



# **Week 9: Examples of Knowledge management systems**

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## **Chapter 13 – Chapter 16**



# Outline

- Knowledge Discovery Systems: Chapter 13
- Knowledge Capture Systems: Chapter 14
- Knowledge Sharing Systems: Chapter 15
- Knowledge Application Systems: Chapter 16



# Knowledge Discovery Systems

- Synthesis of new knowledge through **socialization** with other **knowledgeable persons**
- Discovery by **finding interesting patterns** in observations, typically embodied in **explicit data**



# Case Study (1)

- An application of **Rule Induction** to **real estate appraisal systems**
  - ♦ In this case, we seek **specific knowledge** that we know can be found in the data in databases, but which can be **difficult to extract**.
  - ♦ Procedure: create a decision tree:
    - Data preparation and preprocessing
    - Tree construction
    - House pruning: use heuristics to remove deviated leaf nodes from a certain group
    - Paired leaf analysis: differences in worth between two sibling leaves is directly caused by difference in their values of the critical attribute



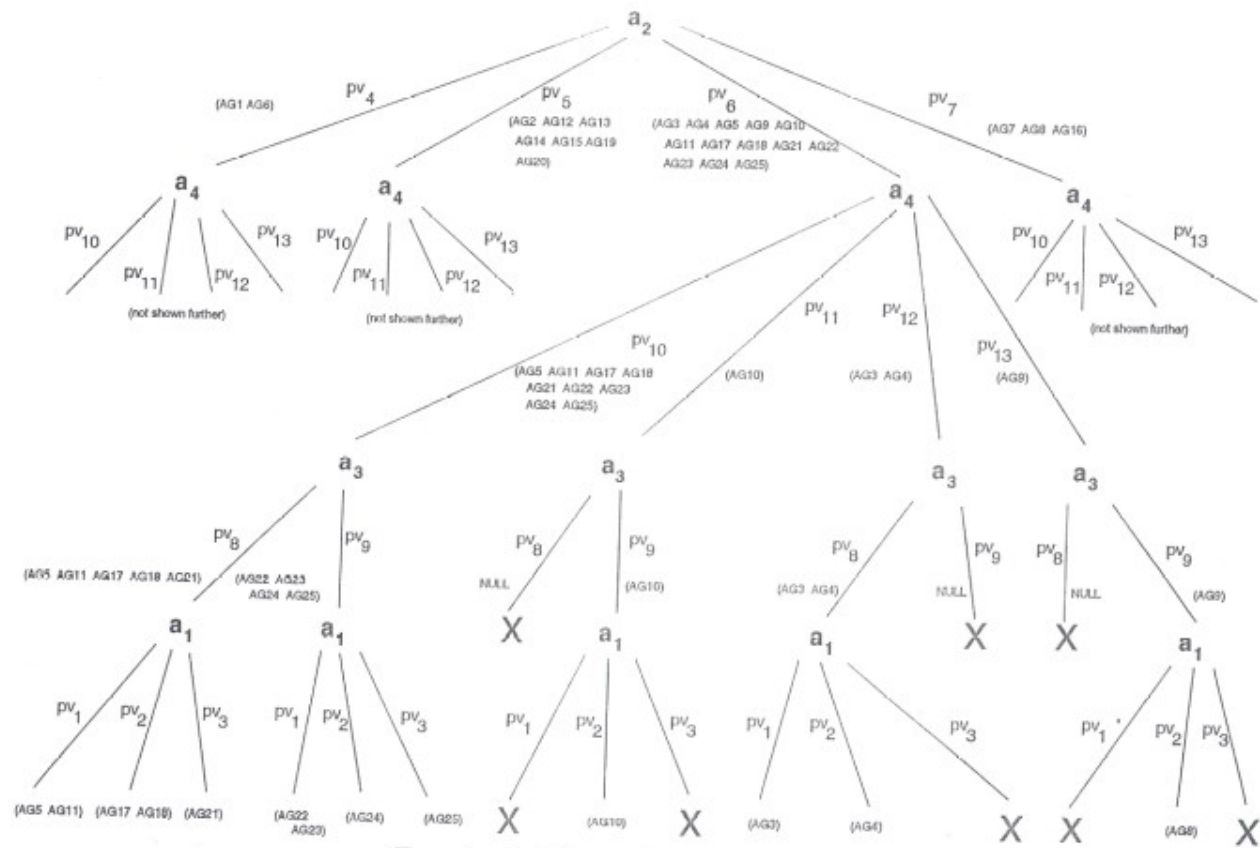
# Case Study: An application of Rule Induction to real estate appraisal systems

