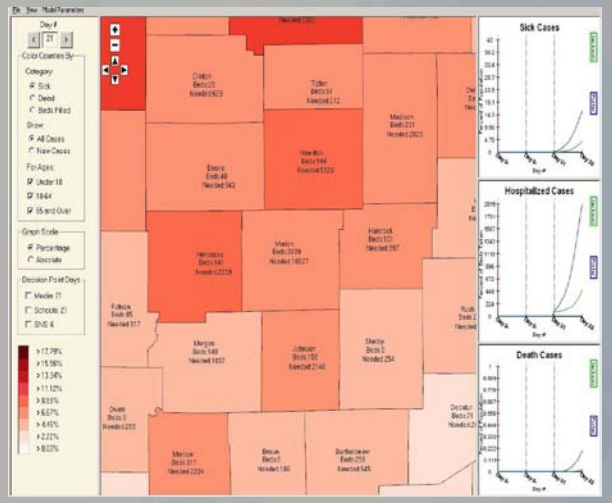
PURVAC

Purdue University Regional Visualization and Analytics Center

Visual Analytics in Real Applications: Research to Reality



David S. Ebert

www.purvac.org

RVAC Regional Visualization and Analytics Centers

Discovery Park

Two Examples

- Exercise program and integration of visual analytics
  - *State of Indiana (94 Health Departments)*
    - Focused drills for pandemic flu preparedness
- Low-cost mobile command and control environment for emergency responders
  - *Provide common operation picture during training and for after action review*
  - *Provide mobile display for emergency responders*

ISDH PanFlu 2008

Background: December 2007- August 2008

Each of the 10 Homeland Security Districts provided a Tabletop Exercise (TTX) and a Functional Exercise (FE)

An "Executive" Tabletop provided to the senior leadership in Indiana

State-wide…10 districts with 92 counties

Organized by "district," but delivered to each county in the district

Various levels of community preparedness and exercise support

Outcomes

83 counties played

2,220+ responders participated

CDC disaster preparedness rating increased from 38% in 2006 to 96% in 2008

- 9 of 13 critical elements received 100%

Example Comments

"Speed of injects was excellent, and necessary to create an environment out of your "comfort zone" for participants. In the real world there is no control of the "game speed" and it is time exercise participants realize this."

"This was a great exercise. It allowed us to see that all of the efforts we have expended so far have been worthwhile. It allowed us to go beyond the immediate needs and let us contemplate the best way to use our resources in a long term situation."

