

# **Knowledge Sharing Media For Group Memory And Collaborative Brainstorming**

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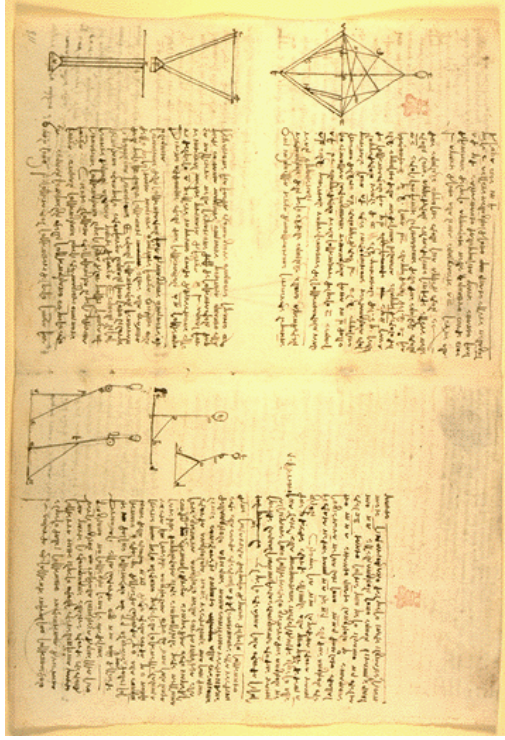
**November 7, 2000**

# Outline

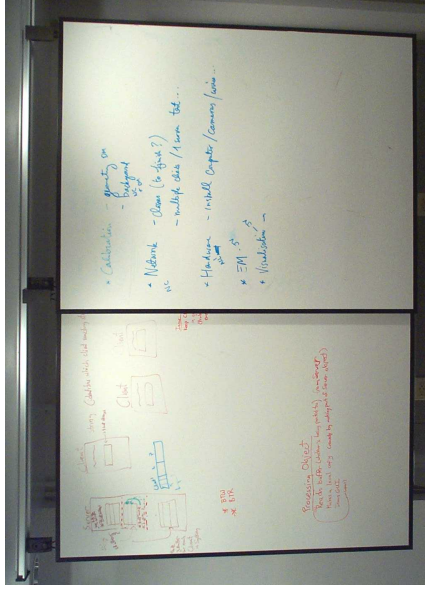
- **Introduction: Knowledge Sharing Media**
- **Plexus: Questions and Answers**
  - **Navigating the space**
  - **6.034 as an example**
- **Whimsy: Brainstorming**
  - **Liberating ideas from the whiteboard**
  - **Five design goals**
- **Conclusion: Design rationale capture**

# What are knowledge sharing media?

Tools for exchanging knowledge:  
Preservation and communication



Leonardo: Codex Arundel

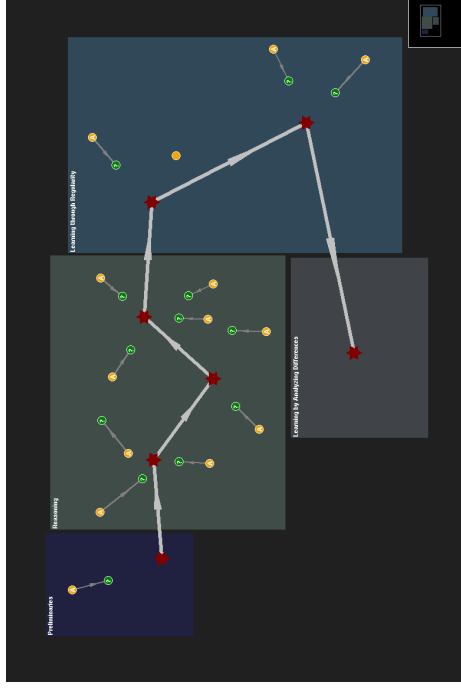


# **Digital knowledge sharing media**

- **Mutability**
- **Searchability**
- **Navigability and visualization**
- **Intelligent use of contents**

# Two Knowledge Media

- **Questions and answers**  
**Plexus: Exploring a spatial metaphor for group memory**



- **Brainstorming results**  
**Whimsy: Capturing and archiving ideas**

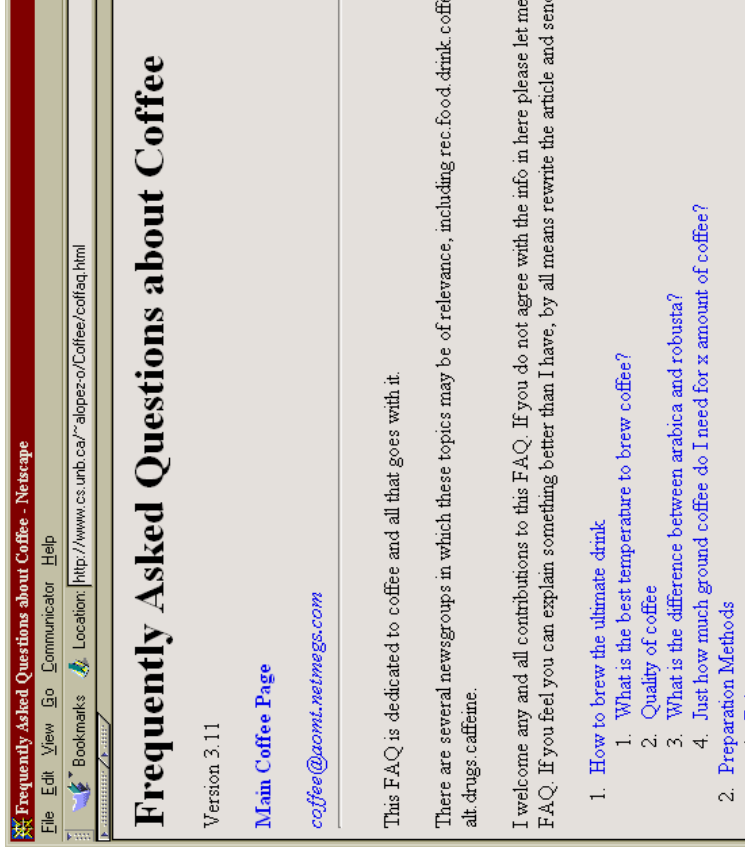
What can a smart space do?