Attribute	Induction Results	Expert Estimate	Difference
Living Area	\$15 - \$31	\$15 - \$25	0 - 2.4%
Bedrooms	\$4311 - \$5212	\$2500 - \$3500	49 - 72%
Bathrooms	\$3812 - \$5718	\$1500 - \$2000	154 - 186%
Garage	\$3010 - \$4522	\$3000 - \$3500	0.3 - 29%
Pool	\$7317 - \$11697	\$9000 - \$12000	2.5 - 19%
Fireplace	\$1500 - \$4180	\$1200 - \$2000	25 - 109%
Year Built	1.2 - 1.7%	1.0 - 1.2%	20 - 42%

## Summary of Induction Results



# Case Study: An application of Rule Induction to real estate appraisal systems



## Partial Decision Tree Results for Real Estate Appraisal



## Case Study (2)

- **An application of Web Content mining to Expertise Locator Systems**
  - ♦ NASA Expert Seeker Web Miner
  - ♦ A KM system that locates experts based on published documents requires:
    - *Automatic method for identifying employee names.*
    - *A method to associate employee names with skill keywords embedded in those documents.*



# Knowledge Capture Systems

- Knowledge capture systems support process of **eliciting** explicit or tacit knowledge from people, artifacts, or organizational entities
- Rely on mechanisms and technologies to support **externalization** (converting tacit knowledge into explicit forms) and **internalization** (conversion of explicit knowledge into tacit knowledge)





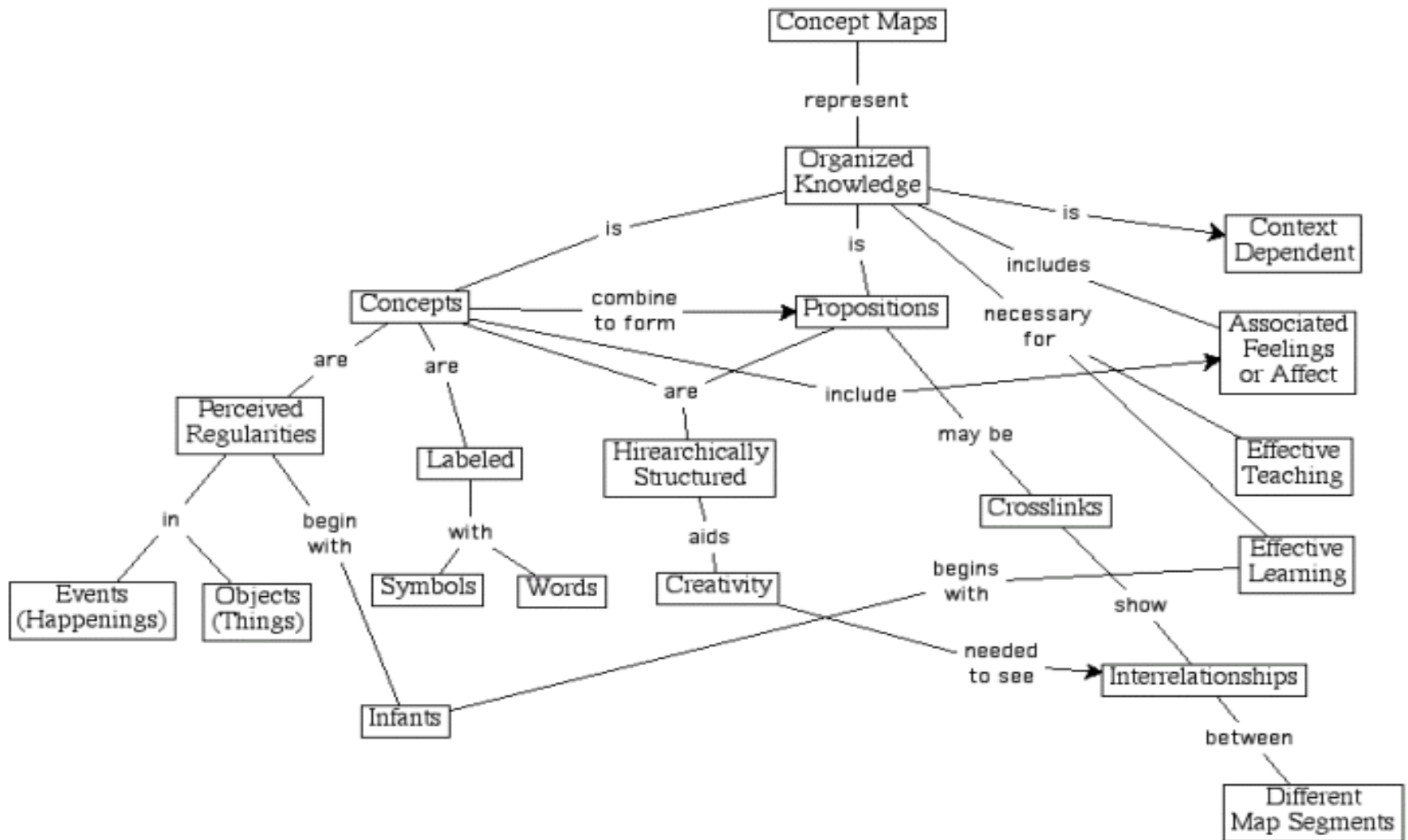
# Knowledge Representation through the use of Concept Maps

