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# A Collaborative Approach to Building Personal Knowledge Networks or

How to Build a Knowledge Advantage Machine?

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# Importance of Knowledge in Post-Modern Society

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An investment in **Knowledge** returns the best interest of all.

Benjamin Franklin



# Nature of Knowledge

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- Knowledge is *power*
- Knowledge is *scattered*
- Knowledge is growing *exponentially*
- Knowledge is mingled with *trivia*

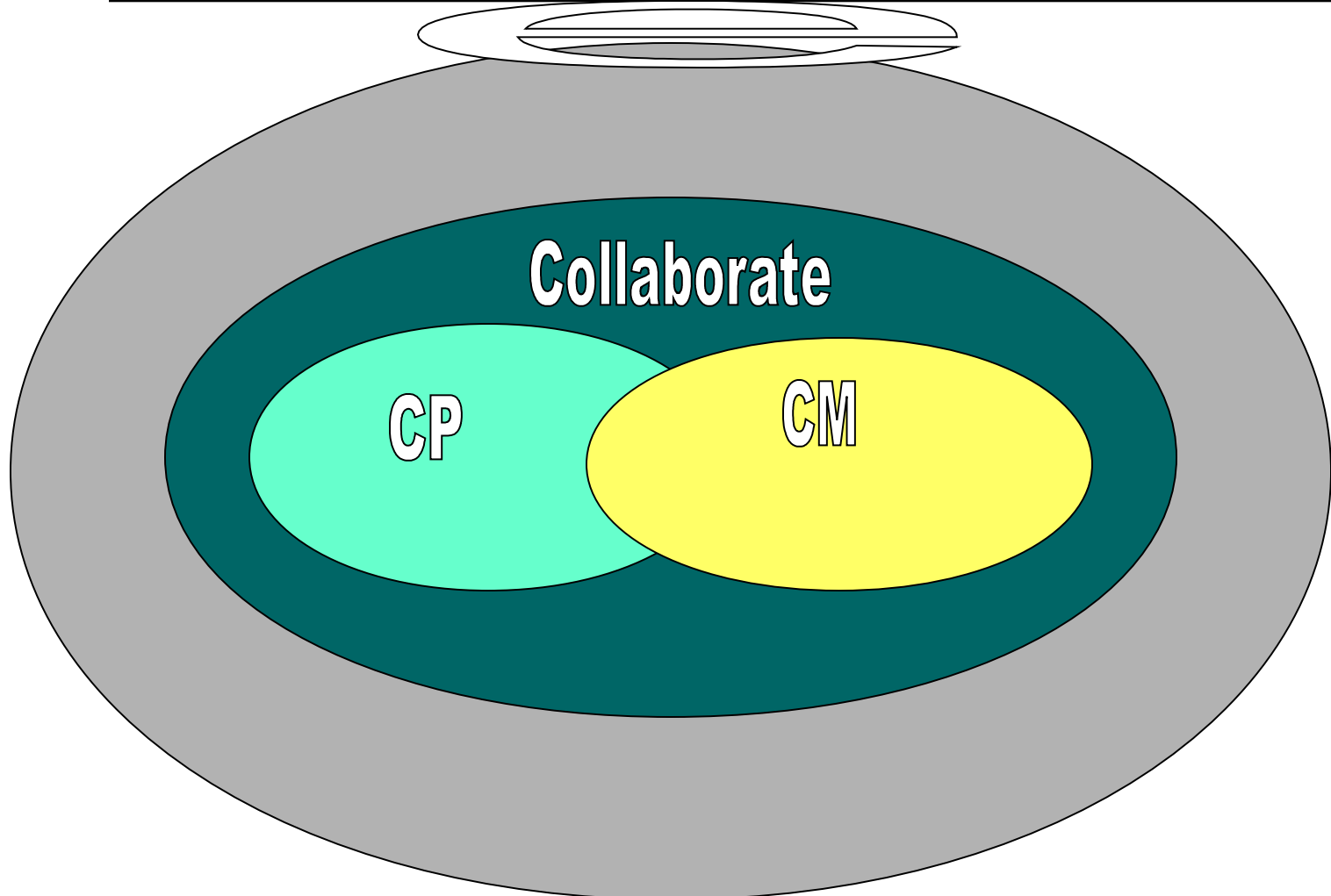
# To be useful....

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Knowledge must be synthesized, presented on-demand, be visualizable and adaptable to the present context.

