

From gIBIS to MEMETIC

Evolving a Research Vision into a Practical Tool

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¹ Knowledge Media Institute, The Open Univ., UK,

² Verizon, USA

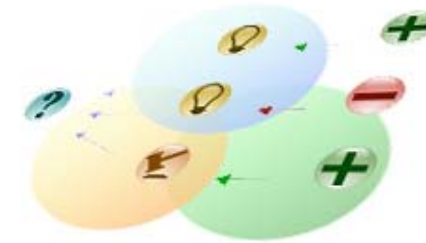
³ RIACS, NASA Ames Research Center, USA

⁴ Cognexus Institute, USA

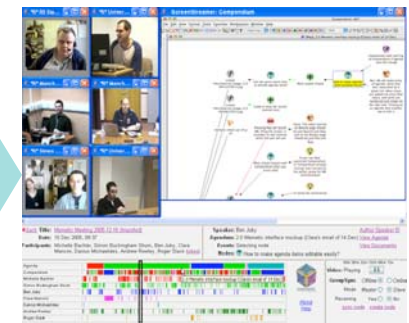
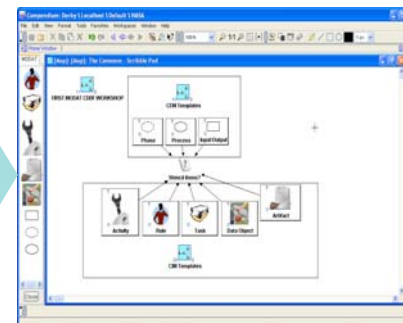
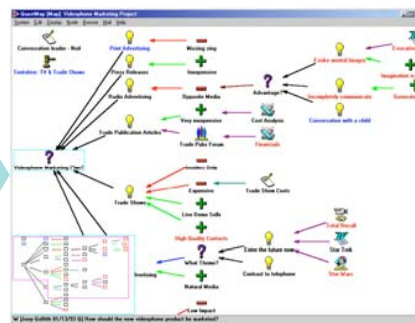
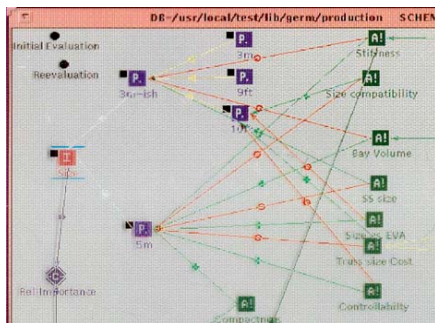
⁵ Access Grid Support Centre, Univ. Manchester, UK

⁶ Intelligence, Agents, Multimedia Group, Univ. Southampton, UK

⁷ School of Informatics, Univ. Edinburgh, UK



Funding gratefully acknowledged: Verizon, NASA, EPSRC, ESRC, JISC, DARPA





Argumentation-Based Design Rationale:

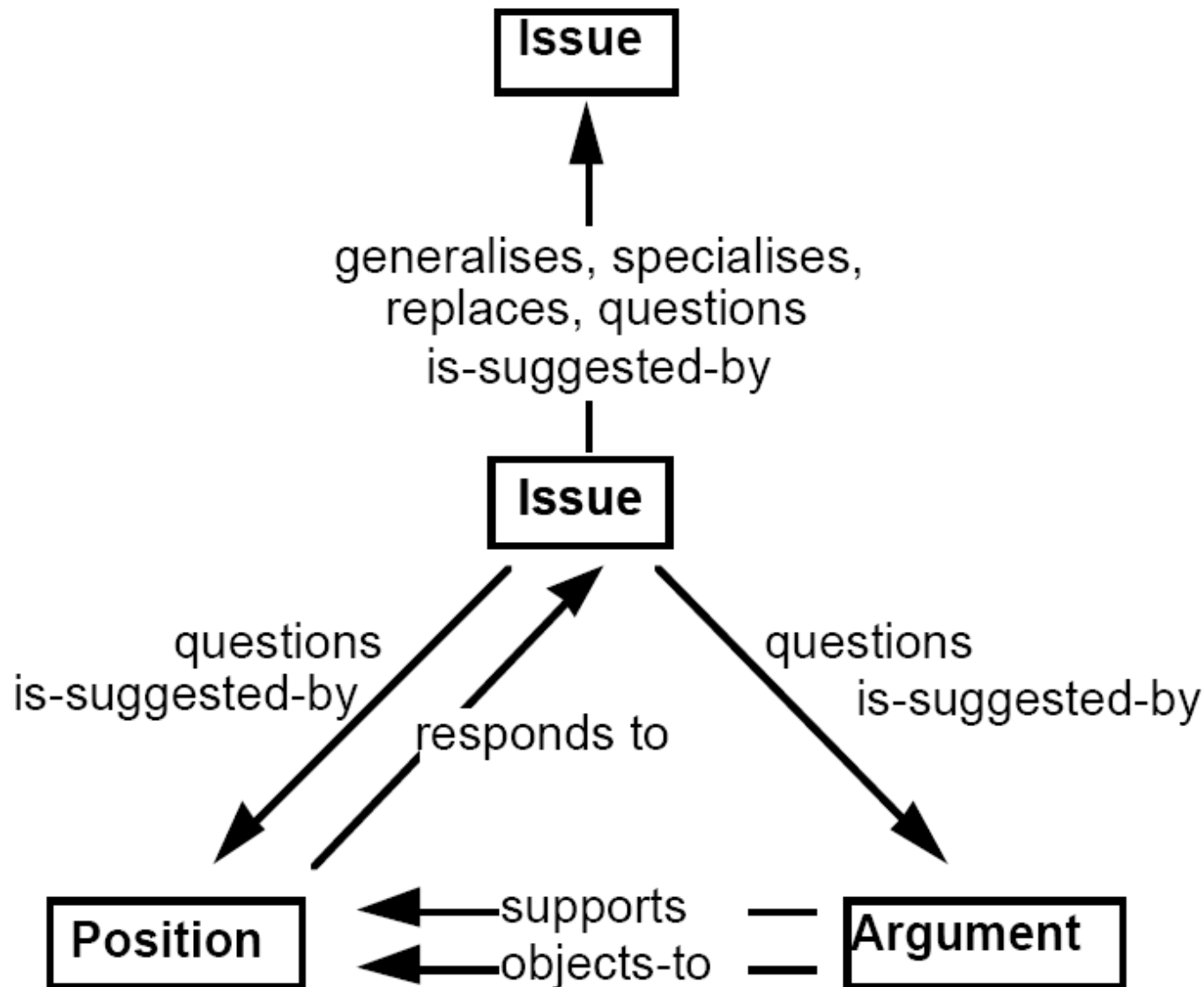
History...

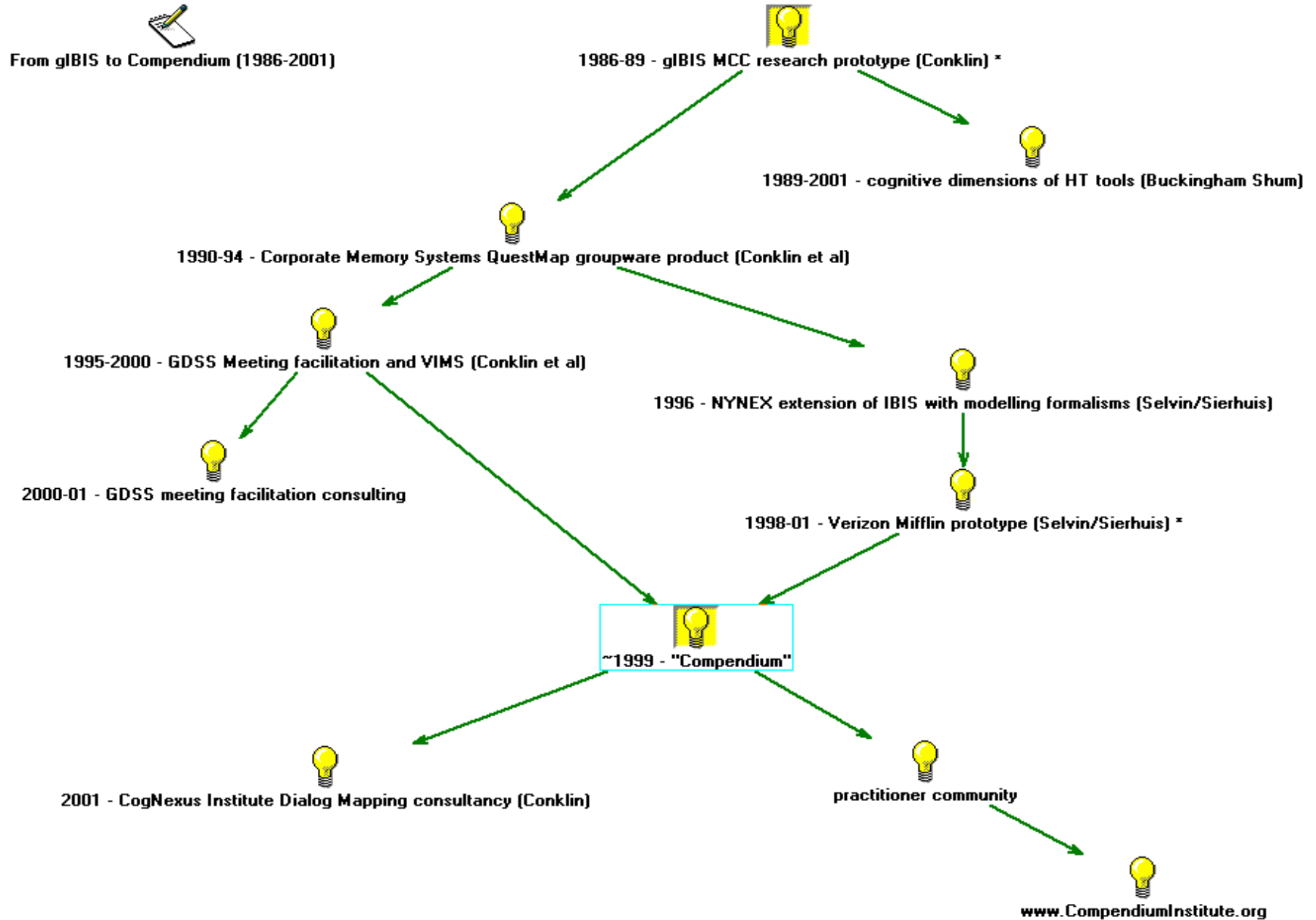


Argumentation-based DR's intellectual roots...

- **Doug Engelbart:**
 - Augmenting Human Intellect
- **Horst Rittel:**
 - Wicked Problems and Argumentative Design
- **John Seely Brown**
 - Cognitive tools that trace the evolution of ideas
- **Karl Weick:**
 - Sensemaking when confronted by socio-technical complexity

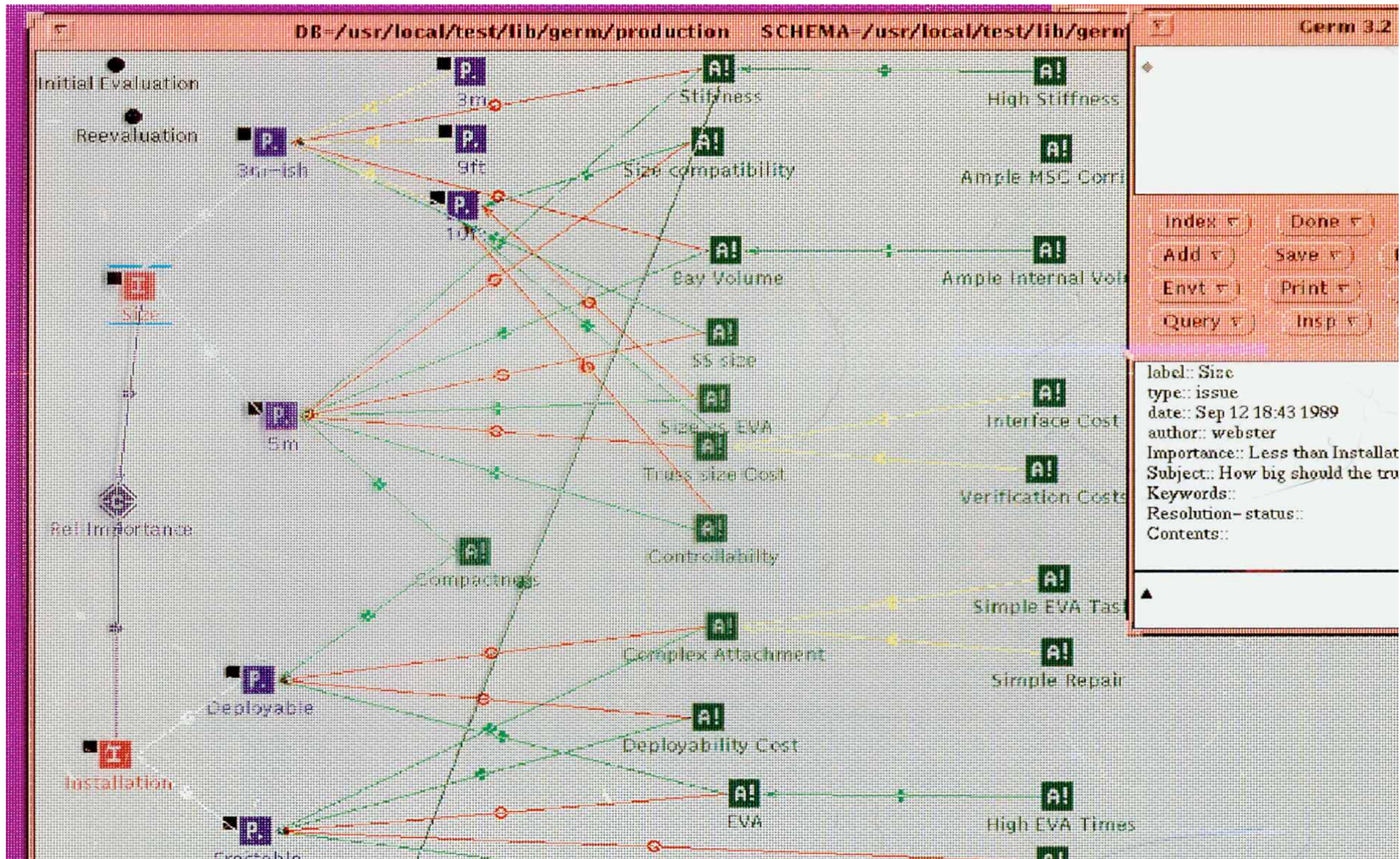
Rittel's IBIS: Issue-Based Information System