Design meetings → complex collaborative tasks  
· problem-solving (e.g.) supported  
by structure

Personal secretary → arrange time of interactions  
· arrange time of interactions  
· arrange time of interactions

# Questions and Answers

- **When a question arises:**
  - Has it been asked before?
  - Whom to ask?
  - How to save the answer?
  - How to find it afterwards?
- **Preventing “getting lost”**



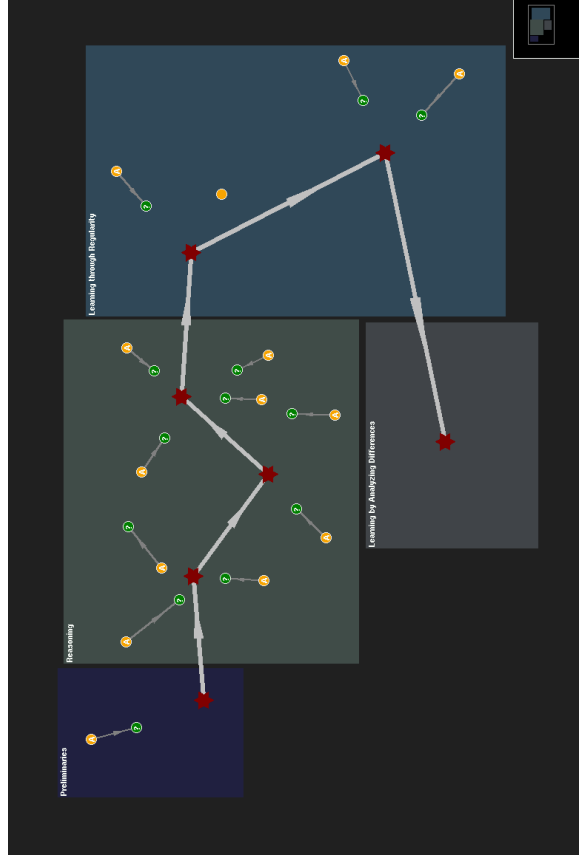
The screenshot shows a Netscape browser window with the title "Frequently Asked Questions about Coffee - Netscape". The address bar displays "http://www.cs.umb.ca/~alopez-o/Coffee/coiffaq.html". The page content includes the title "Frequently Asked Questions about Coffee", the version "Version 3.11", and a link to the "Main Coffee Page" at "coffee@aomi.netmegs.com". A paragraph states: "This FAQ is dedicated to coffee and all that goes with it. There are several newsgroups in which these topics may be of relevance, including rec.food.drink.coffee, alt.drugs.caffeine." Below this is a welcome message: "I welcome any and all contributions to this FAQ. If you do not agree with the info in here please let me know. If you feel you can explain something better than I have, by all means rewrite the article and send it to me." A list of questions follows:

1. How to brew the ultimate drink
1. What is the best temperature to brew coffee?
2. Quality of coffee
3. What is the difference between arabica and robusta?
4. Just how much ground coffee do I need for x amount of coffee?

Below the list, the text "Preparation Methods" is partially visible.

# Plexus: The Spatial Metaphor

- **Provide a shared, visual information space to structure this dialogue**
- **Proximity implies relevance**
- **Architect space with relevant navigation affordances**



