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Measured Response

**The Application of Terascale Computing in
a Homeland Security Simulation**

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- Human Aspect in Homeland Security
- Live and Computational Experimentation in Bio-terrorism Response
- Measured Response



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- Synthetic Environment for Analysis and Simulation (SEAS) Lab
- Krannert School of Management
- Purdue University



- Indiana State 21st Century Research And Technology Fund
- National Science Foundation



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Presentation



- Need: Human Aspect of Homeland Security
- Project: Measured Response (MR)
- Architecture: Tera-scale Computing
- Event: Measured Response 2003
- Updates: New Models
- Future: Visualization, Timelines



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Need



- Capabilities to analyze human responses
- Emphasize citizens and policy makers
- Virtual environment to test and analyze
- Experiment with complex coordination



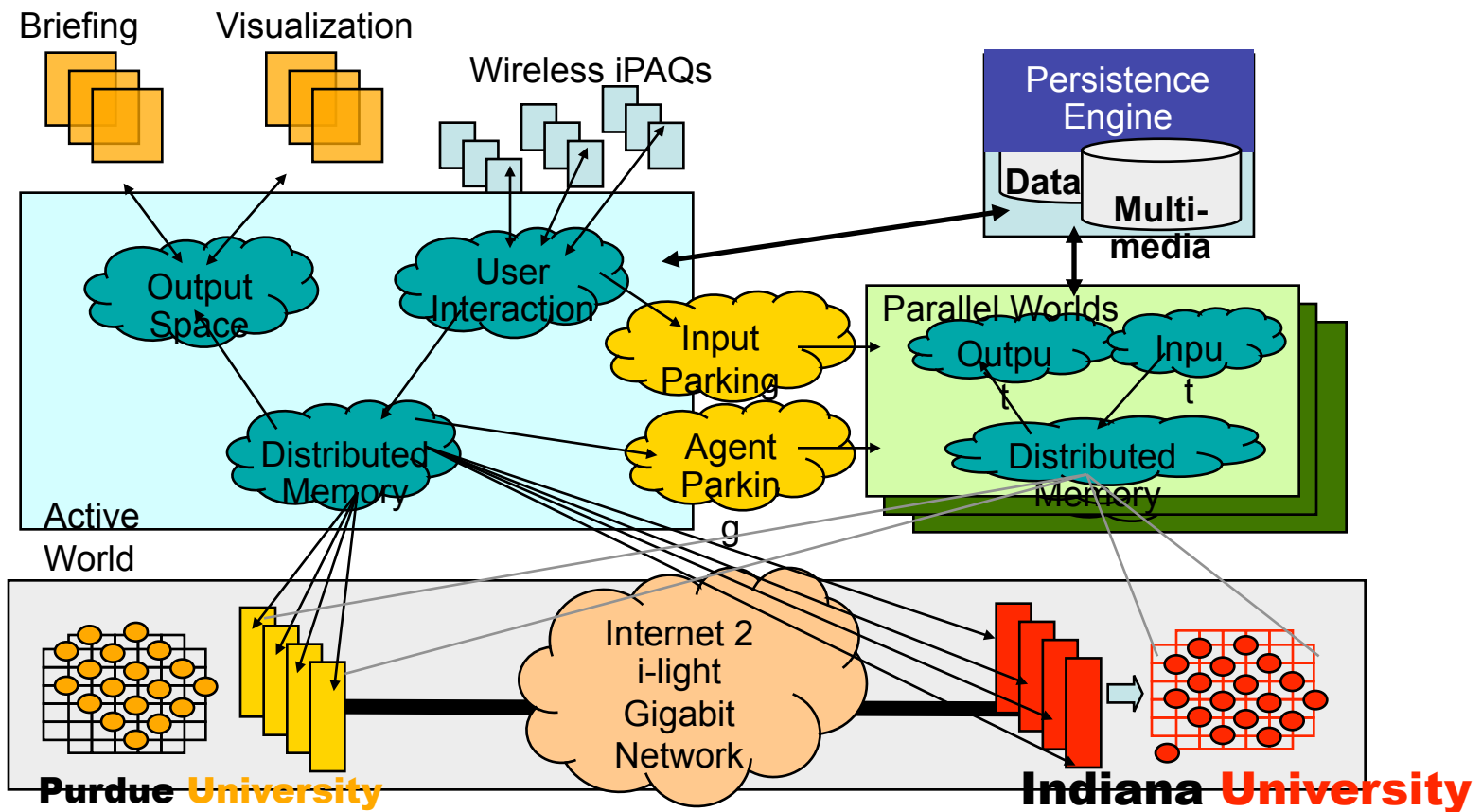
- Virtual Environment
- Emergency Response Systems
- Decision Making Tool



