

Implementing Creative Environments for Scientific Research in a Research Institute



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Dissertation Outline

1. Introduction
2. Requirements and Theory of Creative Support
3. Development of a Creative Environment (CE) for a Research Institute
4. Implementation of a Prototype CE
5. Constructing an Ontology of COE Program
 - An Application of a CE: Usefulness Test
6. Conclusions

Related Research Works

Creative support by psychology:

Art (Edmonds and Candy 2002);

Learning of small children (DP Shepardson 1996);

Industrial design (G Gemser and M Leenders 2001).

Creative support by management science:

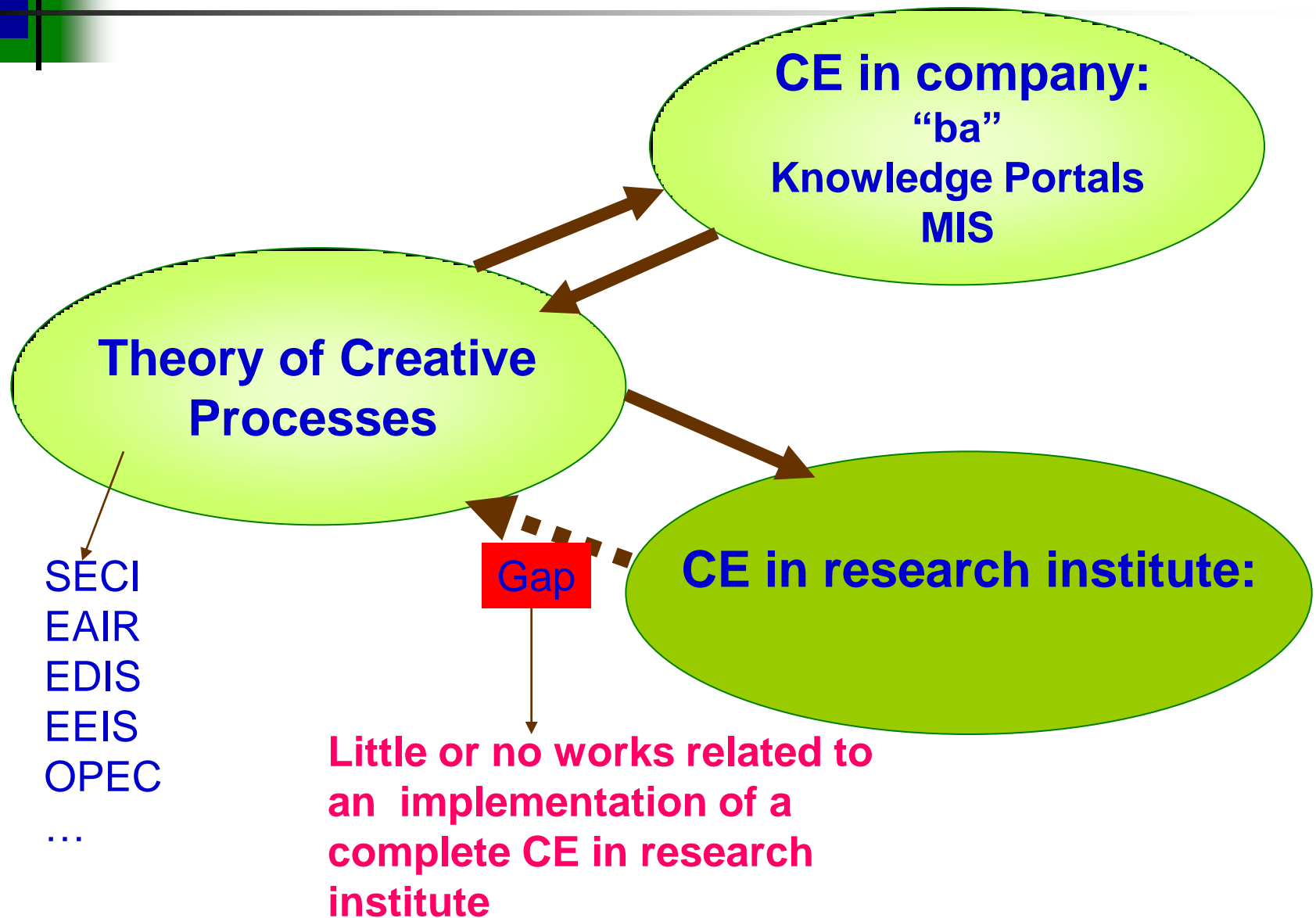
“Ba” (Krough and Nonaka et al. 2000);

