

The Structured Evidential Argumentation System

OKMDS Panel Session

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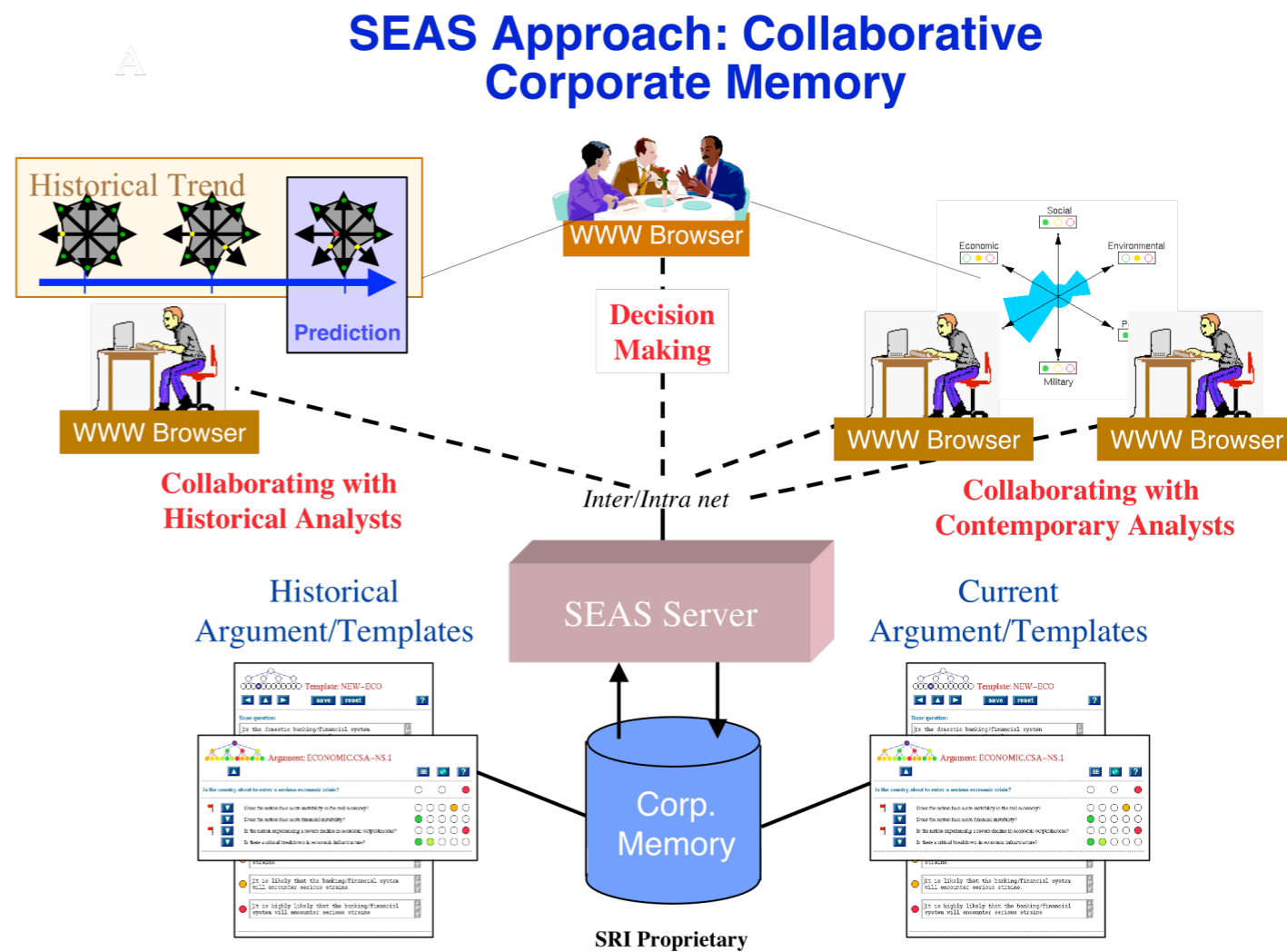
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Based on original slides by John Lowrance

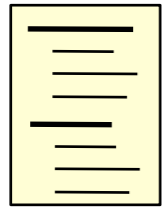


What is SEAS?

