Putting Plans to Use

Intelligent Systems for Planning, Execution and Collaboration

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Planning

- Key task
- List of important and varied applications
- HTN framework as an integrator
- Wide variety of planning techniques

Execution - USE of plans

- Examples

Collaboration

- Plans to aid communications and collab.

Pointer to the Future

- Web + Social Networking + Agents
  + Plans + Virtual Worlds

Suggested Reading

O-Plan and its Applications

Tate, A. and Dalton, J. (2003) O-Plan: a Common Lisp Planning Web Service, invited paper, in Proceedings of the International Lisp Conference 2003, October 12-25, 2003, New York, NY, USA, October 12-15, 2003.

http://www.aiai.ed.ac.uk/project/ix/documents/2000/2000-sges-tate-intelligible-planning.pdf

I-X/I-Plan and its Integration Approach

Tate, A. (2000) Intelligible AI Planning, in Research and Development in Intelligent Systems XVII, Proceedings of ES2000, The Twentieth British Computer Society Special Group on Expert Systems International Conference on Knowledge Based Systems and Applied Artificial Intelligence, pp. 3-16, Cambridge, UK, December 2000, Springer.

http://www.aiai.ed.ac.uk/project/ix/documents/2003/2003-luc-tate-oplan-web.pdf

I-Rooms

Tate, A. (2010) I-Room: Integrating Intelligent Agents and Virtual Worlds, X10 Workshop on Extensible Virtual Worlds (http://vw.ddns.uark.edu/X10). Organized by the IBM Academy of Technology and the University of Arkansas. Second Life, March 29-30, 2010.

http://www.aiai.ed.ac.uk/project/ix/documents/2010/2010-xvw-tate-iroom.pdf

Helpful Environment

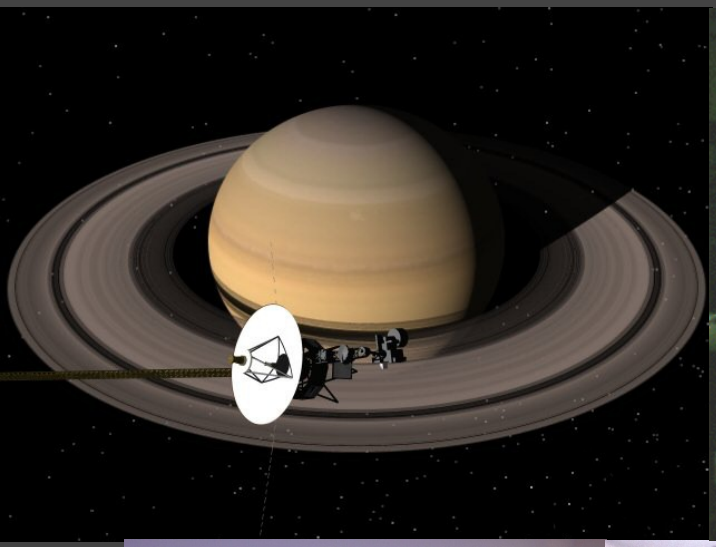
Tate, A. (2006) The Helpful Environment: Geographically Dispersed Intelligent Agents That Collaborate, Special Issue on "The Future of AI", IEEE Intelligent Systems, May-June 2006, Vol. 27, No. 3, pp 57-61. IEEE Computer Society.

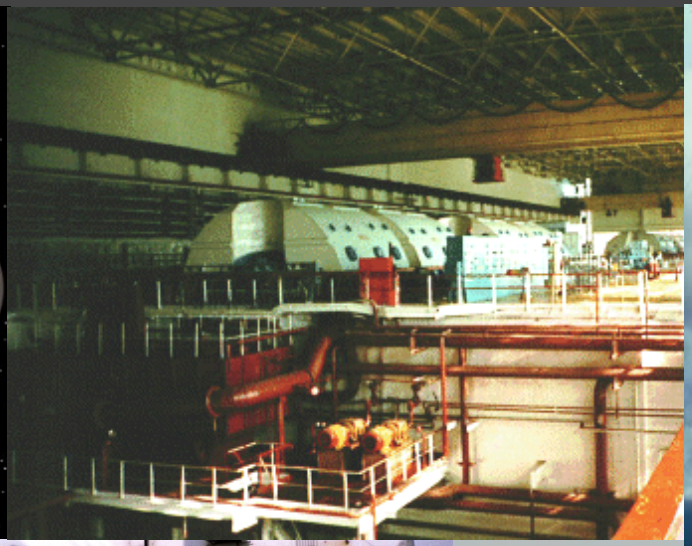
http://www.aiai.ed.ac.uk/project/ix/documents/2006/2006-ieee-is-tate-helpful-env-as-published.pdf

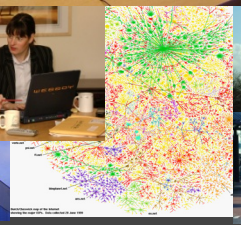
AI Planning

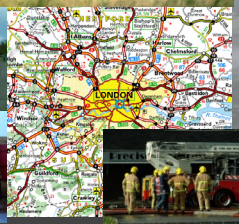
- Practical AI Planners
- Edinburgh Planners
  - Nonlin
  - O-Plan
  - Optimum-AIV
  - I-X/I-Plan
- Planning++

Edinburgh AI Planners in Productive Use









http://www.aiai.ed.ac.uk/project/plan/

Nonlin (1974-1977)

- Hierarchical Task Network Planner
- Partial Order Planner
- Plan Space Planner (vs. Application State Space)
- Goal structure-based plan development - considers alternative “approaches” based on plan rationale
- QA/ “Modal Truth Criterion” Condition Achievement
- Condition “Types” to limit search
- “Compute Conditions” for links to external data and systems (attached procedures)
- Time and Resource Constraint checks

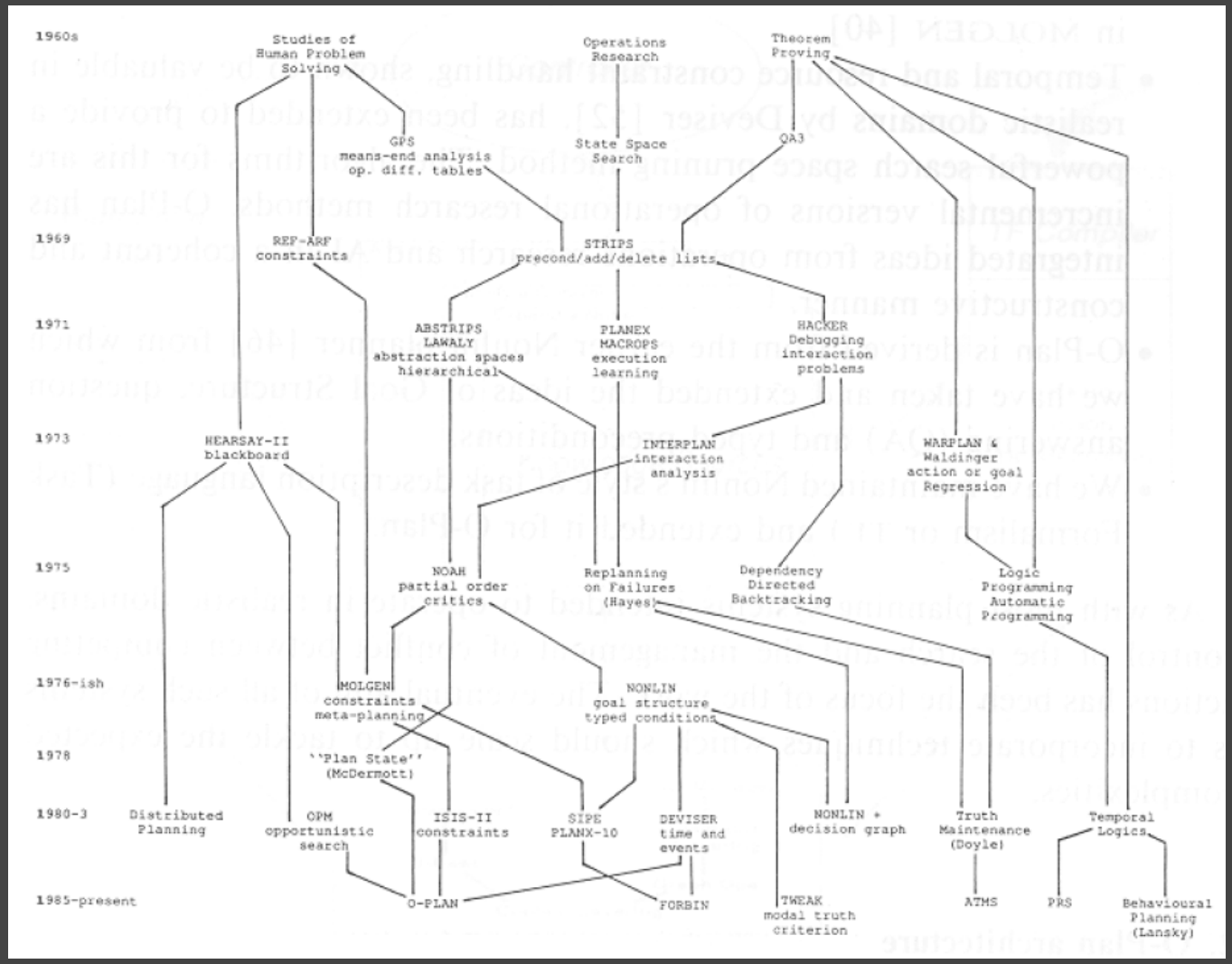
- Nonlin core is basis for text book descriptions of HTN Planning