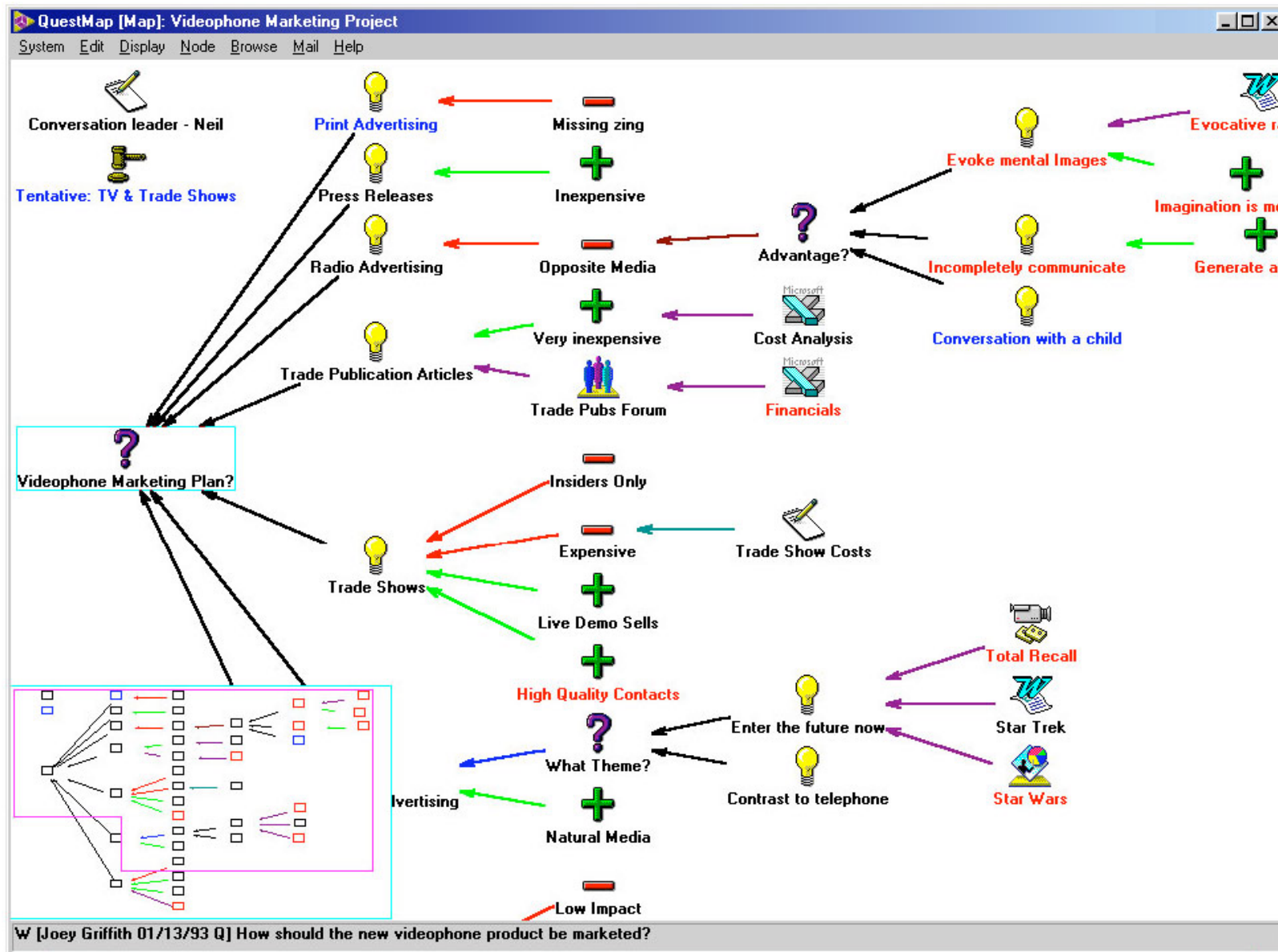
gIBIS: graphical IBIS

(MCC research prototype, 1989, running in GERM)



CM/1, renamed QuestMap

(Corporate Memory Systems 1992, spinoff from MCC's gIBIS)



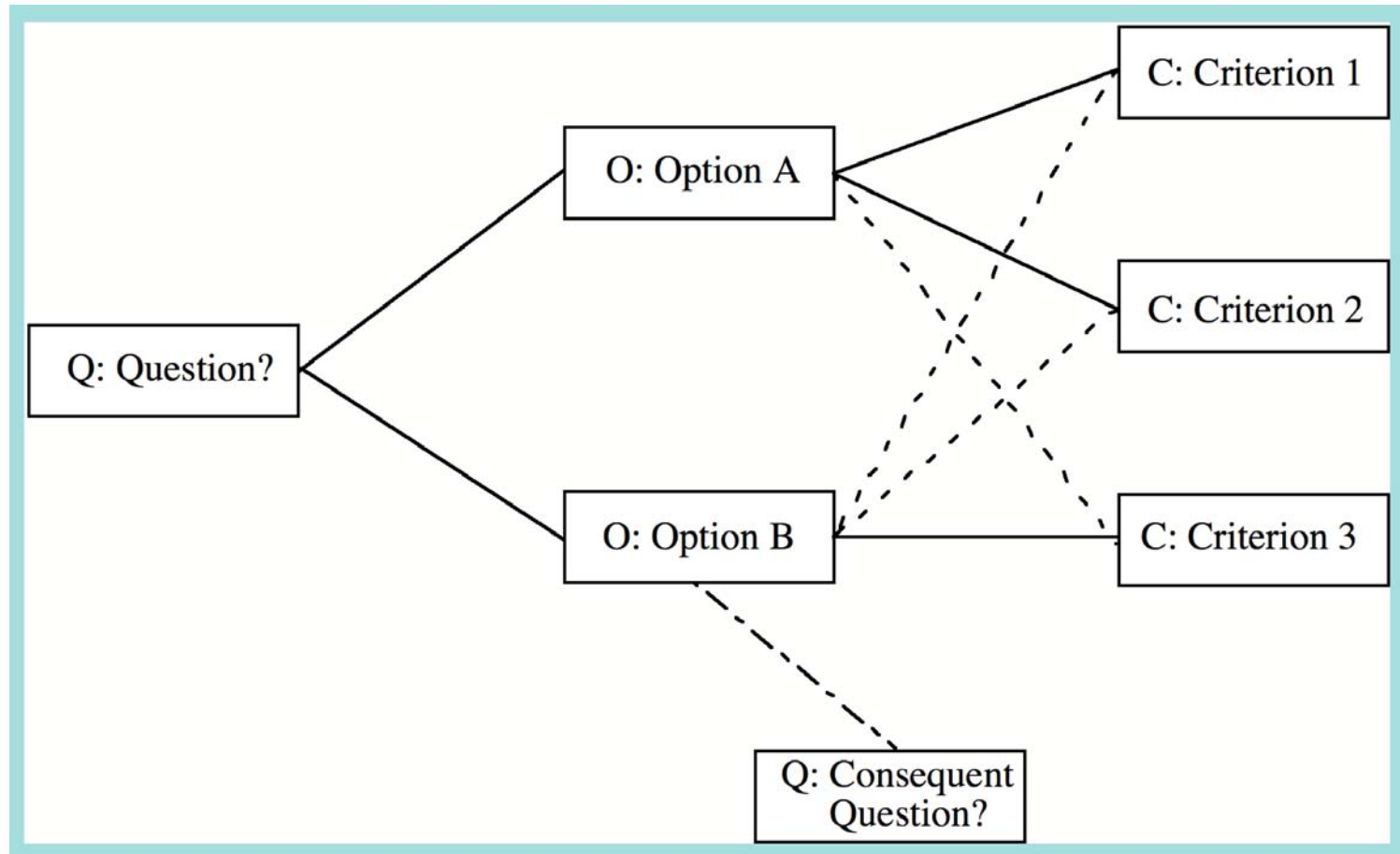


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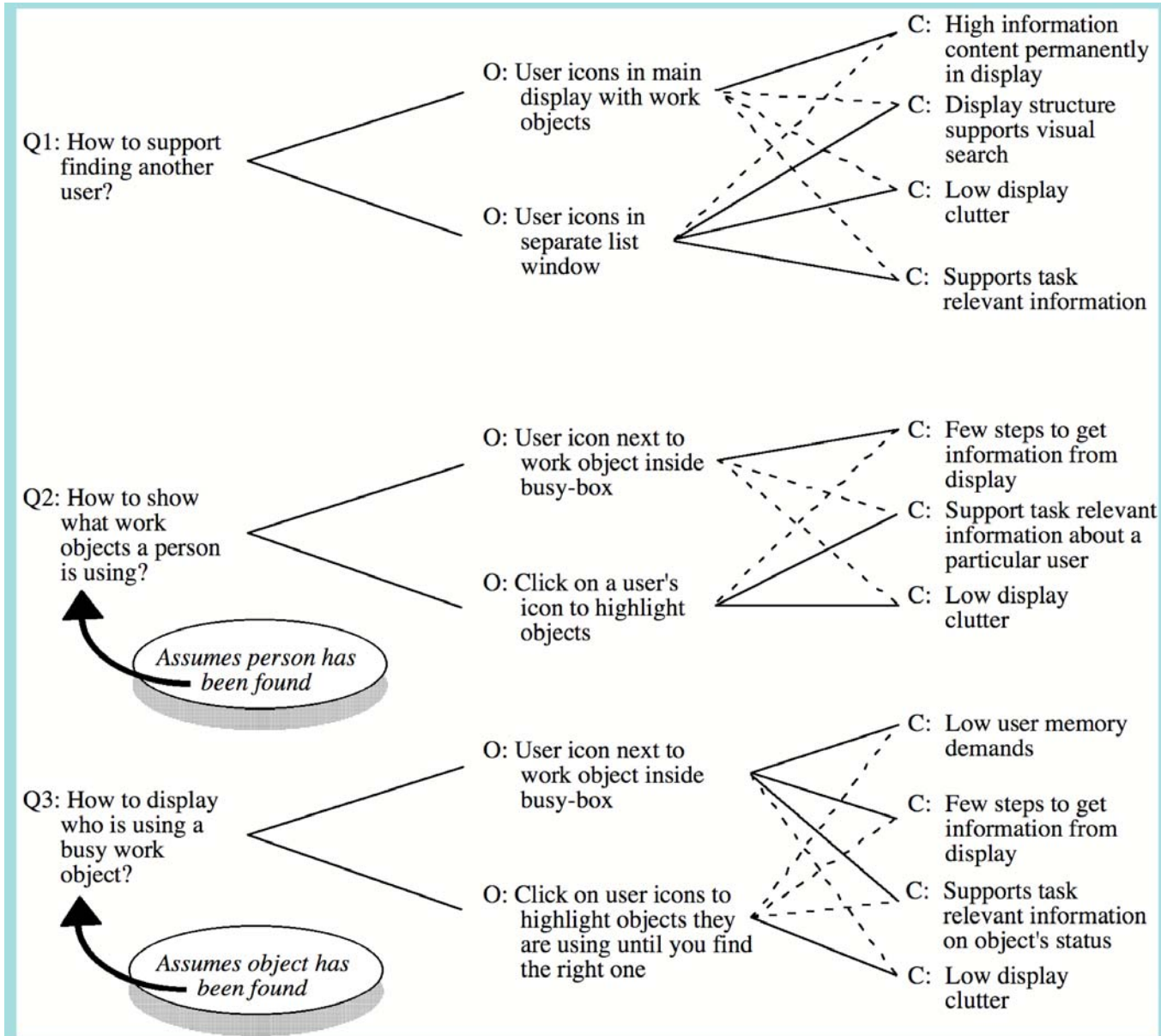
QOC Design Space Analysis

MacLean, Young & Moran, CHI 1989

Design Space Analysis using 'QOC'



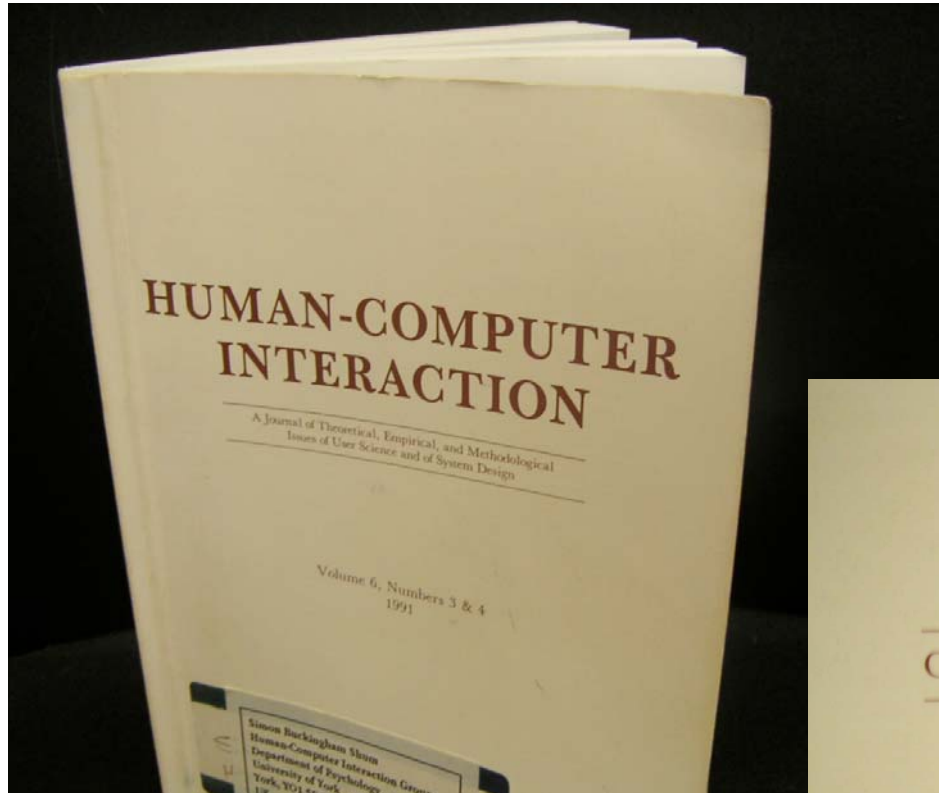
Design Space Analysis using 'QOC'



Design Rationale (1987-1996) The 1991 HCI Special Issue



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HUMAN-COMPUTER
INTERACTION

Contents of Volume 6, Numbers 3 & 4 1991

EDITORIAL

Introduction to This Special Issue on Design Rationale.....197
John M. Carroll and Thomas P. Moran

ARTICLES

Questions, Options, and Criteria: Elements of Design
Space Analysis.....201
*Allan MacLean, Richard M. Young,
Victoria M. E. Bellotti, and Thomas P. Moran*