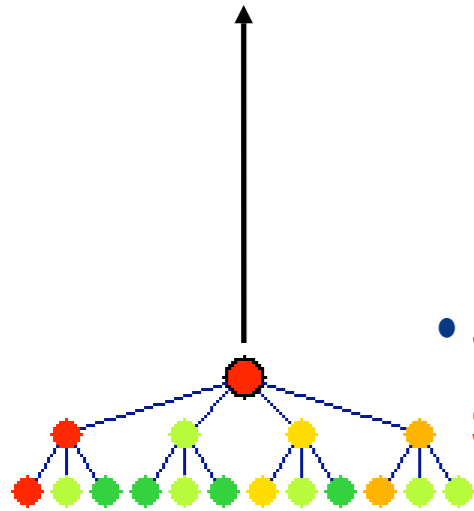
- SEAS is a software tool for analysts
- That records analytic reasoning and methods
 - using template-based structured argumentation
- That supports collaborative analysis
- Across contemporary and historical situations and analysts
- Used for a variety of applications, and deployed at several sites and internally at SRI.



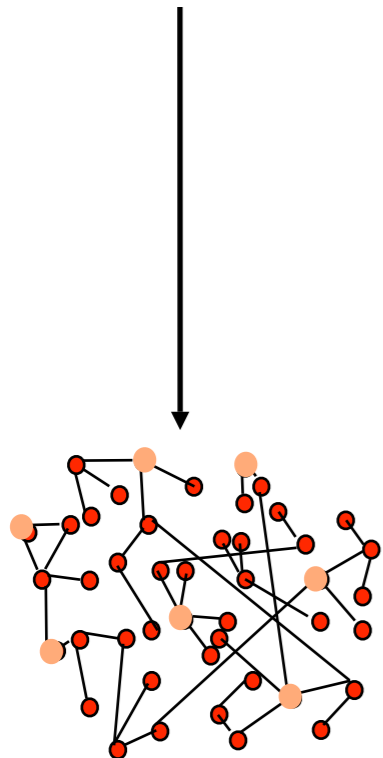
Why Structured Argumentation?



- Analytic products are typically recorded in text, with very **limited structure**, making them
 - Time consuming to find and understand
 - Difficult to compare and contrast
 - Difficult to extract the analytic method employed for reuse



- Structured argumentation records analytic products, within **simple structures**, making them
 - Easy to understand and explain
 - Quick to find, compare, and contrast
 - Separable from their underlying analytic method
 - Directly modifiable by analysts



- Attempts to capture analytic products as belief nets, with **complex structure**, typically failed because
 - Analysts resented having their role reduced to data entry
 - Analysts could not follow the lines of reasoning or explain them to others e.g., the policy and decision makers
 - Analysts could not create or update the models



SEAS Basics

- At its core, answers a top level question by asking, and answering, more specific questions.
- At the very basic level, questions are arranged as a tree:
 - Higher level nodes represent high level, more abstract questions.
 - Leaves usually correspond to specific questions, often answerable by direct observation and assessment.
 - Lower level answers combine to progressively give a higher level answer.
- Questions generally framed as “yes/no” or on a range.
 - Users answer by assigning a value at a leaf node.
 - Users justify answer by attaching supporting evidence (files and links), as well as a text rationale.