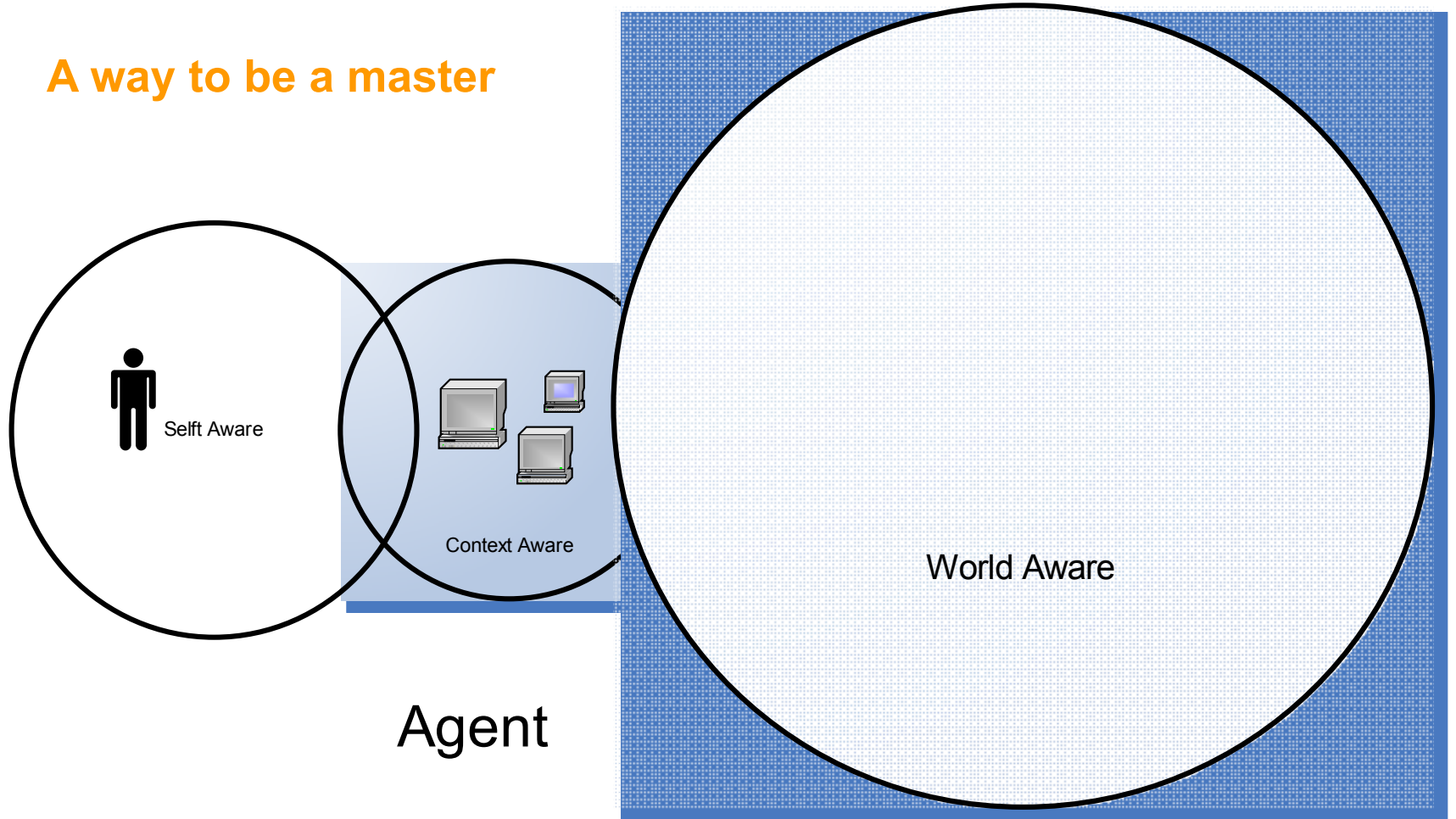
# Knowledge Advantage

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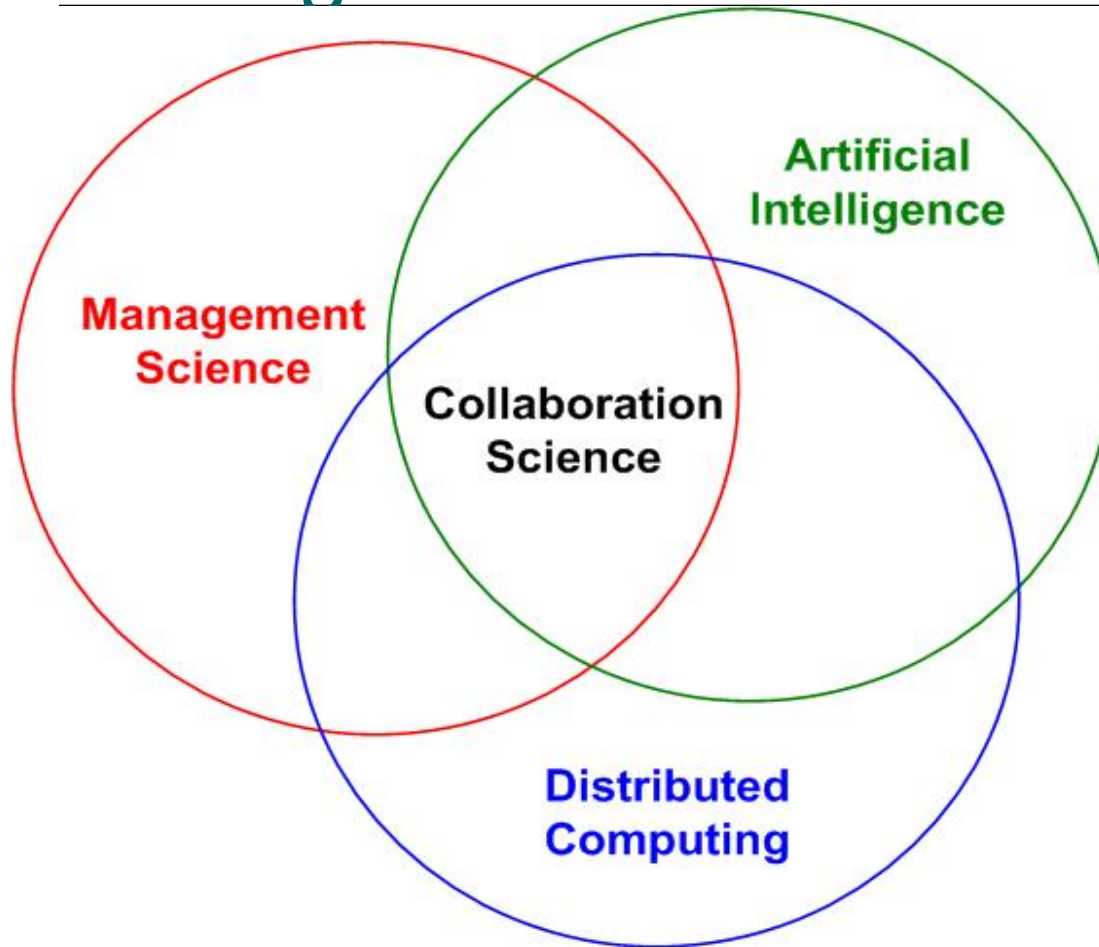
# Context Awareness

A way to be a master



# Collaboration and Knowledge Advantage

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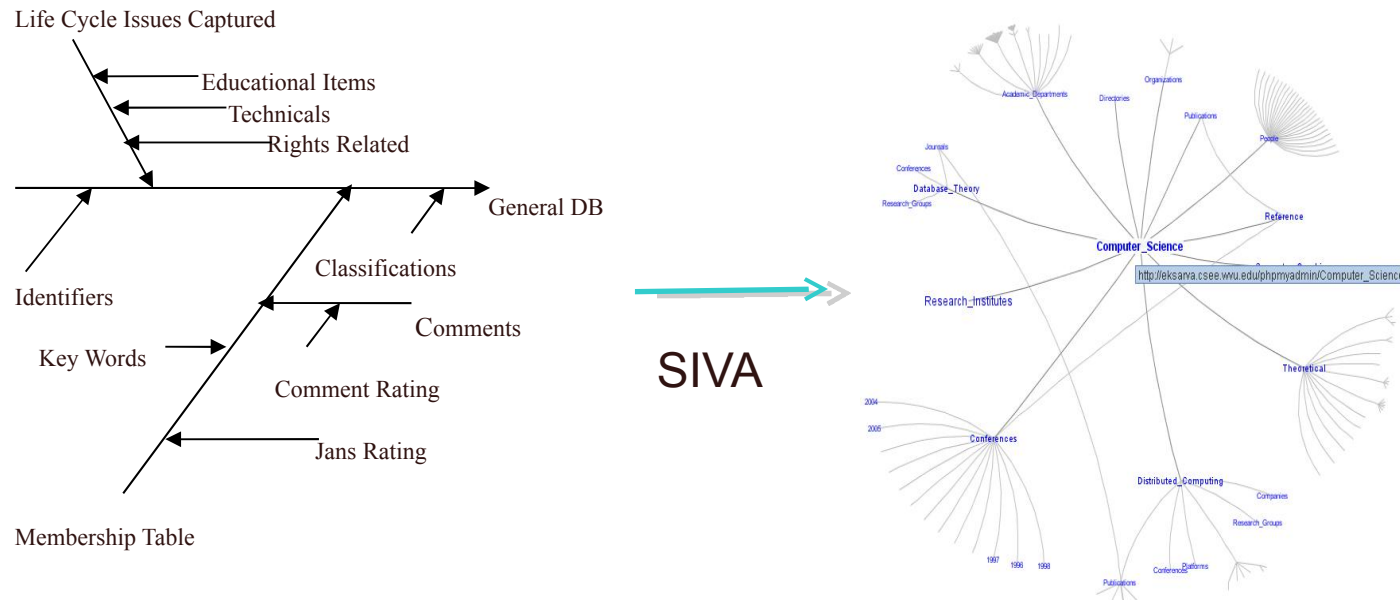
# Welcome to the SIVA Paradigm

