I-Room: a Virtual Space for Intelligent Interaction

An intelligent environment which acts as a knowledge aid to support collaborative teleconferences and meetings

Austin Tate
AIAI, University of Edinburgh

Ai Austin
Virtual University of Edinburgh
I-Room: a Virtual Space for Intelligent Interaction

Low cost, simple setup, mixed-reality meetings spaces
I-Room: a Virtual Space for Intelligent Interaction

Distributed collaborative team support for production and review in the creative industries
I-Room: a Virtual Space for Intelligent Interaction

Operations Centres, Brainstorming Spaces, Team Meeting Rooms, Training and Review Areas
I-Room: a Virtual Space for Intelligent Interaction

Operations Centres, Brainstorming Spaces, Team Meeting Rooms, Training and Review Areas
I-Room: a Virtual Space for Intelligent Interaction

Tutorial and commercial spaces
I-Room Introduction

• I-Room provides a 3D virtual space with multiple work zones, designed for collaborative and brainstorming style meetings

• I-Rooms are used in the I-X research on intelligent collaborative and task support environments

• The main feature of the I-Room is the link up with external web services, collaboration systems and intelligent systems aids
I-Room Applications

- Virtual collaboration center
- 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 Integration

• The I-Room 3D virtual space is linked to a social networking and community knowledge management web portal in OpenVCE.net

• Recent experimental use of the I-Room and OpenVCE for the "Whole of Society Crises Response" (WoSCR) community in the conduct of emergency response and crisis management

• This is intended as a contribution to the wider notions of "The Helpful Environment"
VCE for WoSCR

• Whole of Society Crisis Response Community

• Cognitive Work Analysis of Requirements and Technologies

• Virtual Collaboration Environment:
  – Web-based portal
  – Virtual interaction space
  – Community tools including I-Room
  – Collaboration protocols

• OpenVCE.net
WoSCR

• Whole of Society Crisis Response Community

• The Whole of Society Crises Response (WoSCR) community takes a "whole of society" approach to complex problems seeking to input PMESII factors into the analysis and decision support when a crisis occurs. It seeks a global comprehensive approach to crises response

• PMESII stands for the "Political, Military, Economic, Social, Infrastructure, and Information" considerations involved in crisis and emergency response
Cognitive Work Analysis – Phase I

Domain Purpose

Domain Values & Priorities

Domain Functions

Physical Functions

Physical Objects

Explicit Communication

Information Gathering

Shared Access

Transfer

*Web 2.0 tools

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.
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

## Work Task Docket; Distributed Collaboration

<table>
<thead>
<tr>
<th>Domain Functions</th>
<th>Work Situations</th>
<th>Intra-agency</th>
<th>National</th>
<th>Inter-agency</th>
<th>Multi-national</th>
<th>Inter-agency &amp; Multi-national</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Forming</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Meet others</td>
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<tr>
<td>Identify the challenge/s</td>
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<tr>
<td>Agree on goals</td>
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<tr>
<td><strong>Storming</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Define problems to solve</td>
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<td></td>
<td></td>
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<tr>
<td>Define how to solve the problems</td>
<td></td>
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<tr>
<td>Define how to function together</td>
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<tr>
<td><strong>Norming</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Develop work habits with group</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree on rules, values, methods, etc...</td>
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</tr>
<tr>
<td><strong>Performing</strong></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Assess outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adapt to change</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Tuckman, B.W. (1965) Developmental Sequence in Small Groups
Open Virtual Collaboration Environment

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

• Virtual World 3D Space
  – Second Life
  – Opensim (potentially behind a firewall)

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

• Community Tools
  – AIAI I-Room – a Room for Intelligent Interaction
  – CMU Catalyst Community Knowledge base
  – Concept Maps, and Experimental 3D Model Visualizations
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 erapistard 4 weeks ago
Expt Case 0 H1N1 Forum started by Iñaki Kuduri, last reply by Jeff Hansberger 18 weeks ago

What are you doing?

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

Iñaki Kuduri Preparing a presentation to the Virginia Local Government IT Executives (VALGITE) for Apr 26 on VOICECE 3 days ago

Austin Tate Writing paper on OpenVCE support to WoSCR for KSCO-2010 http://kascoc.info/kasc-2010.html 2 days ago

Iñaki Kuduri Meeting Ken Anderson of Project EPIC - see http://sn.im/tweakt 1 day ago

Austin Tate Meeting Ken Anderson of Project EPIC - see http://sn.im/tweakt 1 day ago

PMESII-Tools 3 weeks 6 days ago
PMESII-Tools 3 weeks 6 days ago
PMESII-Tools 3 weeks 6 days ago
VOICECE 6 weeks 2 days ago
VOICECE 6 weeks 2 days ago

What's happening

Iñaki Kuduri has updated group VOICECE Group 14 hours ago
Iñaki Kuduri Resources and VOICECE 24 hours ago
Iñaki Kuduri 14 hours ago
Austin Tate 14 hours ago

Updated 3 minutes ago
OpenVCE Portal – Roles of Elements

• Blog – personal web log

• Forum – threaded discussion within community

• Wiki – community knowledge creation and refinement

• Book Pages – edited content and index pages (change by admins and group leaders only)

• Comment – can be added to most elements
Main Page

Return to OpenVCE.net Community Portal.