O-Plan (1983-1999) Features

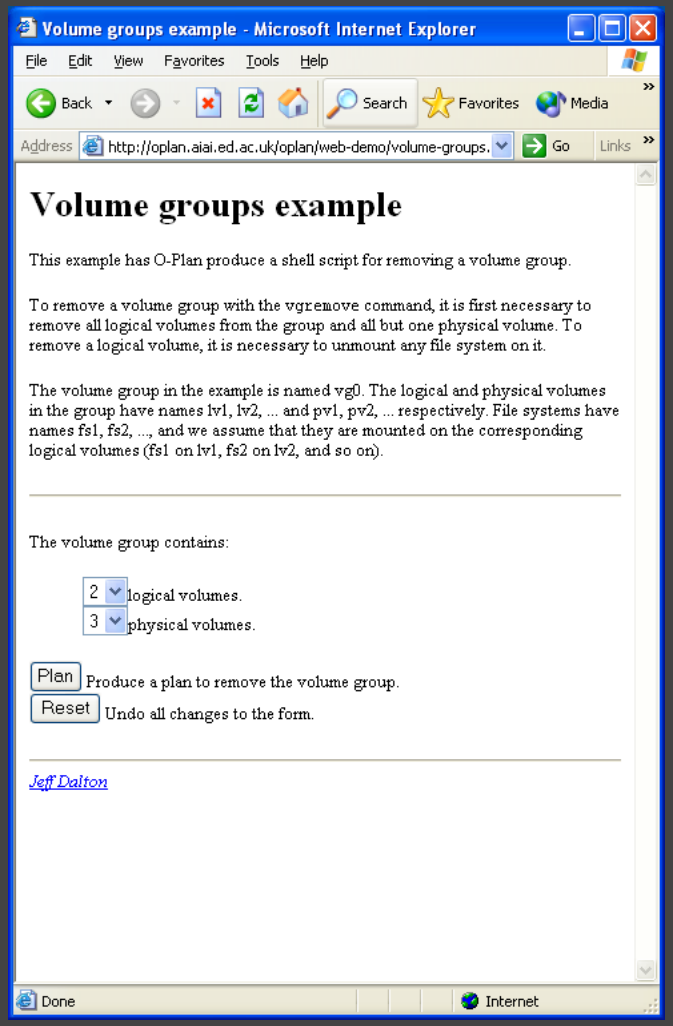
- Domain knowledge elicitation and modelling tools
- Rich plan representation and use
- Hierarchical Task Network Planning
- Detailed constraint management
- Goal structure-based plan monitoring
- Dynamic issue handling
- Plan repair in low and high tempo situations
- Interfaces for users with different roles
- Management of planning and execution workflow

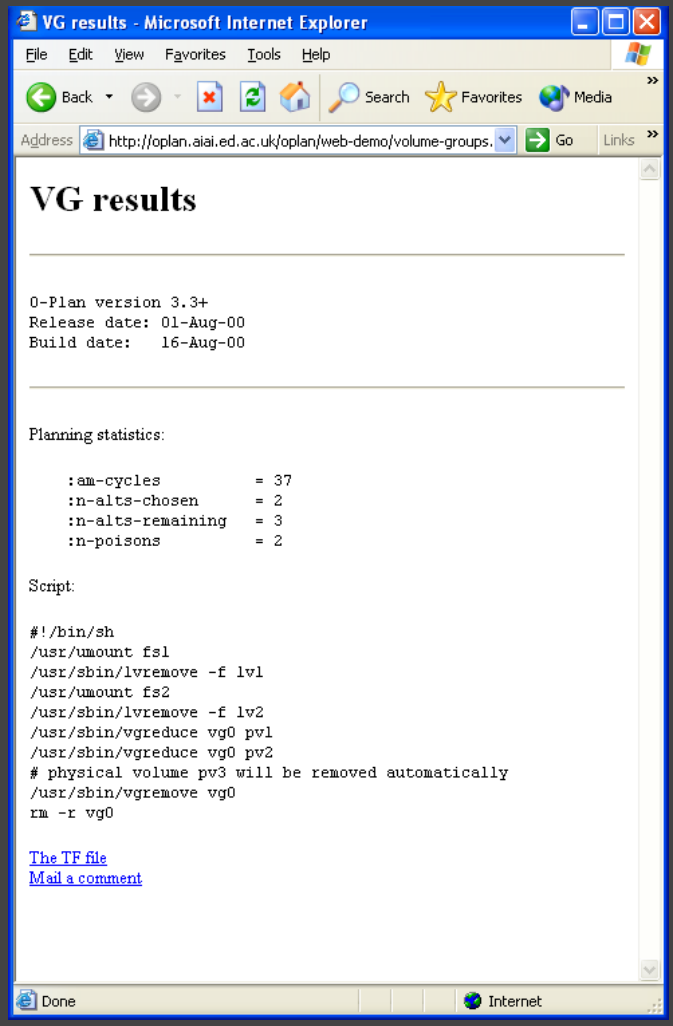
Features Typical of a number of Practical AI Planning Planners