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- Sieve
- Interlink
- Visualize
- Apply



# SIVA Paradigm -----Sieve, Interlink, Visualize, and Apply

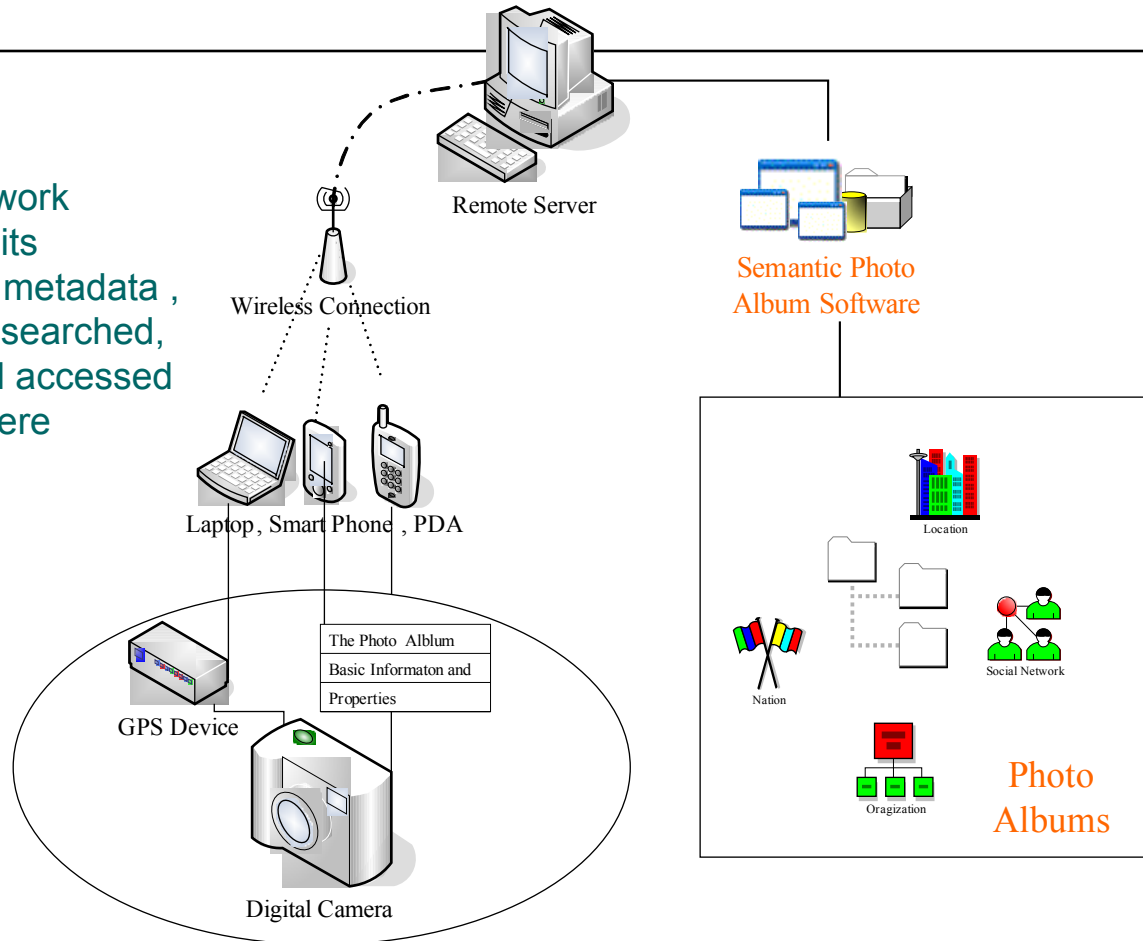


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# **Vijjana – A Model based on the SIVA Paradigm**

# An instance of Vijjana Model Application

Semantic network consists of units with enriched metadata, which can be searched, achieved, and accessed from everywhere by everybody.



# A Vijjana based Photo Album

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- Organizes itself
- Retrieves photos based on context
- Accessible to Personal Apps

# The Vijjana Model

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- $Vijjana-X = \{J, T, R, dA, oA, cA, vA, sA, rA\}$

