CPS EAGER: Intelligent Agent Incident Command System (ICS) Augmentation - #1528550

Wright State University

Research Contributions

Making interactions visible and understandable to decision makers

Demonstration of effectiveness of information presentation and transparency in situations where agents can support and enhance human decision-making

Extracting existence and character of invisible interactions from observation/data

Development of ontology design patterns to allow effective reasoning during crisis situation

Optimizing the ground activities to find invisible interactions implied, but not anticipated

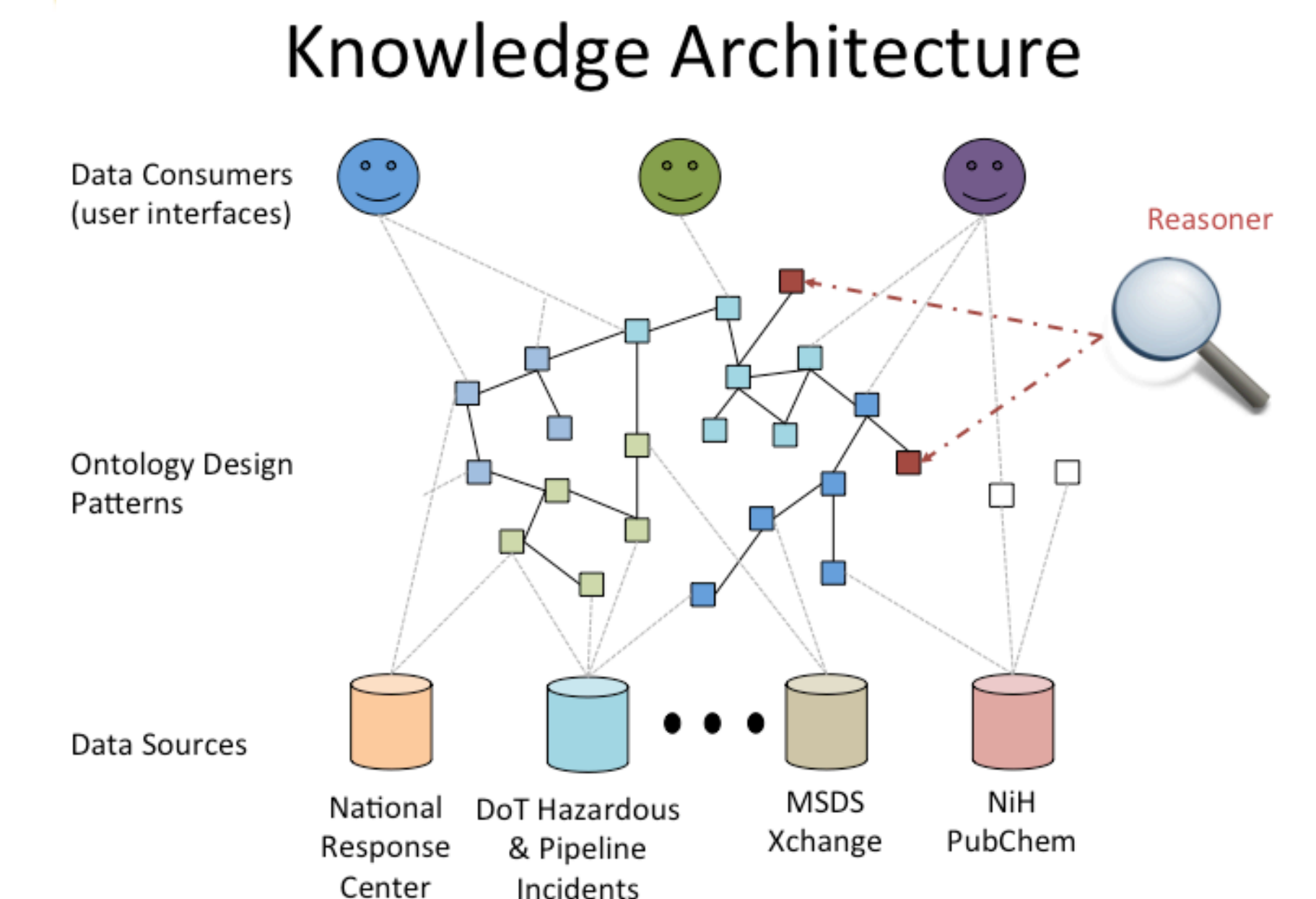Development of model consistency tools for automatic update of causal models

Scenario

- **Aircraft crash and explosion in a chemical plant causes chemical hazard**
- Scenario complexity is varied by changing the chemicals and levels of toxicity
- Several potential, and partial list of unintended consequences occur, such as:
  - Undetected ground water run-off contamination affects children swimming in nearby creek.
  - The nursing home must leave behind the corpse of a recently deceased resident.
  - Too much focus on the plane crash may distract law enforcement from identifying the secondary device.
- Testing with Emergency Responders using real-virtual simulations

ICS

- The focus is on unified command, common terminology, modular organization, management by objective, and hard limits on span-of-control
- **Limiting span-of-control** protects against cognitive overload and mental fatigue, but it **also limits span-of-knowledge** wrt complex feedback loops that involve causes and effects separated by more than one level of hierarchy
- **Can we design a system to detect these complex feedback loops and avoid or exploit them, as appropriate?**

Research Methods

Knowledge Architecture

Agent-Based Simulation Model

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