Models of creative processes (Wierzbicki and Nakamori, 2006);

Knowledge portals for company (R Mack, Y Ravin and RJ Byrd 2001);

MIS (Allen S. Lee 1989).

Research Motivation



Research Objectives

- 1) **Find** which aspects of **knowledge creation processes** require most support in a CE;
- 2) **Build a framework** of a CE;
- 3) **Specify the functions and elements** of a CE;
- 4) **Implement a CE** in a research institute for scientific research;
- 5) **Verify the usefulness** of the CE. (Conduct some applications, tests and user evaluations)



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User Requirements Analysis

A collaboration work with Dr. Tian on User Requirement Analysis:

- ◆ Conducted a **survey** for investigating “**What aspects of knowledge creation processes should be supported**” at JAIST.
- ◆ Developed a **Survey On-line Analysis System** for transforming the **survey results** to the **user requirements**.

Survey Instrument

Survey population:

- All students, post doctors, and associates (professors not included – Dreyfus & Dreyfus, 1986)

Questionnaire Release:

- Publish English and Japanese version online
- Released from Oct.3 to Oct.31, 2005

Response Rate:

- 143 respondents; 13.2% response rate

Analysis Method Using in Survey On-line Analysis System



A family of achievement functions and the reference profile approach (Wierzbicki et al, 2000)

- The system user specifies a **reference distribution** of results (truly demanded);
- The system computes the values of the **achievement functions**;
- The system orders the questions and prepares a **ranking list**.

User Requirements Analysis System (1)

Part Four. 3: Do you feel you are efficient in generating new ideas and research concepts?

A: Very good

B: Good

C: Average

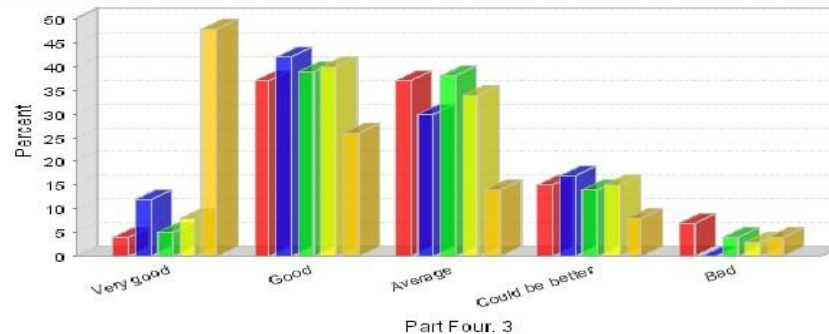
D: Could be better

E: Bad

Percent	A	B	C	D	E
MS	4%	37%	37%	15%	7%
KS	12%	42%	30%	17%	0%
IS	5%	39%	38%	14%	4%
ALL	8%	40%	34%	15%	3%
reference	48	26	14	8	4

school status Nationality calculate view chart

Types	A ($y_{jk}-r$)	B ($y_{jk}-r$)	C ($y_{jk}-r$)	D ($y_{jk}-r$)	E ($y_{jk}-r$)	mini $\sigma_{jk} (y_{jk}-r)$	$\sum e \sigma_{jk} (y_{jk}-r)$	$\sigma_1(y_{jk}, r, e)$
MS	-44	11	-23	-7	-3	-44	-66	-77.0
KS	-36	16	-16	-9	4	-36	-41	-56.5
IS	-43	13	-24	-6	0	-43	-60	-73.0
ALL	-40	14	-20	-7	1	-40	-52	-66.0



An example of computing the distributions of answers and the value of function σ_1 for a selected question