X = the domain name

J= the collection of JAN's in the Vijjana-X

T = the Taxonomy used for classification of JAN's

R= the domain specific relations

dA = the discovery agent which finds relevant JAN's

oA = the organizing agent which interlinks the JAN's  
based on R

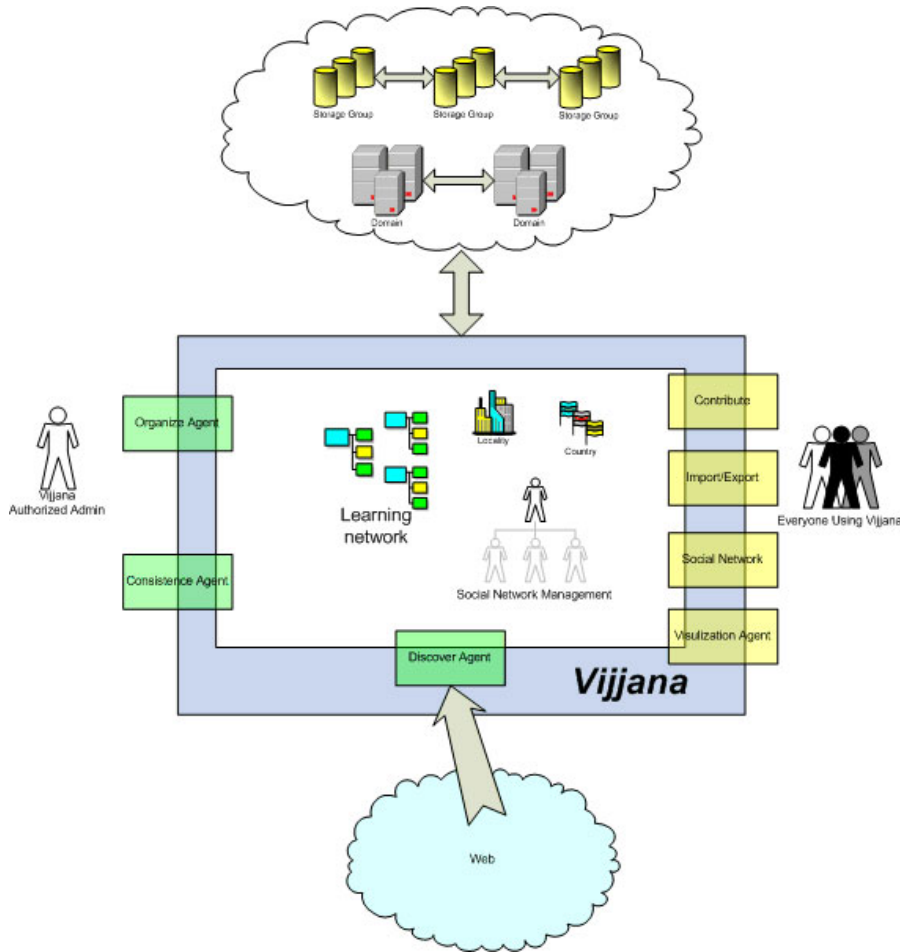
cA = the consistency/completeness agent

vA = the visualization agent

sA = the search agent

rA = the rating agent

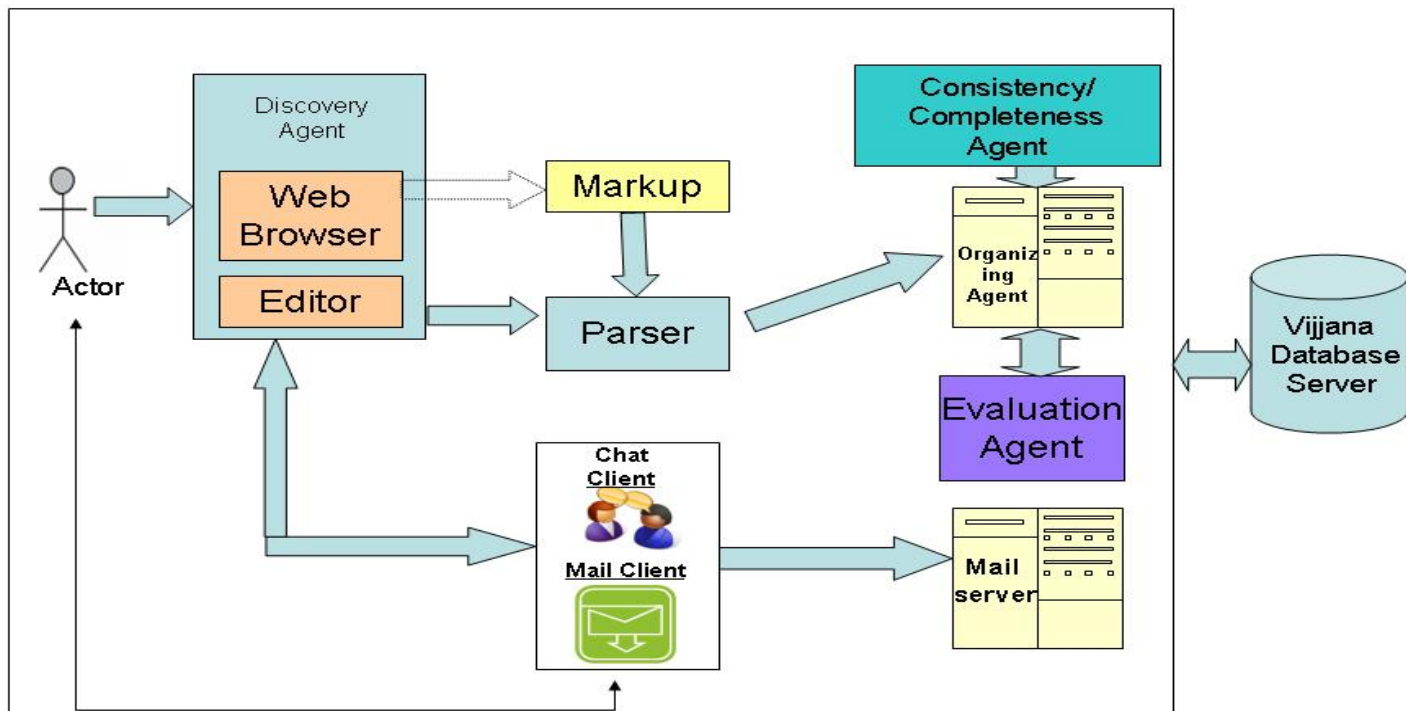
# Framework Infrastructure



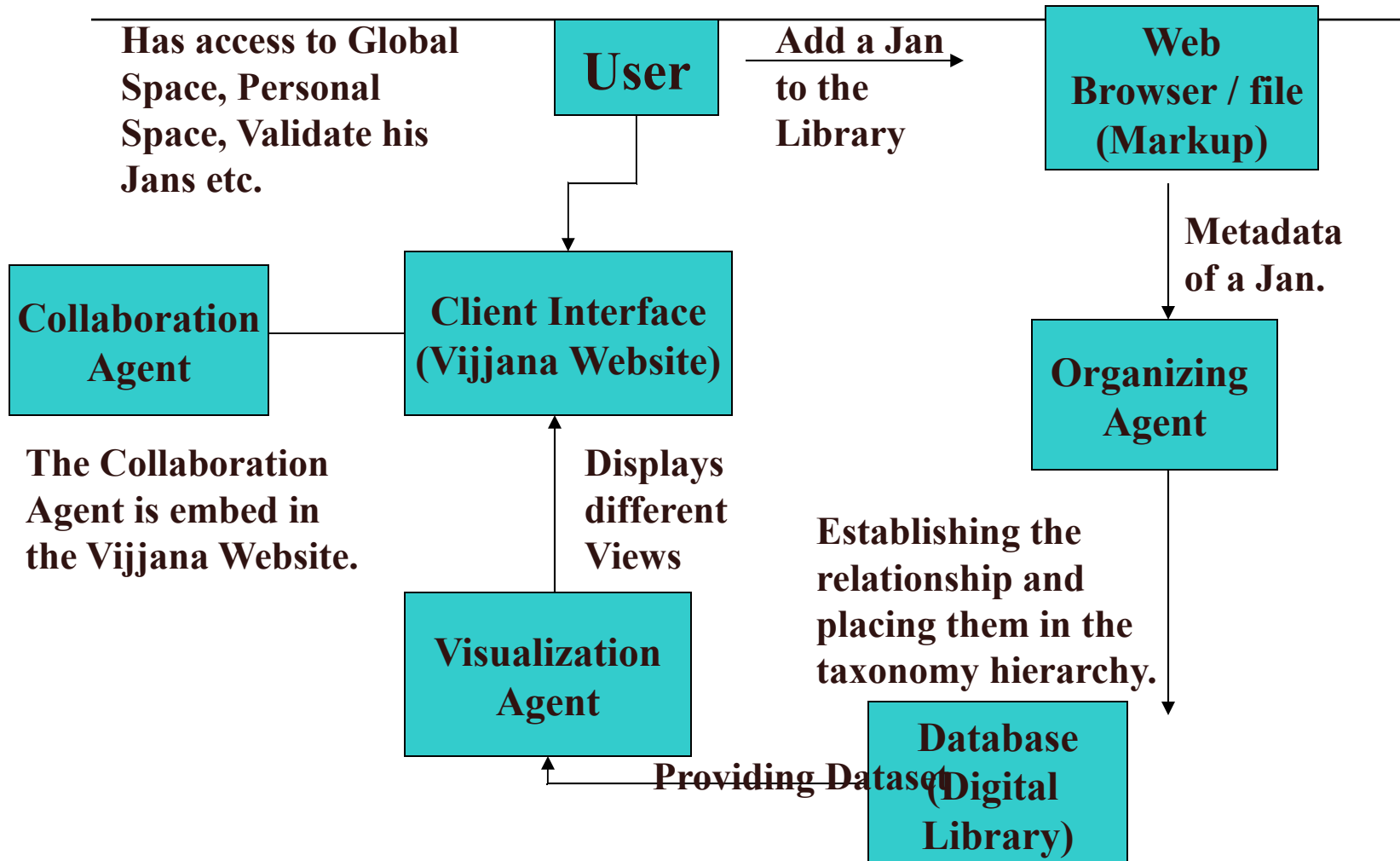
- Knowledge is contributed by trusted user and administrated by their supervisor
- Semantic service is running on recognizing, organizing, and clustering knowledge.
- Access can be everywhere