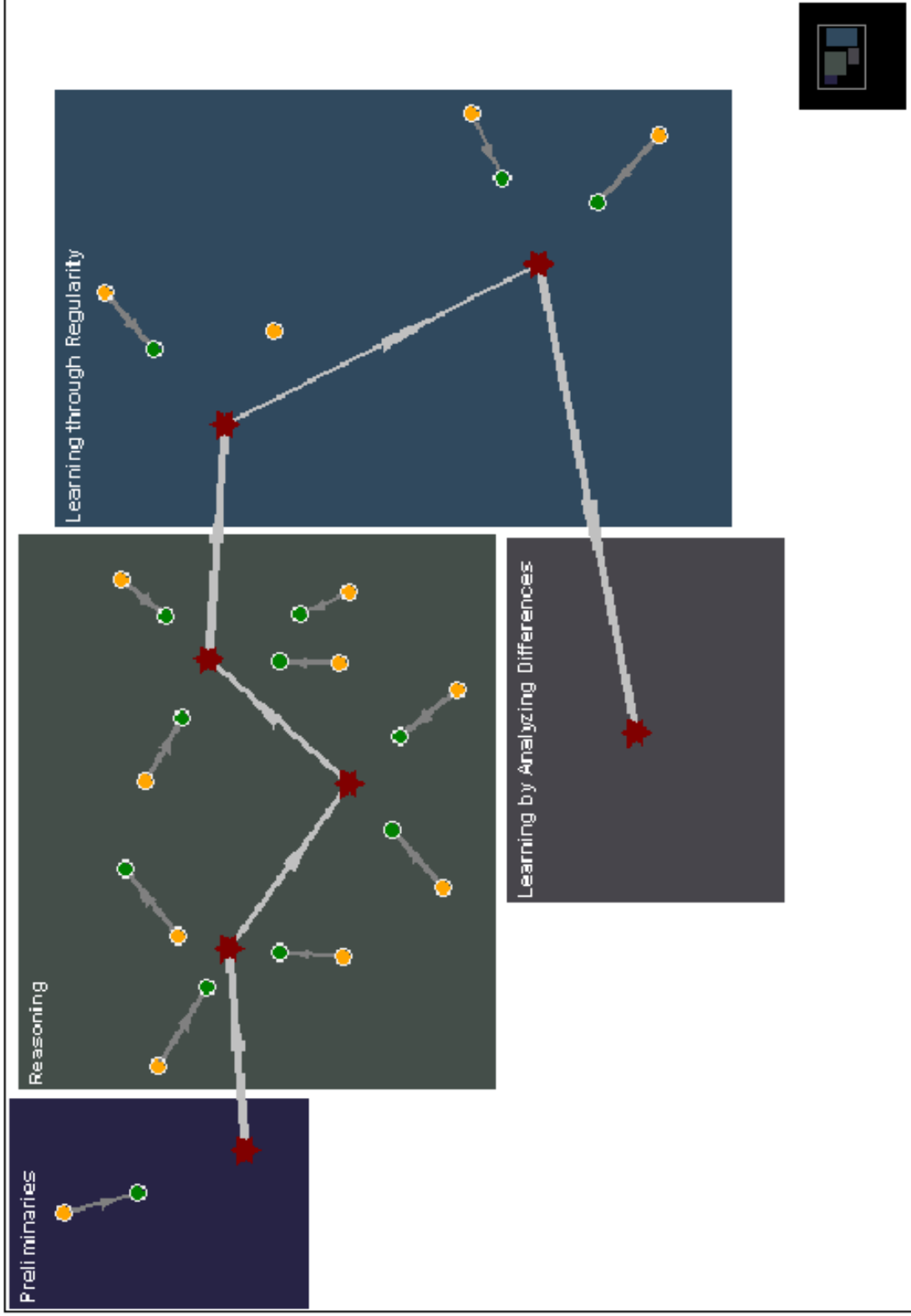
## **Why spatial Q's and A's?**

- **Through proximity, askers know where to find relevant and related questions**
  - **Looser notion of relevance than a hierarchy**
- **Experts can find questions they can answer**
- **Overview of what prompts the most questions**
- **Cognitive mapping: Engaging spatial memory**



# 6.034: Information Architecture

## Landmarks, paths, regions (Lynch 60, Neveitt 00)



## 6.034: Rules of Discourse

- **Students post questions**
- **Questions are anonymous to other students**
- **Teaching Assistants post answers**
- **Answers may prompt more questions**



- **Teaching Assistant may rearrange space**

# Plexus Interface

**Plexus: OfficeHours** Space Search Import Navigation Types

**Welcome to OfficeHours, mark foltz**

Unread notes by date:

- [\\*\(student, Feb 29\) How do I evaluate a Scheme symbol to its value?](#)
- [\\*\(student, Feb 29\) Why do my results vary in PS92?](#)
- [\\*\(student, Feb 29\) Implicit Constraints in Model-Based Diagnosis?](#)
- [\\*\(student, Feb 29\) Implicit Constraints in Model-Based Diagnosis?](#)
- [\\*\(student, Feb 29\) Finding the DPLL Search Tree?](#)
- [\\*\(student, Feb 29\) What to do with "hidden"?](#)
- [\\*\(student, Feb 29\) What is iterative deepening?](#)
- [\\*\(student, Feb 29\) What is the difference between best-first search and branch-and-bound?](#)
- [\\*\(student, Feb 29\) Setting possible actions to the new state](#)

You can return here by clicking on the Home icon, on right side of the panel below.

**Reasoning**

**Preliminaries**

**Learning by A\* and J\***

**Learning by Acquiring Decision Boundaries**

Depth-first search restarts at the most recent ancestor with unexplored children when a leaf has no more unexplored children. Iterative deepening is depth-first search that restarts at the root when ...

**Model-based Diagnosis**

**Model-based Diagnosis**  
Model-based diagnosis reasons about a model of a system to generate candidate diagnoses (or system modes) given observed behavior. It can be thought of as a special kind of constraint satisfaction, ...

**Implicit Constraints in Model-Based Diagnosis?**  
Just a little question on the problem set. How does the diagnosis problem capture 'implicit' constraints, i.e. in the valve problem, if modelCPU then we can't say anything about the pressurization...

**Implicit Constraints in Model-Based Diagnosis?**  
Just use the theory (class) that are given to work through Problem 5. In other words, even though common sense would dictate that the flow in both valves should be the same, we won't because that ...