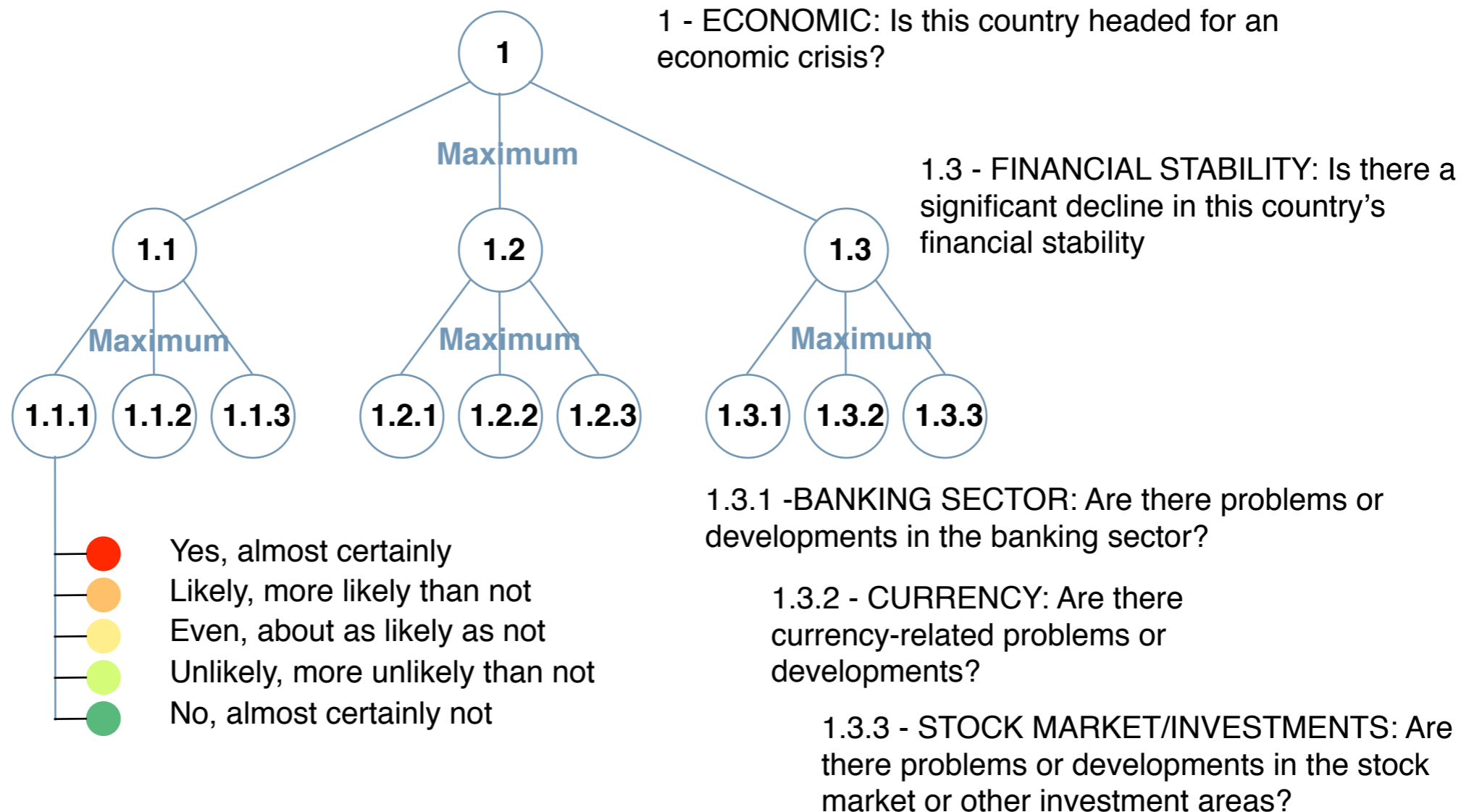


Template Example: Economic Crisis

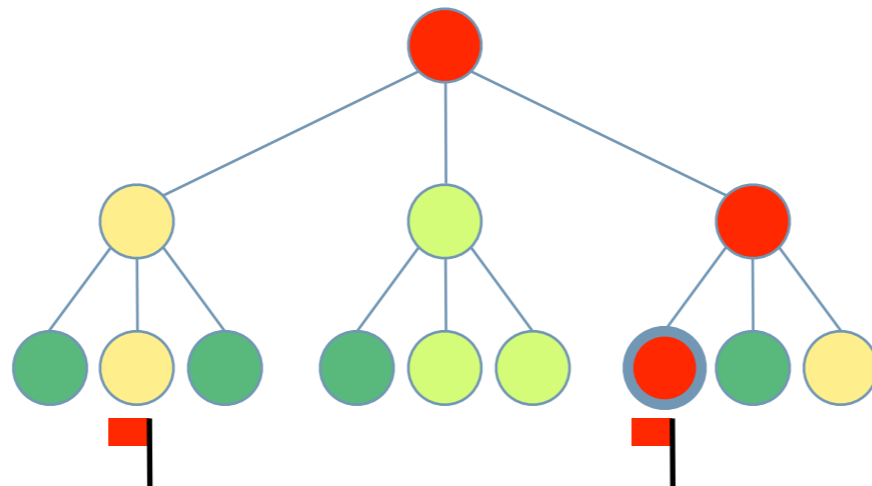
Derivative Questions

Primitive Questions

Multiple Choice Answers



Argument



Question

1.3.1 BANKING SECTOR: Are there problems or developments in the banking sector?


Answer


Answered by: John Lowrance On: 15 Jan 2007 16:45:30

- Yes, almost certainly
- Likely, more likely than not
- Even, about as likely as not
- Unlikely, more unlikely than not
- No, almost certainly not

Rationale: The nation's banks are facing a severe crisis due to the accumulation of bad debt.


Evidence

- 

Accumulated Debt - 15 Jan 2008 ○○○○●
 Entered by: Tom Boyce On: 12 Apr 2008 9:32:43
 Relevance: Banks in general have accumulated an alarming level of debt.
- 

Mixed Earnings Report - 13 Mar 2007 ○○●○○
 Entered by: Eric Yeh On: 14 Nov 2006 10:19:43
 Relevance: Recent earnings reports indicate the banking sector as a whole performed moderately well.

