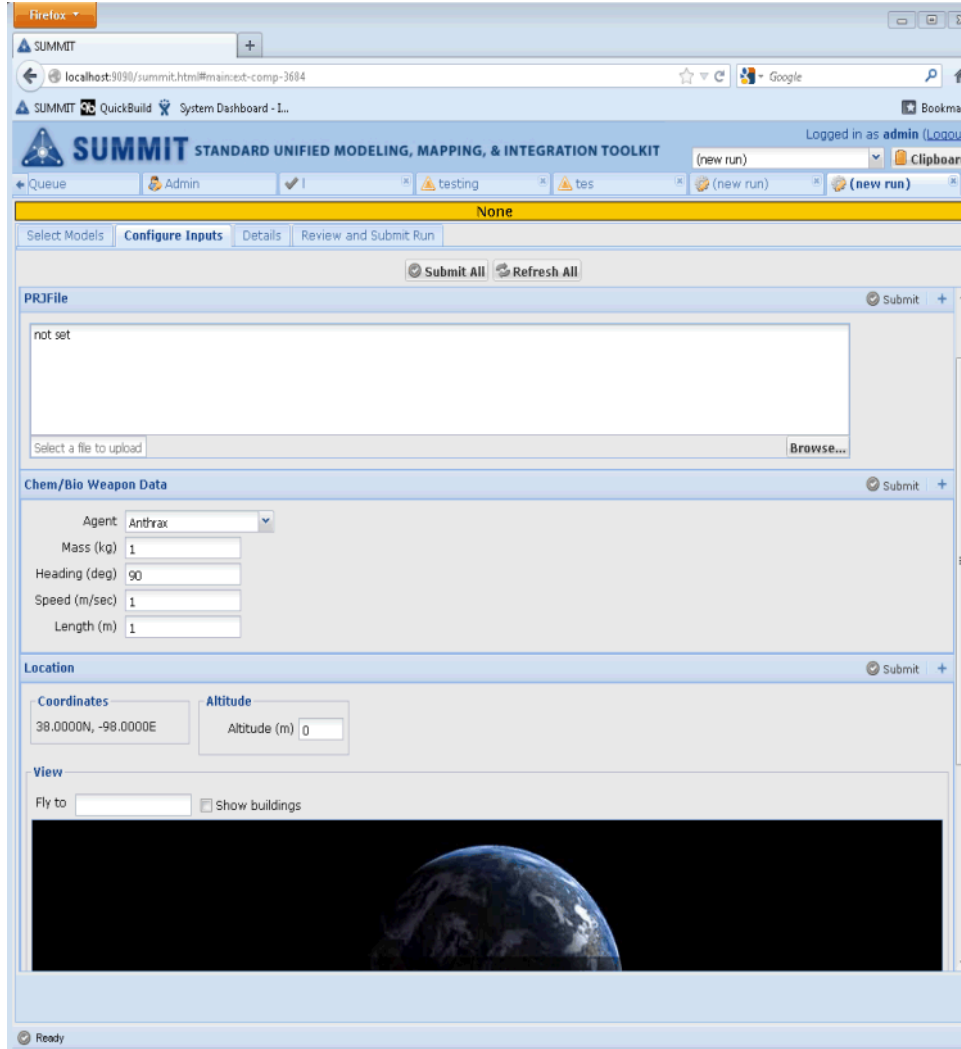
```

1 ContamW 3.0a 0
2
3 ! rows cols ud uf T uT N wH u Ao a
4 100 160 1 1 296.150 2 0.00 10.00 0 0.600 0.280
5 ! Ta Pb ws Wd rh day u..
6 290.339 100842.7 4.497 238.2 44.000 1 0 0 0 0 ! steady simulat
7 293.150 101325.0 1.000 270.0 0.000 1 0 0 0 0 ! wind pressure t
8 null ! no weather file
9 null ! no contaminant file
10 null ! no continuous values file
11 null ! no discrete values file
12 null ! no WPC file
13 null ! no EWC file
14 WPC description
15 ! Xref Yref Zref angle u
16 0.000 0.000 0.000 0.00 0
17 ! epsP epsS tShift dStart dEnd wp mf
18 0.01 0.01 00:00:00 1/1 1/1 0 0
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 ! slae rs aflmaxi aflcnvg aflinit Tadi
  
```



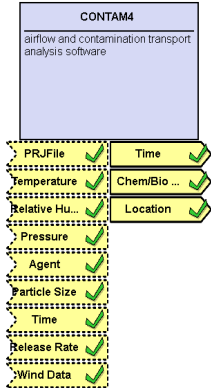
CONTAM BBC User Interface

| CONTAM3 | |
|---|--------------|
| airflow and contamination transport analysis software | |
| PRJFile | Time |
| Time | Weather |
| Chem/Bio ... | Chem/Bio ... |
| Location | Location |



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

CONTAM BBC User Interface



Firefox

SUMMIT

localhost:9090/summit.html#main:ext-comp-2907

SUMMIT QuickBuild System Dashboard - L...

Logged in as admin (Logout)

Create New Run Queue Admin testing tes (new run)

None

Select Models Configure Inputs Details Review and Submit Run

Submit All Refresh All

Particle Size

Submit Refresh Delete File Switch UI New

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

Select a file to upload Browse...

Wind Data

Submit Refresh Delete File Switch UI New

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

Select a file to upload Browse...

CONTAM Release Rate

Submit Refresh Delete File Switch UI New

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

Select a file to upload Browse...

Relative Humidity

Submit Refresh Delete File Switch UI New

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

Ready

Use XML format
as inputs to user
created data types

WindData.xml - Notepad2

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

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**
 - Mentor Nerayo Teclemariam
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Questions?