Virtual Operations Centres for Coalition Operations and Distributed Team Collaboration

Austin Tate & Jeff Hansberger
University of Edinburgh & US Army Research Lab

http://openvce.net
Project to provide a Virtual Collaboration Environment for the WoSCR Community

• Support for Whole of Society Crisis Response Community

• Cognitive Work Analysis of Requirements and Technologies

• Experiments with Virtual Collaboration Environment (VCE):
  – Web-based portal
  – Virtual interaction space
  – Community tools
  – Collaboration protocol

• USJFCOM, US ARL HRED, CMU, U.Virginia, U.Edinburgh, Perigean Technologies
Cognitive Work Analysis – Task Independent

Vicente, K. J. (1999) Cognitive Work Analysis
## Work Organizational Analysis – Task & Agent Centric

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Tuckman, B.W. (1965) Developmental Sequence in Small Groups
Requirements for Effective Distributed Task-centric Collaboration

• Mix of physical operations centres and remote access
• Bring in experts for improved analysis and option generation
• Mix of synchronous and asynchronous activity
• Share community knowledge and experience
• Share Standard Operating Procedures and Lessons Learned
Open Virtual Collaboration Environment

• Web-based Collaboration Portal
  – Drupal CMS
  – Also explored Facebook, Google Groups, Yahoo Groups, Ning Groups, Grou.ps, Joomla,
    Linkups to external web services and widgets

• Virtual World 3D Space
  – Second Life™ and Second Life Enterprise
  – OpenSim (allows for secure use, potentially behind a firewall, e.g. US government)

• Virtual Collaboration Protocol
  – Standard Operating Procedures
  – FAQ and Tips
  – Collaboration Protocol (with Rob Cross, University of Virginia)

• Community Tools
  – AIAI I-Room – a Virtual Space for Intelligent Interaction
  – CMU Catalyst Community Knowledge Base
  – IHMC/Perigean Technologies Concept Maps
  – Experimental 3D Model Visualizations
OpenVCE Web Portal – Roles of Elements

Collaboration Tools – Roles of Elements

Web Pages – definitive edited content and index pages (editorial control)

News and Calendar – Activity Awareness

Discussion Forums – threaded discussions within community

Wiki – community knowledge creation and refinement

Blogs – individual web logs

Status – current activity

Comments – can be added to most elements
Welcome to the OpenVCE community portal. All content is community-created, so become a registered user and start contributing!

**Forthcoming events**

- **Federal Consortium for Virtual Worlds Conference 2010**
  - 2 weeks 5 days from now
  - contact: Austin Tate

- **WoSCR Community - Possible Virtual Iterative Workshop Series - VIWS-4**
  - 5 weeks 2 days from now
  - contact: Austin Tate

**Current discussions**

- OpenVCE envisioned site structure
  - started by Jeff Hansberger, last reply by Austin Tate 28 weeks ago

- The weakest link
  - started by ac, last reply by erapisardi 4 weeks ago

- Expt Case 0 H1N1 Forum
  - started by Austin Tate, last reply by Jeff Hansberger 16 weeks ago

**What are you doing?**

- **Austin Tate**
  - Meeting Ken Anderson of Project EPIC - see http://sn.im/tweakt

**What's happening**

- **auentzes** has updated group VOICE Group 14 hours ago
- VOICE 6 weeks 2 days ago
- Main Page 6 weeks 3 days ago
I-Room: Mixed-initiative Collaboration
A Virtual Space for Intelligent Interaction

Truly distributed mixed initiative collaboration and task support is the focus of the I-Room, allowing for the following tasks:

- situation monitoring
- sense-making
- analysis and simulation
- planning
- option analysis
- briefing
- decision making
- responsive enactment
Sensing and Situation Analysis
Planning, Evaluation Option Argumentation
Briefing and Decision Making
Acting, Reacting and Communication
Central Meeting Area
I-Room Applications

- Virtual collaboration centre
- Business teleconferencing
- Team Meetings for project and product reviews
- Product Help Desks
- Design to Product – product lifecycle support
- Environment, building and plant monitoring
- Health and safety at work, disability awareness
- Intelligent tutors, guides and greeters
- Active demonstration pavilions
I-Room: a Virtual Space for Intelligent Interaction

Operations Centres for Mixed Agency Operations

EADS/Airbus Innovation Works G7 Summit Exercise
http://vue.ed.ac.uk/associates/eads/
Virtual Worlds for Simulation & Training

- MOSES – Military Metaverse, US Army and other US government agencies
  http://www.militarymetaverse.org
  http://blog.inf.ed.ac.uk/atate/moses

- VOICCE – Virginia’s Operational Integration Cyberspace Center of Excellence
  http://openvce.net/voicce

- International Virtual Emergency Exercises (IVEE) and Multinational Planning Augmentation Team (MPAT)
  http://openvce.net/event-ivee1
  http://openvce.net/mpat