## Multiscale navigation

## **Plexus: Spatial vs. Hypertext Views**

- **Asking: Placement in context vs. appending to a list**
- **Answering: "Regions of expertise"**
- **Searching: Navigation vs. hierarchical browsing**

### **Related work**

- **Answer Garden (Ackerman et al. 90, 94, 98)**
  - **Hypertext-based FAQ builder**
- **Abuzz.com and similar sites**

## **Plexus: Evaluation and Future Work**

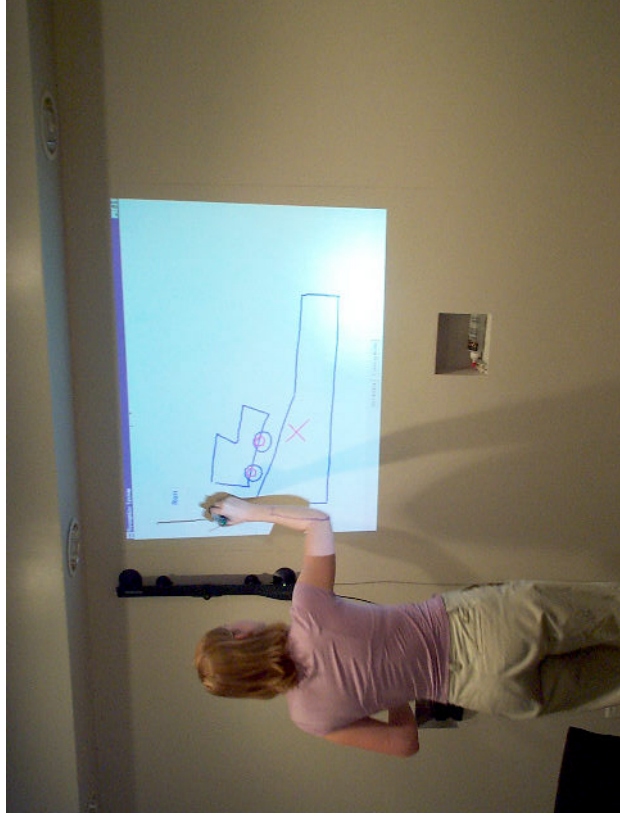
- **Used for two weeks by 6.034 students**
  - **Limited usage, positive feedback**
- **Course-long study**
- **Spatially organize existing Web FAQs**

**Will placement of contributions be consistent?**

# Outline

- ✓ **Introduction: Knowledge Sharing Media**
- ✓ **Plexus: Questions and Answers**
  - **Navigating the space**
  - **6.034 as an example**
- **Whimsy: Brainstorming**
  - **Liberating ideas from the whiteboard**
  - **Five design goals**
- **Conclusion: Design rationale capture**

# Whimsy: Capturing Ideas



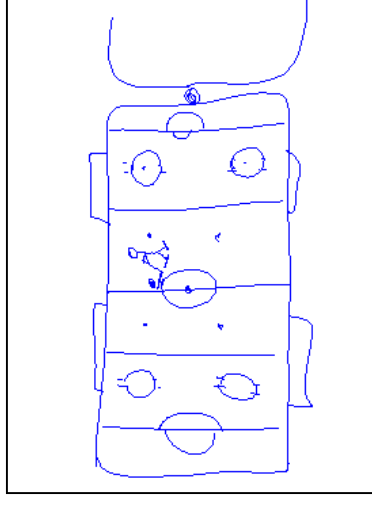
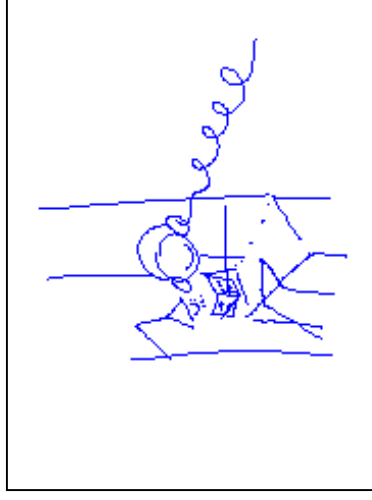
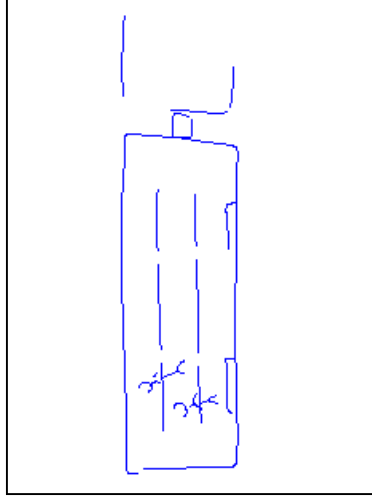
- **Spontaneous interaction**
- **Structured brainstorming meetings**
- **Work in progress**

# What is Brainstorming?

**Osborne (1957):**

- 1. Withhold criticism**
- 2. Free-wheeling**
- 3. Quantity first**
- 4. Combination & improvement**

Q: How can subway cars be improved?