O-Plan (1983-1999) Lineage

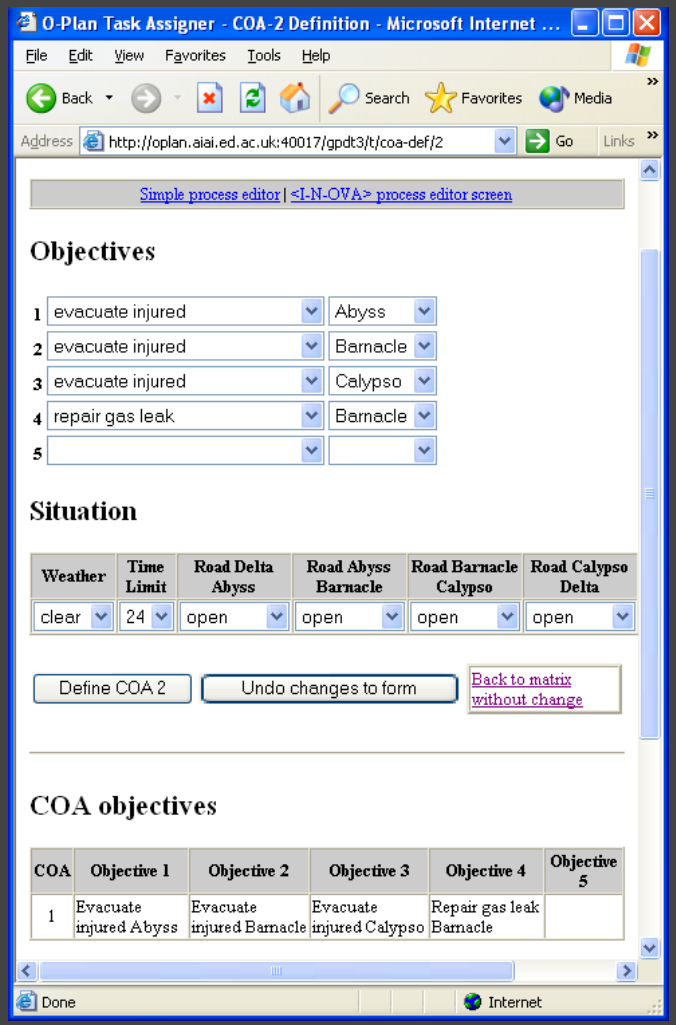


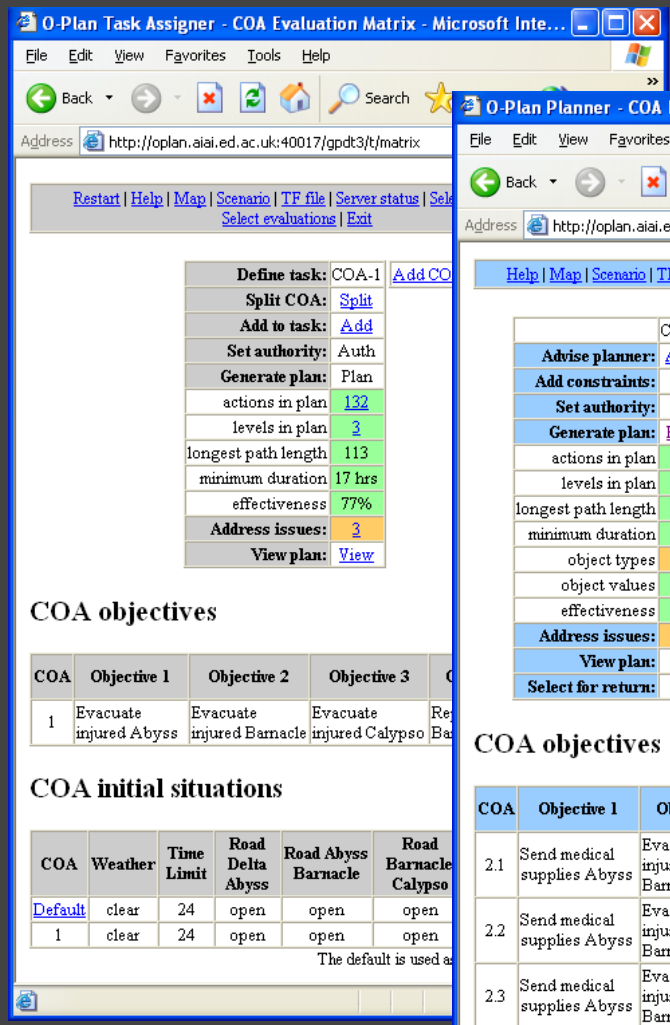
O-Plan Unix Sys Admin Aid

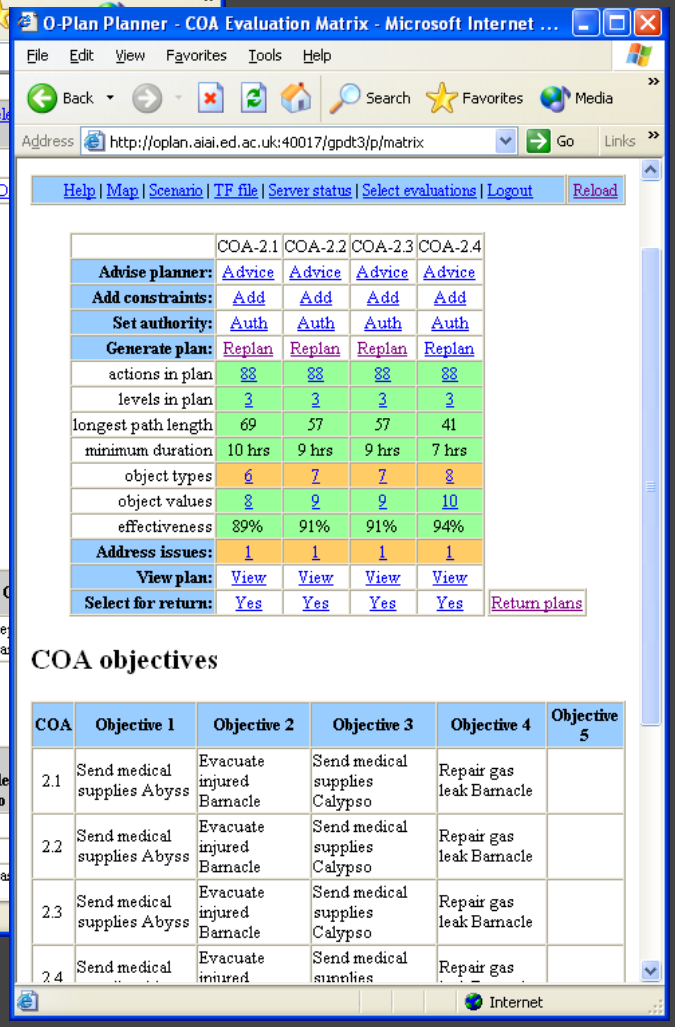




O-Plan Emergency Response Task Description, Planning and Workflow Aids







Practical Applications of AI Planning – O-Plan Applications

O-Plan has been used in a variety of realistic applications:

- Noncombatant Evacuation Operations (Tate, et al., 2000b)
- Search & Rescue Coordination (Kingston et al., 1996)
- US Army Hostage Rescue (Tate et al., 2000a)
- Spacecraft Mission Planning (Drabble et al., 1997)
- Construction Planning (Currie and Tate, 1991 and others)
- Engineering Tasks (Tate, 1997)
- Biological Pathway Discovery (Khan et al., 2003)
- Unmanned Autonomous Vehicle Command and Control

- O-Plan's design was also used as the basis for Optimum-AIV (Arup et al., 1994), a deployed system used for assembly, integration and verification in preparation of the payload bay for flights of the European Space Agency Ariane IV launcher.

Optimum-AIV

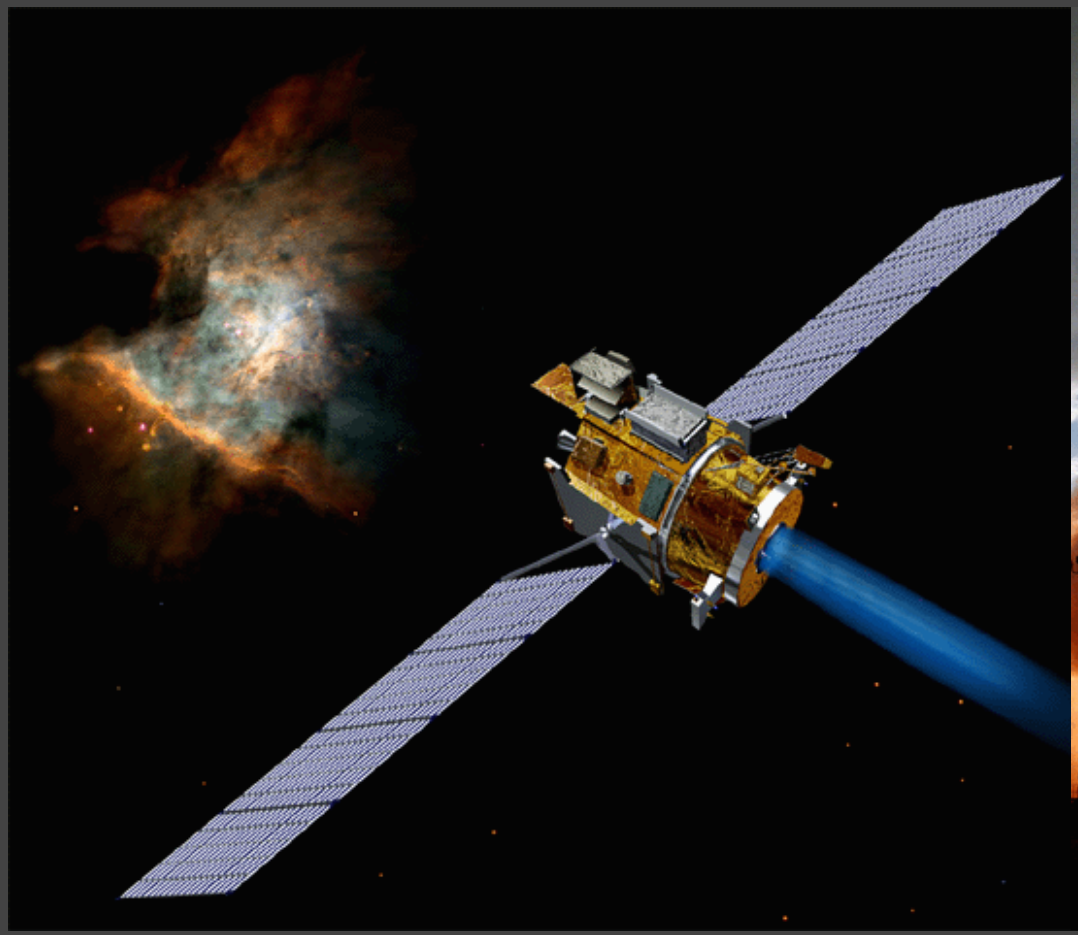
Optimum-AIV (1992-4) Features

- Rich plan representation and use
- Hierarchical Task Network Planning
- Detailed constraint management
- Planner and User rationale recorded
- Dynamic issue handling
- Plan repair using test failure recovery plans
- Integration with ESA's Artemis Project Management System

Some Practical Applications of AI Planning

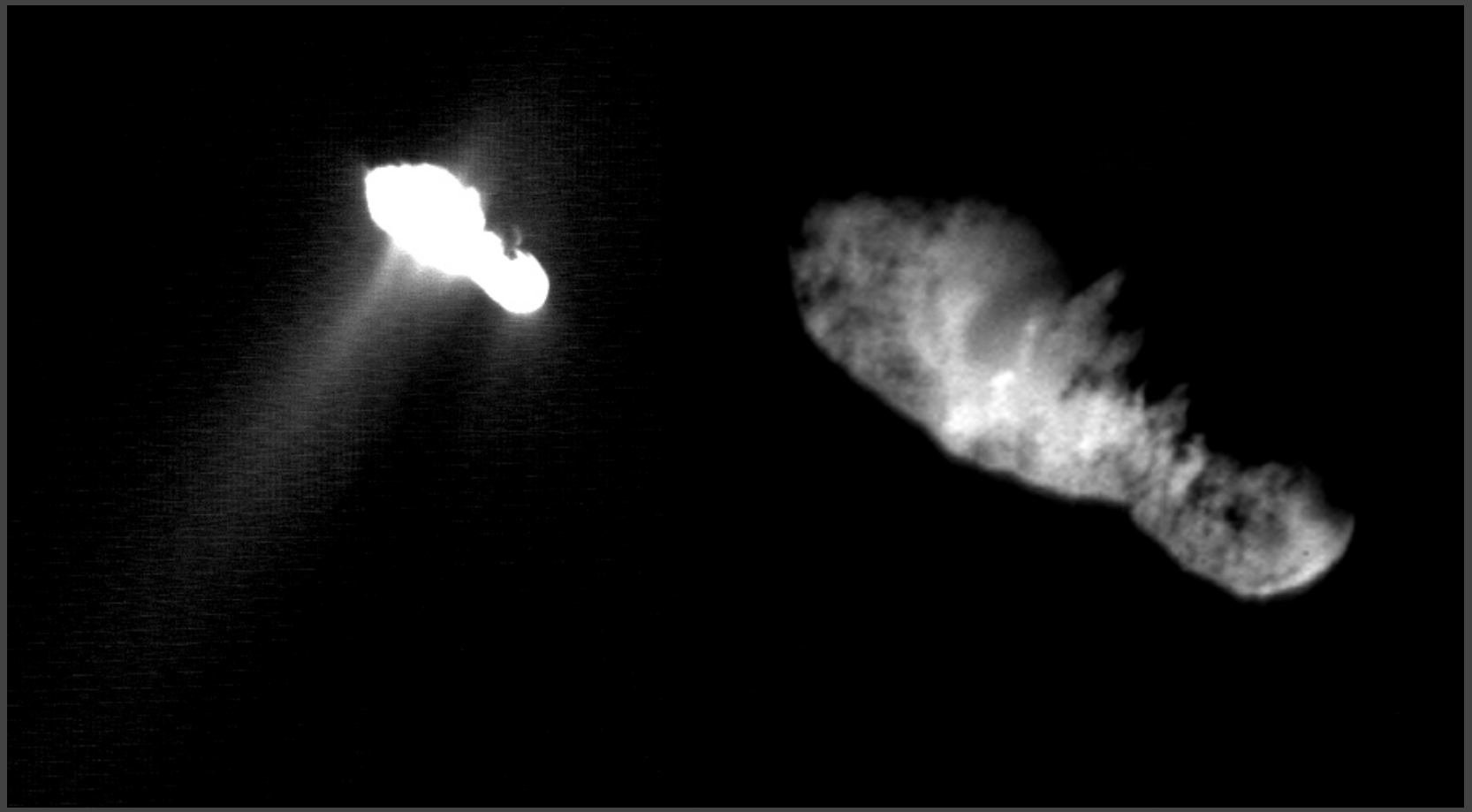
- Nonlin electricity generation turbine overhaul
- Deviser Voyager mission planning demonstration
- SIPE – a planner that can organise a …. brewery
- Optimum-AIV
  - Integrating technologies
  - Integrating with other IT systems
- O-Plan – a wide range of diverse applications
- Bridge Baron
- Deep Space 1 – to boldly go…