What's in Design Rationale?251
Jintae Lee and Kum-Yew Lai

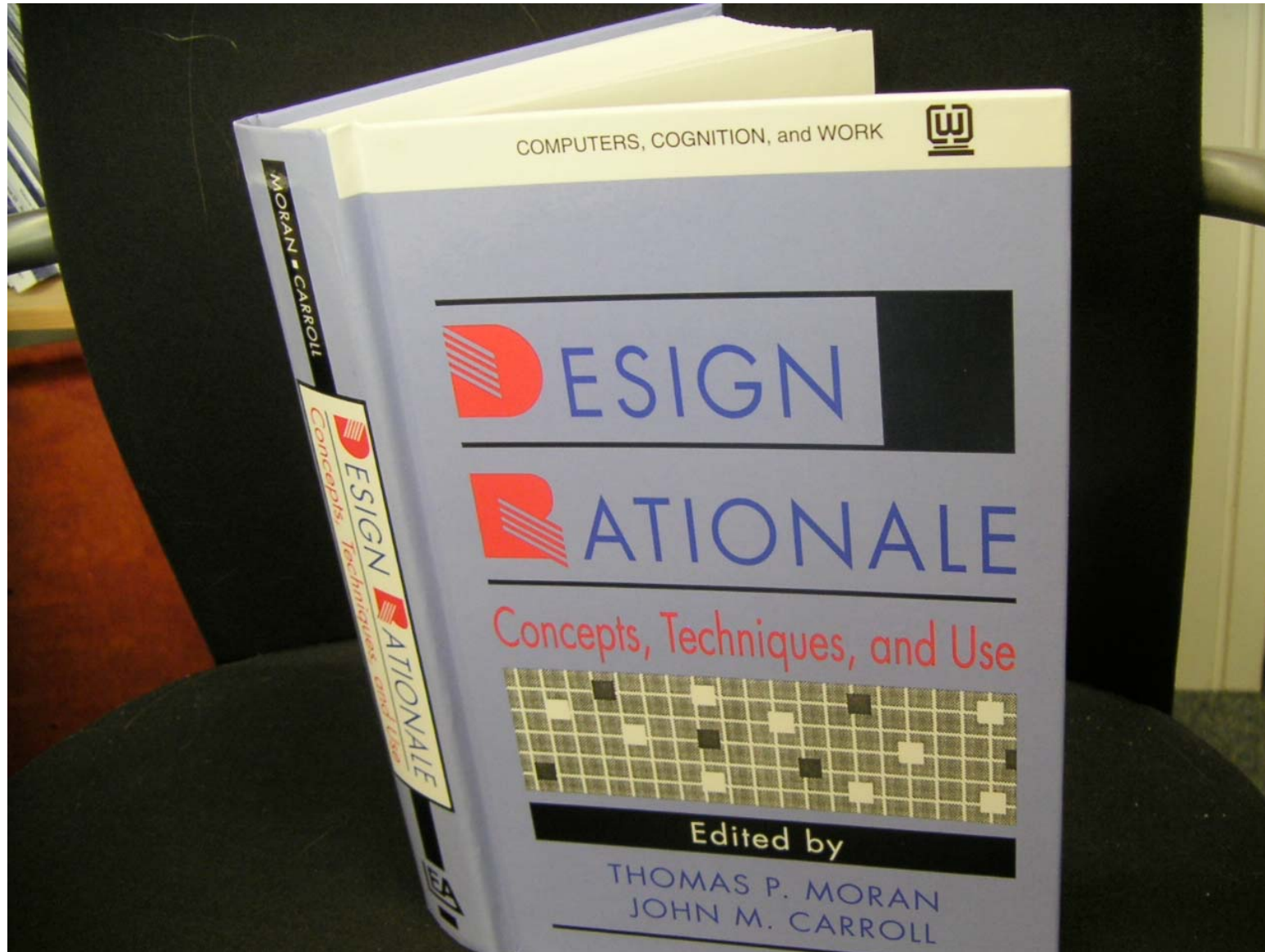
.....the View-Matcher

Design Rationale (1987-1996)

The 1996 Book



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Challenges

**The KM
capture
bottleneck...**

**DR capture
divorced from
'real design'**

**Organisational
/business
disincentives**

**Learning
something
new takes
effort**

**"Changes our
meetings too
much"**

**"That was
great, but it
looks too
hard"**

***Useful design memory doesn't come for free...
so at what point is effort to be invested?***

***Critically, how to turn any new cognitive effort
to the team's immediate advantage?***

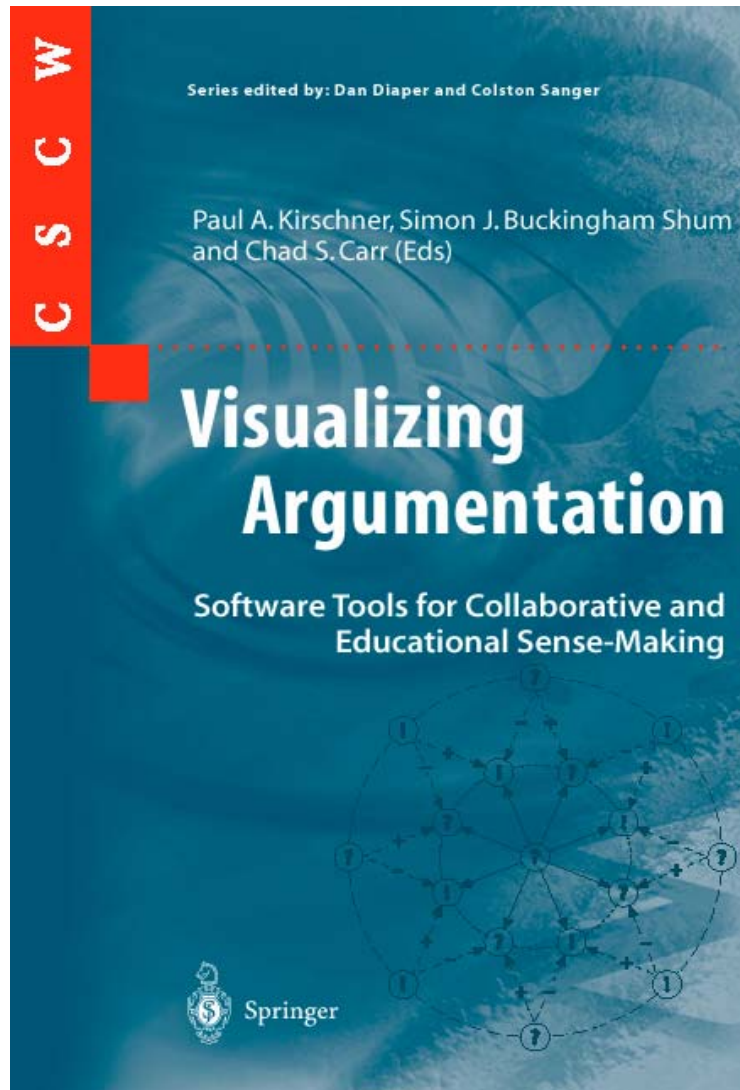


*...development of
Compendium...*

so that by 2003...



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Visualizing Argumentation (2003)

www.VisualizingArgumentation.info

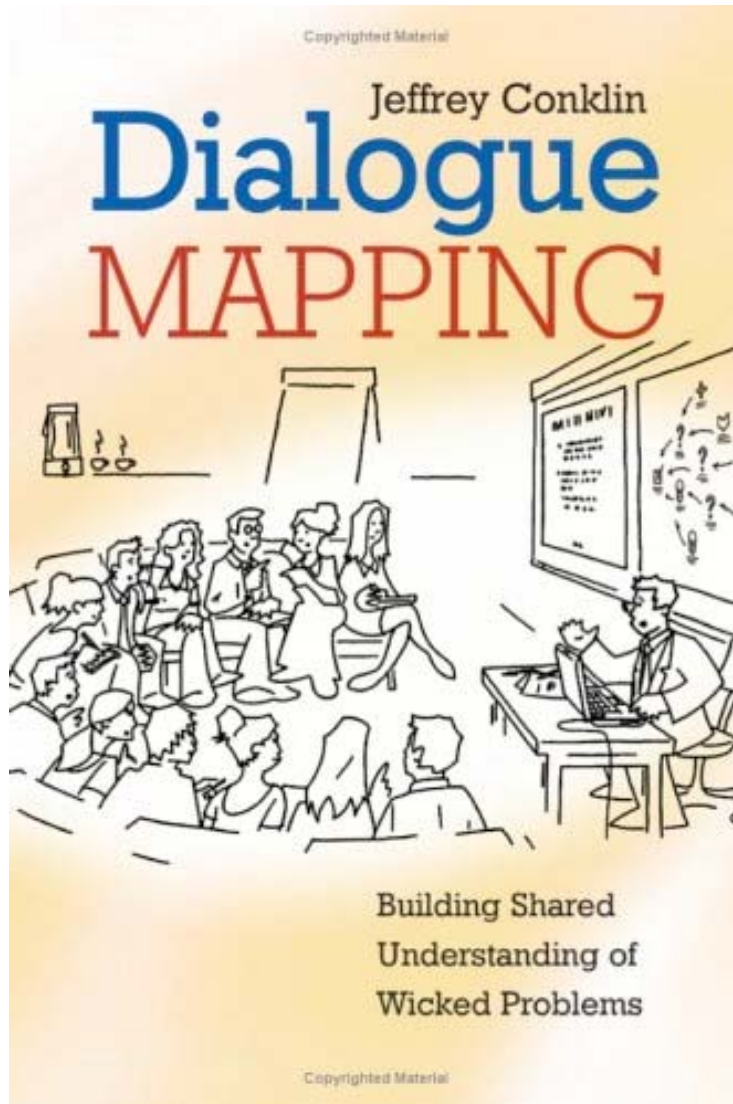
Argument mapping for collective sensemaking and organisational memory in design, scholarly publishing, scientific and public policy debates, education

Including 3 chapters about descendants of gIBIS, two of them practice-oriented

The craft skill of IBIS mapping in meetings: “Dialogue Mapping” (2005)



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Jeff Conklin:
CogNexus Institute:
www.CogNexus.org

Cognexus Dialogue mapping website



Dialog Mapping - Microsoft Internet Explorer provided by The Open University V 6.0 sp1

File Edit View Favorites Tools Help Google ibis tutorial Search Web Search Site PageRank Options

Address http://www.cognexus.org/id41.htm

Links ScholOnto D3E admin Welcome to Virgin Atlantic HT04pc ACM DL AKT ePrints Amazon BBC News CI CoAKTiNG Customize Links

CogNexus Institute

home

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Project teams desperately need to maximize *shared understanding*, and minimize *fragmentation*

One of the most powerful mechanisms for doing this is use of a *shared display*.

Dialog Mapping is a radical new way to exploit the power of shared display ... to increase coherence, and increase the likelihood of project success.

Dialog Mapping

- [Learn about the Dialog Mapping Workshop](#)
- [Learn about Dialog Mapping Services](#)

Picture a meeting room the usual tables and chairs and with a computer, display projector, and screen. Now bring in a group of people working on a project or problem. Now bring in a facilitator (also known as a "technographer" who sits at the computer and types.

Art by Rocky DeKoven. From *Connected Executives* (available from The Technography Store at <http://www.technography.com>)

[Click for larger view](#)

A very good arrangement in a meeting room at the [Knowledge Media Institute](#), Open University, UK.

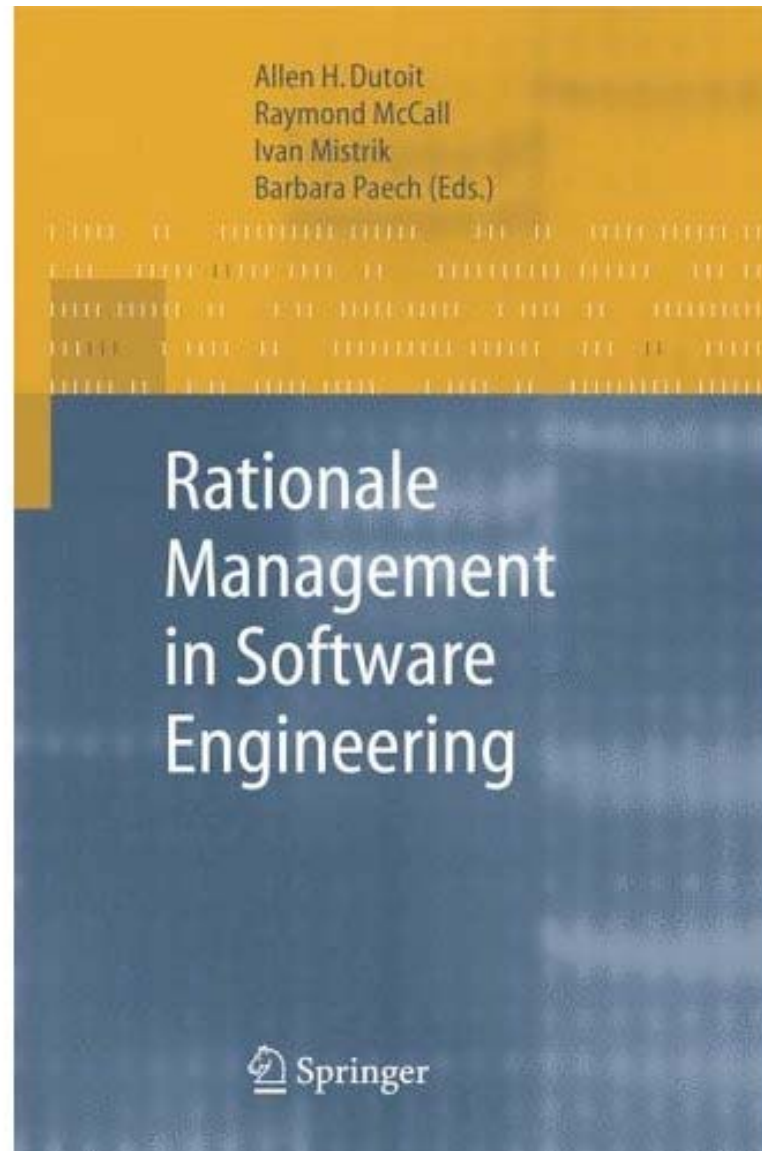
As the people in the meeting speak, the facilitator paraphrases and captures what they are saying in a hypertext diagram on the screen. For example, at one moment in the meeting it might look like this:

Done Internet

Design Rationale: 2006 book



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Buckingham Shum, S., Selvin, A.M., Sierhuis, M., Conklin, J. Haley, C.B. and Nuseibeh, B. (2006).

Hypermedia Support for Argumentation-Based Rationale: 15 Years on from gIBIS and QOC.

In: *Rationale Management in Software Engineering*, (Eds.) Allen H. Dutoit, Raymond McCall, Ivan Mistrik, and Barbara Paech. Springer-Verlag/Computer Science Editorial

PrePrint available as
KMI Technical Report KMI-05-18

Argumentation-based Design Rationale capture today?