# **Why a digital medium for brainstorming?**

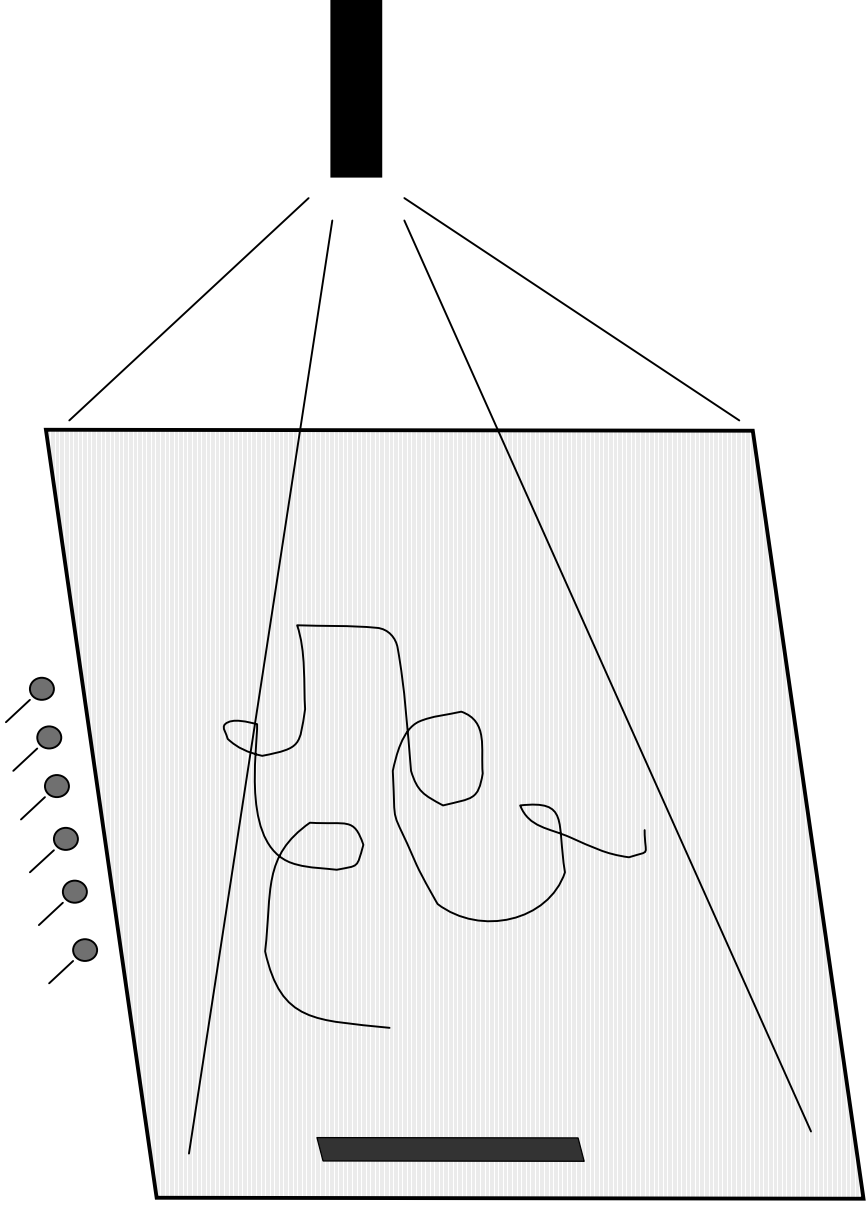
- **Pen and paper is convenient, but**
  - Napkins are hard to file
  - Napkins are hard to photocopy
- **A digital medium can help**
  - Ideas are archivable
  - Ideas are sharable

# **Brainstorming: Five design goals**

- 1. Expressibility**  
Focus on the idea, not the medium
- 2. Accessibility**  
Ideas can occur anywhere
- 3. Preservation**  
No good idea should be lost
- 4. Reminding**  
“Where were we?”
- 5. Individual and Group**  
Personal notebook and shared whiteboard