Deep Space 1 – 1998-2001



http://nmp.jpl.nasa.gov/ds1/

DS 1 – Comet Borrelly



http://nmp.jpl.nasa.gov/ds1/

DS1 Remote Agent Approach

- **Constraint-based planning and scheduling**
  - supports goal achievement, resource constraints, deadlines, concurrency
- **Robust multi-threaded execution**
  - supports reliability, concurrency, deadlines
- **Model-based fault diagnosis and reconfiguration**
  - supports limited observability, reliability, concurrency
- **Real-time control and monitoring**

Common Themes in Practical Applications of AI Planning

- Outer “human-relatable” approach (e.g. HTN)
- Underlying rich time and resource constraint handling
- Integration with plan execution
- Model-based simulation and monitoring
- Rich knowledge modelling languages and interfaces

Planning Research Areas & Techniques

- Domain Modelling — HTN, SIPE
- Domain Description — PDDL, NIST PSL
- Domain Analysis — TIMS

- Search Methods — Heuristics, A*
- Graph Planning Algthms — GraphPlan
- Partial-Order Planning — Nonlin, UCPOP
- Hierarchical Planning — NOAH, Nonlin, O-Plan
- Refinement Planning — Kambhampati
- Opportunistic Search — OPM
- Constraint Satisfaction — CSP, OR, TMMS
- Optimisation Methods — NN, GA, Ant Colony Opt.
- Issue/Flaw Handling — O-Plan

- Plan Analysis — NOAH, Critics
- Plan Simulation — QinetiQ
- Plan Qualitative Mdling — Excalibur

- Plan Repair — O-Plan
- Re-planning — O-Plan
- Plan Monitoring — O-Plan, IPEM

- Plan Generalisation — Macrops, EBL
- Case-Based Planning — CHEF, PRODIGY
- Plan Learning — SOAR, PRODIGY

- User Interfaces — SIPE, O-Plan
- Plan Advice — SRI/Myers
- Mixed-Initiative Plans — TRIPS/TRAINS

- Planning Web Services — O-Plan, SHOP2

- Plan Sharing & Comms — I-X, <I-N-C-A>
- NL Generation — …
- Dialogue Management — …

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- Dialogue Management — …

Problem is to make sense of all these techniques

Deals with whole life cycle of plans

A More Collaborative Planning Framework

- Human relatable and presentable objectives, issues, sense-making, advice, multiple options, argumentation, discussions and outline plans for higher levels
- Detailed planners, search engines, constraint solvers, analyzers and simulators act in this framework in an understandable way to provide feasibility checks, detailed constraints and guidance
- Sharing of processes and information about process products between humans and systems
- Current status, context and environment sensitivity
- Links between informal/unstructured planning, more structured planning and methods for optimisation

I-X/I-Plan (2000-)

- Shared, intelligible, easily communicated and extendible conceptual model for objectives, processes, standard operating procedures and plans:
  - I Issues
  - N Nodes/Activities
  - C Constraints
  - A Annotations
- Communication of dynamic status and presence for agents, and reports about their collaborative processes and process products
- Context sensitive presentation of options for action
- Intelligent activity planning, execution, monitoring, re-planning and plan repair via I-Plan and I-P^2 (I-X Process Panels)

<I-N-C-A> Framework

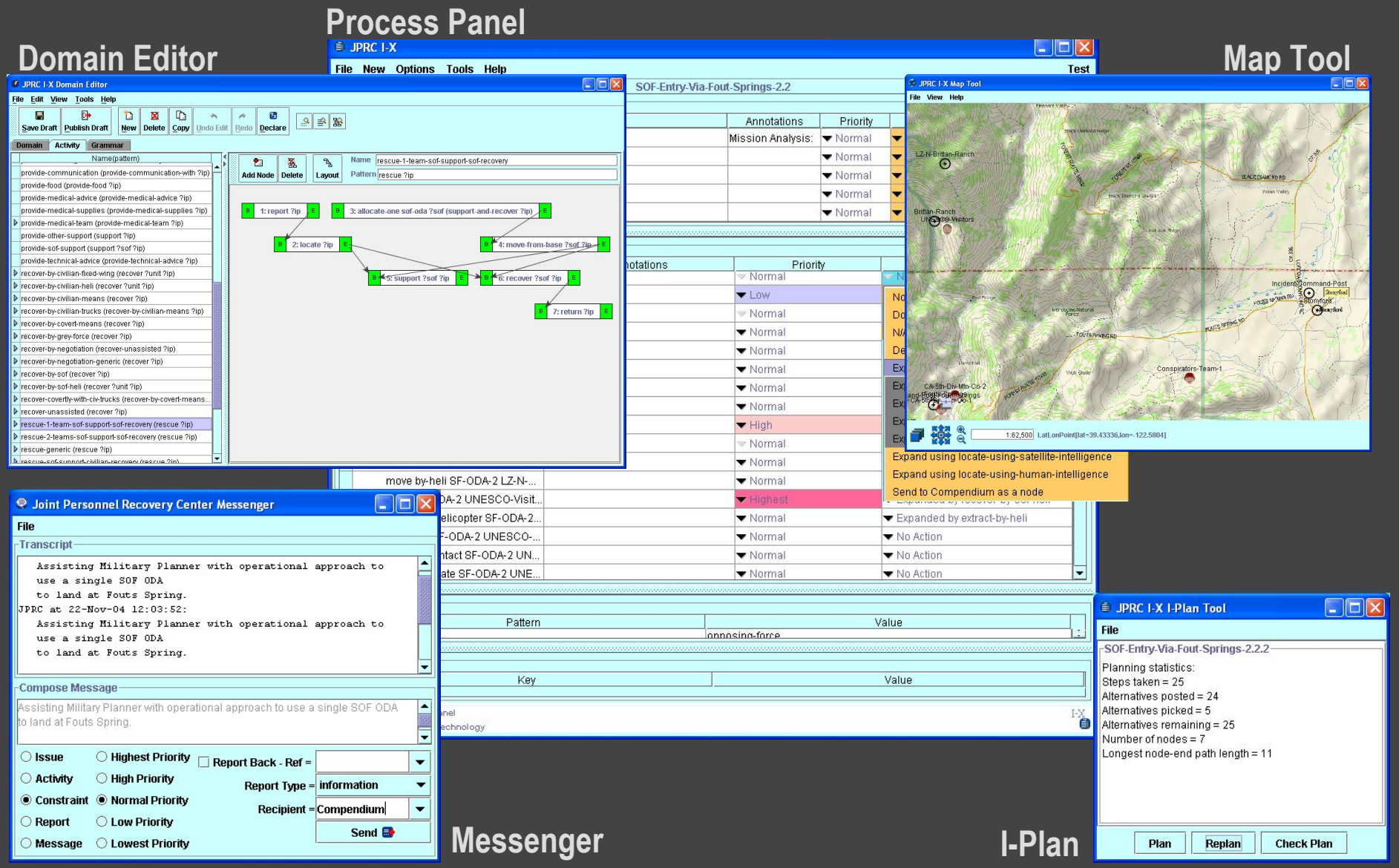
- Common conceptual basis for sharing information on **processes** and **process products**
- Shared, intelligible to humans and machines, easily communicated, formal or informal and extendible
- Set of restrictions on things of interest:
  - I — Issues — e.g. what to do? How to do it?
  - N — Nodes — e.g. include activities or product parts
  - C — Constraints — e.g. state, time, spatial, resource, …
  - A — Annotations — e.g. rationale, provenance, reports, …
- Shared collaborative processes to manipulate these:
  - Issue-based sense-making (e.g. gIBIS, 7 issue types)
  - Activity Planning and Execution (e.g. mixed-initiative planning)
  - Constraint Satisfaction (e.g. AI and OR methods, simulation)
  - Note making, rationale capture, logging, reporting, etc.
- Maintain state of current status, models and knowledge
- I-X Process Panels (I-P^2) use **representation** and **reasoning** together with **state** to present current, context sensitive, options for action

Mixed-initiative collaboration model of "mutually constraining things"