- **Concepts**, enclosed in **circles** or **boxes** are perceived **regularities** in events or objects designated by a label
- Two concepts connected by a **linking word** to form a *proposition*, a *semantic unit* or *unit of meaning*
- **Vertical** axis expresses a **hierarchical** framework for **organizing** the **concepts**



# Concept Map about Concept Maps

## Maps: meta representation







# Knowledge Capture Systems: CmapTools

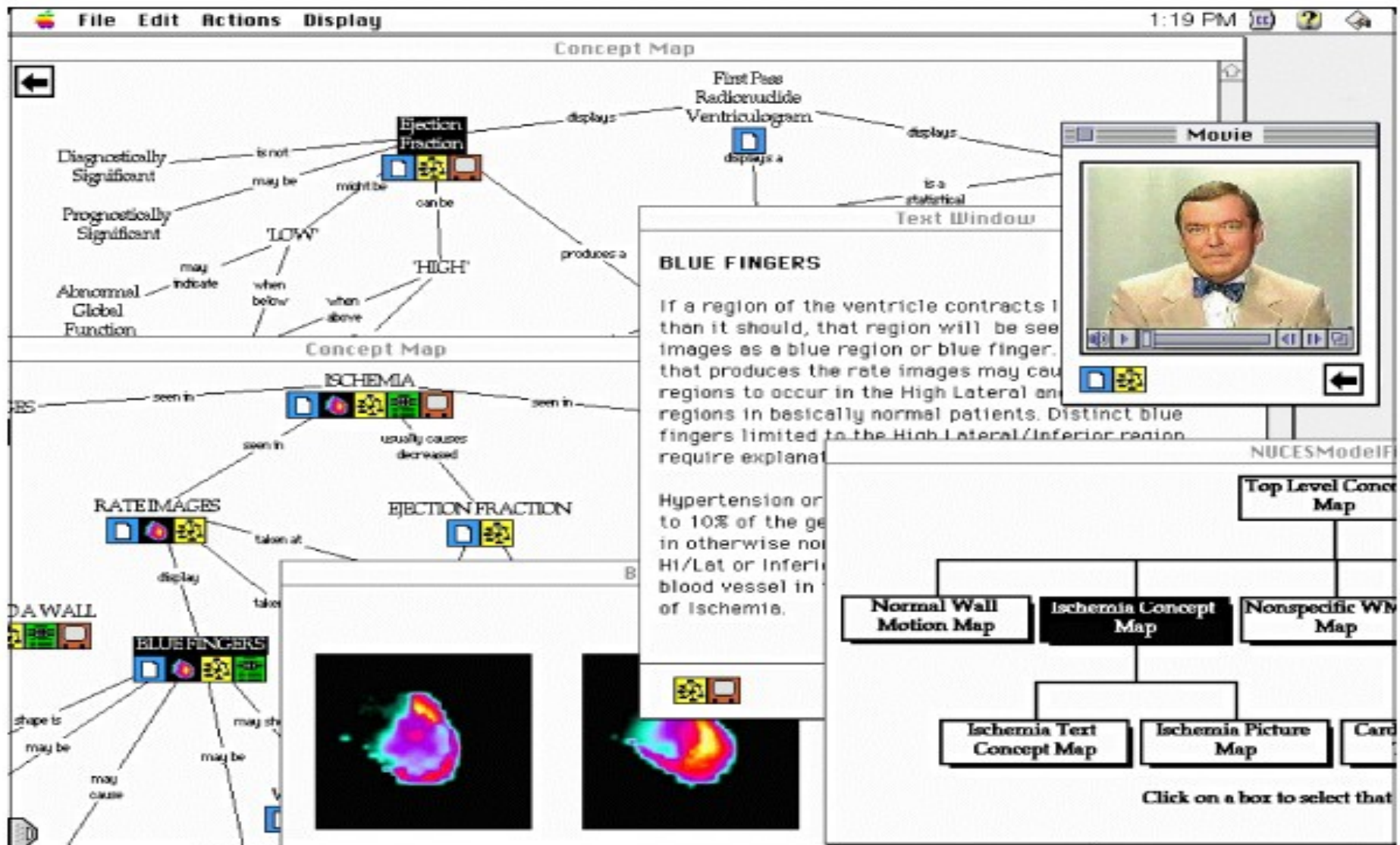
- To **capture knowledge** resulting in context rich knowledge representation models to be **viewed** and **shared** through the **Internet**
- Facilitate **navigation** with concept maps
- Serve as the **browsing** interface to a domain of **knowledge**
- **Icons** below the concept nodes provide **access to auxiliary information**
- Linked media **resources** and concept maps **can be located anywhere on the Internet**
- Browser provides a window showing the **hierarchical ordering** of maps