# Vijjana Client

VijSpace Client (Developer)  
Architecture



# Work Flow for knowledge accumulation





# The Vijjana Work Process

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- Identify the domain
- Create a Taxonomy and semantic links
- Discover URLs
- Markup
- Organize
- Archive

# The Vijjana Work Process

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- Check consistency and completeness
- Visualize
- Search
- Retrieve on demand contextually

# Web Interface Prototype

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- Browse JAN's with in the user interest.
- Comment on the JAN, for discussion .
- Rate the JAN, to get best & useful content.
- Visualization of Taxonomy, for addition of JAN's manually.
- Visualization of Knowledge Domains for easy navigation and User friendly search.

# Web Interface of Singed User

The screenshot shows a web browser window with the address bar displaying "Vijjana". The browser's search bar contains "find your JAN". Below the search bar is a navigation menu with a search bar and a "find your JAN" button. The main content area is divided into two columns. The left column features a radial navigation menu with "Science" at the center, connected to various categories: Earth\_Sciences, Educational\_Resources, Employment, Environment, F, G, H, Chats\_and\_Forums, D, Directories, Chemistry, C, Biology, B, s\_and\_Alternative\_Science, Astronomy, Agriculture, A, Encyclopedias, Regional, Reference, Recreation, News\_and\_Teens, Home, Health, Games, Computers, Business, Arts, World, Sports, Society, and Shopping. The right column lists categories with their descriptions and rates:

- Agriculture**  
The science and technology of growing living things (plants and animals) for human consumption or use as pets, ornament, food, fiber, or construction material. Includes Forestry, Horticulture and Soil Science.  
Rate:2
- Astronomy**  
Astronomy is the study physical and chemical properties of the stars, planets, galaxies and the universe, as we know it, today and in the past.  
Rate:0
- Chemistry**  
Chemistry is typically defined as the science that studies the composition, structure, and transformation of matter. It has been called "the central science" because of the way it is related with all the other sciences. Chemistry bridges the gap between  
Rate:5
- Technology**  
Engineering and related applied sciences.  
Rate:5
- Environment**  
Scientific aspects (and many non-scientific aspects) of environmental protection, natural heritage conservation, sustainable living, environmental impact of technologies, and global environmental change. Environmental Science involves the focused applic  
Rate:0
- Math**  
Math or mathematics is the study of numbers and variables representing numbers to solve everyday problems, learn about the world around us or to be an exercise in logical reasoning.  
Some applications of math are in the areas of finance, physic  
Rate:3
- Physics**  
"Physics is the study and application of the fundamental laws of nature, including the laws of motion, gravity, electromagnetism, heat, and microscopic interactions. These laws govern the

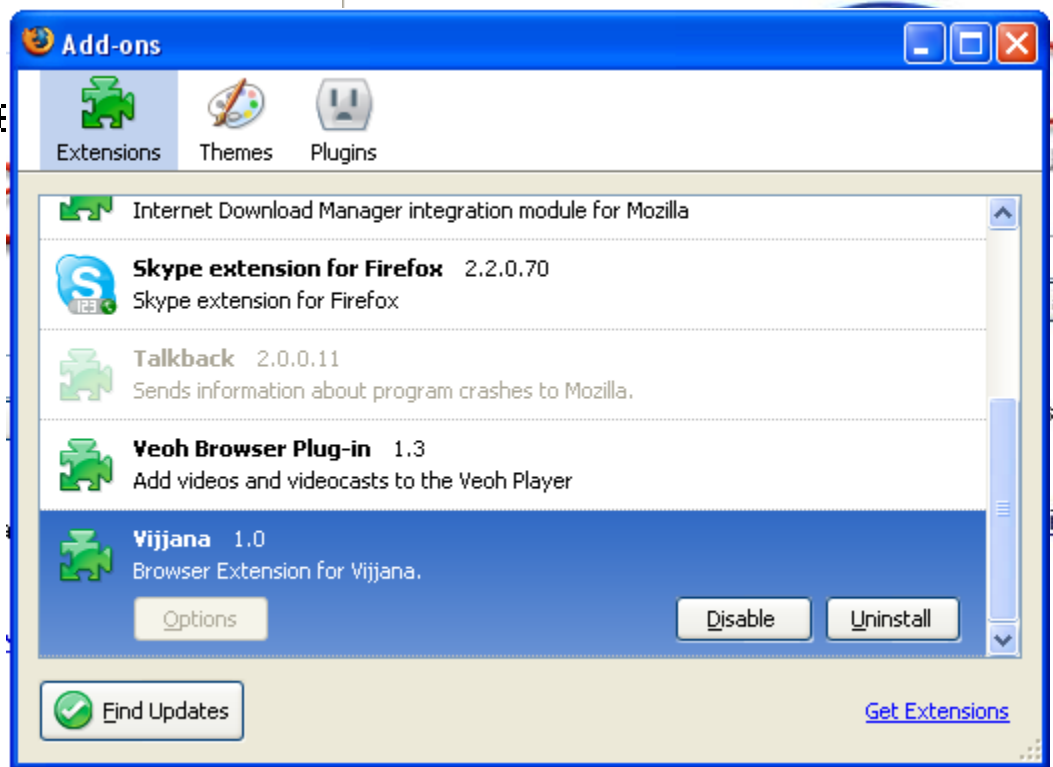
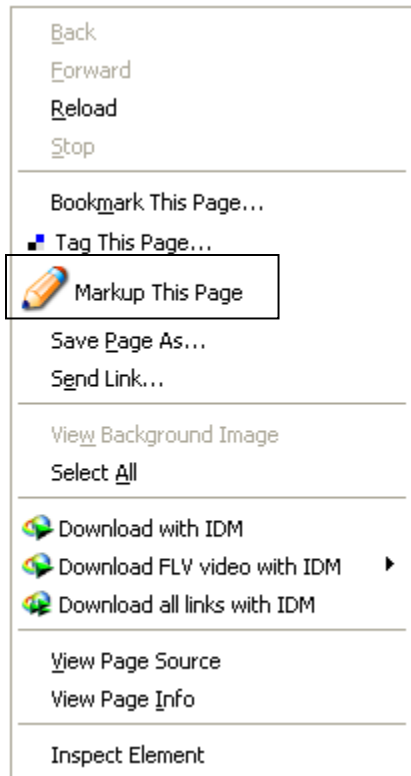
# Vijjana Add-on