User Requirements Analysis System (2)

the basic achievement function:	
Parameter:	Reference Distribution:
<input type="radio"/> 0.1	VG=21,G=38,AVG=22,B=14,VB=5
<input type="radio"/> 0.1	VG=42,G=42,AVG=7,B=5,VB=4
<input type="radio"/> 0.2	VG=48,G=26,AVG=14,B=8,VB=4
<input type="radio"/> 0.5	VG=36,G=28,AVG=20,B=12,VB=4
<input checked="" type="radio"/> 0.5	VG=48,G=26,AVG=14,B=8,VB=4
<input type="radio"/> 0.1	VG=48,G=26,AVG=14,B=8,VB=4
<input type="radio"/> 0.1	VG=36,G=28,AVG=20,B=12,VB=4
the function based on the Theory of Regret	
Parameter:	Reference Distribution:
<input type="radio"/> 3	VG=21,G=38,AVG=22,B=14,VB=5
<input type="radio"/> 11	VG=48,G=26,AVG=14,B=8,VB=4
<input type="radio"/> 3	VG=42,G=42,AVG=7,B=5,VB=4
<input type="radio"/> 3	VG=48,G=26,AVG=14,B=8,VB=4
<input type="radio"/> 3	VG=36,G=28,AVG=20,B=12,VB=4

Please input the number of question entries you want to display at the top and bottom of ranking list

10

Please click following buttons, you can get a ranking list of questions according to the achievement degrees with respect to different types marked on the buttons. (Note: "Totality" means the system order the questions for total distributions; "All Types" means the system order the questions for all types of distributions.)

Totality	school	status	Nationality
ALL types	KS	Master student	Japanese
	IS	Doctoral student	Others
	MS	Post doctor	
		Associate	

Select the computing results to be displayed

User Requirements Analysis System (3)

The worst top 10 in ranking list			
question index	questions	Types	score
Part Three. 1(9)	Because of language reason, it is difficult to discuss research issues with the colleagues from other countries.	ALL	-58.8
Part Three. 1(17)	I easily and readily share tacit knowledge (highly personal and unformulated knowledge and experience).	ALL	-57.8
Part Three. 1(7)	I am efficient in preparing presentations and speaking at seminars.	ALL	-55.0
Part Three. 1(8)	I have good feed back, enough critical questions and suggestions from my group in discussing.	ALL	-54.0
Part Five. 3	You know enough to plan and organize your research efficiently. There are short-term and long-term research goals and you know how to achieve them step by step.	ALL	-54.0
Part Two. 4	You are efficient in designing and planning experiments?	ALL	-51.2
Part Four. 3	Do you feel you are efficient in generating new ideas and research concepts?	ALL	-50.4
Part Five. 1	It is difficult for you to decide research topic.	ALL	-49.4
Part Four. 6	Do you feel you have good enough proportion of relaxation after your normal work to get new ideas?	ALL	-48.6
Part Five. 6	Do you feel you have well enough technical support for planning and organizing your research?	ALL	-46.8
The best 10 in ranking list			
question index	questions	Types	score
Part Two. 1 (1)	Learning and training on how to do experiment (including theory, method and skill)	ALL	6.8
Part Two. 1 (2)	Help and Guidance from the supervisor or colleagues	ALL	-1.6
Part One. 1 (4)	How often do you use following information and resources to search the scientific literature? (Search engine, for example Google, Yahoo and so on)	ALL	-2.8
Part Three. 1 (11)	Because of research competition, we can not exchange our ideas and results adequately with the colleagues.	ALL	-4.4
Part Three. 1 (6)	I am too shy to discuss my ideas openly and freely with the colleagues.	ALL	-5.0
Part One. 1 (3)	How often do you use following information and resources to search the scientific literature? (Scientific Website related to your research)	ALL	-14.2
Part Two. 1 (5)	Good managements of experimental equipments, operational manuals and material	ALL	-23.4
Part Three. 1 (12)	My supervisor encourages us to discuss and exchange our idea in the group.	ALL	-23.4

An example of the ranking lists of the worse evaluated questions and the best evaluated questions