Pandemic Influenza Preparedness Exercise Visual Analytics

Requirements for system

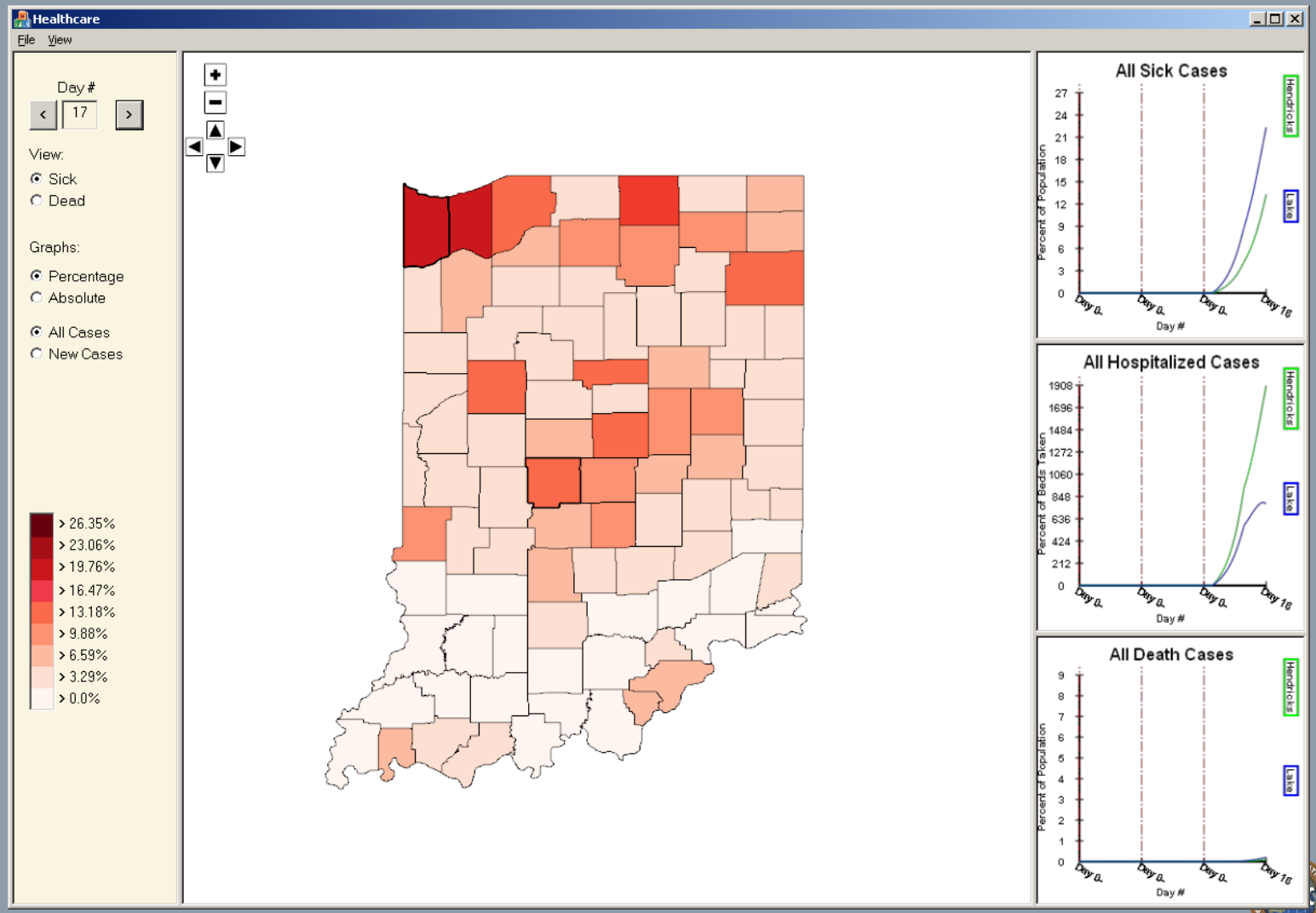
- Allow decision makers to understand the effects of three types of actions:
  - *Use of Strategic National Stockpile*
  - *Public information announcements*
  - *Closing schools*
- Increase understanding of impact, decisions, capacity needs
- Allow changing of pandemic influenza model parameters

Project Components and Partners

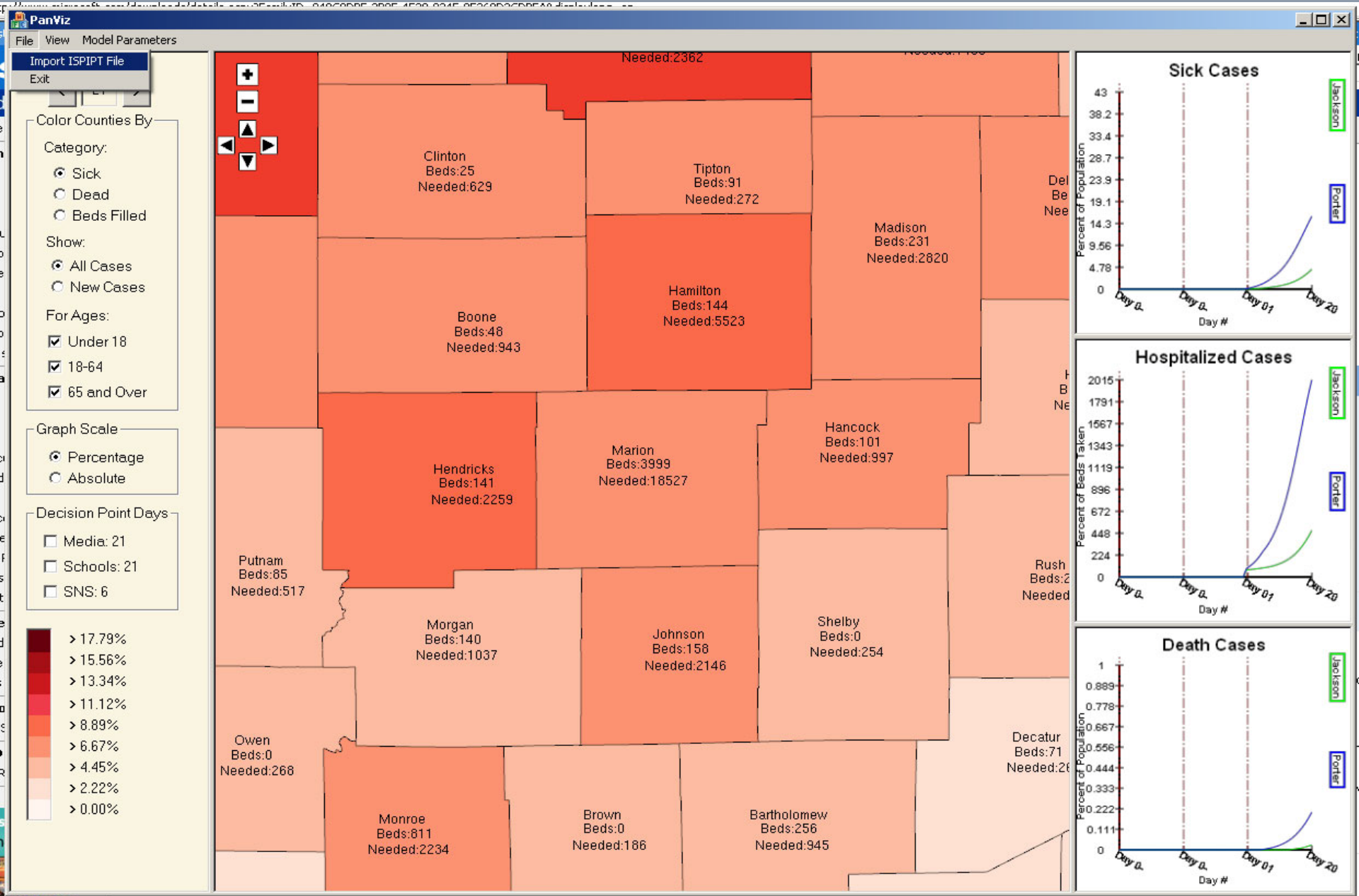
Battelle PNNL – pandemic influenza model