# Explanation Subsystem using CmapTools





# Knowledge Sharing Systems

- A knowledge sharing system helps to organize and distribute an organization's **corporate memory** so that it can be accessed even after the **original** sources of knowledge **no longer remain** within the organization.
- Systems that enable **members of an organization** to **acquire** tacit and explicit knowledge from **each other**.



# Expertise-Locator Knowledge Sharing Systems

- Goal: to catalog knowledge competencies, **including information not typically captured by human resources systems**, in a way that could later be **queried** across the organization to help locate intellectual capital.
- Significant challenge in the development of ELS, knowledge repositories, and digital libraries deals with the accurate development of **knowledge taxonomies**.
  - ♦ Taxonomies, also called classification or categorization schemes, are considered to be knowledge organization systems that serve to **group objects together based on a particular characteristic**.



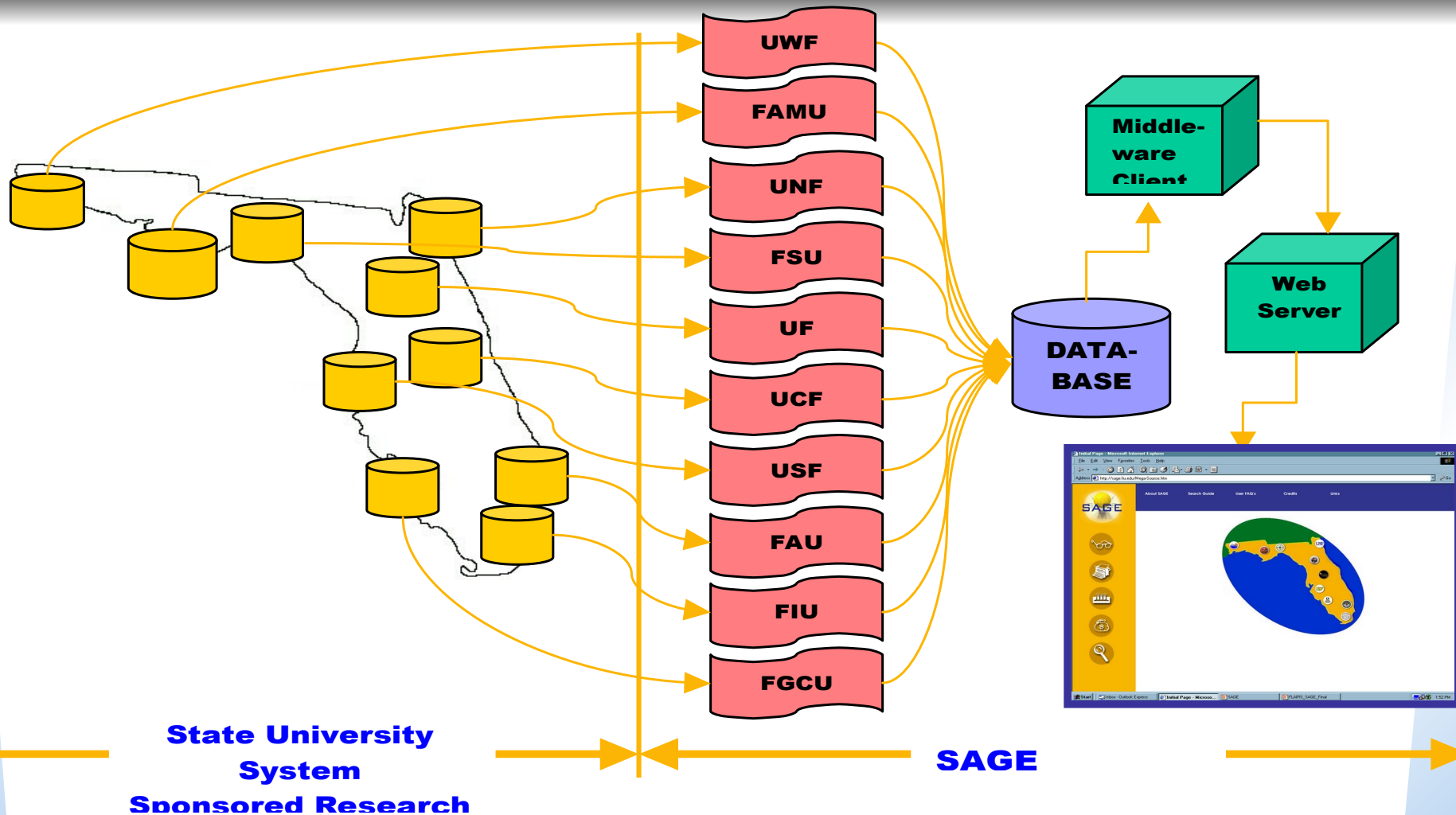


# Case Study (1)- SAGE

- The purpose of **Searchable Answer Generating Environment (SAGE)** is to create a searchable repository of **university experts** in the State of Florida.
- Each university has a database of their researchers.
- The system assumes that **the researchers who successfully obtained funded research grants** are **experts** in their fields.
- [www.sage.fiu.edu](http://www.sage.fiu.edu)