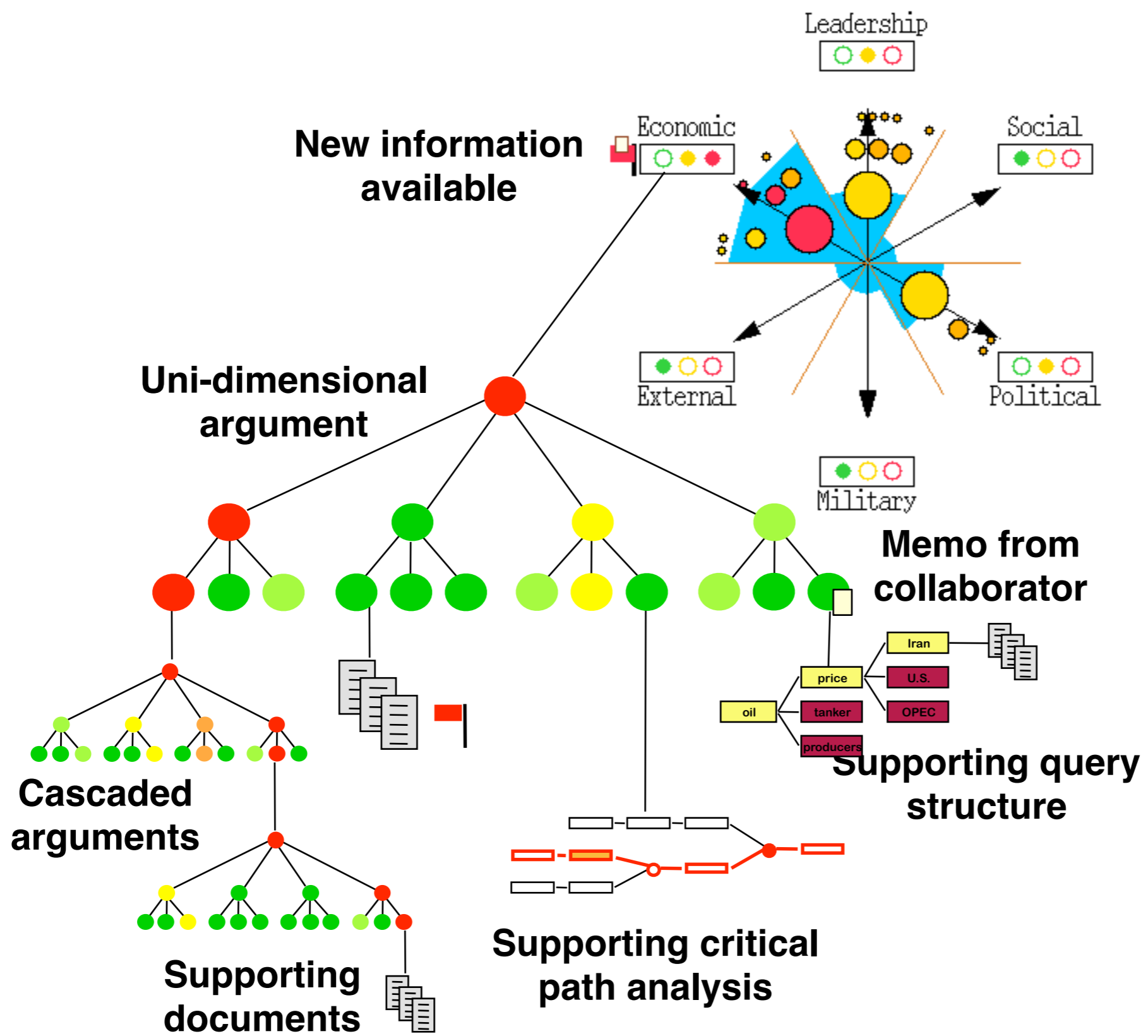
Exhibits

 **Email Message from John Doe to Jane Doe - 5 Apr 2006**
 Entered by: Janet Murdock On: 18 Jan 2007 1:22:23



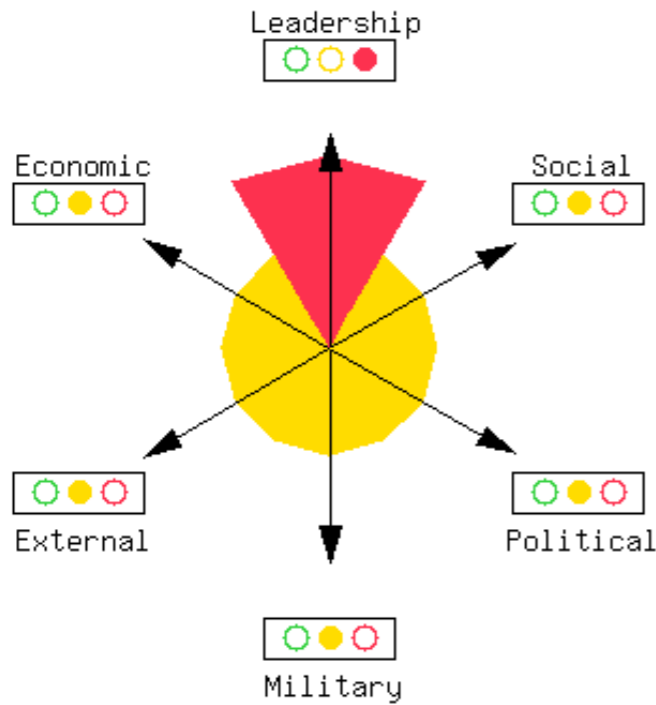
Cascaded Arguments Record Complex Lines of Reasoning

Multi-dimensional argument summary



Multiple Views

- Analyses can be viewed using different visualizations, with ability to set elements viewed and level of detail.



NATION-STATE: Is this country headed for a crisis?