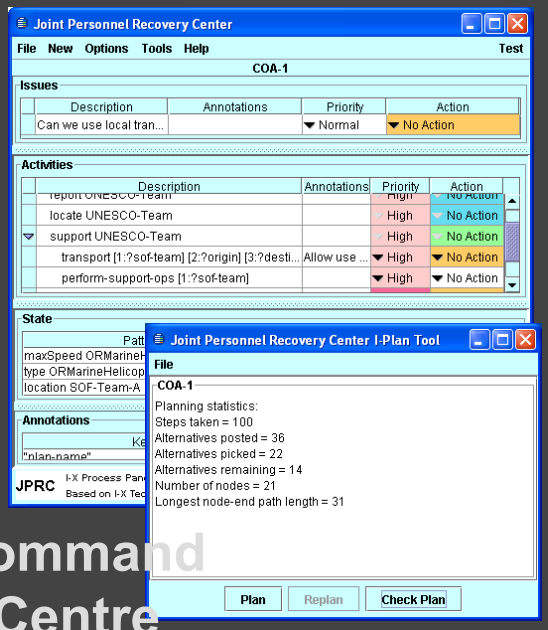
I-P^2 aim is a Planning, Workflow and Task Messaging "Catch All"

- Can take ANY requirement to:
  - Handle an issue
  - Perform an activity
  - Respect a constraint
  - Note an annotation
- Deals with these via:
  - Manual activity
  - Internal capabilities
  - External capabilities
  - Reroute or delegate to other panels or agents
  - Plan and execute a composite of these capabilities (I-Plan)
- Receives reports and interprets them to:
  - Understand current status of issues, activities and constraints
  - Understand current world state, especially status of process products
  - Help user control the situation
- Copes with partial knowledge of processes and organisations

I-X Process Panel and Tools



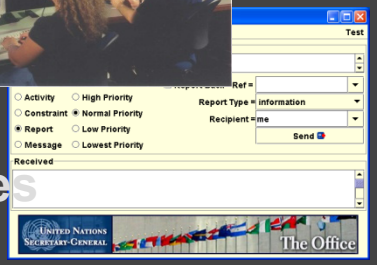
I-X for Emergency Response

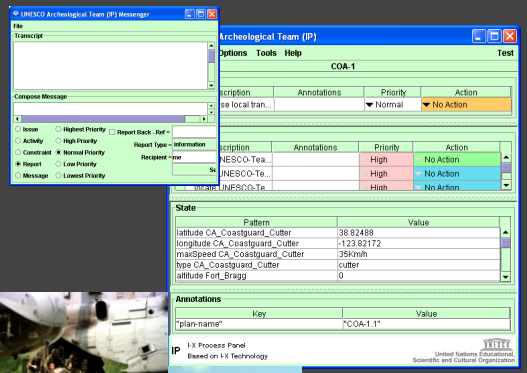


Command Centre

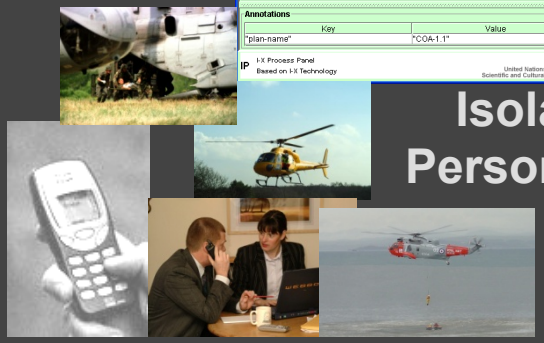
Collaboration and Communication

Central Authorities





Emergency Responders



Isolated Personnel

I-Room: a Virtual Space for Intelligent Interaction

Operations Centres, Brainstorming Spaces, Team Meeting Rooms, Training and Review Areas

I-Room Introduction

- I-Room provides a 3D virtual space with multiple work zones, designed for collaborative and brain storming 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 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 Integration

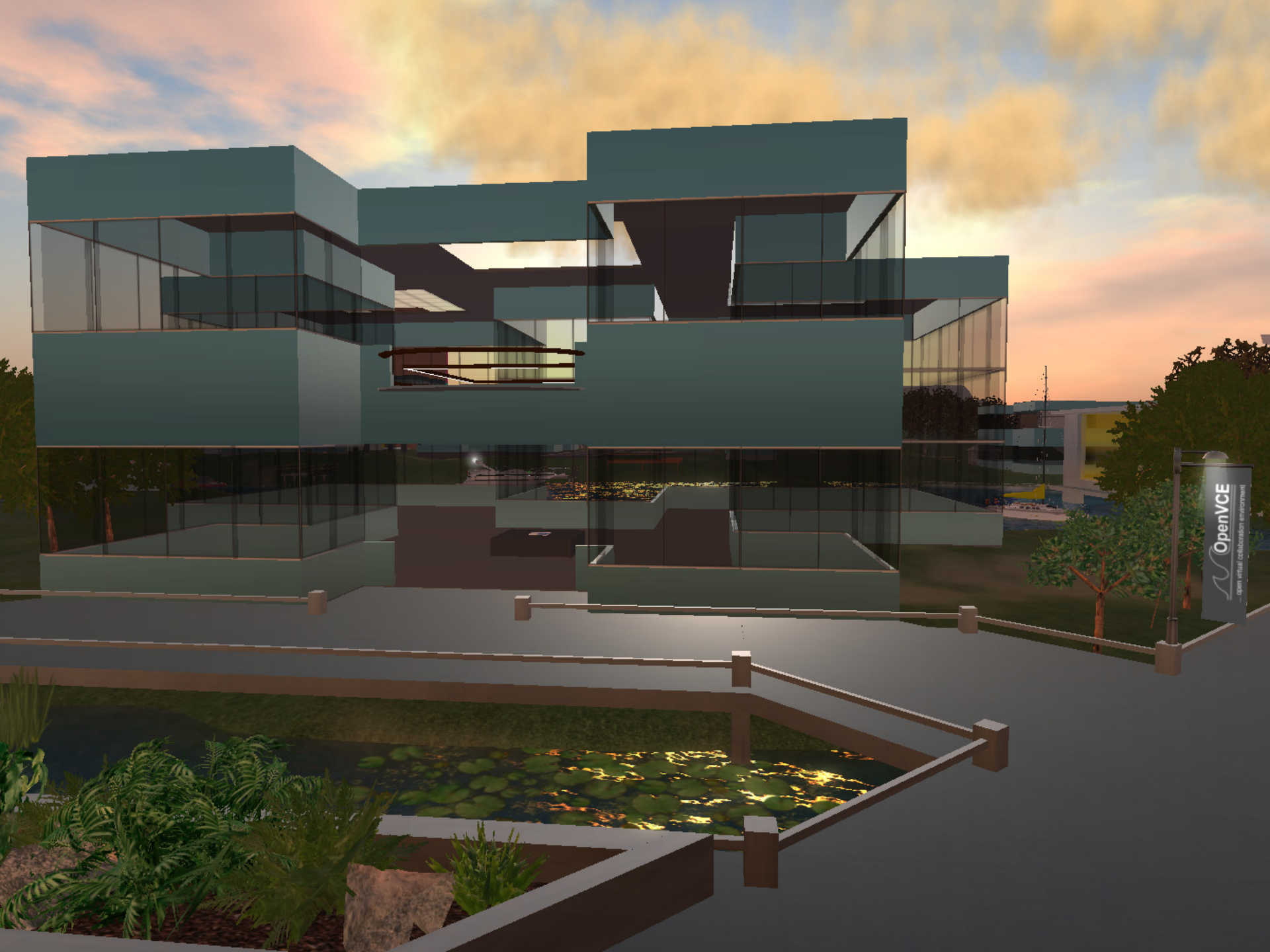
- The I-Room 3D virtual space is linked to a social networking and community knowledge management web portal in OpenVCE.net
- Recent experimental use of the I-Room and OpenVCE for the "Whole of Society Crises Response" (WoSCR) community in the conduct of emergency response and crisis management
- This is intended as a contribution to the wider notions of "The Helpful Environment"