- Simudyne SimuGrid in OpenSimulator
BlueWall.Slade @gateway.bluewallvirtual.net:8002: Cinder - thanks for working with us to get parts in the viewer :)  
BlueWall.Slade @gateway.bluewallvirtual.net:8002:  
Fred Appleby @hg.viewtwo.net:8654: Good idea Robert  
Cinder Biscuits @lgrid.com:8002: of course, and I still have more to do.
Further Slides for Details

• More information on Work Analysis Phases I and II

• OpenVCE Experimental Evaluation

• I-Room: More Sample Screens

• DICE Project: Simplified I-Room
Cognitive Work Analysis – Phase I

Vicente, K. J. (1999) Cognitive Work Analysis
Cognitive Work Analysis – Phase I

The first phase of the Cognitive Work Analysis involves identifying the activity-independent constraints of the work domain:

- **Domain purpose**: the overarching goal to be achieved – in this case, distributed collaboration.
- **Domain values and priorities**: principles or qualities on which work in the domain is founded – in this case, we can identify coordination, communication and activity awareness as essential components of distributed collaboration.
- **Domain functions**: the realization of the domain values and priorities (and fulfillment of the domain purpose) as abstract functions within the domain.
- **Physical functions**: the realization of the domain functions in terms of techniques.
- **Physical objects**: artifacts that provide some aspect of the identified physical functionality, with particular reference to novel “Web 2.0”-type technologies that may be exploited alongside common existing technologies.

By pinpointing specific tools and providing a clear functional rationale for their use, the resulting analysis provides a roadmap for the development of a VCE that meets the functional objectives of the domain.
Work Organizational Analysis – Phase II

The second phase of the Cognitive Work Analysis situates tasks at the appropriate organizational level according to the actors involved.

One dimension of this is based on the domain functions identified in the CWA, each now elaborated according to specific work tasks.

The second dimension reflects increasing geographical and organizational dispersal – from local and intra-agency through national inter-agency and on to multi-national and involving civil and military participants.
# Work Organizational Analysis – Phase II

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### OpenVCE Evaluation: Goal & Procedural Uncertainty


![Diagram of Goal Uncertainty and Procedural Uncertainty](image)

**GOAL UNCERTAINTY**

- **Low**
  - Relational Mode
  - Virtual Group

- **High**
  - Political Mode
  - Traditional Group
  - Anarchy Mode

**PROCEDURAL UNCERTAINTY**

- **Low**
  - Relational mode
    - Goal directed
    - Guided by rules, routines, and performance programs
  - Political mode
    - Conflicting goals, interests
    - Certainty about preferred approach and outcomes

- **High**
  - Process mode
    - Goal directed
    - Multiple options and alternative solutions
  - Anarchy mode
    - Goals are ambiguous
    - Processes to reach goals are unclear

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OpenVCE Evaluation: Concepts explored in Plan Document produced by each Group

Team A

VCP Progress: Overview
Case: Reinder Flu

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<th>VCP Tasks</th>
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<td>Before Meeting 1</td>
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<tr>
<td>Process coordinator: introduce themselves, communicate case to team; introduce individual problem map</td>
<td>SCP</td>
<td>✔ done</td>
</tr>
<tr>
<td>Team members: compare individual problem maps</td>
<td>SCP</td>
<td>✔ done</td>
</tr>
<tr>
<td>Process coordinator: organize team meeting; create draft integrated problem map</td>
<td>SCP</td>
<td>✔ done</td>
</tr>
<tr>
<td>Meeting 2</td>
<td></td>
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<tr>
<td>Process coordinator: welcome</td>
<td>SCP</td>
<td>✔ done</td>
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<tr>
<td>Process coordinator: lay out timeline; reference process norms</td>
<td>SCP</td>
<td>✔ done</td>
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<tr>
<td>Team: agree project roles</td>
<td>SCP</td>
<td>✔ done</td>
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<td>Before Meeting 2</td>
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<td>Team members: compare individual experience matrix</td>
<td>SCP</td>
<td>✔ done</td>
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<tr>
<td>Process coordinator: organize team meeting; generate experience slides (from accountability matrix)</td>
<td>SCP</td>
<td>✔ done</td>
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<td>Meeting 2</td>
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<td>Process coordinator: reference discussion norms; introduce the problem dimension solution template</td>
<td>-</td>
<td>✔ done</td>
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<tr>
<td>Team: discuss individual experiences (for dimension)</td>
<td>-</td>
<td>✔ done</td>
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<td>Team: discuss and agree subteams</td>
<td>SCP</td>
<td>✔ done</td>
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<tr>
<td>Case planner: compare accountability matrix</td>
<td>SCP</td>
<td>✔ done</td>
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<tr>
<td>Case planner: generate empty solution pages (from accountability matrix)</td>
<td>SCP</td>
<td>✔ done</td>
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<td>Before Meeting 3</td>
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<tr>
<td>Gatekeeper</td>
<td>monitor closed</td>
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Virtual Worlds Space Simplification
Uncluttered I-Room in MOSES/OpenSim
OpenVCE
... open virtual collaboration environment

http://openvnce.net