Results of User Requirements

The most critical issues (by the System):

- c1) Difficulty in discussing research questions with colleagues from other countries; (Debate)
- c2) Easiness of sharing tacit knowledge; (Debate)
- c3) Critical feedback, questions and suggestions in group discussions; (Debate)
- c4) Organizing and planning research activities; (Roadmapping)
- c5) Preparing presentations for seminars and conferences; (Debate)
- c6) Designing and planning experiments; (Implementation)
- c7) Generating new ideas and research concepts. (Hermeneutic)

The most important issues (by the System):

- i1) Learning and training how to do experiments; (Implementation)
- i2) Help and guidance from the supervisor and colleagues; (Hermeneutic)
- i3) Frequent communication of the group. (Debate)

Suggestions and comments (by the respondents):

- s1) Plentiful information and knowledge source; (Hermeneutic)
- s2) Communication and discussion with other researchers either from the same lab or from different labs, different subjects, or other institutes. (Debate)
- s3) Training and guiding on research method and experiment skill; (Implementation)

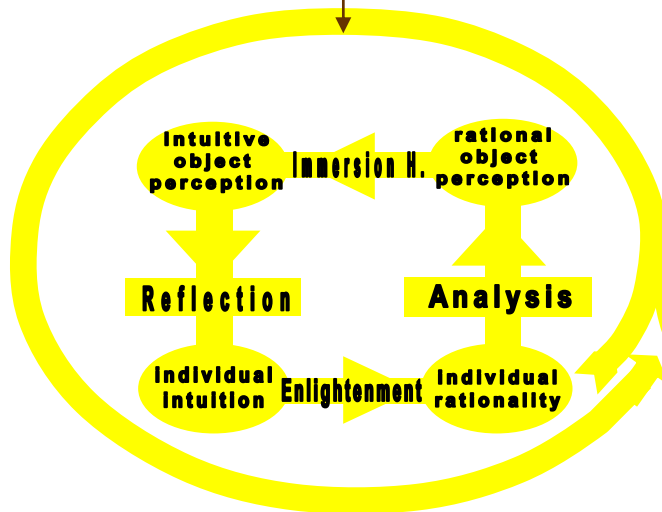
All the requirements were considered into the Creative Environment (CE):