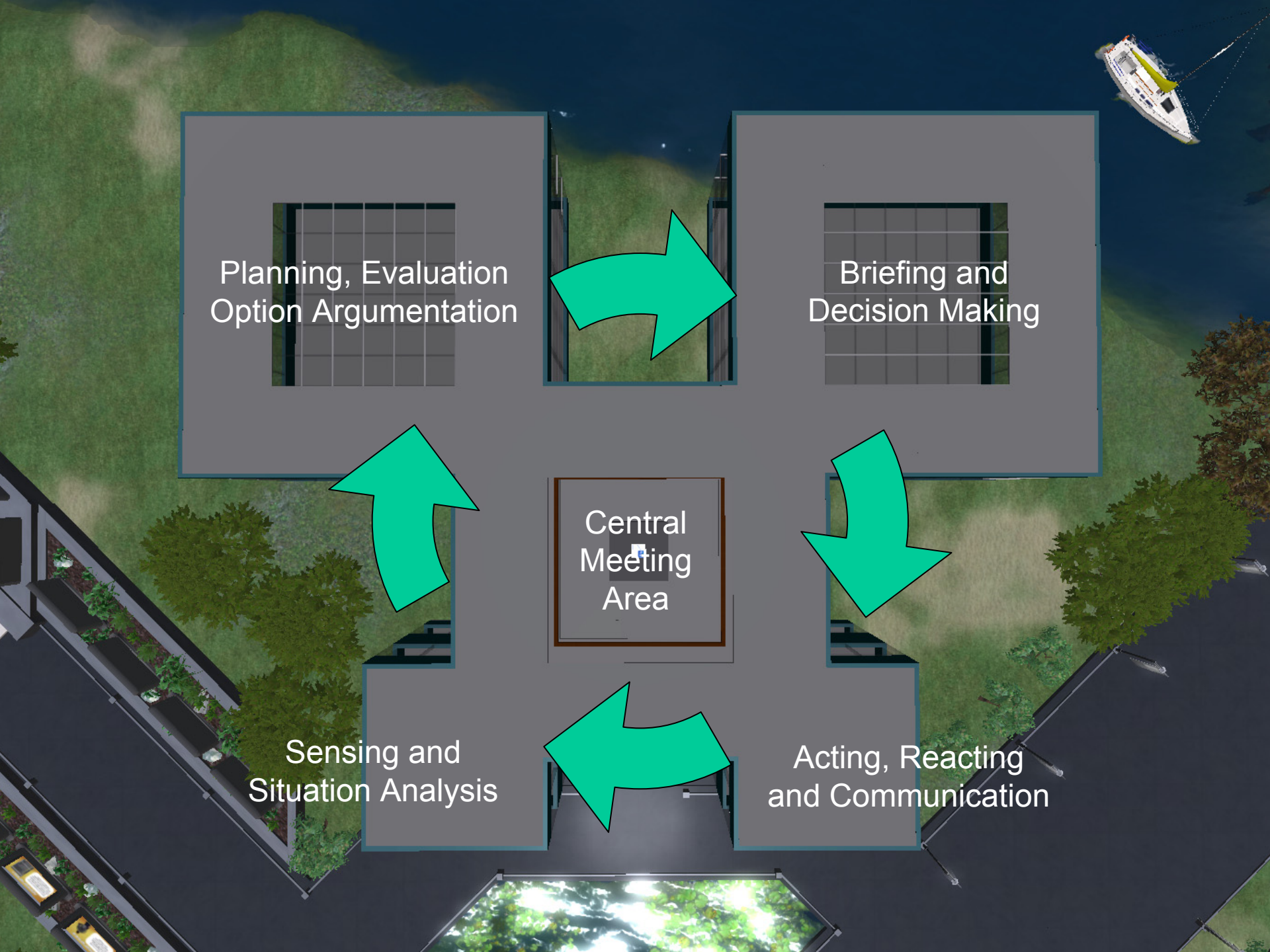

Second Life
Me
Communicate
World
Build
Help
Advanced
Develop
L$ 74,777
Buy L$
9:46 AM PDT
I-Zone, VCE - General
Search
I-Room: A Virtual Space for Intelligent Interaction
Trinity Rooney
Diana Grizot
Firery Broome
Owner
Theo Outlander
WorkingRelationships
Deb Quintessa
OpenVCE
Ai Austin
Tonito Alderson
RL <--> SL Scripter
AI Supercharge
Owner
Viking Zinner
Vue Associate
SP Pizzicato
Sato Michinaga
Academy of HRD
Rachelle Munro
Member
Pamela Varthader
Member
Joelle Yalin
Honda SL Design Team
JohnFrej Herzfeld
Light Sequent
Innovator
Serious Starsider
DougCaldwell Unplugged
OpenVCE Event Reception
Open University UK
Gardy Flux
Acknowledged
Anders Wildcat
Clear Clickers
Chat Relay
I-Room Helper (off)
Team A
Anders Cronstadt
AO OFF