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Compendium Institute

(2005 workshop includes a detailed Compendium history by AI Selvin)

http://kmi.open.ac.uk/projects/compendium/workshop2005/Home_19216811001132060158877.html

Compendium Institute Workshop 2005

Day 1

Day 2

1 About the Workshop

25 Introductions (11/10/05)

11 Evolution: 2005
Presentation: A Brief History of Compendium (AI Selvin)

4 Presentation: Filling in the Gaps: Enriching Compendium Maps with Integrated Audio and Video (Simon Buckingham Shum and Michelle Bachler)

18 Presentation: Compendium for Web enabled Collaboration (Peg Duffy & Rich Fritzson)

5 Presentation: Using Compendium to Facilitate the Strategy Conversation (Julisa Espinoza, Dil Chowdhry, Tara Carcillo)

2 Short Presentation: Compendium as a Sensemaking Tool in Personnel Recovery Missions (Simon Buckingham Shum)

3 Short Presentation: Modelling the Iraq Debate: Mapping Argumentation in a Document Corpus (Simon Buckingham Shum)

1 Presentation: Supporting Distributed Collaboration for Science Exploration (Maarten Sierhuis)

13 Presentation: Field Notes from a Dialogue Mapper (Jeff Conklin)

4 Open Presentation Slot: Show+tell what





Argumentation-based Design

Rationale capture today?

- **IBIS Mapping, Dialogue Mapping and Conversational Modelling in many organisational sectors**
 - Formally documented case library gradually growing (see Compendium website)
 - >10 year case study at Southern California Edison environmental division
 - IBIS-based issue mapping embedded in Rolls Royce engineering practice (Rob Bracewell)
 - GlaxoSmithKline Compendium pilot for distributed, asynchronous scientific deliberation

Compendium

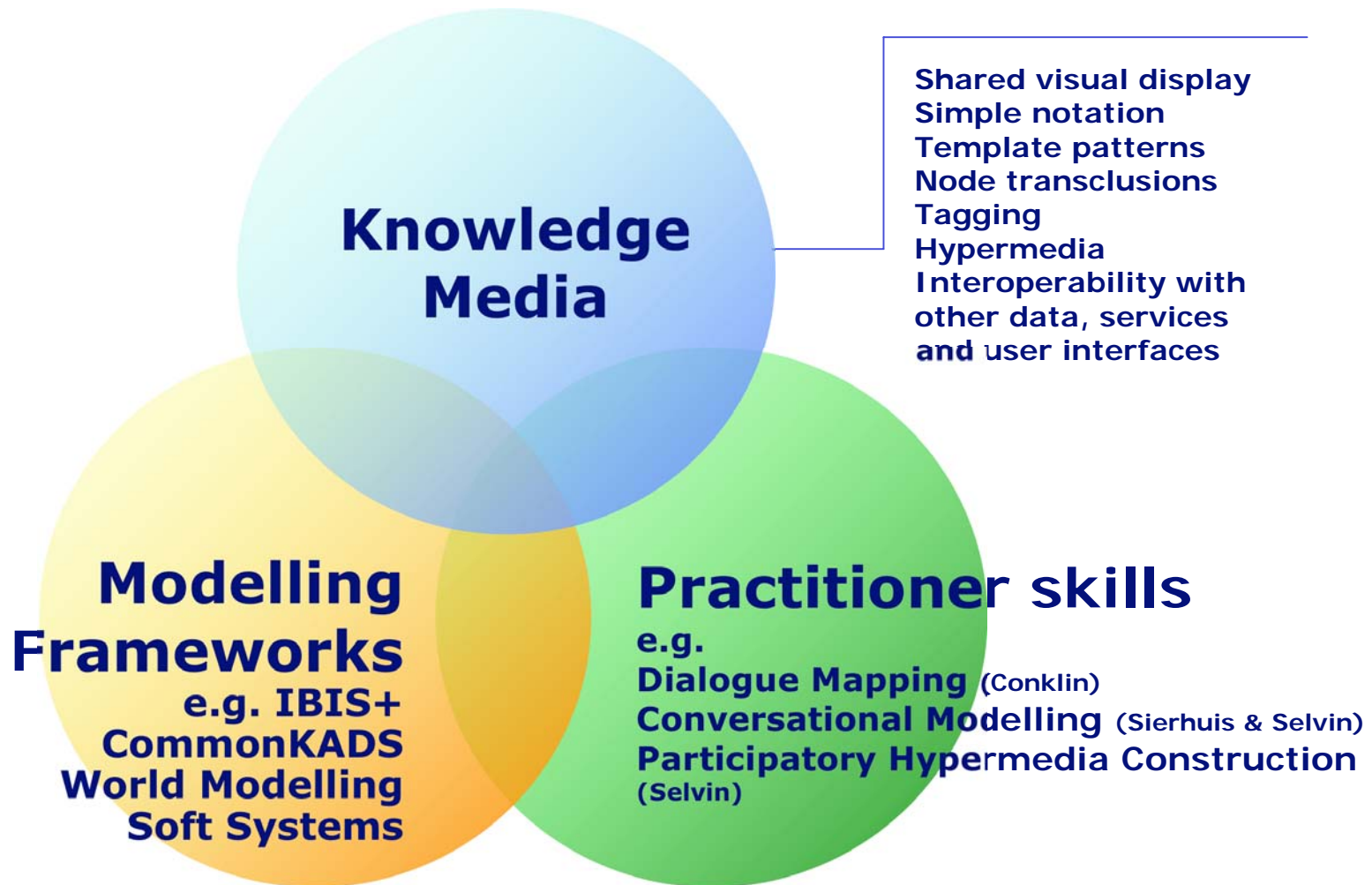


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Our interest is in the practices and tools needed to weave together modelling, argumentation, meetings and group memory

- Design Rationale is just one application
- The focus is on participatory artifact construction, not just argumentation capture
- The software tool is therefore generic, with an open architecture into which one plugs domain-specific services

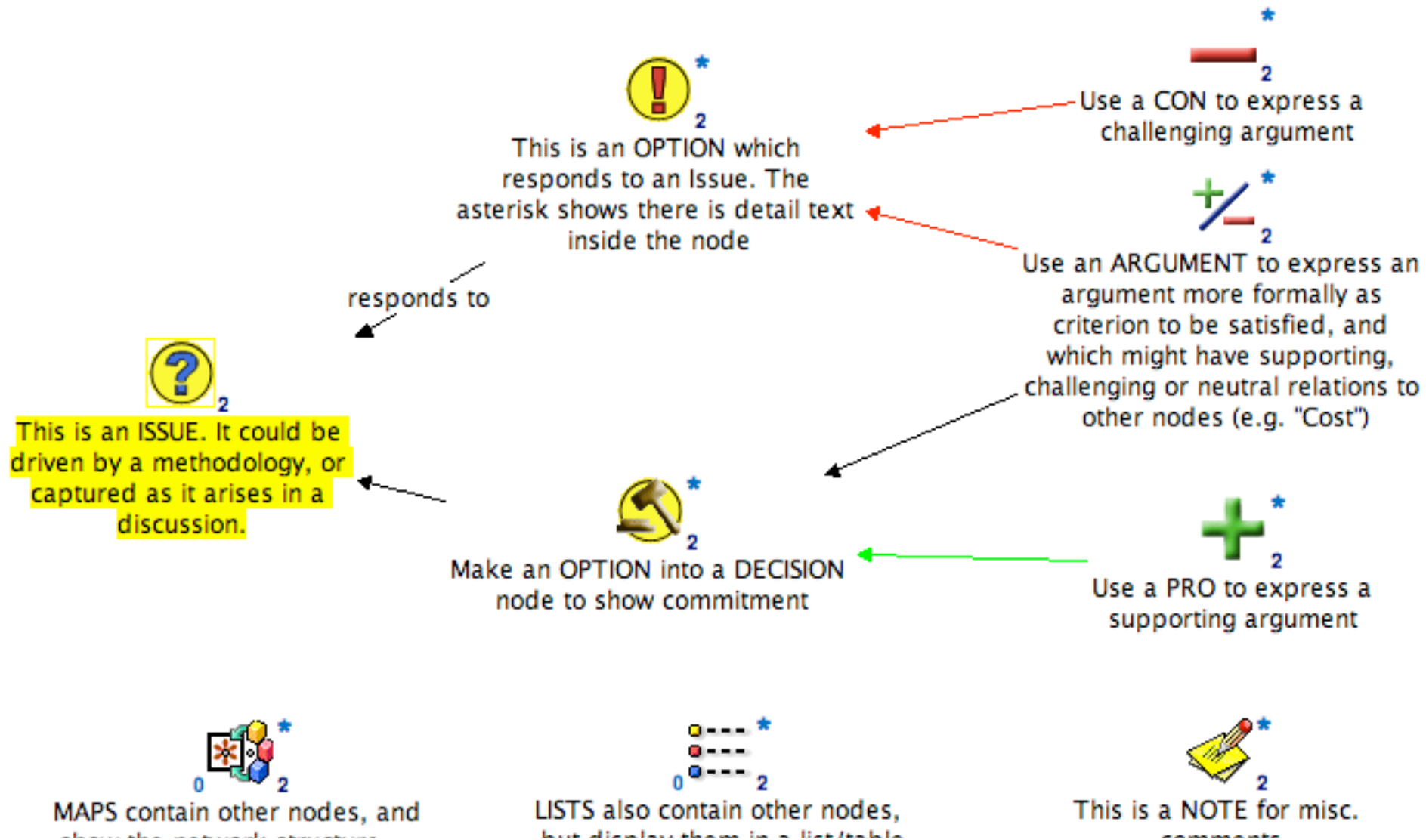
Key elements of Compendium



Compendium: *customisable, collaborative, hypermedia IBIS mapping*



[Map]: Extended IBIS in Compendium





MAPS contain other nodes, and show the network structure -- such as this example



LISTS also contain other nodes, but display them in a list/table



This is a NOTE for misc. comments



REFERENCES link to external documents; double-click to launch, e.g....