# Goal 1: Expressibility

## Sketching and explaining



# Goal 2: Accessibility

## Pick up and use



# Goal 3: Preservation

## Archiving and navigating, or How should we structure this information space?

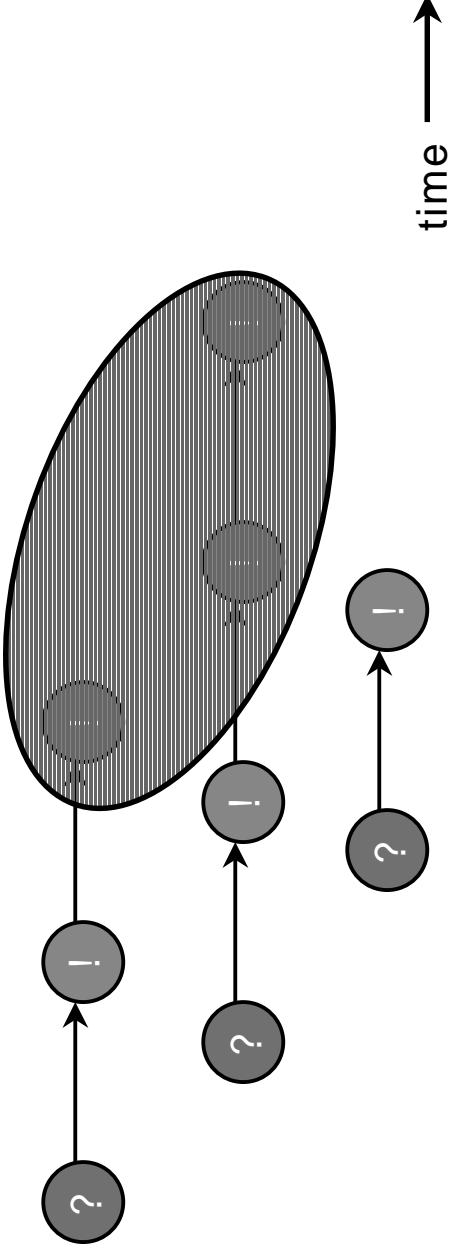
The screenshot shows a web browser window with a navigation menu on the left and a main content area on the right. The navigation menu includes links for 'Home', 'About', 'Contact', 'Privacy', 'Terms', 'FAQ', and 'Help'. The main content area is titled 'Welcome to OfficeHours, mark feltz' and contains a list of links under the heading 'Useful codes by date'. The links are: 'Feb 25', 'Feb 24', 'Feb 23', 'Feb 22', 'Feb 21', 'Feb 20', 'Feb 19', 'Feb 18', 'Feb 17', 'Feb 16', 'Feb 15', 'Feb 14', 'Feb 13', 'Feb 12', 'Feb 11', 'Feb 10', 'Feb 9', 'Feb 8', 'Feb 7', 'Feb 6', 'Feb 5', 'Feb 4', 'Feb 3', 'Feb 2', 'Feb 1', 'Feb 0', 'Jan 31', 'Jan 30', 'Jan 29', 'Jan 28', 'Jan 27', 'Jan 26', 'Jan 25', 'Jan 24', 'Jan 23', 'Jan 22', 'Jan 21', 'Jan 20', 'Jan 19', 'Jan 18', 'Jan 17', 'Jan 16', 'Jan 15', 'Jan 14', 'Jan 13', 'Jan 12', 'Jan 11', 'Jan 10', 'Jan 9', 'Jan 8', 'Jan 7', 'Jan 6', 'Jan 5', 'Jan 4', 'Jan 3', 'Jan 2', 'Jan 1', 'Dec 31', 'Dec 30', 'Dec 29', 'Dec 28', 'Dec 27', 'Dec 26', 'Dec 25', 'Dec 24', 'Dec 23', 'Dec 22', 'Dec 21', 'Dec 20', 'Dec 19', 'Dec 18', 'Dec 17', 'Dec 16', 'Dec 15', 'Dec 14', 'Dec 13', 'Dec 12', 'Dec 11', 'Dec 10', 'Dec 9', 'Dec 8', 'Dec 7', 'Dec 6', 'Dec 5', 'Dec 4', 'Dec 3', 'Dec 2', 'Dec 1', 'Nov 30', 'Nov 29', 'Nov 28', 'Nov 27', 'Nov 26', 'Nov 25', 'Nov 24', 'Nov 23', 'Nov 22', 'Nov 21', 'Nov 20', 'Nov 19', 'Nov 18', 'Nov 17', 'Nov 16', 'Nov 15', 'Nov 14', 'Nov 13', 'Nov 12', 'Nov 11', 'Nov 10', 'Nov 9', 'Nov 8', 'Nov 7', 'Nov 6', 'Nov 5', 'Nov 4', 'Nov 3', 'Nov 2', 'Nov 1', 'Oct 31', 'Oct 30', 'Oct 29', 'Oct 28', 'Oct 27', 'Oct 26', 'Oct 25', 'Oct 24', 'Oct 23', 'Oct 22', 'Oct 21', 'Oct 20', 'Oct 19', 'Oct 18', 'Oct 17', 'Oct 16', 'Oct 15', 'Oct 14', 'Oct 13', 'Oct 12', 'Oct 11', 'Oct 10', 'Oct 9', 'Oct 8', 'Oct 7', 'Oct 6', 'Oct 5', 'Oct 4', 'Oct 3', 'Oct 2', 'Oct 1', 'Sep 30', 'Sep 29', 'Sep 28', 'Sep 27', 'Sep 26', 'Sep 25', 'Sep 24', 'Sep 23', 'Sep 22', 'Sep 21', 'Sep 20', 'Sep 19', 'Sep 18', 'Sep 17', 'Sep 16', 'Sep 15', 'Sep 14', 'Sep 13', 'Sep 12', 'Sep 11', 'Sep 10', 'Sep 9', 'Sep 8', 'Sep 7', 'Sep 6', 'Sep 5', 'Sep 4', 'Sep 3', 'Sep 2', 'Sep 1', 'Aug 31', 'Aug 30', 'Aug 29', 'Aug 28', 'Aug 27', 'Aug 26', 'Aug 25', 'Aug 24', 'Aug 23', 'Aug 22', 'Aug 21', 'Aug 20', 'Aug 19', 'Aug 18', 'Aug 17', 'Aug 16', 'Aug 15', 'Aug 14', 'Aug 13', 'Aug 12', 'Aug 11', 'Aug 10', 'Aug 9', 