Leadership

1 LEADERSHIP AND INTENT : Are changes or developments involving this country's leadership or the leadership's intentions cause for concern? ○ ○ ●

1.1 LEADERSHIP STRENGTH : Is the strength of the leadership declining in a way that is cause for concern? ○ ○ ● ○ ○

1.1.1 INFLUENCE/POWER BASE : Is the leadership's influence or power base eroding? ○ ● ○ ○ ○ ○

Question Amplification

- Declining popular or elite support
- Electoral loss/defeat of leader's political party
- Decreasing ability to rally support for policies/goals
- Decreasing ability to make deals with other political actors

1.1.2 LEGITIMACY/CREDIBILITY : Is the leader's legitimacy or credibility deteriorating? ○ ● ○ ○ ○ ○

Question

- Declining popular or elite support
- Increasing criticism of the leader's performance/competence



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ons declining? ○ ○ ● ○ ○



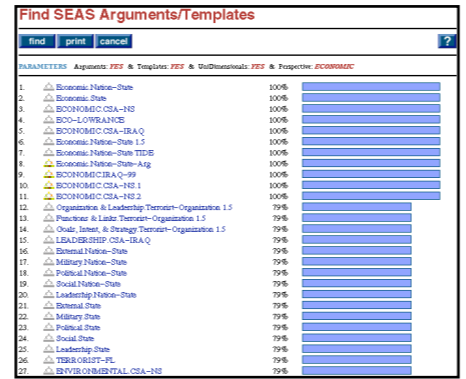
Additional Facilities

- *Memos*, textual notes (“little yellow stickies”) can be attached at any node in an analysis, as well as other argumentation structures in SEAS.
 - Permits discussion and commentary on different aspects of an existing analysis, or on a template designed to tackle an analytical problem.
- *Discovery Tools* attached to leaf question nodes store useful queries/heuristics for discovering material relevant to the given question.
 - Can store URIs for web queries, pointers to RSS feeds, textual reminders, etc...



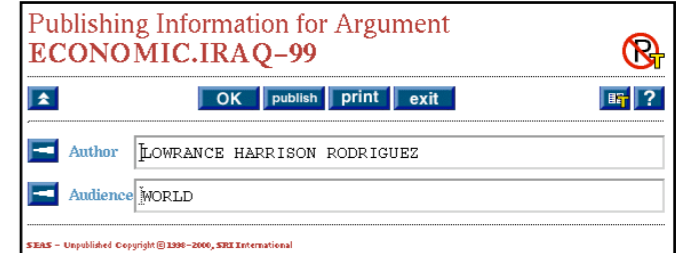
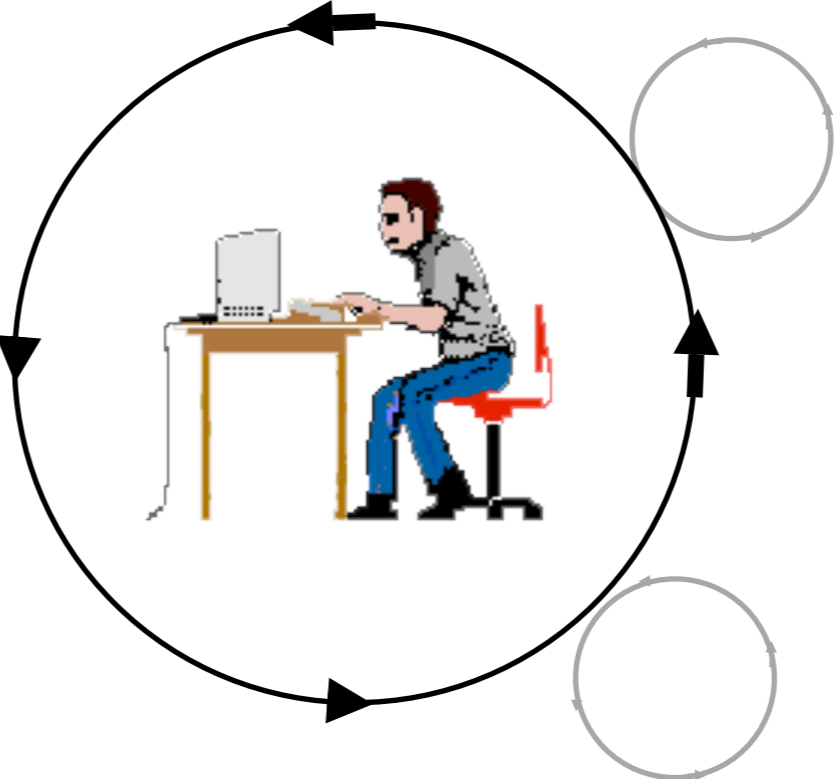
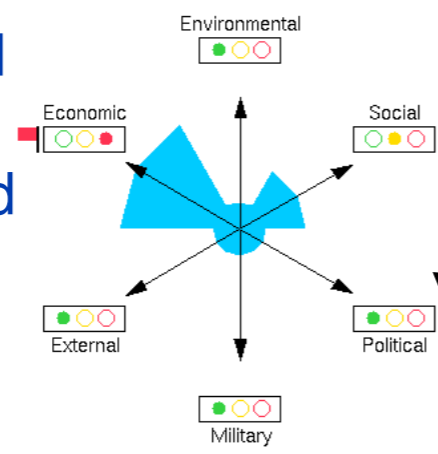
SEAS Cycle for Corporate Memory Management