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- We have also a **browser interface** for accessing Vijjana.
- Browser required: **Mozilla Firefox 2.0.1** or later
- **Vijjana toolbar** is provided as add-on for Firefox
- when the **Add-On** installed, will install the Vijjana buttons



Go to Vijjana Home Page



# SIVA Model (1)-- Context

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- Context Awareness
  - Grammatical analysis—VKE algorithm
- Manually define
  - Semantic network
  - Search criteria— Knowledge Sieving
- Machine Learning

# Context Awareness Prototype

Wearable computing - Wikipedia, the free encyclopedia - Mozilla Firefox

File Edit View History Bookmarks Tools Help del.icio.us Vijana

W http://en.wikipedia.org/wiki/Wearable\_computing

Getting Started Latest Headlines

Make a donation to Wikipedia and give the gift of knowledge!

article discussion edit this page history

Wearable computing

Log in / create account

Learn more about using Wikipedia for research

**Add this JAN to Vijana Database**

Path/URL to this "JAN"

http://en.wikipedia.org/wiki/Wearable\_computing

Keyphrases describing this "JAN"

ubiquitous compu → Add This

Wearable  
Wearable compu  
Wearable compu  
computing  
computer  
style  
article  
tone  
article or section  
merged

Hit "Delete" key to remove the selected keyphrase

Category: None Sub-Category: None

**Confirmation**

JAN added to Vijana Database

OK

JAN rating (Optional, Default = 1)

Low High

Add to DB Cancel



# SIVA Model(2) -- Channel

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- Expert System
  - Context detection
  - Resource utilization
- Data Mining
  - Data warehouse
  - Mobile information

# SIVA Model(3) – Sieving

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- Plenty of knowledge can be filtered
  - Under context
    - Where
    - Who
  - Under manual definition
    - Search Criteria
    - User preference

# Visual knowledge Sieve of Vijjana

The visual knowledge sieve for 'Computer Science' is a radial network diagram. The central node is 'Computer Science'. It branches out into several categories: Academic Departments, Organizations, Publications, Journals, Conferences, Database\_Theory, Research\_Groups, Reference, Research\_Institutes, Theoretical, and Distributed\_Computing. The 'Conferences' branch further divides into sub-nodes for the years 2004, 2005, 1997, 1990, and 1998. The 'Distributed\_Computing' branch includes sub-nodes for Companies, Research\_Groups, and Conferences/Forums. A URL is highlighted in a box: [http://websarva.csee.wvu.edu/phpmyadmin/Computer\\_Science](http://websarva.csee.wvu.edu/phpmyadmin/Computer_Science).

The search interface on the right shows the search term 'computer science' and a list of 10 results. A dropdown menu is open, showing sorting options: Sort Best Match First (selected), Sort Newest First, Sort Oldest First, and Sort by Ratings. A ratings table is also visible:

| 254 Ratings |      |
|-------------|------|
| 5 star:     | (76) |
| 4 star:     | (66) |
| 3 star:     | (36) |
| 2 star:     | (31) |
| 1 star:     | (45) |

The search results list includes:

1. **Computer science** - Wikipedia, the free encyclopedia  
en.wikipedia.org - **Computer science** (or **computing science**) is the study foundations of information and computation and their implementation and
2. **Computer Science**  
library.albany.edu - A gateway to **computer science** resources on the Web broad subject categories.
3. **SCHOOL OF COMPUTER SCIENCE/Carnegie Mellon University**  
cs.cmu.edu - Education in **computer** music, data mining, machine learning, vision, and speech with a list of research topics.
4. Department of **Computer Science** | University of Illinois at Urbana ...  
cs.uiuc.edu - Department of **Computer Science**, Thomas M. Siebel Center for **Computer Science**, ... or webmaster@cs.uiuc.edu with questions or comments on this page.
5. **Computer Science** in the Yahoo! Directory  
dir.yahoo.com - Yahoo! reviewed these sites and found them related to **Computer Science**.
6. **Stanford Computer Science**  
www-cs.stanford.edu - Founded in 1965, the Department of **Computer Science** is a center for research and education at the undergraduate and graduate levels. ...
7. Department of **Computer Science**, Cornell University  
cs.cornell.edu - The program is broad and rigorous with courses in algorithms, data structures, logic, programming languages, scientific computing, systems, and theory, ...
8. Department of **Computer Science**  
cs.umd.edu - Offers BS, MS, and Ph.D. degrees in **computer science**. Research interests include artificial intelligence, distributed systems, databases, high performance ...
9. **Computer Science** Division | EECS at UC Berkeley  
cs.berkeley.edu - CS Directory (by name) Soda Directory (by room) Graduate Students Courses Course Home Pages - Course Descriptions - CS Class Schedule ...
10. **UCLA Computer Science** Department  
cs.ucla.edu - UCLA **Computer Science** Department 4732 Boelter Hall ... "Top Research Universities Faculty Scholarly Productivity Index" for the field of **computer science**. ...

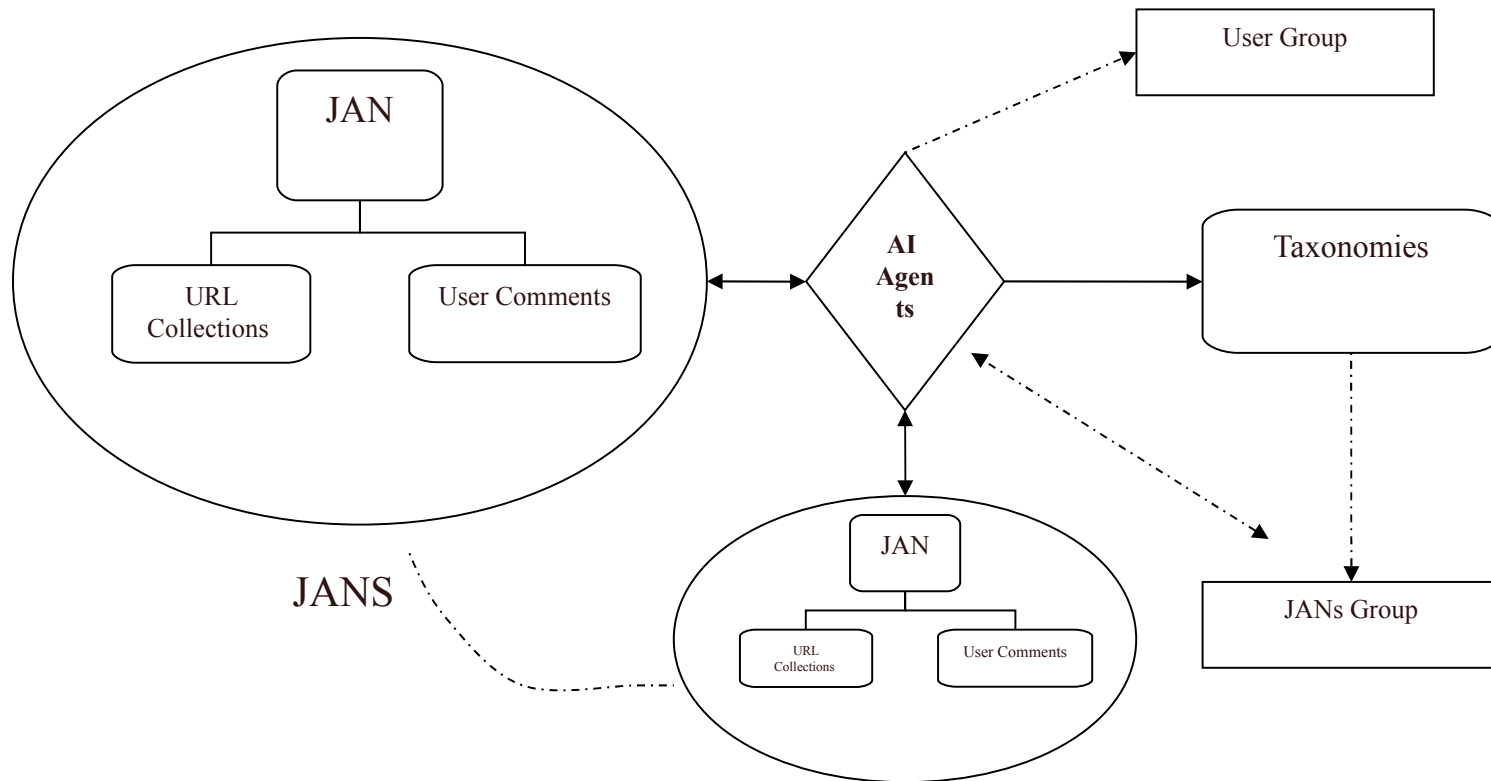
Navigation buttons at the bottom of the search interface include: « Previous 1 2 3 4 5 6 7 Next ».