'Aug 8', 'Aug 7', 'Aug 6', 'Aug 5', 'Aug 4', 'Aug 3', 'Aug 2', 'Aug 1', 'Jul 31', 'Jul 30', 'Jul 29', 'Jul 28', 'Jul 27', 'Jul 26', 'Jul 25', 'Jul 24', 'Jul 23', 'Jul 22', 'Jul 21', 'Jul 20', 'Jul 19', 'Jul 18', 'Jul 17', 'Jul 16', 'Jul 15', 'Jul 14', 'Jul 13', 'Jul 12', 'Jul 11', 'Jul 10', 'Jul 9', 'Jul 8', 'Jul 7', 'Jul 6', 'Jul 5', 'Jul 4', 'Jul 3', 'Jul 2', 'Jul 1', 'Jun 30', 'Jun 29', 'Jun 28', 'Jun 27', 'Jun 26', 'Jun 25', 'Jun 24', 'Jun 23', 'Jun 22', 'Jun 21', 'Jun 20', 'Jun 19', 'Jun 18', 'Jun 17', 'Jun 16', 'Jun 15', 'Jun 14', 'Jun 13', 'Jun 12', 'Jun 11', 'Jun 10', 'Jun 9', 'Jun 8', 'Jun 7', 'Jun 6', 'Jun 5', 'Jun 4', 'Jun 3', 'Jun 2', 'Jun 1', 'May 31', 'May 30', 'May 29', 'May 28', 'May 27', 'May 26', 'May 25', 'May 24', 'May 23', 'May 22', 'May 21', 'May 20', 'May 19', 'May 18', 'May 17', 'May 16', 'May 15', 'May 14', 'May 13', 'May 12', 'May 11', 'May 10', 'May 9', 'May 8', 'May 7', 'May 6', 'May 5', 'May 4', 'May 3', 'May 2', 'May 1', 'Apr 30', 'Apr 29', 'Apr 28', 'Apr 27', 'Apr 26', 'Apr 25', 'Apr 24', 'Apr 23', 'Apr 22', 'Apr 21', 'Apr 20', 'Apr 19', 'Apr 18', 'Apr 17', 'Apr 16', 'Apr 15', 'Apr 14', 'Apr 13', 'Apr 12', 'Apr 11', 'Apr 10', 'Apr 9', 'Apr 8', 'Apr 7', 'Apr 6', 'Apr 5', 'Apr 4', 'Apr 3', 'Apr 2', 'Apr 1', 'Mar 31', 'Mar 30', 'Mar 29', 'Mar 28', 'Mar 27', 'Mar 26', 'Mar 25', 'Mar 24', 'Mar 23', 'Mar 22', 'Mar 21', 'Mar 20', 'Mar 19', 'Mar 18', 'Mar 17', 'Mar 16', 'Mar 15', 'Mar 14', 'Mar 13', 'Mar 12', 'Mar 11', 'Mar 10', 'Mar 9', 'Mar 8', 'Mar 7', 'Mar 6', 'Mar 5', 'Mar 4', 'Mar 3', 'Mar 2', 'Mar 1', 'Feb 29', 'Feb 28', 'Feb 27', 'Feb 26', 'Feb 25', 'Feb 24', 'Feb 23', 'Feb 22', 'Feb 21', 'Feb 20', 'Feb 19', 'Feb 18', 'Feb 17', 'Feb 16', 'Feb 15', 'Feb 14', 'Feb 13', 'Feb 12', 'Feb 11', 'Feb 10', 'Feb 9', 'Feb 8', 'Feb 7', 'Feb 6', 'Feb 5', 'Feb 4', 'Feb 3', 'Feb 2', 'Feb 1', 'Jan 31', 'Jan 30', 'Jan 29', 'Jan 28', 'Jan 27', 'Jan 26', 'Jan 25', 'Jan 24', 'Jan 23', 'Jan 22', 'Jan 21', 'Jan 20', 'Jan 19', 'Jan 18', 'Jan 17', 'Jan 16', 'Jan 15', 'Jan 14', 'Jan 13', 'Jan 12', 'Jan 11', 'Jan 10', 'Jan 9', 'Jan 8', 'Jan 7', 'Jan 6', 'Jan 5', 'Jan 4', 'Jan 3', 'Jan 2', 'Jan 1'. The main content area also contains three diagrams: 'Performance', 'Reasoning', and 'Learning by Acquiring Decision Boundaries'. The 'Performance' diagram shows a network of nodes and edges with red dots. The 'Reasoning' diagram shows a similar network with a central node and several branches. The 'Learning by Acquiring Decision Boundaries' diagram shows a network with a central node and several branches, with red dots indicating specific nodes.