- The Application of Tera-scale Computing in a Homeland Security Simulation
- Connect Palmtops to eventually Teraflops in a Seamless Simulation



Measured Response used configurable, distributed, grid computing on linked IBM SP2 supercomputers to connect palmtops to teraflops in a seamless simulation





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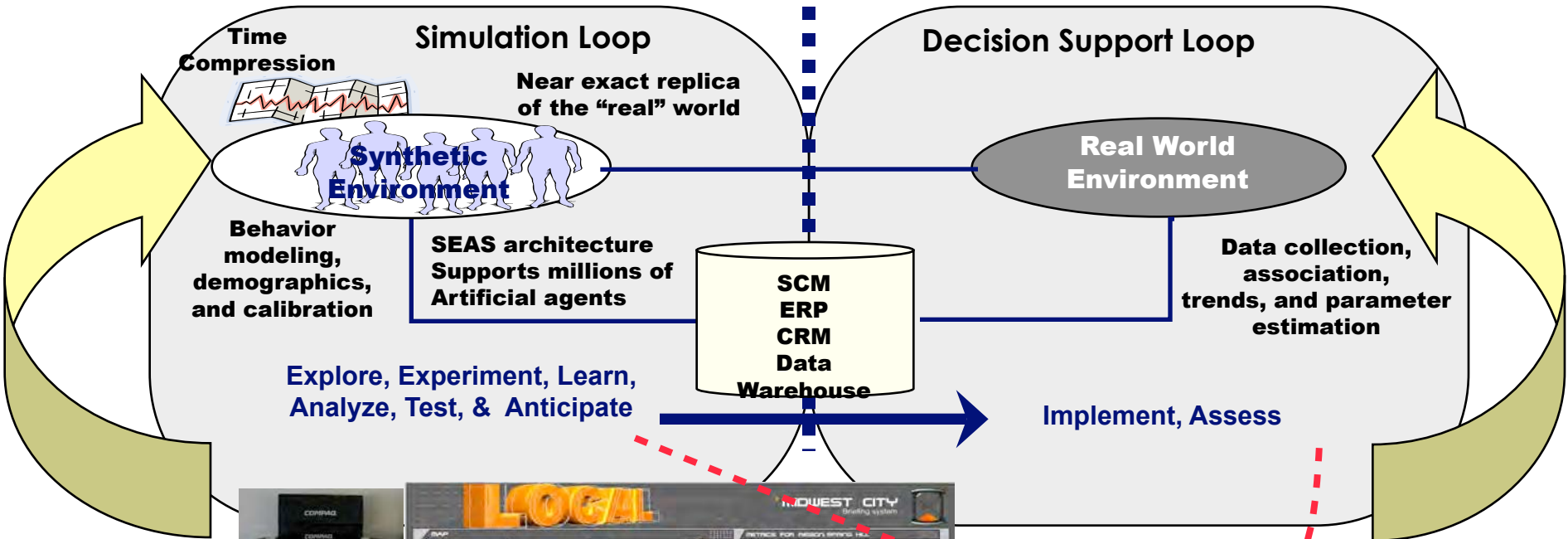
Architecture (cont)



- The Real and the Virtual World
- Wireless hand-held devices
- Super Nodes at Purdue and IU
- I-Light Gigabit Network
- Distributed Grid Computing



Parallel Worlds



The user(s) can seamlessly switch between real and virtual worlds through an intuitive user interface.



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Architecture: Parallel Worlds



- Simulation Loop
- Decision Support Loop
- Common Data Storage



Simulation Loop

- Replica of the real world
- Behavioral modeling, demographics and calibration
- Time compression
- Supports millions of artificial agents



Architecture: Parallel Worlds: Simulation Loop (cont)



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Used to...

- Explore
- Experiment
- Learn
- Analyze
- Test
- Anticipate



Architecture: Parallel Worlds: Decision Support Loop



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Decision Support Loop

- Real world environment
- Data collection
- Association
- Trends
- Parameter Estimation



Architecture: Parallel Worlds: Decision Support Loop (cont)



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Used to...