# SIVA Model(4) – InterLink

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- Relevant knowledge should be clustered together
- Similar topics can be grouped to be discussed
- People with same interest should be provided with communication channels.
- Links should be updated as time goes on
- Dynamically transform based on lower-level semantics changes

# SIVA Model(4) – InterLink



# SIVA Model(5) - Visualization

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- ❑ Visualization is more than a method of computing!
- ❑ a visual form enabling the viewer to observe, browse, make sense, and understand the information.
- ❑ interactive graphics, imaging, and visual design.
- ❑ It relies on the visual system to perceive and process the information.

# What is Information Visualization ?

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- “The use of computer-supported, interactive, visual representation of **abstract** data to amplify cognition.”

Card, Mackinlay, and Shneiderman

- Interactive
- Visual representation
- Amplify cognition

# Vijjana Views

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- ❑ HyperGraph
  - Hypergraph View
- ❑ Prefuse Toolkit
  - Tree View
  - RadialGraph View





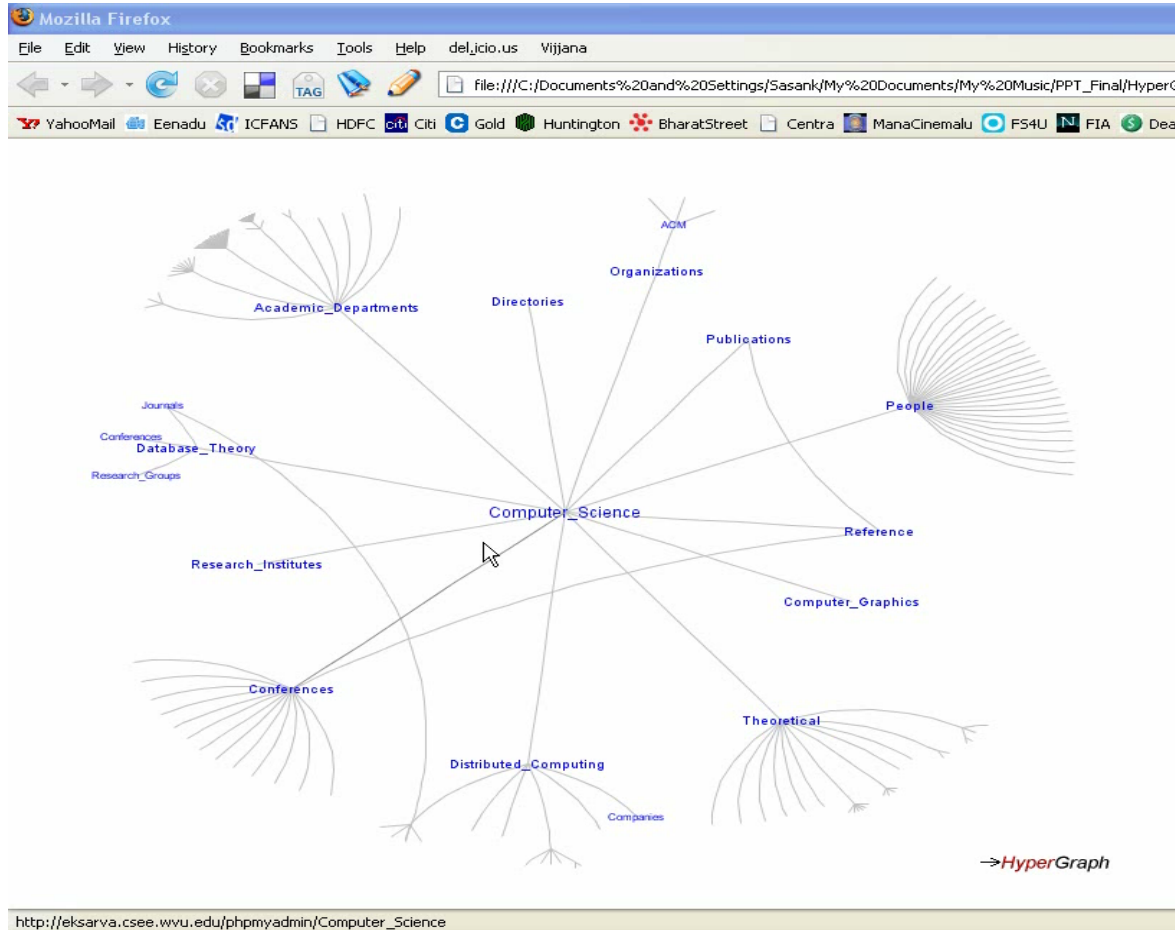
# HyperGraph

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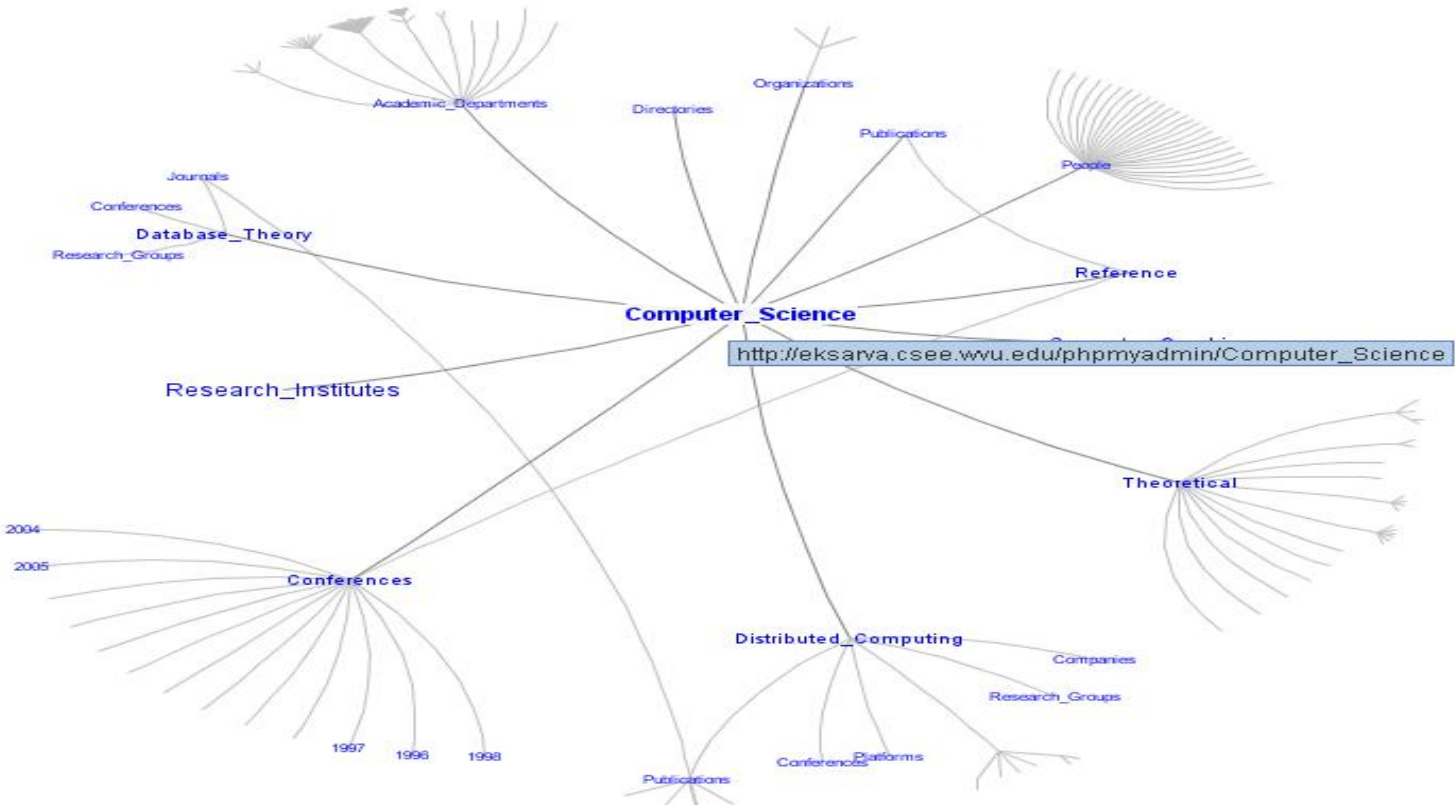
- ❑ **HyperGraph** is an **open source** project which provides java code to work with **hyperbolic geometry** and especially with **hyperbolic trees**.
- ❑ Hyperbolic trees are very useful - they show more data than standard tree representations like your favorite explorer, and they have a great look and feel.

<http://hypergraph.sourceforge.net/>

# HyperGraph



# Knowledgebase of Computer Science Domain



# JAN's from Computer Science Domain

computer Science      Search

Sort Best Match First  
Sort Best Match First  
Sort Newest First  
Sort Oldest First  
Sort by Ratings

Web Pages - about 22.7

hide details

1. **Computer science** - Wikipedia, the free encyclopedia  
[en.wikipedia.org](http://en.wikipedia.org) - **Computer science** (or computing science) is the study foundations of information and computation and their implementation and

2. **Computer Science**  
[library.albany.edu](http://library.albany.edu) - A gateway to **computer science** resources on the Wet broad subject categories.

3. **SCHOOL OF COMPUTER SCIENCE/Carnegie Mellon University**  
[cs.cmu.edu](http://cs.cmu.edu) - Education in **computer** music, data mining, machine learning, vision, and speech with a list of research topics.

4. **Department of Computer Science | University of Illinois at Urbana ...**  