- Most effective when domain-specific
- Relating questions
- Ranking ideas later

# Goal 4: Reminding

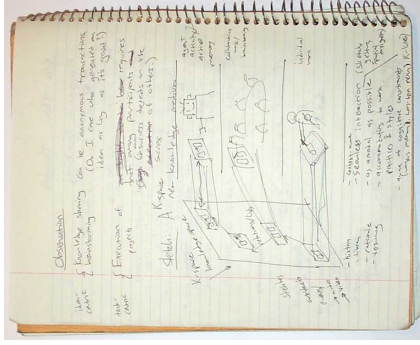
Where were we?

- Restoring context and frame of mind
- Summarization

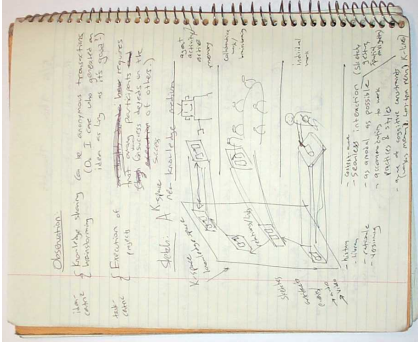


- Signposts
  - “Let’s pick up next week with...”
- A special case: myself

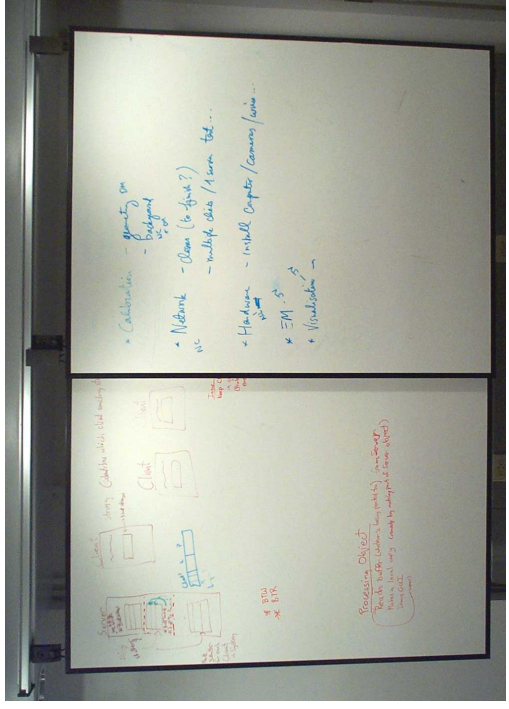
# Goal 5: Group and Individual



Mark's



Mike's



## **Whimsy: Some Hard Problems**

- **Context capture and representation**
- **Multimodal segmentation and indexing**
  - **Domain knowledge can help**
- **Interfaces for adding and navigating ideas**
  - **Tivoli (Moran, Chiu, van Melle 97)**
- **Usability and evaluation**



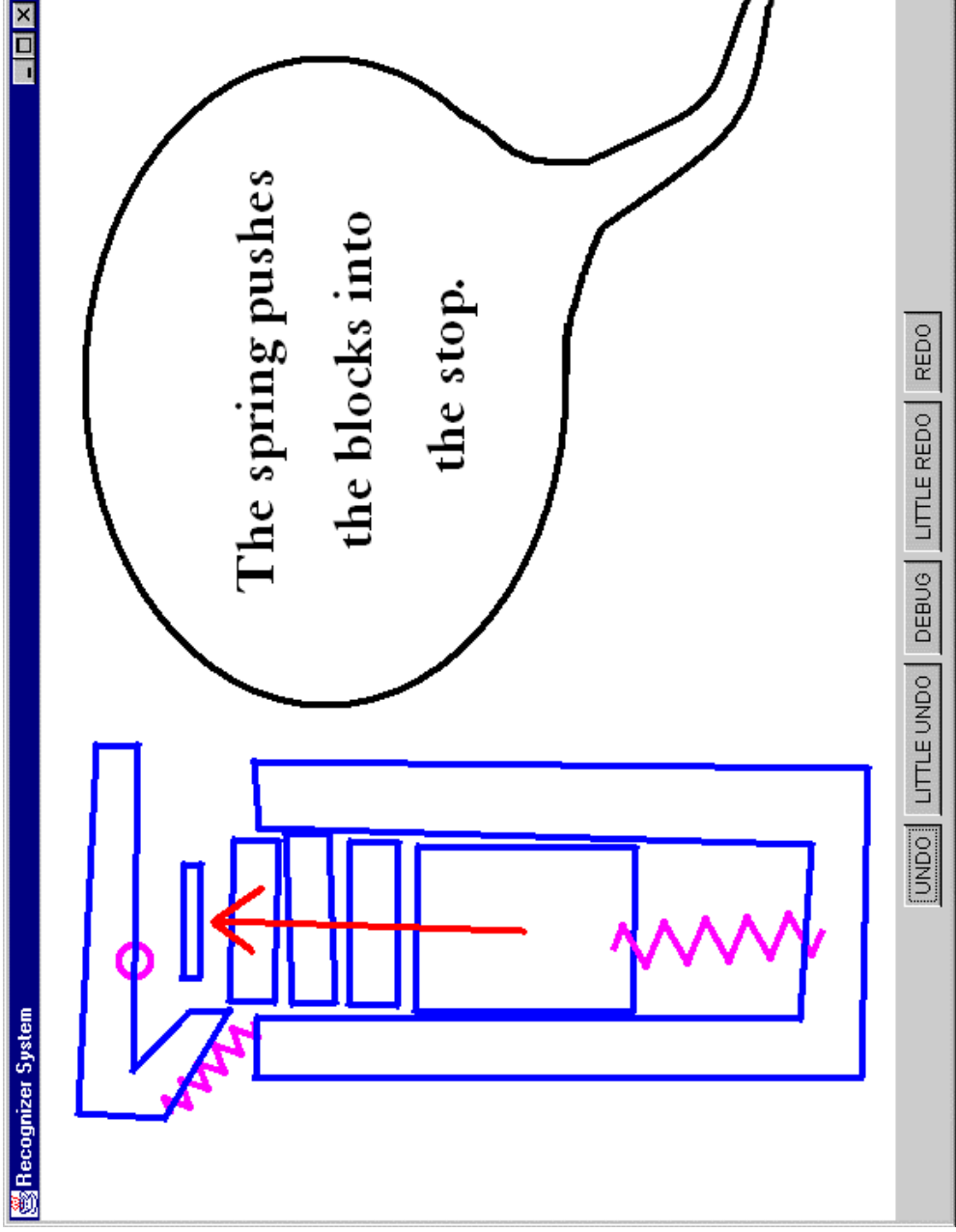
# **Whimsy: Research Approach**

- 1. Understand brainstorming activity**  
**Cognitive and social aspects**
- 2. Understand brainstorming facilitation**  
**What do experts do?**
- 3. Pick a domain**  
**User interface design**
- 4. Intermediate goals**  
**User-assisted segmentation first**

# **Digital knowledge sharing media**

- **Mutability**
- **Searchability**
- **Navigability and visualization**
- **Intelligent use of contents**

# Design Rationale Capture



**Weisman 99, Alvarado 00, Oltmans 00**

# Summary

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