

# Knowledge State Sensitive Mission Rehearsal

**Nathan G. Brannon**  
**Sandia National Laboratories**

**HCI International 2005**  
**11<sup>th</sup> International Conference on Human-Computer Interaction**  
**July 2005**



# Overview

---

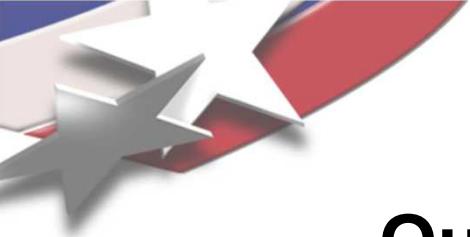
- Relevant Needs With Quick Response Teams
- Problems
- Domain Constraints
- Mission Rehearsal System
  - Guidance from literature
  - Incorporating a sensitivity to memory dynamics
- Current Developments and Concluding Remarks



## Relevant Needs With Quick Response Teams

---

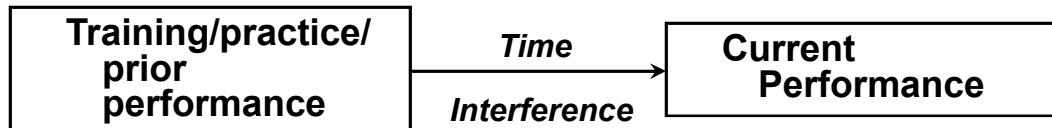
- Human as a central and balanced element
- An ability for the human to perform a wider variety of tasks
  - Quickly, effectively, and consistently
  - With fewer individuals (“more with less”)
- Retrieve knowledge and skills despite potential for decay and interference



# Quick Response Team Problems

---

- An over-reliance on human flexibility and real-time innovation
- Difficult to choreograph context specific activity
  - Contingencies
  - Roles & responsibilities
- Knowledge retrieval





# Domain Constraints

---

- **Adapt to varying contexts**
  - Training and practice limited
- **Experience**
  - Good (e.g., reaction time...)
  - Bad (e.g., decision biases...)
- **Must incorporate intelligence or general information**
- **Push situation assessment ahead of window for time to act**
- **Almost always some time in transit to site**
- **Availability of entire staff and skill sets vary**



# Mission Rehearsal System

## *Guidance from literature*

---

- **Perceptual vs. Cognitive Fidelity**
  - The romance with “realism”
  - The emphasis and measured value of visual fidelity conflict with relevant needs
    - Entertainment vs. effectiveness
- **Guided mental rehearsal**
  - Useful even for perceptual/motor skill
- **Sensitivity to cognitive factors**
  - Significant and measurable gains
- **“Cognitive factors”?**



# Mission Rehearsal System

## *Sensitivity to Memory Dynamics*

---

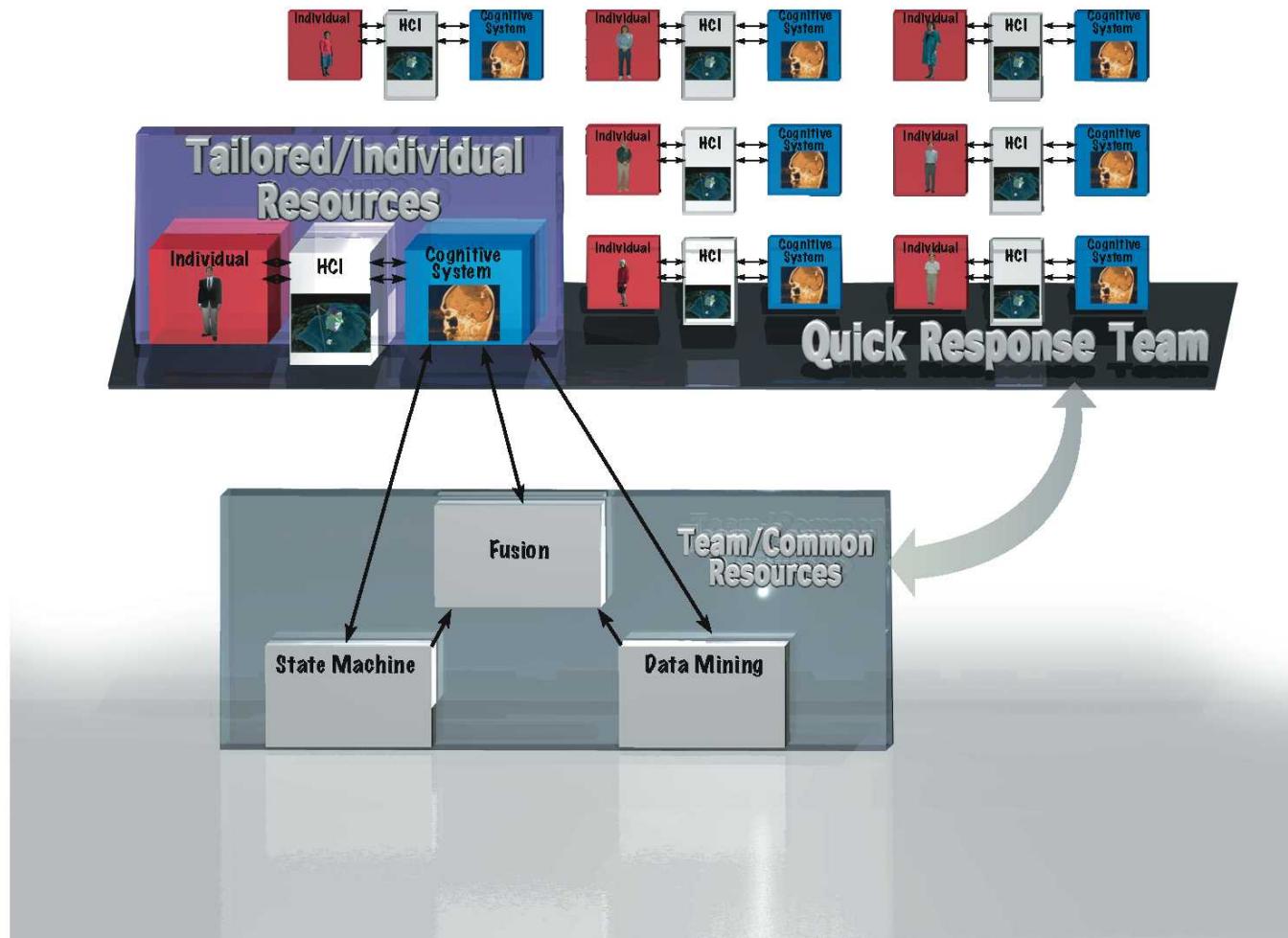
- Understand the task and more specifically the knowledge
  - Procedural vs. Declarative Knowledge
    - Varying learning and degradation characteristics
  - Can be computationally modeled
    - Leverage model to drive rehearsal content
      - ACT-RPD
    - Raise activation of knowledge and facilitate retrieval mechanisms during subsequent performance
- Rehearse a context specific task guided by a system sensitive to the state of an individual's skill



# Mission Rehearsal System

## *Broader View*

---





## Concluding Remarks

---

- **Significant opportunities to apply models in support of tailored, relevant, and timely mission rehearsal**
- **Addressing challenges of varying contexts and potential roles and responsibilities**
- **Decreased burden on individual flexibility and real-time innovation**
- **Respecting the need for rapid, consistent, and effective human performance**