1. Query corporate memory by describing the current situation



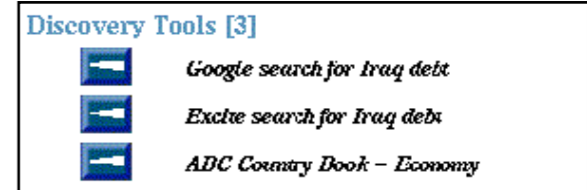
6. Create, modify, and publish new templates that capture analytic methods

2. Browse retrieved arguments and templates produced by others to understand their thinking regarding similar situations



5. Publish arguments so that others can review analysts thinking

3. Create an argument by recording answers to questions posed by a template and attach supporting evidence



4. Unknown answers become information acquisition targets; invoke discovery tools from the template to find answers



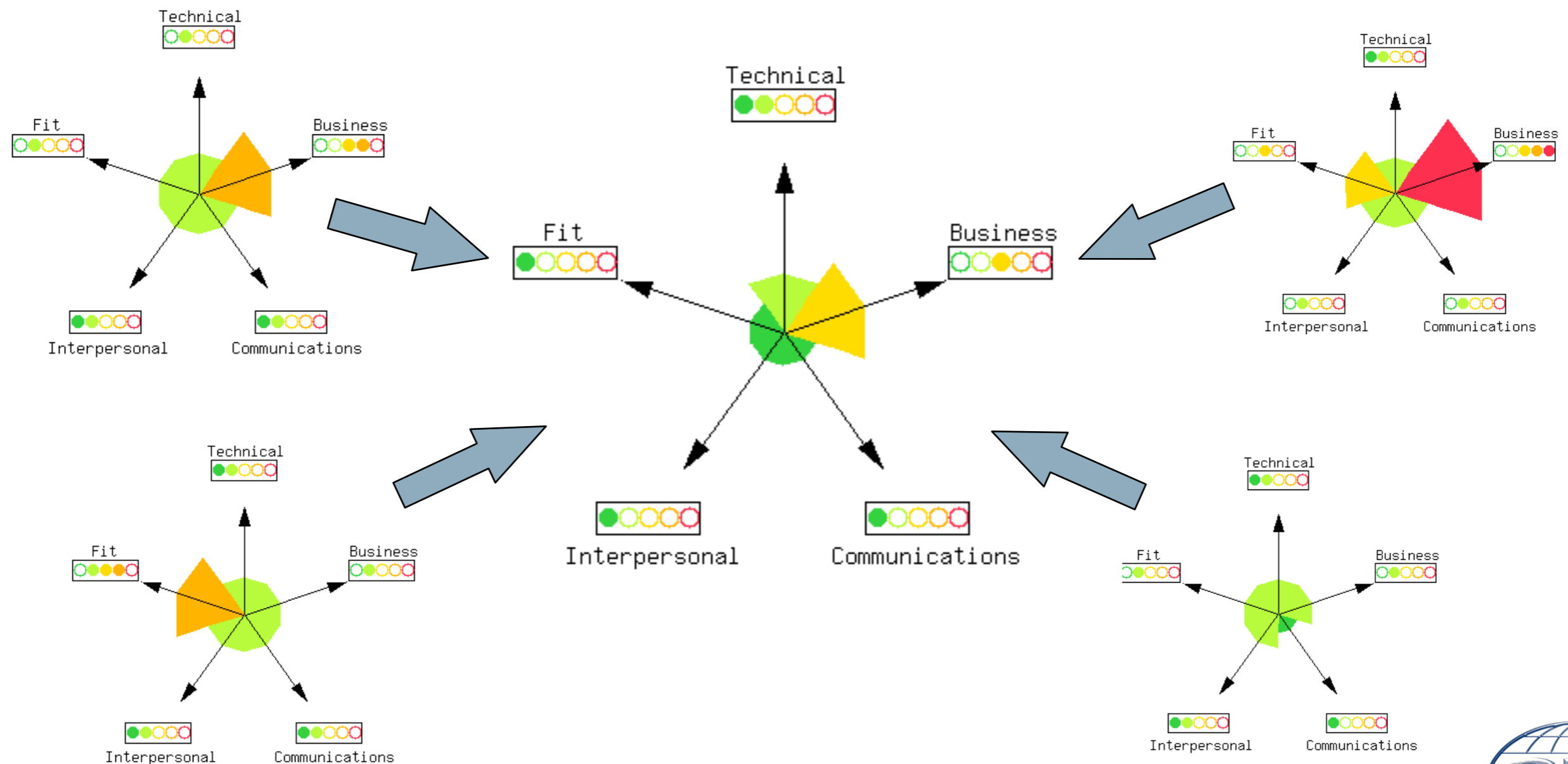
Corporate Memory and Collaboration

- Implements an analytical corporate memory.
 - Best practices and expertise are stored (and retrievable) in the form of templates.
 - Past analyses are be stored, allowing for evaluation of the lines of thinking used to arrive at decisions, and for comparison against current analyses.
- Facilitates different collaboration strategies.
 - Organizes tasking of an analysis for a team (each member responsible for sets of questions).
 - Analysts can work on the same problem independently, and join answers to get a consensus view.



Combining Independent Analyses

- Multiple independent analyses based on the same template can be combined programmatically to arrive at a consensus view.
- Points of agreement and disagreement can be quickly identified.



The Three Waves of SEAS Adoption

1. Structured Argumentation

- Externalization and **transparency** of thinking and ideas
