Supporting Collaborative Operations within a Coalition Personnel Recovery Center

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Overview

- The I-X Framework:
  - The <I-N-C-A> Ontology and I-X Process Panels.
  - Intelligence through Hierarchical Task Refinement.
  - Other I-X Tools.

- The Co-OPR Application:
  - Personnel Recovery Centers: Layout and Tools.
  - Customizing I-X for Personnel Recovery
  - Experiments and Evaluation

- Conclusions and Future Research
“To-Do” Lists and I-X Process Panels

- organizing work: to-do lists
  - universally acknowledged to be useful
  - help people remembering what needs to be done
    » ensure everything gets done
    » provide overview of unaccomplished tasks

- the I-X framework
  - for creating applications in which multiple agents
    » adopt a task-centric view of a situation
    » must coordinate to perform their activities

- I-X Process Panels
  - principal interface to an I-X application
  - provide functionality of to-do list (amongst others)
I-X Process Panels and the <I-N-C-A> Ontology

- Process Panels reflect underlying ontology: <I-N-C-A>

- <I-N-C-A>: generic model for synthesis tasks
  - nodes: components of the artifact to be designed
  - constraints: required relations between nodes and environment
  - issues: points to be addressed before design is complete
  - annotations: additional information, e.g. rationale

- <I-N-C-A> for synthesizing plans (courses of action)
  - nodes: activities that are to be performed as part of the plan
  - constraints: temporal constraints, world state constraints, resource constraints, etc.
  - issues: flaws in the plan, opportunities
  - annotations: anything, e.g. rationale for activities
I-X Process Panel: Example

- **issues**: questions
- **activities**: items on the to-do list
  - described as verb plus parameters
  - can be annotated
  - have priority
  - actions suggested by I-X
    - tick off
    - refine task
    - pass to others
    - use custom handler
- **state**: world state information
- **annotations**: none shown here
Hierarchical Task Refinement in I-X Process Panels

- I-X Process Panel matches task pattern against activities to identify applicable refinements
  - manual expansion through action menu
  - automated planning attempts to find possible completions of the current partial plan
  - option management allows exploration of “what if” scenarios
  - option evaluation matrix supports option comparison

- users may add activities at any level manually to adapt plan

- helps users by:
  - keeping track of (known) applicable methods
  - checking consistency of constraints associated with a plan
  - supporting option exploration and evaluation
The I-X Tool Suite for e-Response

- Web Resources
  - SOP repository

- Presence Tool
  - Agent presence awareness

- Map Tool
  - Situation awareness

- Process Panel
  - Principal activity/issue interface

- Domain Editor
  - Create and manage SOPs

- 3-D Viewer

- PDA Viewer

- Message Tool
  - Formal/informal communications channel

- I-Space
  - Agent relationship/capability tool

- Map Tool
  - Situation awareness

- Process Panel
  - Principal activity/issue interface
Co-OPR2

Collaboration and Communication

Central Authorities

Command Centre

Emergency Responders

Isolated Personnel

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See JPRA/PRETC Field Training References Staff Roles and Responsibilities Pages M-1 to M-3
Typical Rescue Coordination Centre

- incident board
- information board
- asset board
- JPRC director’s desk
- JPRC Director
- area map
- controller
- staff
- watch supervisor
- operator’s desk
- fax operator’s desk
- computer operator’s desk
- bin
Typical Rescue Coordination Centre
Communications
Simple Chat
Structured chat
Information sharing

Task Support
Checklists
To do list
Progress reporting
Plan option aids

Whiteboards
Incident
Weather/Codes/Info
Assets
Mapboards
Web Resources
Fact Book
Phone List
Codes
Mission Folders (to be active?)

KSCO 2007
Experiments
Evaluation and Results

- aim: show value of I-X technology
- evaluation methodology
  - role-play CPX (JPRC director, watch supervisor, controller)
    - analyze and categorize cognitive tasks: timing
- experimental results
  - use of SOPs encouraged a methodical approach
  - interruptions: quick resumption of activity

<table>
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<tr>
<th>Phase</th>
<th>OODA</th>
<th>SHORE</th>
<th>“JPRC Experiment C” Analysis</th>
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<tbody>
<tr>
<td>1</td>
<td>observe</td>
<td>stimulus</td>
<td>information-gathering</td>
</tr>
<tr>
<td>2</td>
<td>orient</td>
<td>hypothesis</td>
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<tr>
<td>3</td>
<td>decide</td>
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</tr>
<tr>
<td>4</td>
<td>act</td>
<td>response</td>
<td></td>
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Conclusions

- I-X Process Panels: view as intelligent and collaborative to-do lists
  - intelligence: seamless integration through hierarchical task refinements modelled in I-DE

- Co-OPR application: lessons learned
  - evaluation now almost complete
  - early experiments show how I-X addresses some of the problems observed during a CPX
  - I-X naturally supports handover between shifts
  - some issues with the generic user interface need work