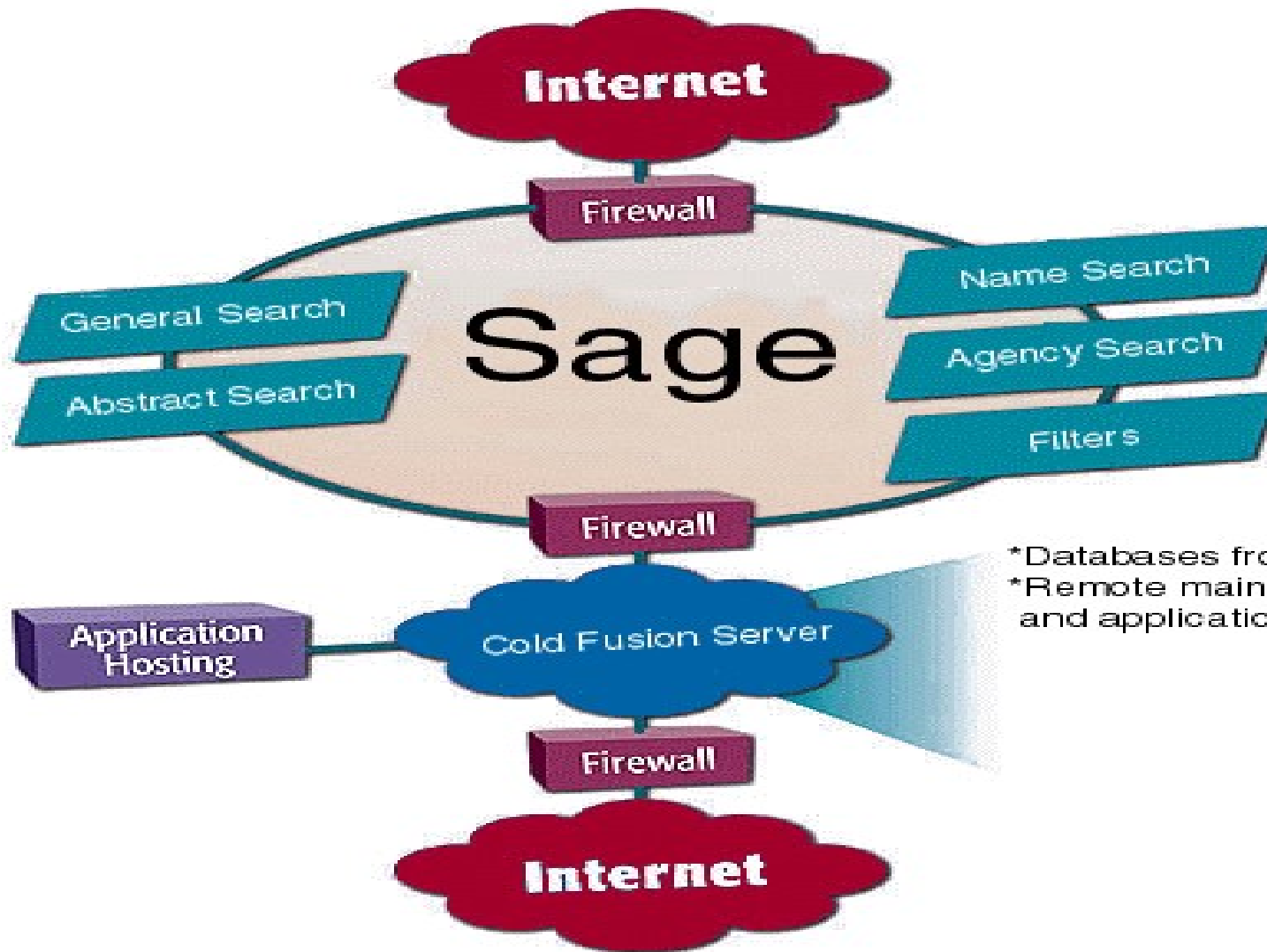


# SAGE Architecture





# Technologies to Implement SAGE



\*Databases from other Universities  
\*Remote maintenance of database and applications.