- Implement
- Access



Architecture: Parallel Worlds: Common Data Storage



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- Real World Data
 - Supply Chain Management (SCM)
 - Enterprise Resource Planning (ERP)
 - Customer Relationship Management (CRM)
 - Data Warehousing
- Simulation Data



- Simulation
- Participants
- Demo
- Value



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Event: MR 03: Simulation



- Bio-terror Attack
- Population
- Disease



- Facilitated Workshop
- Computer Based Simulation
- After Action Review

- Real-Time
 - Information
 - Analysis
 - Judgment
 - Communication
 - Decisions





Information

- What do we know?
- What more do we need to know?
- Where can we acquire it?



Analysis

- How reliable is our information?
- What does it mean?



Judgment

- What should we do about the situation?
- What can we do about it?
- What resources are available?



Communication

- Whom should we inform?
- How?
- Within the government?
- Outside the government?



Decisions

- Who makes them?
- What range of options are available?
- What resources are available?



Event: MR 03: Participants

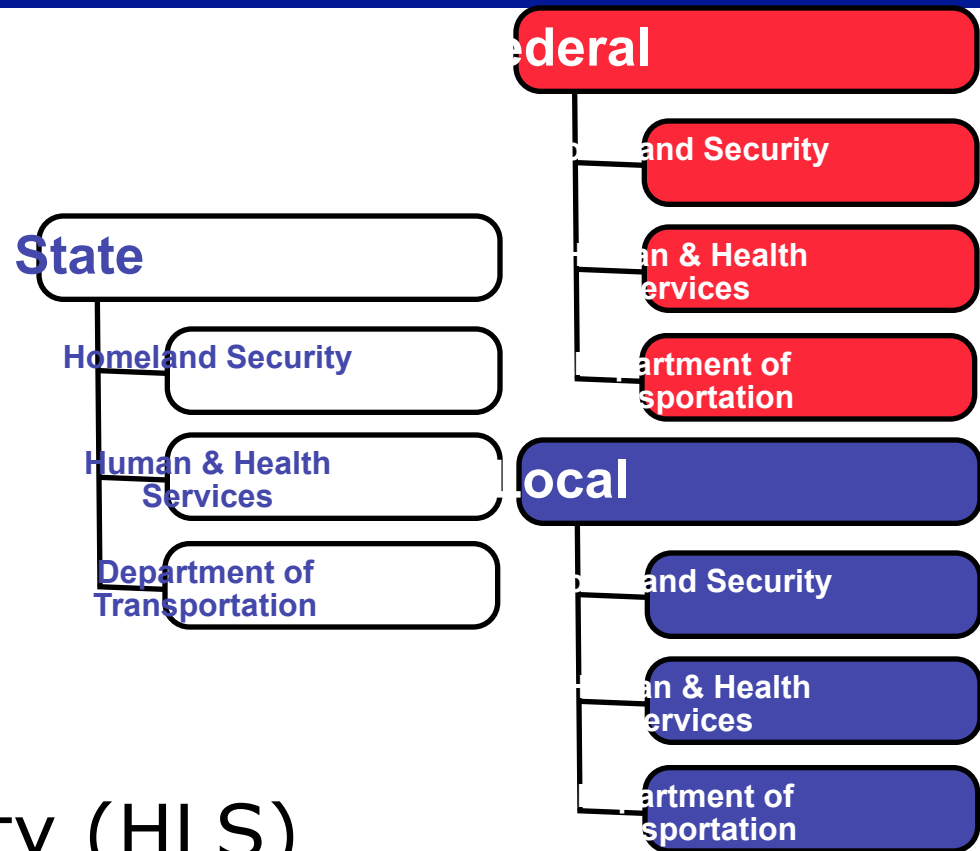


- Three Levels

- Federal
- State
- Local

- Three Agencies

- Homeland Security (HLS)
- Health and Human Services (HHS)
- Department of Transportation (DOT)





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Event: MR 03: Demo



Demonstration

- Briefing Screens
- Situation Monitors
- 2D Simulation
- Video



Event: MR 03: Value



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The Value: The value of any simulation is not the technology used for the simulation, but the lessons learnt from its outcome



Updates



- Modeled Smallpox
- Social Contagion Model
- Leadership Behavior
- Modeled Media effects



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Future



- 2D and 3D Simulations
- Multiple Simulations
- Time Branching
- Population Granularity
- Adjacency and proximity problem



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Summary



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