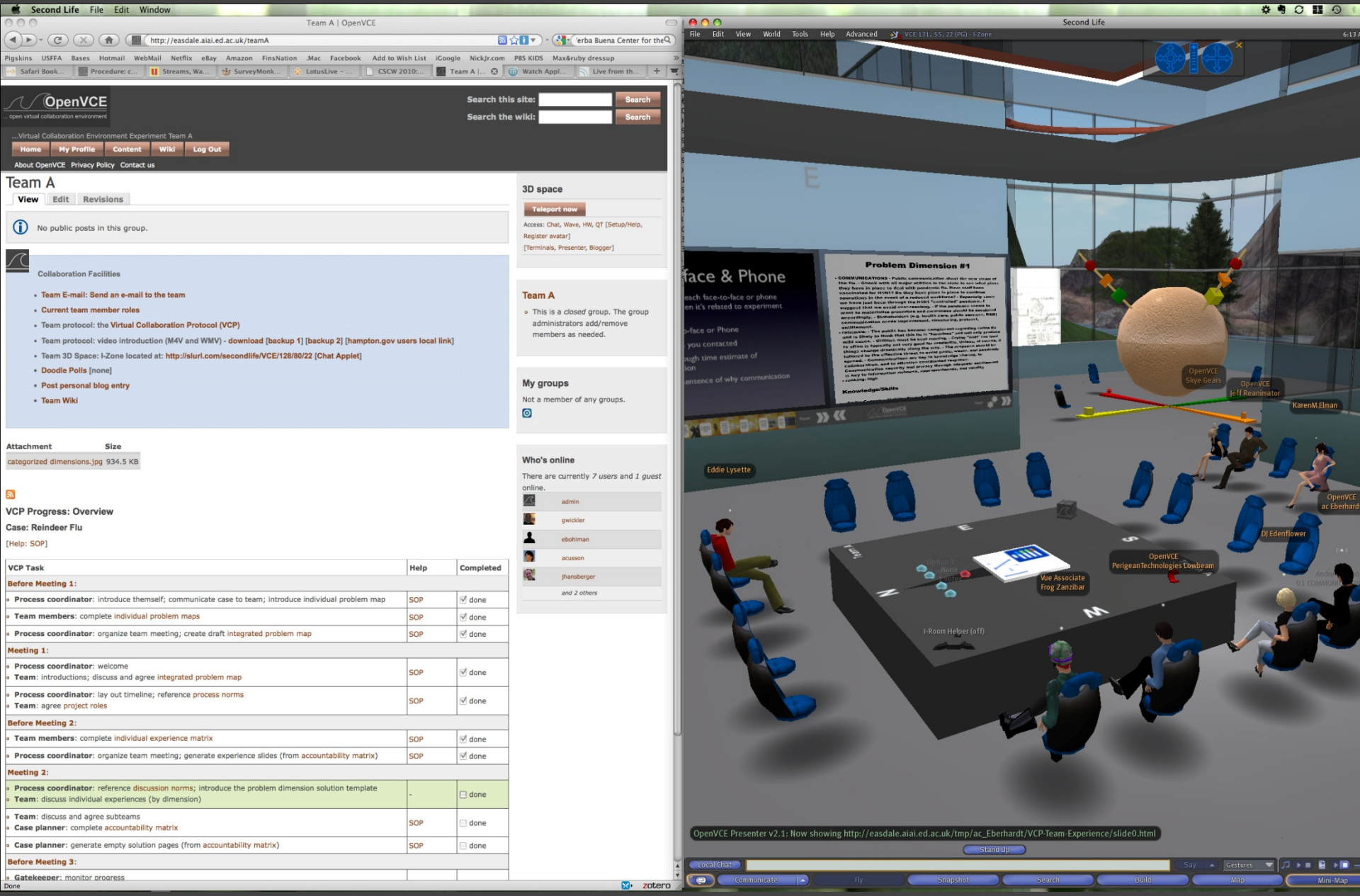
I-Room: Mixed-initiative Collaboration

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


OpenVCE
open virtual collaboration environment


Planning, Evaluation
Option Argumentation
Briefing and
Decision Making
Central
Meeting
Area
Sensing and
Situation Analysis
Acting, Reacting
and Communication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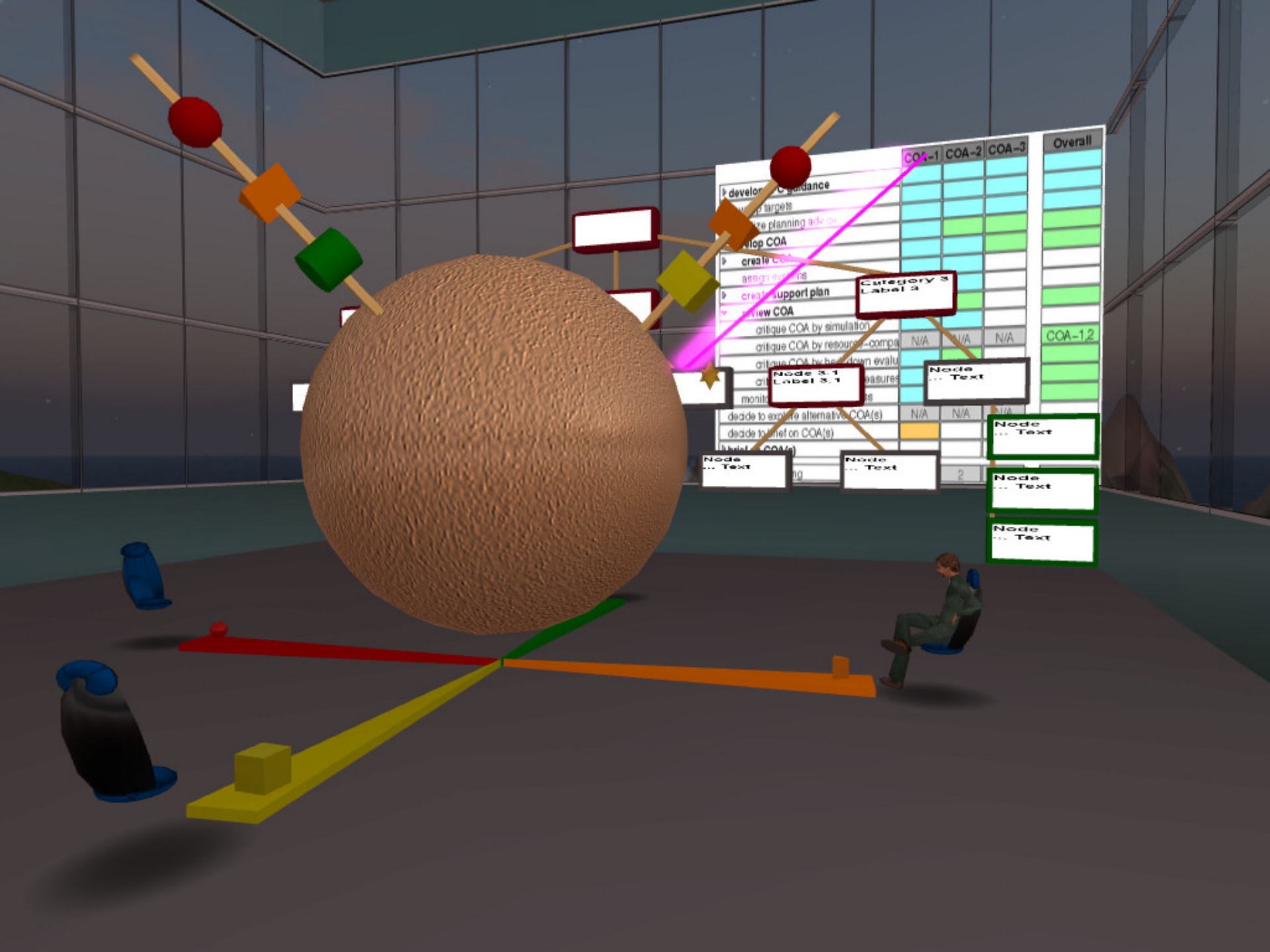
Home
My Profile
Content
Wiki
Log Out
About OpenVCE Privacy Policy Contact us
Team A
View
Edit
Revisions
No public posts in this group.
Collaboration Facilities
Team E-mail: Send an e-mail to the team
Current team member roles
Team protocol: the Virtual Collaboration Protocol (VCP)
Team protocol: video introduction (M4V and WMV) - download [backup 1] [backup 2] [hampton.gov users local link]
Team 3D Space: I-Zone located at: http://slurl.com/secondlife/VCE/128/80/22 [Chat Applet]
Doodle Polls [none]
Post personal blog entry
Team Wiki
Attachment Size
categorized dimensions.jpg 934.5 KB
VCP Progress: Overview
Case: Reindeer Flu
[Help: SOP]
VCP Task
Help
Completed
Before Meeting 1:
Process coordinator: introduce themself; communicate case to team; introduce individual problem map
Team members: complete individual problem maps
Process coordinator: organize team meeting; create draft integrated problem map
Meeting 1:
Process coordinator: welcome
Team: introductions; discuss and agree integrated problem map
Process coordinator: lay out timeline; reference process norms
Team: agree project roles
Before Meeting 2:
Team members: complete individual experience matrix
Process coordinator: organize team meeting; generate experience slides (from accountability matrix)
Meeting 2:
Process coordinator: reference discussion norms; introduce the problem dimension solution template
Team: discuss individual experiences (by dimension)
Team: discuss and agree subteams
Case planner: complete accountability matrix
Case planner: generate empty solution pages (from accountability matrix)
Before Meeting 3:
Gatekeeper: monitor progress
SOP
done
3D space
Teleport now
Team A
This is a closed group. The group administrators add/remove members as needed.
My groups
Not a member of any groups.
Who's online
There are currently 7 users and 1 guest online.
admin
gwickler
ebohlman
acusson
jhansberger
and 2 others
Second Life
Problem Dimension #1
Eddie Lysette
OpenVCE Skye Gears
OpenVCE Jeff Reanimator
KarenM Elman
DJ Edenflower
OpenVCE PerigeanTechnologies Lowbeam
Vue Associate Frog Zanzibar
I-Room Helper (off)
OpenVCE Presenter v2.1: Now showing http://easdale.aiai.ed.ac.uk/tmp/ac_Eberhardt/VCP-Team-Experience/slide0.html
Stand Up
Local Chat
Communicate
Fly
Snapshot
Search
Build
Map
Mini-Map


COA-1
COA-2
COA-3
Overall
develop COA
create support plan
review COA
critique COA by simulation
critique COA by resource-comp
N/A
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N/A
COA-1,2
decide to explore alternative COA(s)
decide to brief on COA(s)
Category 3
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Helpful Environment

The Future of AI

The "Helpful Environment": Geographically Dispersed Intelligent Agents That Collaborate

Austin Tate, *Artificial Intelligence Applications Institute, University of Edinburgh*

AI's first 50 years have given us powerful techniques and tools, some which have found significant and valuable application. AI technology helps many people on a regular basis, both directly and indirectly, through the goods they use, through the services they receive, and in the course of their work. The promise of ubiquitous computing,

A future network of sophisticated sensors, protection, and repair systems could be integral to clothing, communications devices, transportation systems, buildings, and the environment. These would form the basis for a distributed, adaptable, and resilient "helpful environment."

sensor grids, home robots, and Web services is an exciting new driver for AI that should see its reach extend still further into our everyday lives. AI's role in underpinning much of the emerging Semantic Web is one example already of how widely we'll use the methods in the future.

Imagine an environment where sophisticated sensors and autonomous or semiautonomous diagnosis, protection, and repair systems are integral to clothing, communications devices, vehicles, transportation systems, buildings, and the environment. These would form the basis for a distributed, adaptable, and resilient "safety net" for every individual and organization at personal, family, business, regional, national, and international levels.[1] In natural-disaster-prone areas, government legislation, building codes, and insurance requirements would ensure that all future PDAs, communication devices, vehicles, and buildings include appropriate sensor and actuator systems to assist both their users and others nearby. Systems would adapt and respond to emergencies whether or not communication were possible. Where feasible, local help would be used, with appropriate calls on shared services facilitated, whenever this is both possible and necessary. Through this framework, requests for assistance could be validated and brokered to available and appropriate services in a highly distributed market fashion. Services would be provided to individuals or communities through this network to add value and give all sorts of assistance beyond the emergency response aspects. In emergency situations, the local infrastructure would be augmented by the facilities of the responder teams at any level from local police, ambulance, and fire response, all the way up to international response. An emergency zone's own infrastructure could be augmented on demand by laying down temporary low-cost sensor grids and placing specialized devices and robotic responders into the disaster area.

Emergency response challenges

The United Nations Office for the Coordination of Humanitarian Affairs (http://ochaonline.un.org) is one of the international bodies that are charged with assisting in international crises. OCHA's primary functions are to

- develop common strategies for response,
- assess situations and needs,
- convene coordination forums,
- mobilize resources,
- address common problems, and
- administer coordination mechanisms.

These challenges face any group or organization that intends to help in a crisis.

Local or regional governments are often responsible for the event handling, planning, coordination, and status reporting involved in emergency responses. They must harness local response capabilities to augment their own by calling on other resources. Figure 1 shows the Tokyo Metropolitan Government's emer-

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The creation and use of task-centric virtual organizations involving people, government and non-governmental organizations, automated systems, grid and web services working alongside intelligent robotic, vehicle, building and environmental systems to respond to very dynamic events on scales from local to global.

- Multi-level emergency response and aid systems
- Personal, vehicle, home, organization, district, regional, national, international
- Backbone for progressively more comprehensive aid and emergency response
- Also used for aid-orientated commercial services
- Robust, secure, resilient, distributed system of systems
- Advanced knowledge and collaboration technologies
- Low cost, pervasive sensor grids, computing and communications
- Changes in codes, regulations, training and practices

Tate, A. (2006) The Helpful Environment: Geographically Dispersed Intelligent Agents That Collaborate, Special Issue On "The Future of AI", IEEE Intelligent Systems, May-June 2006, Vol. 27, No. 3, pp 57-61. IEEE Computer Society.

Suggested Reading

O-Plan and its Applications

Tate, A. and Dalton, J. (2003) O-Plan: a Common Lisp Planning Web Service, invited paper, in Proceedings of the International Lisp Conference 2003, October 12-25, 2003, New York, NY, USA, October 12-15, 2003.

http://www.aiai.ed.ac.uk/project/ix/documents/2000/2000-sges-tate-intelligible-planning.pdf

I-X/I-Plan and its Integration Approach

Tate, A. (2000) Intelligible AI Planning, in Research and Development in Intelligent Systems XVII, Proceedings of ES2000, The Twentieth British Computer Society Special Group on Expert Systems International Conference on Knowledge Based Systems and Applied Artificial Intelligence, pp. 3-16, Cambridge, UK, December 2000, Springer.

http://www.aiai.ed.ac.uk/project/ix/documents/2003/2003-luc-tate-oplan-web.pdf

I-Rooms

Tate, A. (2010) I-Room: Integrating Intelligent Agents and Virtual Worlds, X10 Workshop on Extensible Virtual Worlds (http://vw.ddns.uark.edu/X10). Organized by the IBM Academy of Technology and the University of Arkansas. Second Life, March 29-30, 2010.

http://www.aiai.ed.ac.uk/project/ix/documents/2010/2010-xvw-tate-iroom.pdf

Helpful Environment

Tate, A. (2006) The Helpful Environment: Geographically Dispersed Intelligent Agents That Collaborate, Special Issue on "The Future of AI", IEEE Intelligent Systems, May-June 2006, Vol. 27, No. 3, pp 57-61. IEEE Computer Society.

http://www.aiai.ed.ac.uk/project/ix/documents/2006/2006-ieee-is-tate-helpful-env-as-published.pdf

I-X – Intelligent Systems Technology
I-Room – a Virtual Space for Intelligent Interaction
OpenVCE – Virtual Collaboration Environment
The Helpful Environment

Web + Social Networking + Agents + Plans + Virtual Worlds

http://i-x.info
http://openvce.net
http://openvce.net/i-room
http://openvce.net/helpful-environment

Extra Slides

- Deep Space 1 Extra Slides and Papers
- I-X Extra Slides
- I-Room Extra Slides
- Helpful Environment Extra Slides

DS1 Domain Requirements

Achieve diverse goals on real spacecraft

- **High Reliability**
  - single point failures
  - multiple sequential failures
- **Tight resource constraints**
  - resource contention
  - conflicting goals
- **Hard-time deadlines**
- **Limited Observability**
- **Concurrent Activity**

DS1 – Flight Experiments 17th – 21st May 1999

- RAX was activated and controlled the spacecraft autonomously. Some issues and alarms did arise:
  - Divergence of model predicted values of state of Ion Propulsion System (IPS) and observed values – due to infrequency of real monitor updates.
  - EXEC deadlocked in use. Problem diagnosed and fix designed by not uploaded to DS1 for fears of safety of flight systems.
- Condition had not appeared in thousands of ground tests indicating needs for formal verification methods for this type of safety/mission critical software.
- Following other experiments, RAX was deemed to have achieved its aims and objectives.