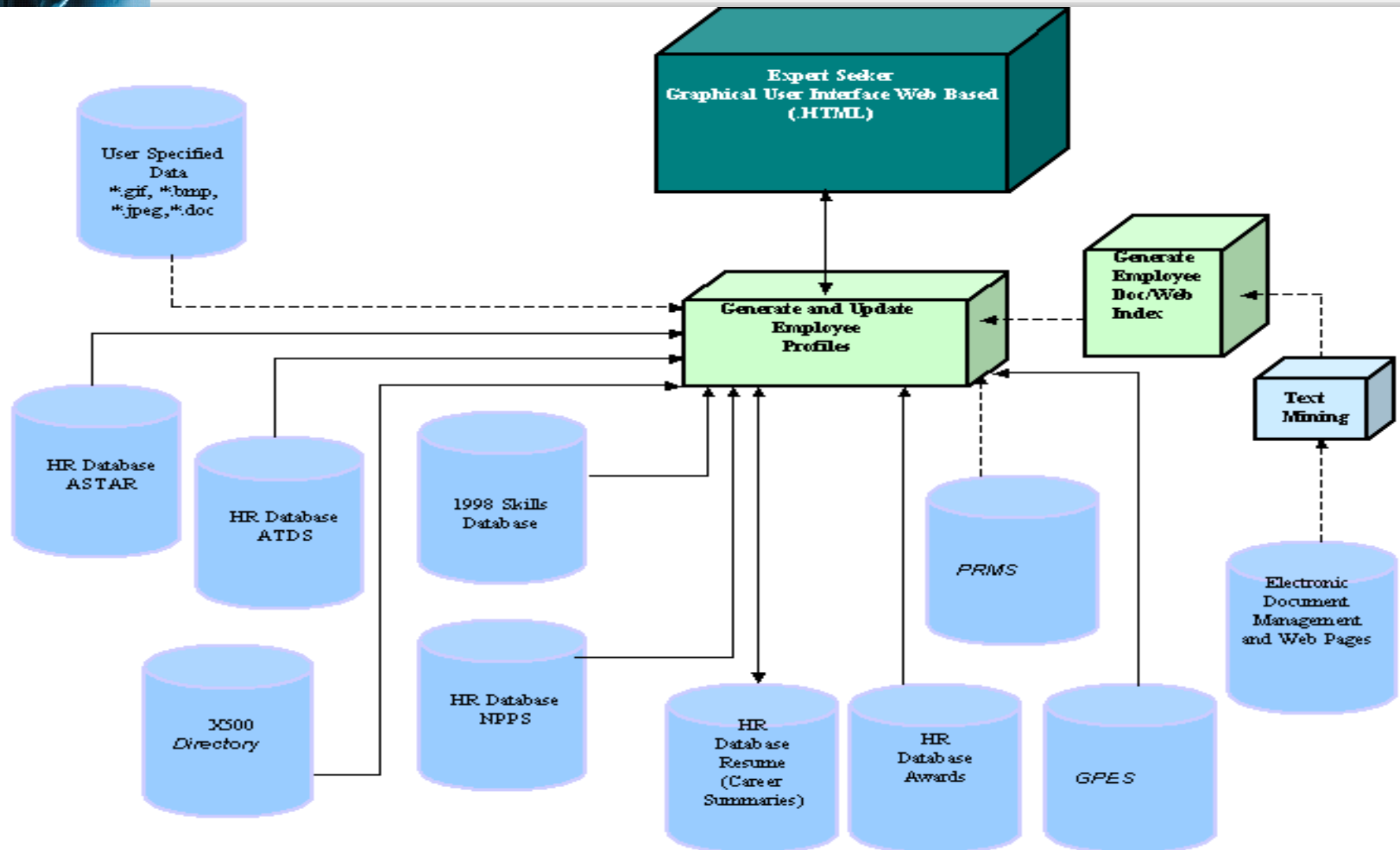


## Case Study (2) – Expert Seeker

- **Expert Seeker** is an organizational expertise-locator KMS used to locate experts at NASA.
- The main **difference** between **Expert Seeker** and **SAGE** is that the former searches for expertise at NASA (KSC and GSFC), while the latter is on the Web and seeks expertise at various universities.
- **Expert Seeker** builds a **profile** for each expert that can be easily searched via a web-based interface.



# Expert Seeker Architecture





# Knowledge Application Systems

- In *Knowledge application systems* explicit or tacit knowledge is **utilized** to guide decisions and actions
- In knowledge application, the **party** that makes **use** of the **knowledge** does **not necessarily need to comprehend it!**



# Case Study (1): SOS Advisor

## The SBIR/STTR Online System (SOS) Advisor

- Web-based **expert system**
- identify potential applicants to the **Small Business Innovation Research (SBIR)** and **Small Business Technology Transfer Research (STTR)** programs
- **optimize the time** required to examine the potential eligibility of companies seeking SBIR/STTR funding.
- **Users** only need to **click yes or no** to answer the **10 questions** that frame the **eligibility criteria**.



# Case Study (1): SOS Advisor

Question	SBIR winners' profile
1. I would like to know if your company is independently owned and operated.	Yes
2. Is this company located in the United States?	Yes
3. Is this company owned by at least 51% U.S. citizens or permanent U.S. residents?	Yes
4. Regarding your company size, does it have less than 500 employees?	Yes
5. What about your proposed innovation? Has it been patented or does it have any patents pending?	No
6. Could it be patented, copyrighted, or otherwise protected?	Don't Care
7. Are you planning on using SBIR/STTR funding to conduct any of the following? a. Systems studies. b. Market research. c. Commercial development of existing products or proven concepts. d. Studies. e. Laboratory evaluations. f. Modifications of existing products without innovative changes.	No
8. Does your technology area align with any of the following research areas of interest to NASA?	Yes
9. Is there a likelihood of your proposed technology having a commercial application?	Yes
10. Has your firm been paid or is currently being paid for equivalent work by any agency of the federal government?	No

**Table 16.2 – SBIR/STTR Profile Framing Questions**