■ Solved by the prototype CE

■ On-going work in the CE

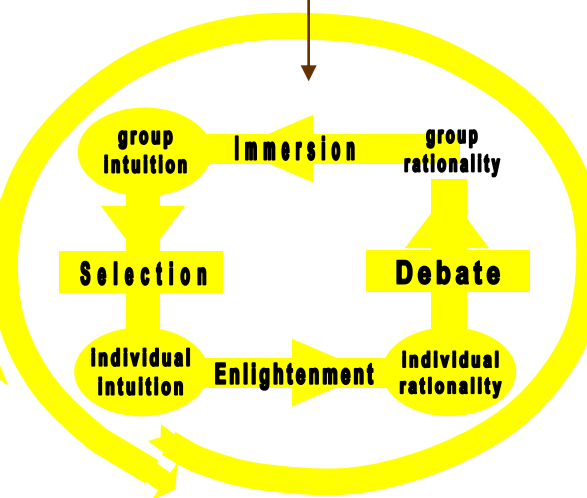
Three Creative Processes Models

C7,i2,S1



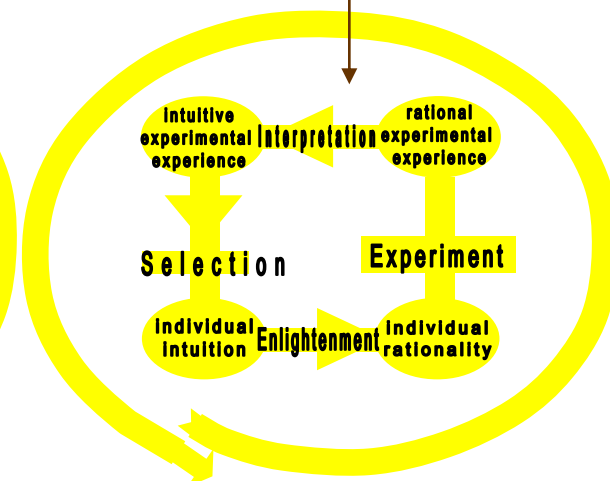
Hermeneutic: EAIR

C1, C2,C3,C5,i3,S2



Debate: EDIS

C6,i1,S3

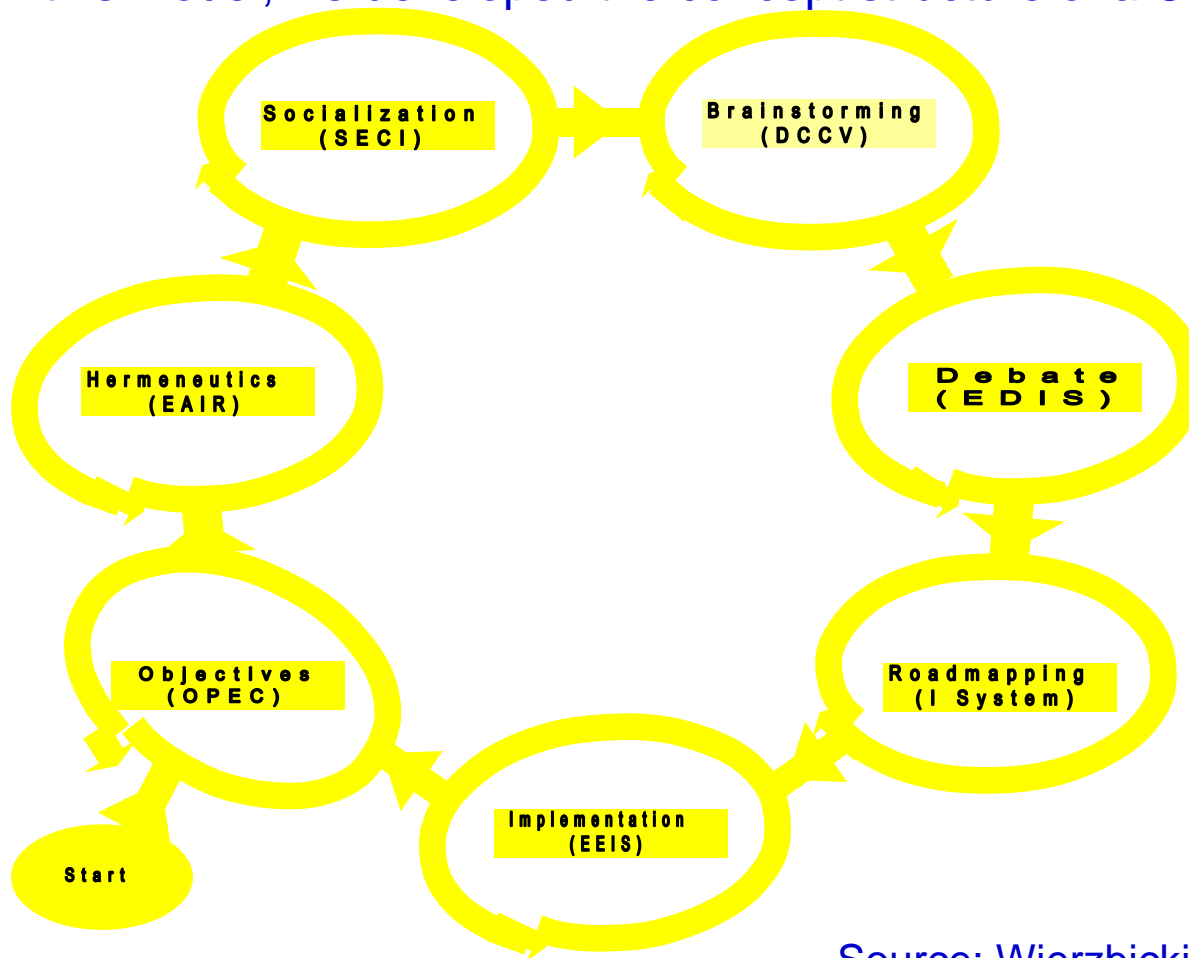


Implementation: EEIS

Source: Wierzbicki and Nakamori, 2006

JAIST Nanatsudaki Model

JAIST Nanatsudaki Model is the extension of the three models of creative processes:
Based on this model, we developed the concept structure of a CE.