REFERENCE to a website



REFERENCE to a PowerPoint file



REFERENCE to an Acrobat PDF file



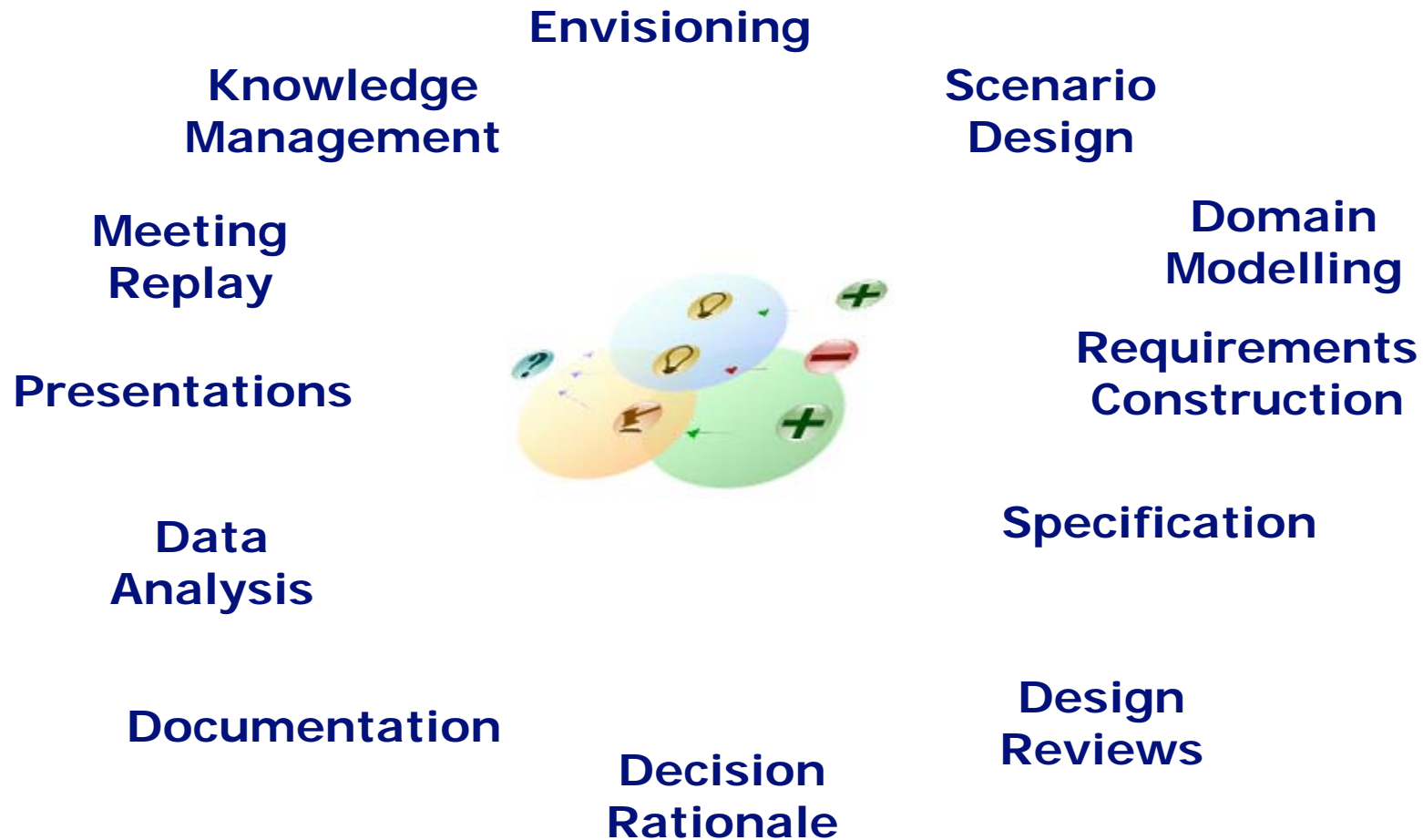
REFERENCE to a movie file



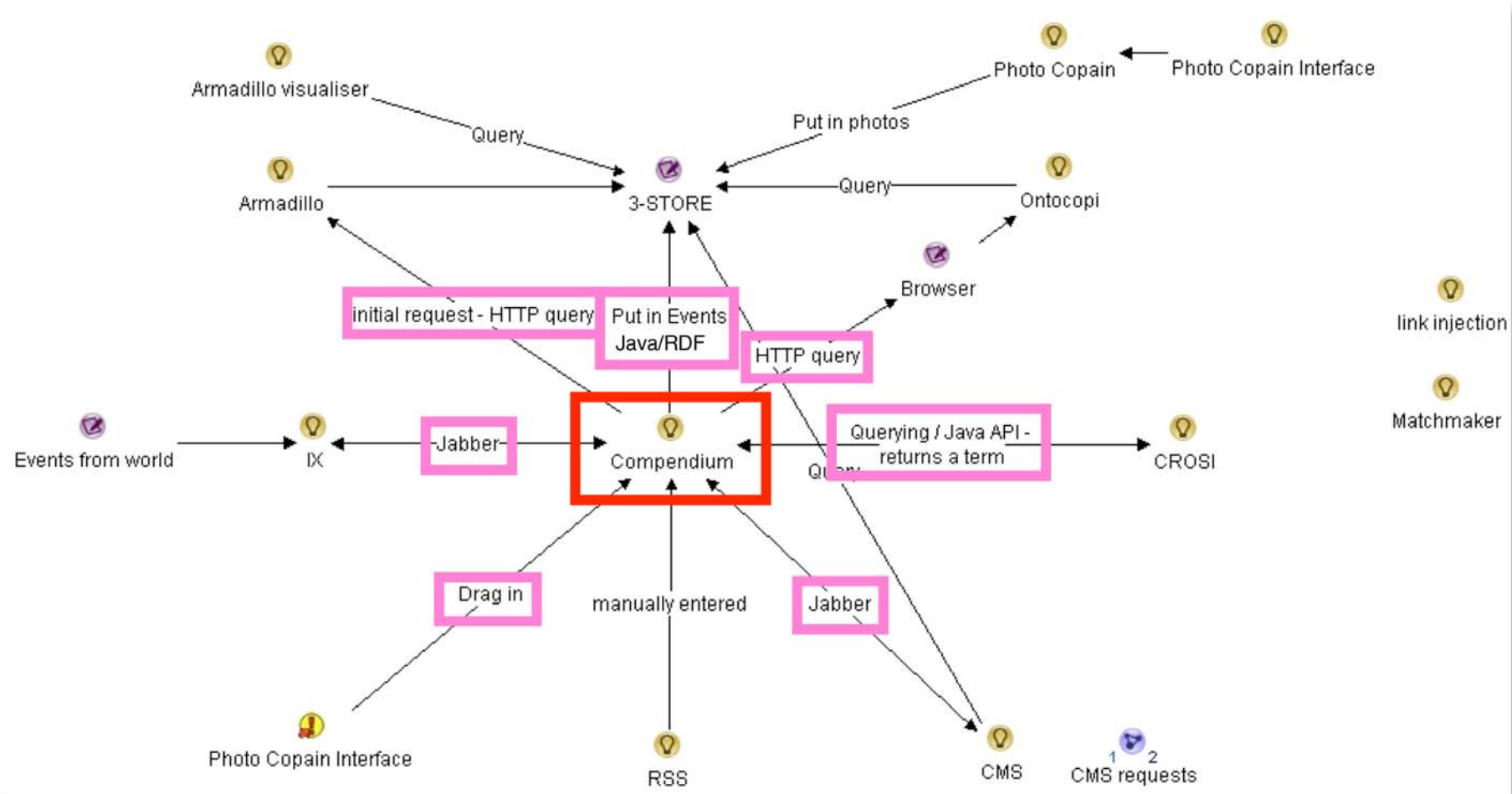
Structure management in Compendium

- **Associative linking**
nodes in a shared context connected by graphical Map links
- **Categorical membership**
nodes in possibly different contexts connected by common attributes via metadata Tags
- **Hypertextual Transclusion**
reuse of the same *node* across different contexts
- **Templates**
reuse of the same *structure* across different contexts
- **External services**
reading and writing the Compendium database

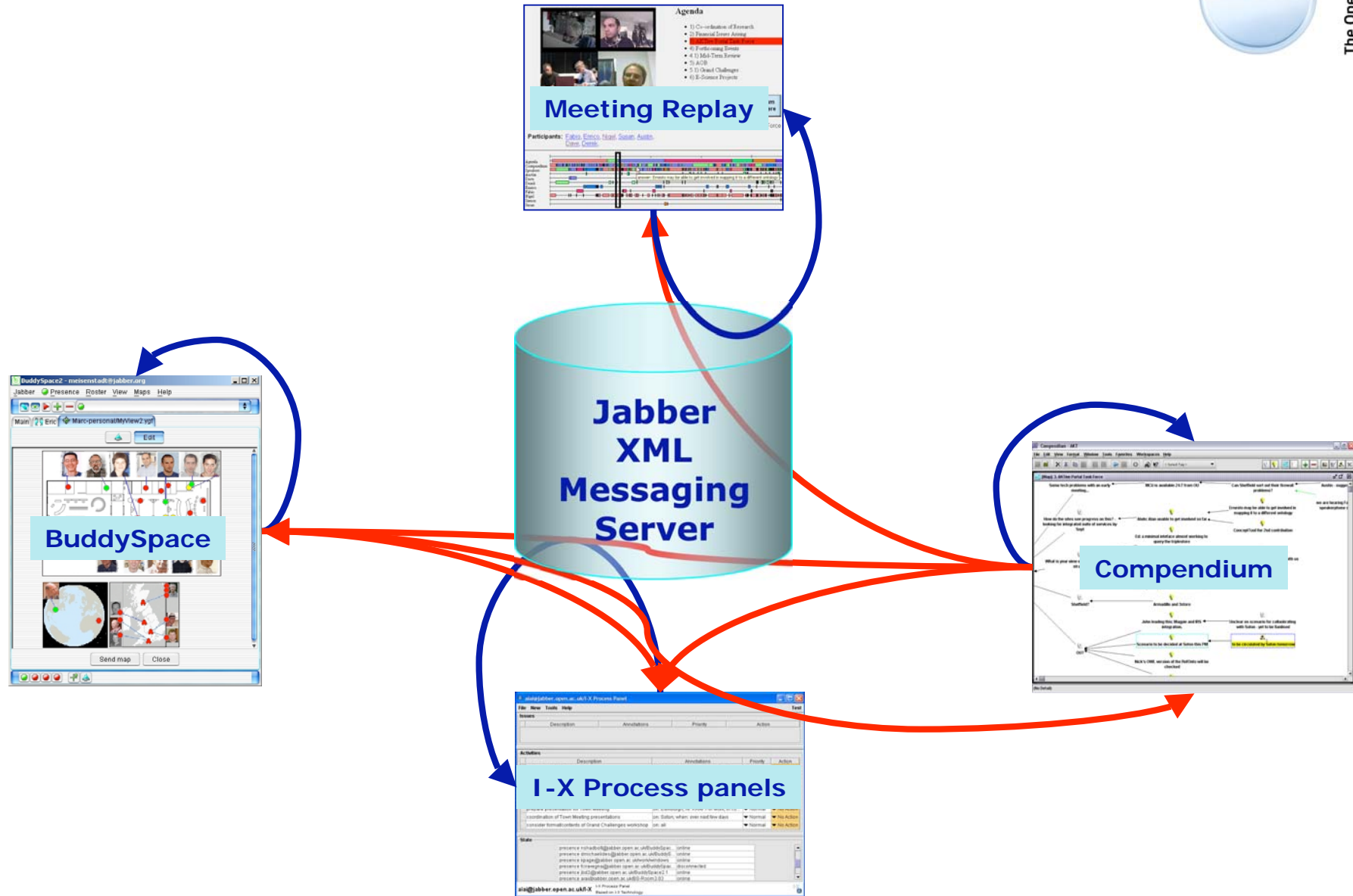
Compendium-IBIS in Design



Compendium as the sensemaking glue in a heterogenous, semantic web architecture for sensemaking and decision-support



Technical integration: Jabber interoperability





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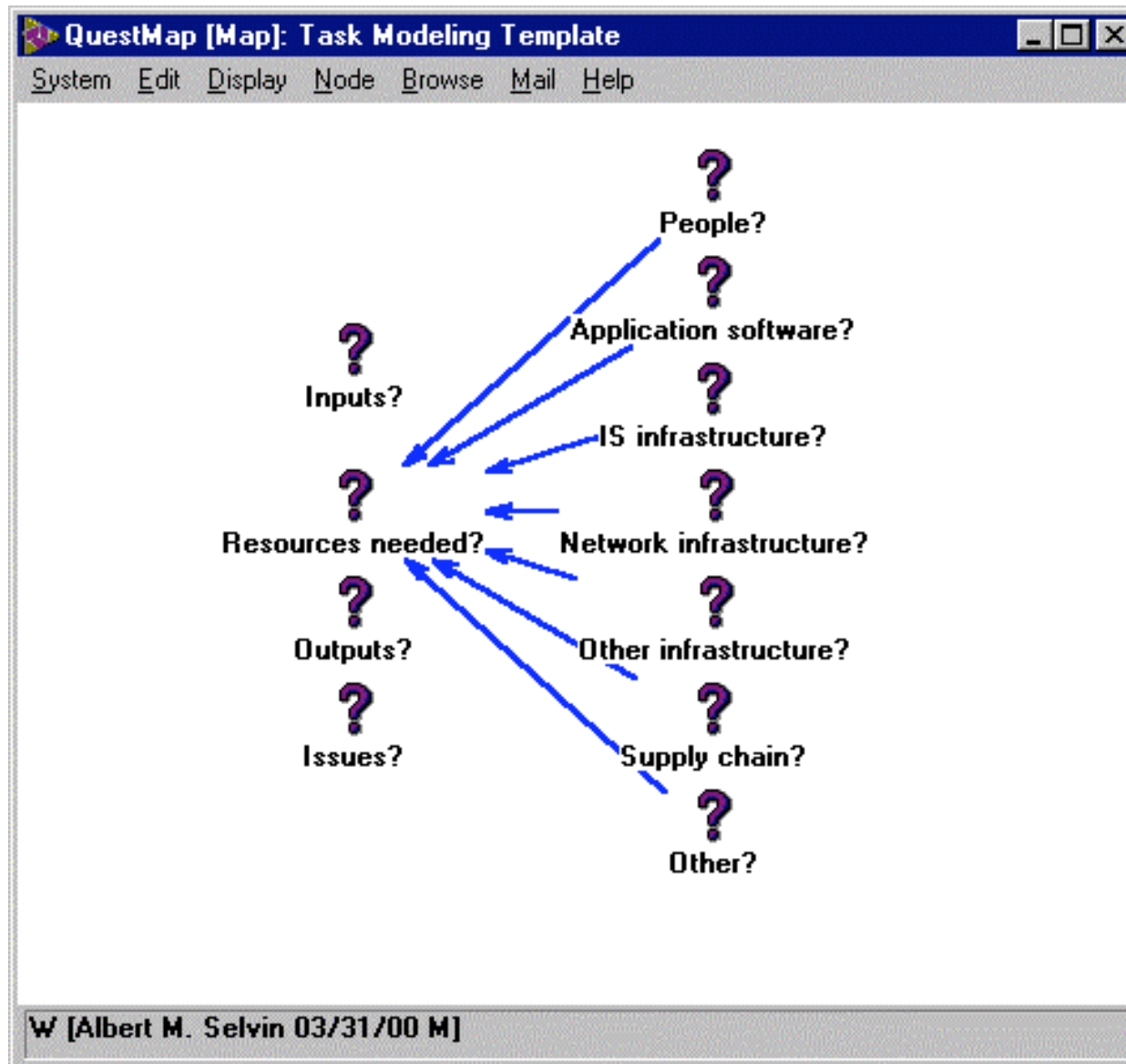
Example Compendium applications



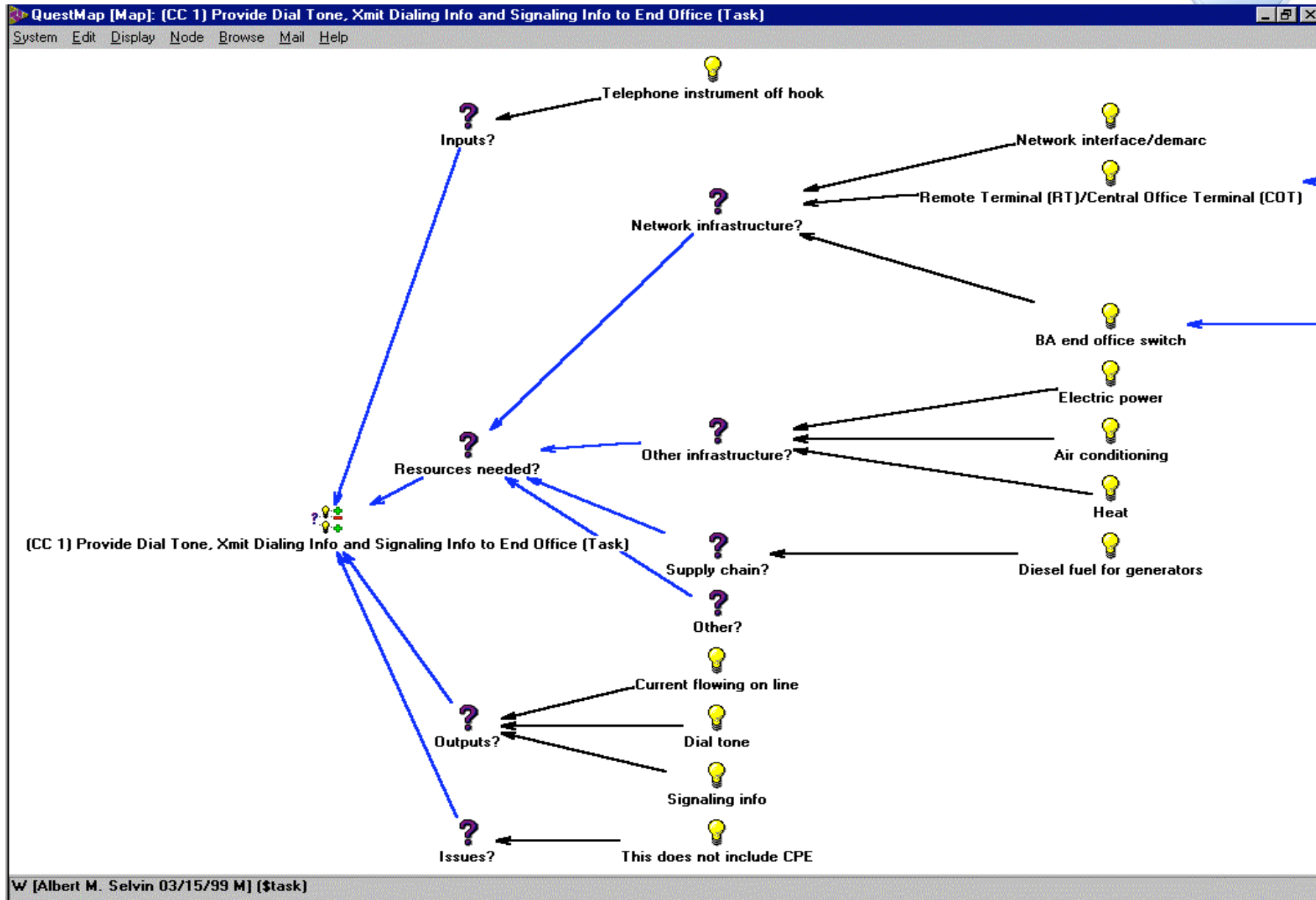
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Domain modelling or application of a methodology using Issue-templates