[cs.uiuc.edu](http://cs.uiuc.edu) - Department of **Computer Science**, Thomas M. Siebel Center for **Computer Science**, ... or webmaster@cs.uiuc.edu with questions or comments on this page.

5. **Computer Science in the Yahoo! Directory**  
[dir.yahoo.com](http://dir.yahoo.com) - Yahoo! reviewed these sites and found them related to **Computer Science**.

6. **Stanford Computer Science**  
[www-cs.stanford.edu](http://www-cs.stanford.edu) - Founded in 1965, the Department of **Computer Science** is a center for research and education at the undergraduate and graduate levels. ...

7. **Department of Computer Science, Cornell University**  
[cs.cornell.edu](http://cs.cornell.edu) - The program is broad and rigorous with courses in algorithms, data structures, logic, programming languages, scientific computing, systems, and theory, ...

8. **Department of Computer Science**  
[cs.umd.edu](http://cs.umd.edu) - Offers BS, MS, and Ph.D. degrees in **computer science**. Research interests include artificial intelligence, distributed systems, databases, high performance ...

9. **Computer Science Division | EECS at UC Berkeley**  
[cs.berkeley.edu](http://cs.berkeley.edu) - **CS** Directory (by name) Soda Directory (by room) Graduate Students Courses Course Home Pages · Course Descriptions · **CS** Class Schedule ...

10. **UCLA Computer Science Department**  
[cs.ucla.edu](http://cs.ucla.edu) - **UCLA Computer Science** Department 4732 Boelter Hall ... "Top Research Universities Faculty Scholarly Productivity Index" for the field of **computer science**....

254 Ratings

|         |      |
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| 1 star: | (45) |

« Previous 1 2 3 4 5 6 7 Next »

# Mobile --- iPhone View



Vijana iPhone app currently can detect user's basic information and provide information correspondingly.

# Conclusion and Future Work

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- **To exploit the knowledge that is so pervasive and accessible, we need something like **Vijjana** .....**

# Reference

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- Vijjana – A Pragmatic model for Collaborative, Self-Organizing, Domain-Centric Knowledge Networks - Reddy, Dr. Ramana. Morgantown : IKE08, 2008.
- Beginning DotNetNuke 4.0 Web Site Creation in VB 2005 with Visual Web Developer 2005 Express. ISBN: 1-59059-767-2.
- The LINQ Project:  
<http://msdn.microsoft.com/en-us/netframework/aa904594.aspx>  
[online].
- Beginning Ajax by Chris Ullman, Lucinda Dykes: ISBN: 978-0-470-10675-4  
<http://www.wrox.com/WileyCDA/Section/id-303217.html>  
[online].
- The Semantic Web: <http://infomesh.net/2001/swintro/>  
[online].



# Questions ?

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