PURVAC – interactive visual analytic tool

PanViz


Healthcare
File View
Day #
17
View:
Sick
Dead
Graphs:
Percentage
Absolute
All Cases
New Cases
> 26.35%
> 23.06%
> 19.76%
> 16.47%
> 13.18%
> 9.88%
> 6.59%
> 3.29%
> 0.0%
All Sick Cases
Percent of Population
Day #
All Hospitalized Cases
Percent of Beds Taken
Day #
All Death Cases
Percent of Population
Day #
Hardin
Lake

PanViz


PanViz
File
View
Model Parameters
Import ISPIPT File
Exit
Color Counties By
Category:
Sick
Dead
Beds Filled
Show:
All Cases
New Cases
For Ages:
Under 18
18-64
65 and Over
Graph Scale
Percentage
Absolute
Decision Point Days
Media: 21
Schools: 21
SNS: 6
> 17.79%
> 15.56%
> 13.34%
> 11.12%
> 8.89%
> 6.67%
> 4.45%
> 2.22%
> 0.00%
Needed:2362
Clinton
Beds:25
Needed:629
Tipton
Beds:91
Needed:272
Madison
Beds:231
Needed:2820
Boone
Beds:48
Needed:943
Hamilton
Beds:144
Needed:5523
Hancock
Beds:101
Needed:997
Hendricks
Beds:141
Needed:2259
Marion
Beds:3999
Needed:18527
Putnam
Beds:85
Needed:517
Morgan
Beds:140
Needed:1037
Johnson
Beds:158
Needed:2146
Shelby
Beds:0
Needed:254
Owen
Beds:0
Needed:268
Monroe
Beds:811
Needed:2234
Brown
Beds:0
Needed:186
Bartholomew
Beds:256
Needed:945
Sick Cases
Percent of Population
Day #
Hospitalized Cases
Percent of Beds Taken
Death Cases
Jackson
Porter

County Specific Scenario Plot for Display	
Selected County:	Adams

Spread Rate

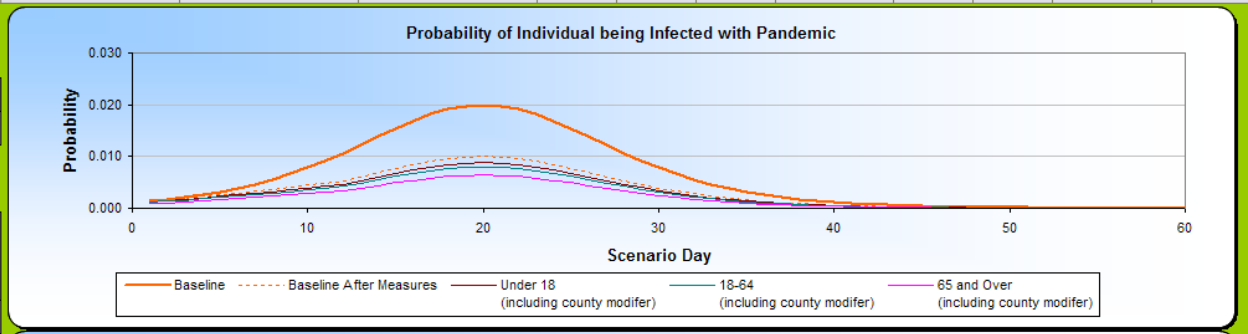
Point of Origin (currently Chicago, IL)	
Latitude	41.879536
Longitude	-87.624333
Miles/Day Traveled:	25.0