Note this MediaWiki facility is an experiment. The OpenVCE.net “Books” are the main knowledge sharing mechanism at the moment.

Contents
1 OpenVCE Facilities
2 Communities
3 Misc.
4 About OpenVCE

OpenVCE Facilities

- Collecting Social Networking Data from Second Life
- Creating SOPs Using a Wiki
- OpenVCE vs. CSCW
- Types of Meeting Space
- Protocol Technology

Communities

- KSCO - Knowledge Systems for Coalition Operations Community
- JOE - Joint Operating Environment Community
- MPAT - Multinational Planning Augmentation Team
- WoSCCR - Whole of Society Crises Response Community
  - H1N1 Swine Flu Scenario

Misc.

- All Pages Index
- Wiki Editing Help, Formatting, Links, Images, Tables, Formatting, Images, Wiki Editing Tips
- Image Tests

About OpenVCE

OpenVCE.net (Open Virtual Collaboration Environment) is a project at the Artificial Intelligence Applications Institute (AII) within the School of Informatics at the University of Edinburgh. It provides open source and freely accessible facilities to support collaboration in a community, linking a web-based Community Portal with a virtual-world based 3D space.
Links between Web Collaboration Portal and 3D Space

http://openvce.net

http://openvce.net/blog
or use in-world blog roster

http://twitter.com tahopencve
or use in-world Twitter roster
Virtual Collaboration Protocol

• 7 main phases of the VCP (Rob Cross):
  – identify problem dimensions (asynchronous)
  – agree problem dimensions (synchronous)
  – describe relevant experience per dimension (asynchronous)
  – discuss experience and decide on sub-teams addressing different problem dimensions (synchronous)
  – subgroup work on different dimensions (asynchronous)
  – presentation of solutions (synchronous)
  – solution integration (asynchronous)

• OpenVCE Web Portal supports asynchronous work
• OpenVCE I-Room supports synchronous work
OpenVCE Portal – Team & Roles

1. Team members with links to their OpenVCE profile pages

2. Team members filling VCP roles

3. Process coordinator can update (at appropriate stage)
OpenVCE Portal – Problem Map Completion

1. Problem Dimension
2. Rationale
3. Ranking
4. Previously Defined Problem Dimensions
5. Space for Additional Problem Dimension
6. Save + Add