Modelling organisational processes in Compendium using a *Template*

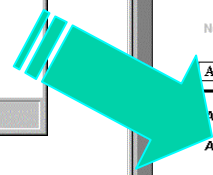
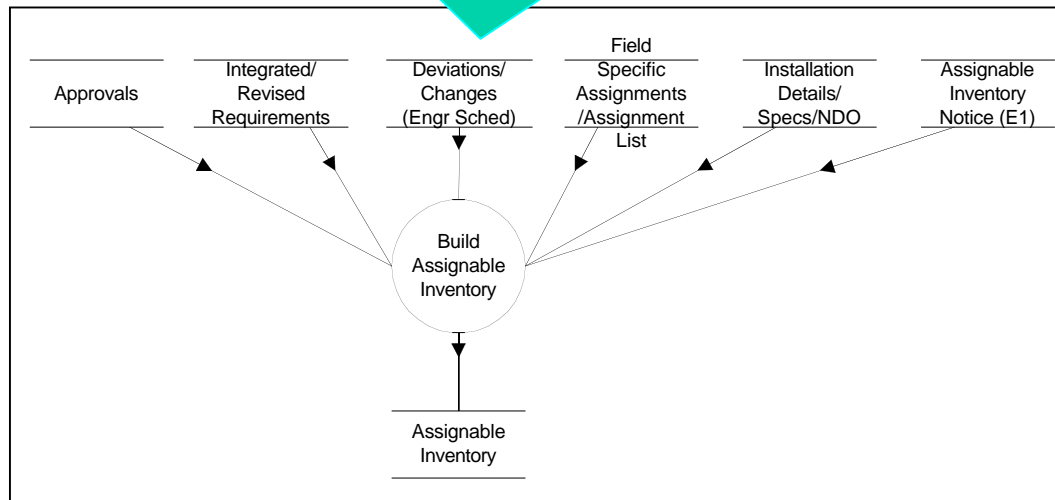
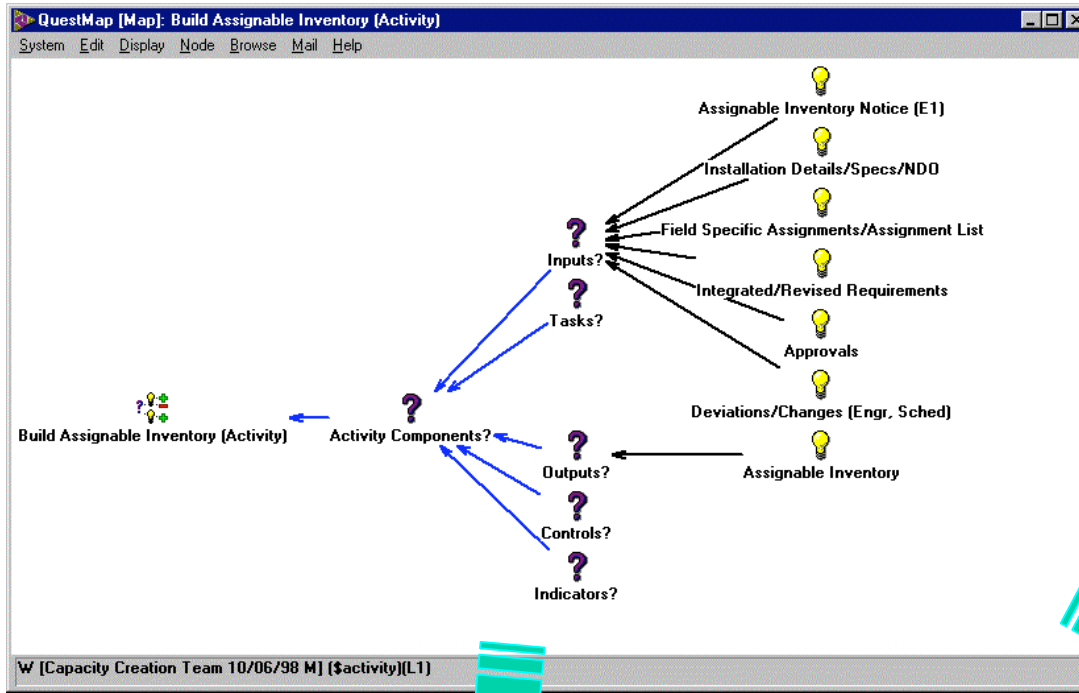


Completing a Compendium template





Generating Custom Documents and Diagrams from Compendium Templates



Microsoft Word - CCPFM0022299.doc

File Edit View Insert Format Tools Table Window Project Compendium Help

© Bell Atlantic

Network Engineering and Planning

Activity: Build Assignable Inventory

Activity Description (L1)

Activity Components

Inputs	What is provided
	Assignable Inventory Notice (E1) Used to reconcile whether this gets generated in "John's" process or "Jack's" process.
	Installation Details/Specs Engineering vendor's detail engineered specification used by the installation vendor to install/remove equipment.
	Field Specific Assignments/Assignment List Equipment location and assignment termination data. Based on the configuration requested via the CCR and is specific to the equipment placed in the office. Terminations, shams, cable lengths, unusual conditions, DCS, power (train, heat dissipation, etc.). The assignment terminations and equipment locations determined for the ER. Also includes "in-assignments."
	Integrated Requirements Any requirements added to the CCR that weren't there originally associated with or related to the CCR. Revised Requirements or supplements to Requirements that may require pricing of supplements to Previous Pricing or authorizations
	CM Consented CCR
	Deviations/Changes (Engr. Sched) Schedule, quality, equipment, building, frame, floor space, power. Deviations identified on the job. Unforeseen conditions at the job site or with the job that were identified after the job was engineered or before/after installation start (e.g., building or job-related conditions, customer initiated requests).
Outputs	What is received
	Assignable Inventory

Last Updated: April 11, 1999 Page 67 Capacity Creation FMO

Page 67 Sec 1 67/107 At 5.4" Ln 16 Col 69 REC TRK EXT OVR WPH

NASA Compendium session



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End-user defined modelling *stencil*



The screenshot shows a software application window titled "Compendium: Derby \ Localhost \ Default \ NASA". The window contains a diagram illustrating an end-user defined modelling stencil. The diagram is organized into several components:

- Top Left:** A box labeled "FIRST MODAT CDDF WORKSHOP" containing a small diagram with nodes and edges, labeled with "11" and "2".
- Top Center:** A box labeled "CEM Templates" containing three sub-diagrams: "Phase" (a dashed circle), "Process" (a solid circle), and "Input/Output" (a rectangle). Each sub-diagram has a "T" icon and a "0" in a circle below it. Arrows from these three sub-diagrams point to a central question mark icon.
- Center:** A central question mark icon labeled "Stencil items?".
- Bottom Center:** A box labeled "CIM Templates" containing five sub-diagrams: "Activity" (a wrench), "Role" (a person in a red suit), "Task" (a stack of books), "Data Object" (a hand holding a pen), and "Artifact" (a clipboard). Each sub-diagram has a "T" icon and a "0" in a circle below it. Arrows from all five sub-diagrams point to the central "Stencil items?" icon.

The application window also features a menu bar (File, Edit, View, Format, Tools, Favorites, Workspaces, Window, Help), a toolbar with various icons, and a status bar at the bottom with a "Close" button.



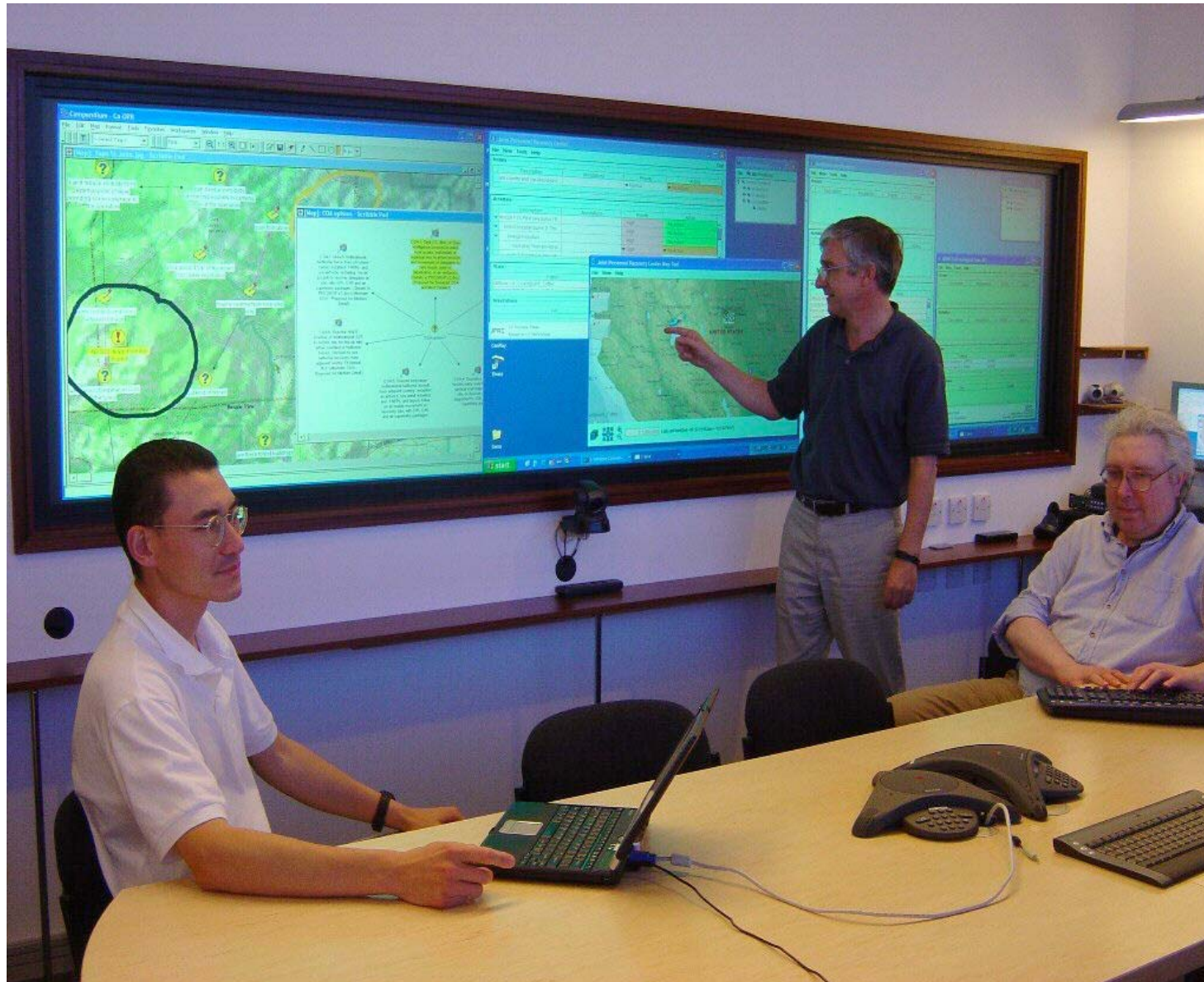
**Issue-templates
plus custom visual language
→
Domain-specific Knowledge
Management Environment**

**Co-OPR Project (with Austin Tate,
AIAI, Univ. Edinburgh)**

Emergency Response Planning Cell



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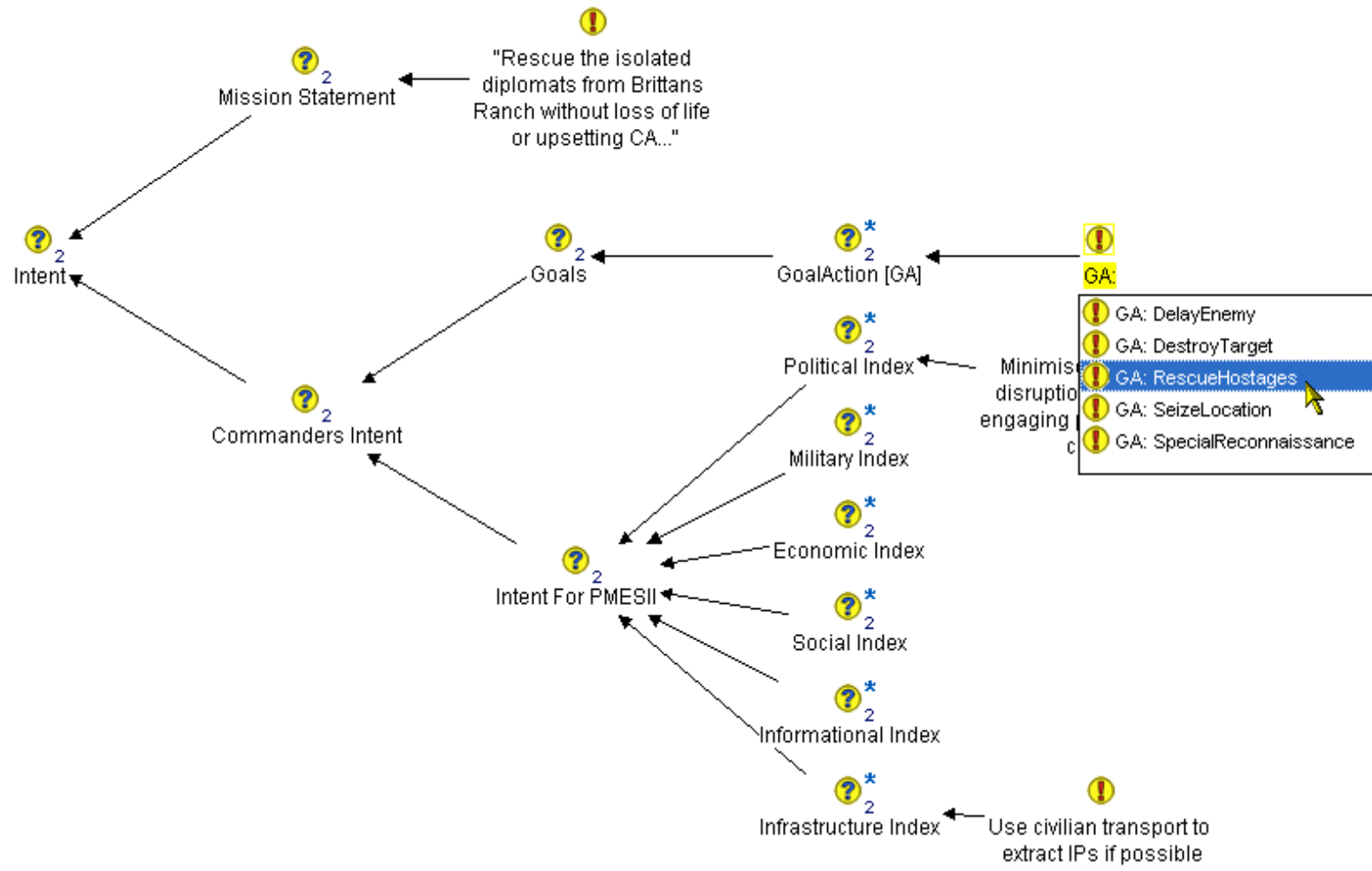