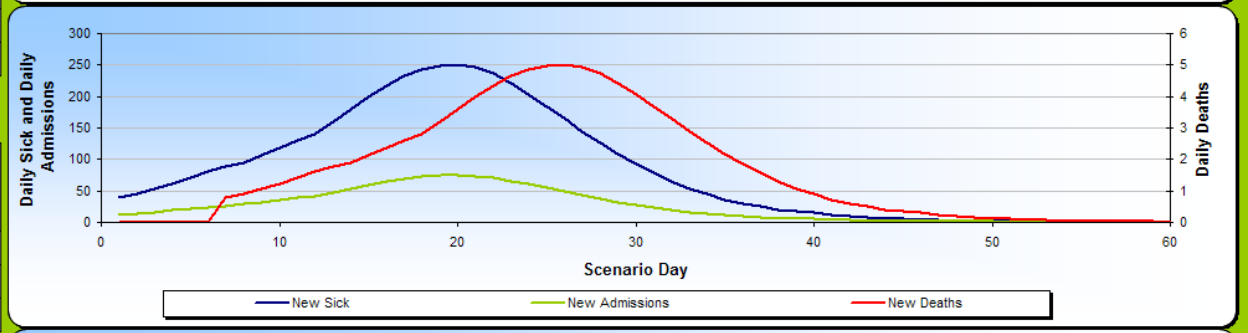
County Type Impact

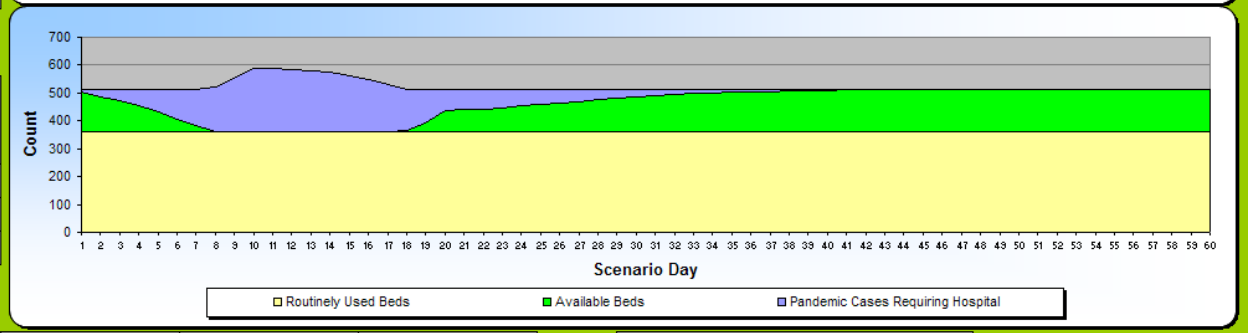
County Density Category	Modification to Baseline Pandemic Influenza Infection Probability
1 = Rural	0.80
2 = Small Towns	1.00
3 = Major Metropolitan	1.20

Demographic Impact

Demographic	Modification to Baseline Pandemic Influenza Infection Probability
Under 18	1.10
18-64	1.00
65 and Over	0.80







Adams
Scenario Summary

Category	30 Day Totals	60 Day Totals
Infected	4,482	4,921
Admitted	1,349	1,483
Deaths	73	98

Output Data for all Counties

Decision Measures

Measure	Meaure On (1) or Off (0)	% Reduction in Infection Probability	Day Implemented (from scenario start on day 1)	Day Measure Reaches Full Impact (number of days after being implemented)
Media	1	10.00	2	2
Close Schools	1	15.00	4	5
SNS	1	25.00	6	7