Help: SOP

OpenVCE Portal – Problem Map Completion
OpenVCE Portal – Individual Experience

```
Agreed

Problem Dimensions

Input Area for describing relevant knowledge & background (leave blank for no experience)

Link to OpenVCE profile

Save

1

2

3

4

Help: SOP

Individual Experience Matrix

VCP Individual Experience Matrix for Gerhard Wickler

Case: Teach VCP

<table>
<thead>
<tr>
<th>#</th>
<th>Dimension / Rationale</th>
<th>Skills / Knowledge</th>
<th>Basis of Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What kind of teaching material is available?</td>
<td>Develop slides for teaching</td>
<td>I have developed teaching material for several university courses</td>
</tr>
<tr>
<td></td>
<td>Teaching material is important for teaching sessions as well as future sessions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>How can we deliver the teaching material in Second Life?</td>
<td>Use presentation technology developed in Edinburgh</td>
<td>I have contributed to the development of that technology</td>
</tr>
<tr>
<td></td>
<td>Teaching in SL is a new field and we need to look into its effectiveness.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>How can we train users?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teaching alone is not good enough. Training is important, too.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

Help: SOP

OpenVCE Portal – Individual Experience

Input Area for describing relevant knowledge & background (leave blank for no experience)

Link to OpenVCE profile

Save
# OpenVCE Portal – VCP Support

**VCP Progress: Overview**

**Case: Teach VCP**

[Help: SOP]

<table>
<thead>
<tr>
<th>VCP Task</th>
<th>Help</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before Meeting 1:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Process coordinator: introduce themselves; communicate case to team; introduce individual problem map</td>
<td>SOP</td>
<td>done</td>
</tr>
<tr>
<td>- Team members: completes individual problem maps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Process coordinator: organize team meeting; create draft integrated problem map</td>
<td>SOP</td>
<td>done</td>
</tr>
<tr>
<td><strong>Meeting 1:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Process coordinator: welcome</td>
<td>SOP</td>
<td>done</td>
</tr>
<tr>
<td>- Team introductions; discuss and agree integrated problem map</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Process coordinator: lay out timeline; reference process norms</td>
<td>SOP</td>
<td>done</td>
</tr>
<tr>
<td>- Team: agree project roles</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Before Meeting 2:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Team members: complete individual experience matrix</td>
<td>SOP</td>
<td>done</td>
</tr>
<tr>
<td>- Process coordinator: organize team meeting; generate experience slides (from accountability matrix)</td>
<td>SOP</td>
<td>done</td>
</tr>
<tr>
<td><strong>Meeting 2:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Process coordinator: reference discussion norms; introduce the problem dimension solution template</td>
<td>SOP</td>
<td>done</td>
</tr>
<tr>
<td>- Team: discuss individual experiences (by dimension)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Team: discuss and agree subteams</td>
<td>SOP</td>
<td>done</td>
</tr>
<tr>
<td>- Case planner: complete accountability matrix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Case planner: generate empty solution pages (from accountability matrix)</td>
<td>SOP</td>
<td>done</td>
</tr>
<tr>
<td><strong>Before Meeting 3:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Gatekeeper: monitor progress</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Subteams: develop solutions</td>
<td>SOP</td>
<td>done</td>
</tr>
<tr>
<td>- Team members: comment on others solutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Subteams: create solution presentations</td>
<td>SOP</td>
<td>done</td>
</tr>
<tr>
<td>- Integrator: begin integration</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Meeting 3:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Subteams: present solutions and discuss</td>
<td>SOP</td>
<td>done</td>
</tr>
<tr>
<td><strong>After Meeting 3:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Integrator: integrate and deliver final solution</td>
<td></td>
<td>done</td>
</tr>
</tbody>
</table>

Tick Active Task When Complete
OpenVCE – Community Tools

- I-Room – Space for Intelligent Interaction
- Catalyst – Community Knowledge Base
- Cmaps - Concept Mapping
- Modelling - Experimental 3D Visualizations
- Collaborative Shared Media
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
Planning, Evaluation
Option Argumentation

Briefing and
Decision Making

Sensing and
Situation Analysis

Central
Meeting
Area

Acting, Reacting
and Communication
### Issues

<table>
<thead>
<tr>
<th>Description</th>
<th>Annotations</th>
<th>Priority</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consider how to handle newcomers</td>
<td></td>
<td>Normal</td>
<td></td>
</tr>
</tbody>
</table>

### Activities

<table>
<thead>
<tr>
<th>Description</th>
<th>Annotations</th>
<th>Priority</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>hold-meeting I-Room-Demo</td>
<td>Normal</td>
<td></td>
<td>Refine using hold-meeting</td>
</tr>
<tr>
<td>start-meeting I-Room-Demo</td>
<td>Normal</td>
<td></td>
<td>Refine using start-meeting</td>
</tr>
<tr>
<td>welcome-participants I-Room-Demo</td>
<td>Normal</td>
<td></td>
<td>Done</td>
</tr>
<tr>
<td>note-apologies I-Room-Demo</td>
<td>Normal</td>
<td></td>
<td>Done</td>
</tr>
<tr>
<td>agree-end I-Room-Demo</td>
<td>Normal</td>
<td></td>
<td>Done</td>
</tr>
<tr>
<td>agree-previous-minutes I-Room-Demo</td>
<td>Normal</td>
<td></td>
<td>Done</td>
</tr>
<tr>
<td>address-action-items I-Room-Demo</td>
<td>Normal</td>
<td></td>
<td>Refine using address-action-items</td>
</tr>
<tr>
<td>discuss-action &quot;Davie Munro&quot; &quot;Obtain Security Service Input&quot;</td>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>discuss-action &quot;Ai Austin&quot; &quot;Read Ops Pineapple Briefing&quot;</td>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>address-agenda-items I-Room-Demo</td>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>discuss-any-other-business I-Room-Demo</td>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>finish-meeting I-Room-Demo</td>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>setup-next-meeting</td>
<td>Normal</td>
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</tr>
<tr>
<td>setup-next-meeting</td>
<td></td>
<td>Normal</td>
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<td></td>
</tr>
</tbody>
</table>

- **Done**: N/A
- **Delegate to Emergency Services**
- **Delegate to Security Service**
- **Carry to next meeting**
- **Pass to MoD**
- **Pass to OGD**
- **Delegate to Local Government**
- **Escalate to Cabinet Office**
Catalyst – Links between OpenVCE Portal and 3D Space
Catalyst – Links between OpenVCE Portal and 3D Space
Shared Media – E.g. Concept Maps & Adobe Connect
OpenVCE – Event Participants

• Real Participant in Physical Meeting Space

• Virtual Participant
  – Second Life
  – Opensim

• Web Observer
  – Adobe Connect
  – Video Stream (H.264) in Web Page
3D Space via Adobe Connect for Web Observers
OpenVCE and I-Room

More information and papers at http://openvce.net/iroom

YouTube video at http://openvce.net/iroom-tour

FWC
Federal Virtual Worlds Challenge

2010
OpenVCE

...open virtual collaboration environment

http://openvce.net