Crisis Action Planning Methodology



*[Map]: Intent

- JPRC 29
- JTFC 10
- Briefing 10
- ProblemID 8
- Intent 8
- Locations 8
- Resources 8
- Forces 8
- Constraints 8
- Rules Engmnt 8



Option Comparison Worksheet



Compendium - Co-OPR Expt. B 2004.11.16			
File Edit Map Format Tools Favorites Workspaces Window Help			
[Map]: COA Comparison			
	COA-1	COA-2	COA-3



Interoperability with other data, processing agents and collaboration tools

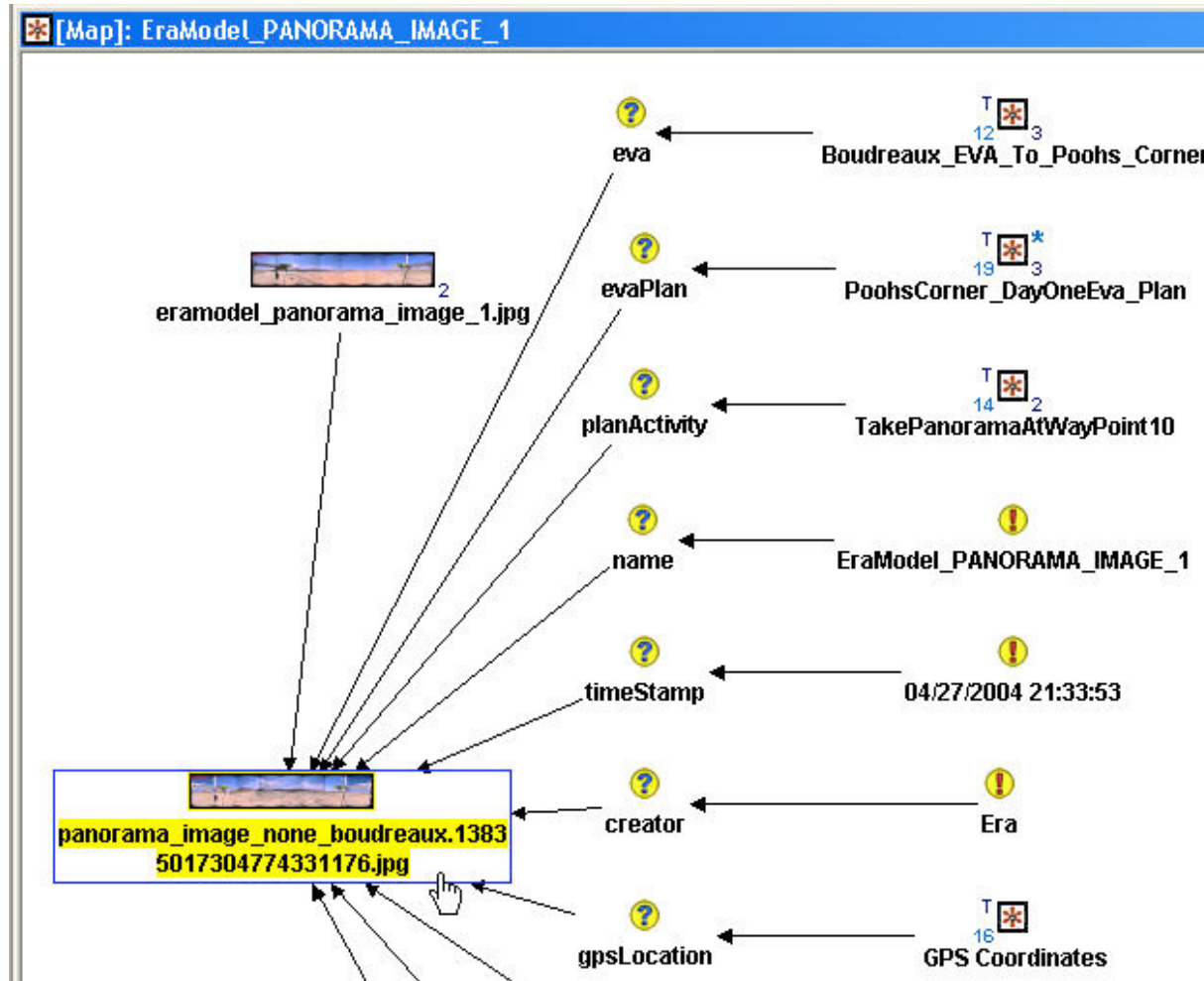
Clancey, W.J., Sierhuis, M., Alena, R., Berrios, D., Dowding, J., Graham, J.S., Tyree, K.S., Hirsh, R.L., Garry, W.B., Semple, A., Buckingham Shum, S.J., Shadbolt, N. and Rupert, S. (2005). **"Automating CapCom Using Mobile Agents and Robotic Assistants."** *1st Space Exploration Conference, American Institute of Aeronautics and Astronautics*, 31 Jan-1 Feb, 2005, Orlando, FL. Available from: AIAA Meeting Papers on Disc [CD-ROM]: Reston, VA, and as Advanced Knowledge Technologies ePrint 375: <http://eprints.aktors.org/375>

Compendium for Human-Agent distributed collaboration in e-Science



Distributed Mars-Earth planning and data analysis tools for Mars Habitat field trial in Utah desert, supported from US+UK

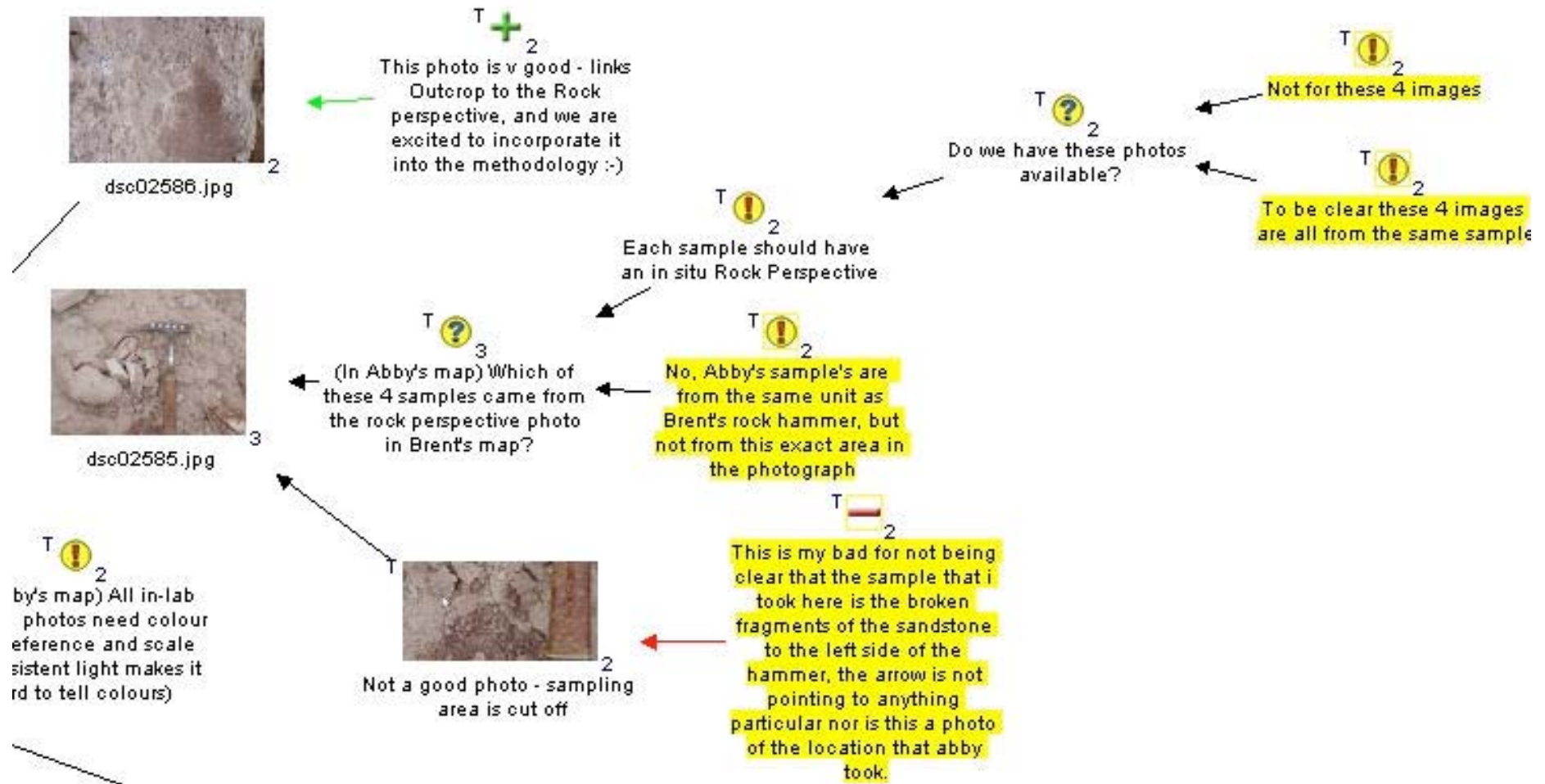
Collaborative sensemaking in e-Science: Compendium science data map, generated by *software agents*, for interpretation by *Mars+Earth scientists*



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RIACS/NASA Ames, Open
University, Southampton
University
Not to be used without
permission

The Compendium maps were autonomously created and populated with science data by Brahms software agents that use models of the mission plan, work process, data flow and science data relationships to create the maps.

Collaborative sensemaking in e-Science: Feedback map *from Earth scientists to Mars colleagues*





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Compendium community of practice

Compendium Institute website



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compendium institute

Home | Tools | Library | Training | Community | Download | Developers | Support

Compendium Institute

The Compendium Institute is an open forum for the ongoing development and dissemination of the Compendium methodology. We support our activities through a range of activities, including seminars, workshops, and certification, and the authoring of software tools for the development and dissemination of the methodology.

Compendium Institute Workshop

[2005.09.22] **Compendium Institute Workshop** - A single click installation, powerful navigation and more...

About Compendium

Compendium has three key elements: a methodology for developing and analyzing a methodology of tools for quickly and easily creating a group. The process enables participants to discuss the discussions, and share their practice -- an approach crucial to the development of the methodology.

The Community Showcase

Visit the Community Showcase

Best viewed with a CSS1 compliant browser

Compendium Institute - News

http://news.kmi.open.ac.uk/rostra/news.php?r=55

Compendium Institute

Home | Tools | Library | Training | Community | Download | Developers | Support

News | Archives | Search | Submit

Compendium Maps UN HIV/AIDS Event
Simon Buckingham Shum
22.11.05

The International Labour Organization (ILO) is the UN specialized agency which seeks the promotion of social justice and internationally recognized human and labour rights. KMI's Simon Buckingham Shum has been working with the ILO's HIV/AIDS Education in the Workplace programme as they...

[Read More...](#)

Compendium 1.4 released! Simon Buckingham Shum 22.09.05 The Compendium Institute is delighted to announce that v1.4 is now released. The major advance is the integrated Apache Derby database... Read More...	Compendium Institute 2005 Workshop (Washington, DC - Nov. 10-11) Simon Buckingham Shum 15.09.05 The international community of Compendium users, researchers, and developers has grown tremendously in the past few years. Innovative uses... Read More...	Hypermedia as a productivity tool for doctoral research Simon Buckingham Shum 15.09.05 A new publication documents the use of Compendium as a long term research support tool... Read More...	Compendium supports NASA Mars exploration field trials Simon Buckingham Shum 12.04.05 If humans land on Mars in 20-30 years' time, how will they work with their support teams on Earth? KMI is supporting scientific... Read More...
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www.CompendiumInstitute.org

Compendium tutorial resources



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- [Movies Home](#)
- [Web Resources](#)
- Welcome & Quick Start**
- Installation:**
 - [Install MySQL](#)
 - [Create a new DB](#)
 - [Convert an old DB](#)
- Basics:**
 - [Nodes](#)
 - [Transclusions](#)
 - [DB Admin](#)
- Web exports:
 - > [Outlines](#)
 - > [Maps](#)
- Learn more:**
 - Applications:
 - > [Discussion Capture](#)
 - > [Modelling with Templates](#)

The screenshot shows the Compendium Institute website. At the top, the logo 'compendium institute' is visible. Below it is a navigation menu with links: Home | Tools | Library | Training | Community | Download | Support. A central banner features a globe icon and the text 'Compendium Software', 'Distribution License', and 'Download Site'. A large red overlay with white text reads 'Compendium instructional screen movies'. Below the overlay, there is a thank you message: 'Thank you for registering your details, which we will use to contact you whenever there is software news.' and a small icon of a software box. At the bottom, a section titled 'We gratefully acknowledge the following organisations who have contributed to the development of the Compendium software:' lists several logos: Verizon, The Open University Knowledge Media Institute (KMI), Center for Creative Leadership, CogNexus Institute, ASolutions Agent, NASA, riacs (Research Institute for Advanced Computer Science), and e-Science dti.