Hospital Bed Model (Enter 1 or 2)	
Enter Choice:	2

Global Parameters (these can be overriden county by county by going to the specific county tab)	
Mortality Rate:	2.0%
Recover Rate:	98.0%
Hospitalization Rate:	30.0%
Typical Hospital Capacity:	70.0%
Mean Time to Recover (days):	10
Mean Time in Hospital (days):	6
Mean Time to Die (days):	6

EOC Data Fusion: Solutions Examples

Scalable Common Operation Picture / Situational Awareness

- Utilize real world training center, local police, former school
- Police training for rescue in a school

Data:

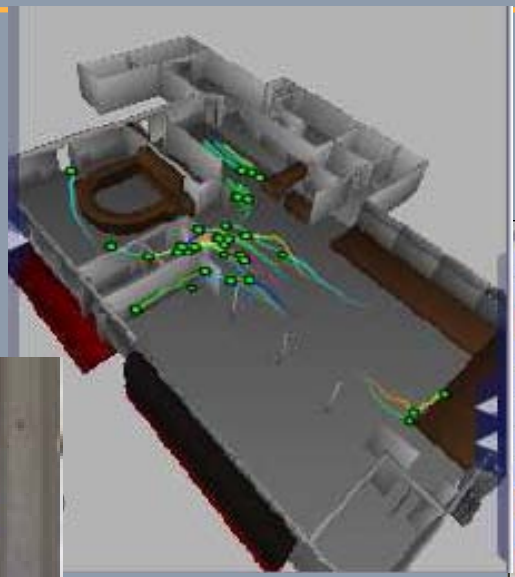
- Personnel/asset tracking
  - *Interior and exterior tracking, sensors*
- Streaming video/audio recording & monitoring

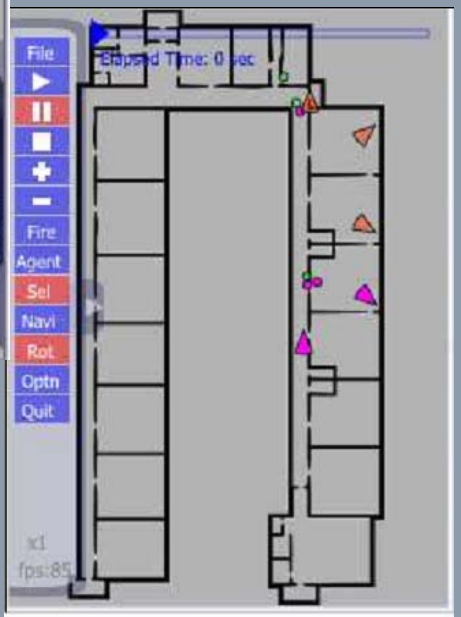
Create COP and AAR displays

- Integrated tracking and video display for situational awareness and review

Real-time data, video, sensor, communications, and network integration

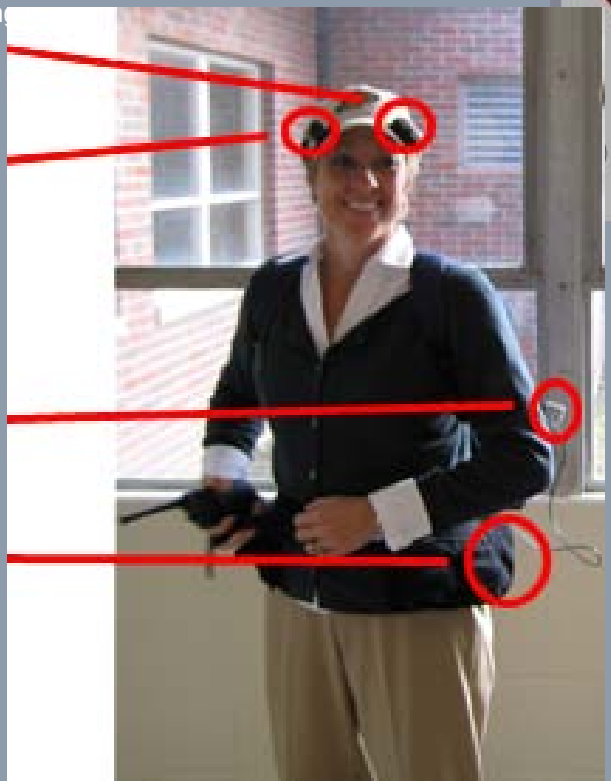
Example Initial Results





Tracking Tag

Camera



GPS

Video Pack

Display on Mobile Device

More information

www.purvac.org

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Collaborators:

- Purdue Homeland Security Institute
- Indiana State Department of Health
- West Lafayette Police Department
- US Army CERDEC