- Improves **rigor** of analysis
- **Speeds** analysis
- Rapid comprehension and **comparison**

2. Collective Reasoning

- **Asynchronous co-authoring** and critical review
- **Use of best practice** as established by others
- **Simultaneous access** to a web server via standard browsers
- Embedded **discussions** using memos

• Corporate Memory

- Repository of opinions and **evolution of thinking**, not just access to facts
- An **audit trail**
- A means to **leverage the successes/failures** of the past



Not Just for Analysis

- SEAS has been used to track project status.
 - Same template was used to query project health each month.
 - Viewed in sequence, trends and problem areas can be identified and corrected.
- Some clients used SEAS to organize their workflows.
 - Used ability to attach documents and references as evidence to organize materials.
 - Answer lights tracked status of product.



Template Construction

- Currently analysts hand construct templates, either from scratch, or by leveraging other templates.
- Current ongoing work in using brainstorming and clustering techniques to construct templates.
- Make use of other knowledge mapping tools and ideas?



Conclusions

- Structured Argumentation has shown that the introduction of simple structure into the analytic process can aid analysts in
 - developing,
 - communicating,
 - explaining, and
 - comparing analytic results
- Coupled with Collaboration aides and a Corporate Memory of analytic thought allows analysts to
 - leverage the thinking of others
 - both past and present