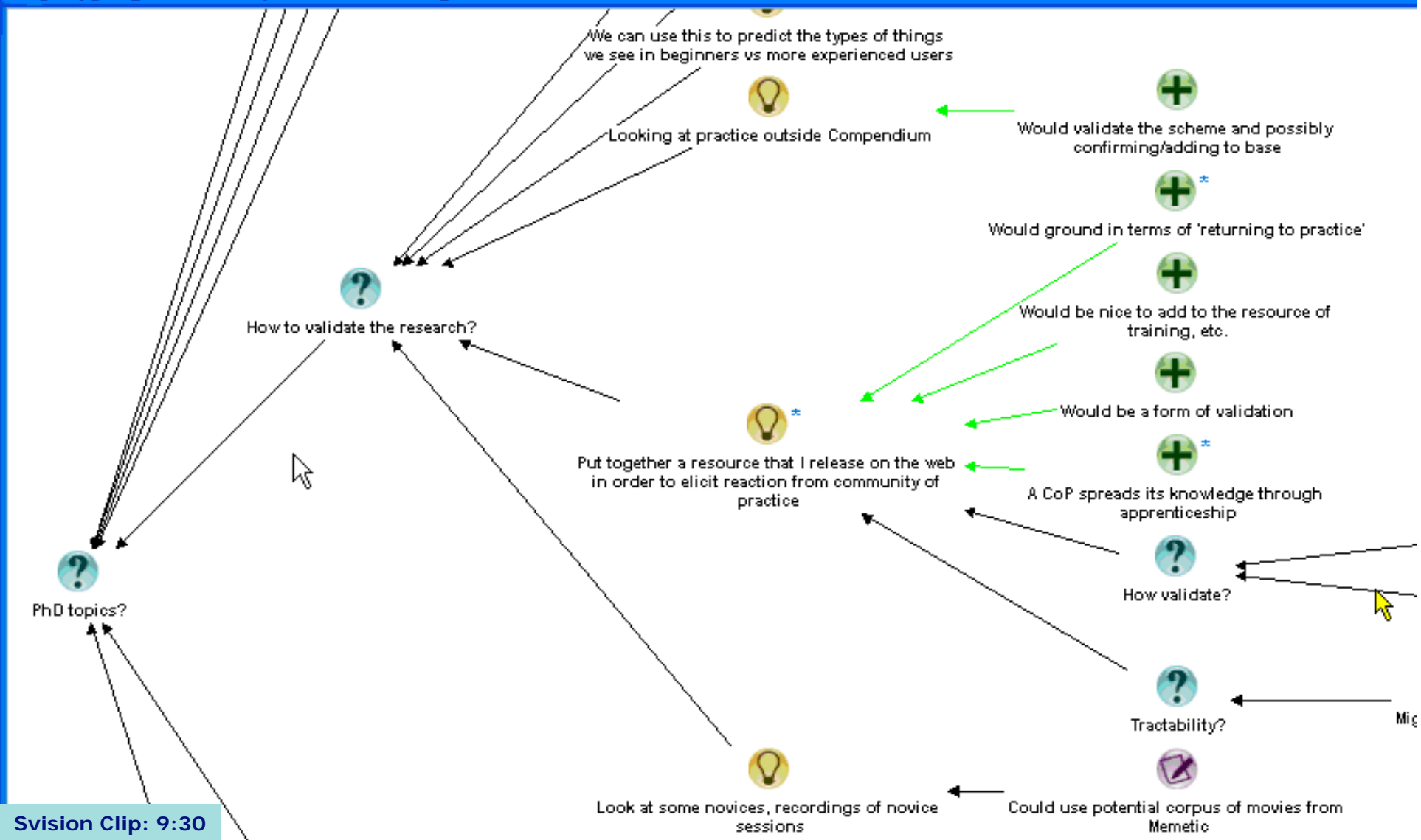
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Integrating IBIS with multimedia meeting records

Dialogue Mapping a research discussion on Skype



[Map]: Agenda for supervision meeting 1/27/2006



Svision Clip: 9:30

Collaborative sensemaking in e-Science: Meeting Replay tool for *Earth scientists*, synchronising video of *Mars crew's* discussion as they annotate their mission plans



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[Map]: Lith Canyon EVA Segment 1 Crew Planning Meeting 05/03/04

Title: Lith Canyon EVA Segment 1 Planning Meeting - 3rd May 2004
Date: Tue May 4 00:37:00 2004
Participants: [Maarten](#), [Brent](#), [Abigail](#), [John](#)

Current Speaker: Maarten
Nodes: Make sure that Boudreaux is in line of sight from AstroOne. Thus move it to WP 2 and 3 at appropriate times

Video: Playing 00h 29m 09s Pause

Group Sync: Offline Online
Mode: Master Slave
Receiving: Yes No

Agents: Agenis, Compendium, Abigail, Brent, John, Maarten

Copyright, 2004,
RIACS/NASA Ames, Open
University, Southampton
University
Not to be used without
permission

RIACS/NASA Ames
Research Center
Mobile Agents Project
Maarten Sierhuis

KMi Open University
CoAKTinG Project
Simon Buckingham-Shum
& AI Selvin

Southampton University
CoAKTinG Project
Kevin Page
Darius Michaelides
Dave De Roure
Nigel Shadbolt



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Access Grid

Access Grid: high quality internet video conferencing

www.accessgrid.org



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“The Access Grid® is an ensemble of resources including multimedia large-format displays, presentation and interactive environments, and interfaces to Grid middleware and to visualization environments.

... the Access Grid (AG) is used for large-scale distributed meetings, collaborative work sessions, seminars, lectures, tutorials, and training. The Access Grid thus differs from desktop-to-desktop tools that focus on individual communication.”



Desktop client for Access Grid



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The screenshot displays a Windows XP desktop environment during a video conference. The desktop background is the standard 'Bliss' wallpaper. The taskbar at the bottom shows the Start button, several open applications including BuddySpace, Internet Explorer, and the AGSC client, and the system tray with the date and time (13:33 Tuesday 15/02/2005).

The main focus is a multi-camera video conference. A large window in the center shows a wide view of a conference room with several participants seated around a table. Smaller windows are overlaid on this, showing individual participants from different locations, including 'University of Manchester - G95', 'Simon Buckingham Shum (Video)', and 'University of Southampton (ECS)(Centre)'. On the right side, there is a control panel for the 'AGSC Room 1' venue, showing a list of participants and options for audio and video settings. A 'QuickCam' window is also visible, showing a camera view of a participant.

Supporting online meetings (JISC Memetic project augmenting Access Grid)



The screenshot displays an online meeting environment. At the top, a row of video thumbnails shows participants. On the left, a vertical list of video thumbnails includes names and IP addresses (e.g., 192.150.184.70). The central window, titled 'Compendium - memetic', shows a diagram with the following text:

- Voyager as the way to capture a meeting's video+audio, to feed into MR
- Voyager as a vanilla video replay tool
- Voyager 'embedded' or interfaced with MR
- MR as 'Voyager++'
- How do we envisage users replaying a meeting?
- Dependencies on user requirements?
- How to elicit user requirements?
- Full-screen: From within an AG node
- 'Standalone': From anywhere - a web browser, possibly via a Java applet
- Possibly independent - we design replay user interface(s) based on their need
- Possibly dependent if user reqts motivate functionality which can only be delivered through a specific replay architecture
- Selection of video st
- How to replay AG-sized displays on a normal screen?
- Ben works in Java
- AG room access is restricted so can't rely on that
- WP4.2 Consult end-users on user requirements. Jan 05 - Feb 05

At the bottom right, a map of the United Kingdom shows participant locations, with names like Rob, Roger, Simon, Michelle, Clara, Andrew, Dave, Danus, Ben, and Tim. The Windows taskbar at the bottom shows the Start button, system tray, and the time 10:51.



The Open University

Meeting Replay

Memetic Project:
www.memetic-vre.net

Memetic Meeting Replay

The CoAKTinG NASA proof of concept now mainstreamed in the Access Grid by the JISC Memetic VRE project



The Open University

ScreenStreamer: Compendium

Compendium: AKT

File Edit View Format Tools Favorites Workspaces Window Help

[Map]: 2.0 Memetic interface mockup (Clara's email of 14 Dec)

◀ back Title: [Memetic Meeting 2005-12-15 \(Imported\)](#) Speaker: Ben Juby Author Speaker ID

Date: 15 Dec 2005, 09:37 Agendum: 2.0 Memetic interface mockup (Clara's email of 14 Dec) [View Agenda](#)

Participants: Michelle Bachler, Simon Buckingham Shum, Ben Juby, Clara Mancini, Danius Michaelides, Andrew Rowley, Roger Slack ([sites](#)) Events: Selecting node [View Documents](#)

Nodes: ? How to make agenda items editable easily?

Participant	Agenda	Compendium
Michelle Bachler	[Timeline]	[Timeline]
Simon Buckingham Shum	[Timeline]	[Timeline]
Ben Juby	[Timeline]	[Timeline]
Clara Mancini	[Timeline]	[Timeline]
Danius Michaelides	[Timeline]	[Timeline]
Andrew Rowley	[Timeline]	[Timeline]
Roger Slack	[Timeline]	[Timeline]

[About](#)
[Help](#)

00h 36m 22s / 02h 06m 12s

Video: Playing

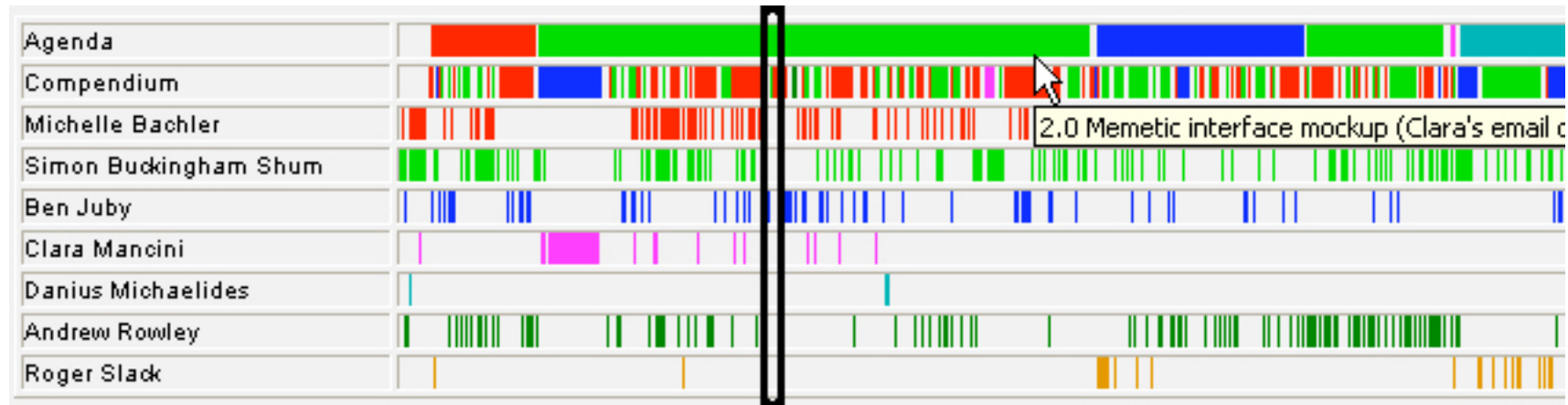
GroupSync Offline Online

Mode Master Slave

Receiving Yes No

[sync node](#) [create node](#)

Interactive event timelines



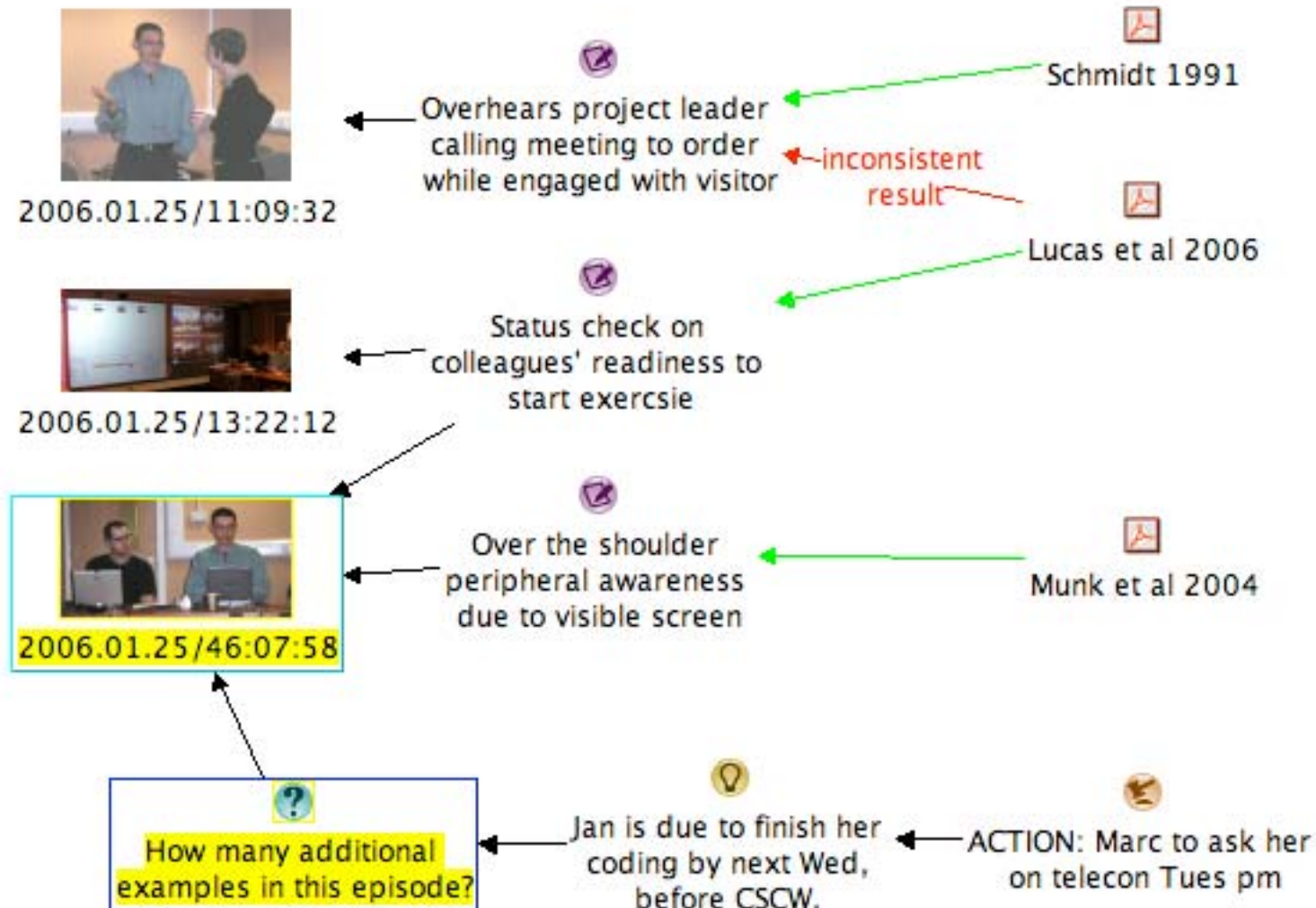
Thus... you can read off:

- When an agenda item was discussed
- Who spoke when, and about which agenda items
- Who spoke a little or a lot
- Who was speaking when a given Compendium node was created, highlighted, tagged, or a hyperlink followed to an external application or website
- What the distribution of Compendium node types is (again, they are color coded by type)
- Which agenda items or Compendium nodes provoked a lot of discussion, amongst whom, and with an approximate indication of whether there was much argumentation

Compendium for video analysis?



- Analysing moments in a meeting





Towards a cognitive tool for knowledge management and collective sensemaking...

Mixing formal + informal, expected + opportunistic, with incremental formalization

Language for the learning curve → fluency

How has the tool evolved to negotiate the cost-benefit tradeoff?

"Excel" for knowledge?...

Open the architecture and interoperability → import/export diverse representations

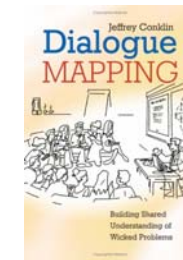
Dialogical approach → support problem (re)framing and multiple perspectives

People/Articles/Tools/Training



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- **Compendium Institute**
research papers; software; community
www.CompendiumInstitute.org
- **Dialogue Mapping**
Jeff Conklin - foundations and practice of real time IBIS mapping
www.cognexus.org
- **Visualizing Argumentation**
research and practice from diverse domains
www.VisualizingArgumentation.info
- **Hypermedia Discourse**
broader framework being developed, of which Compendium is one exemplar
www.kmi.open.ac.uk/sbs/talks/sdc2006



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