DS1 Literature

- **Deep Space 1 Papers**
- Ghallab, M., Nau, D. and Traverso, P., *Automated Planning – Theory and Practice*, chapter 19,. Elsevier/Morgan Kaufmann, 2004.
- Bernard, D.E., Dorais, G.A., Fry, C., Gamble Jr., E.B., Kanfesky, B., Kurien, J., Millar, W., Muscettola, N., Nayak, P.P., Pell, B., Rajan, K., Rouquette, N., Smith, B., and Williams, B.C. *Design of the Remote Agent experiment for spacecraft autonomy*. Procs. of the IEEEAerospace Conf., Snowmass, CO, 1998.
- http://nmp.jpl.nasa.gov/ds1/papers.html

- **Other Practical Planners**
- Ghallab, M., Nau, D. and Traverso, P., *Automated Planning – Theory and Practice*, chapter 22 and 23. Elsevier/Morgan Kaufmann, 2004
- Tate, A. and Dalton, J. (2003) O-Plan: a Common Lisp Planning Web Service, invited paper, in Proceedings of the International Lisp Conference 2003, October 12-25, 2003, New York, NY, USA, October 12-15, 2003.
- http://www.aiai.ed.ac.uk/project/ix/documents/2003/2003-luc-tate-oplan-web.doc

I-X Approach

- The I-X approach involves the use of shared models for task-directed communication between human and computer agents
- I-X system or agent has two cycles:
  - Handle Issues
  - Manage Domain Constraints
- I-X system or agent carries out a (perhaps dynamically determined) process which leads to the production of (one or more alternative options for) a “product”
- I-X system or agent views the synthesised artefact as being represented by a set of constraints on the space of all possible artefacts in the application domain


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OpenVCE Karma Luckstone
OpenVCE JeffD Anda
OpenVCE Ai Austin
OpenVCE Brooks Appletor
OpenVCE Keg Runner
OpenVCE Skye Gears
OpenVCE Aura Atlass
Vue Associate SP Pizzicato
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aiaiaustin (Ai Austin): #openvce MEET-4 now starting at http://tr.im/openvcemeet4
Twitter - SLTweets HUD
Twitter Status - #openvce
Twitter feed on #openvce
Gears: Austin, your voice is noisy and not clear
Stand Up

Helpful Environment Related Projects

- CoAKTinG (Collaborative Advanced Knowledge Technologies in the Grid) – also I-Rescue (Kobe), AKT e-Response and OpenKnowledge
  - Linking issue handling, argumentation, process support, instance messaging and agent presence notification
  - Range of natural, industrial and other emergency scenarios
- CoSAR-TS (Coalition Search and Rescue – Task Support)
  - Use of OWL ontologies and OWL-S described services to describe components
- Co-OPR (Collaborative Operations for Personnel Recovery)
  - Use of OWL ontologies and OWL-S described services to describe components
- FireGrid
  - to establish a cross-disciplinary collaborative community to pursue fundamental research for developing faster than real time emergency response systems using the “Grid”
- e-Response
  - Creation and use of task-centric virtual organizations to respond to highly dynamic events on scales from local to global
  - Flood, metropolitan emergency and industrial accident scenarios

Collaborative
ADVANCED KNOWLEDGE TECHNOLOGIES
CoAKTinG
in the Grid

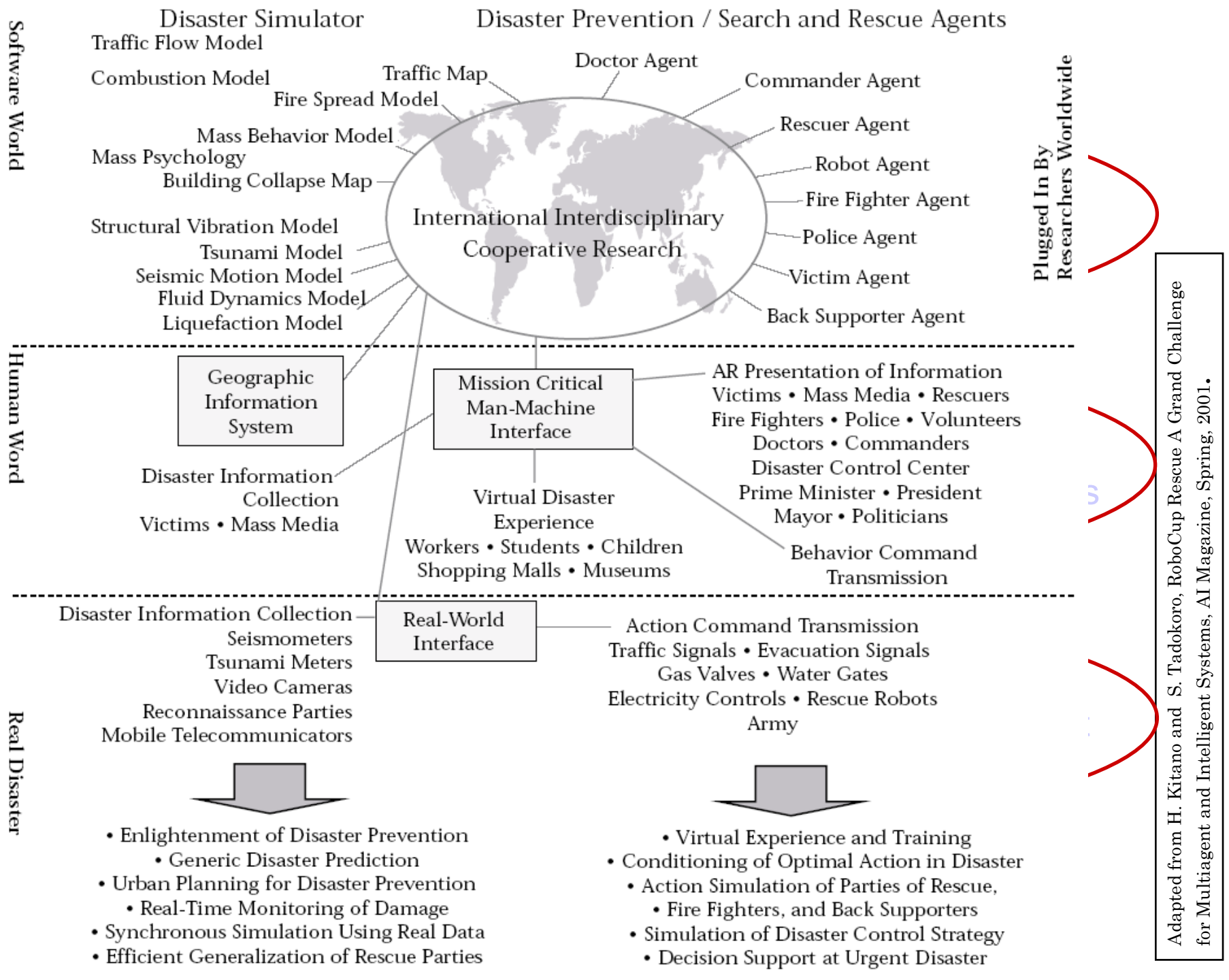
FireGrid

Helpful Environment

"The Helpful Environment" vision is of a future in which ubiquitous computing, sensor grids and networked systems combine to help the individuals, families, businesses, organizations, the public at large, regions and countries to be self supportive and mutually helpful with specialised resources for their daily lives, for help and assistance in emergencies.

The vision, some international programmes which contribute to it, some of the organisations that are pursuing this vision and some of the Edinburgh projects and research that will we hope will help make it a reality is described in this paper:

Tate, A. (2006) The Helpful Environment: Geographically Dispersed Intelligent Agents That Collaborate, Special Issue On "The Future of AI", IEEE Intelligent Systems, May-June 2006, Vol. 27, No. 3, pp 57-61. IEEE Computer Society.



Adapted from H. Kitano and S. Tadokoro, RoboCup Rescue A Grand Challenge for Multiagent and Intelligent Systems, AI Magazine, Spring, 2001.

Helpful Environment

AIAI, University of Edinburgh
Intelligent Systems - Planning and Activity Management

Explores representations and reasoning mechanisms for inter-agent activity support. The agents may be people or computer systems working in a coordinated fashion. The group explores and develops generic approaches by engaging in specific applied studies. Applications include crisis action planning, command and control, space systems, manufacturing, logistics, construction, procedural assistance, help desks, emergency response, etc.

Our long term aim is the creation and use of task-centric virtual organisations involving people, government and non-governmental organisations, automated systems, grid and web services working alongside intelligent robotic, vehicle, building and environmental systems to respond to very dynamic events on scales from local to global.

http://www.aiai.ed.ac.uk/project/plan/