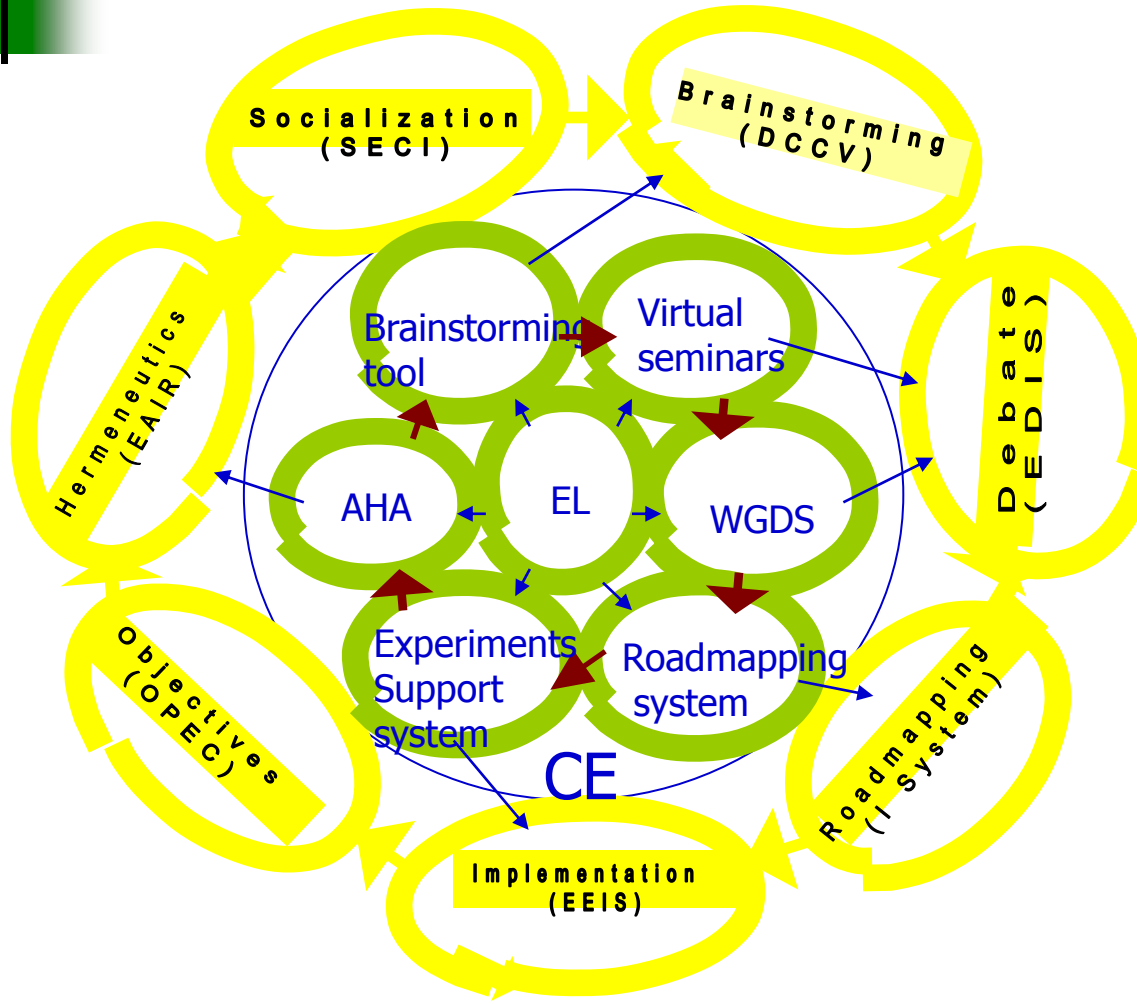
Source: Wierzbicki and Nakamori, 2006



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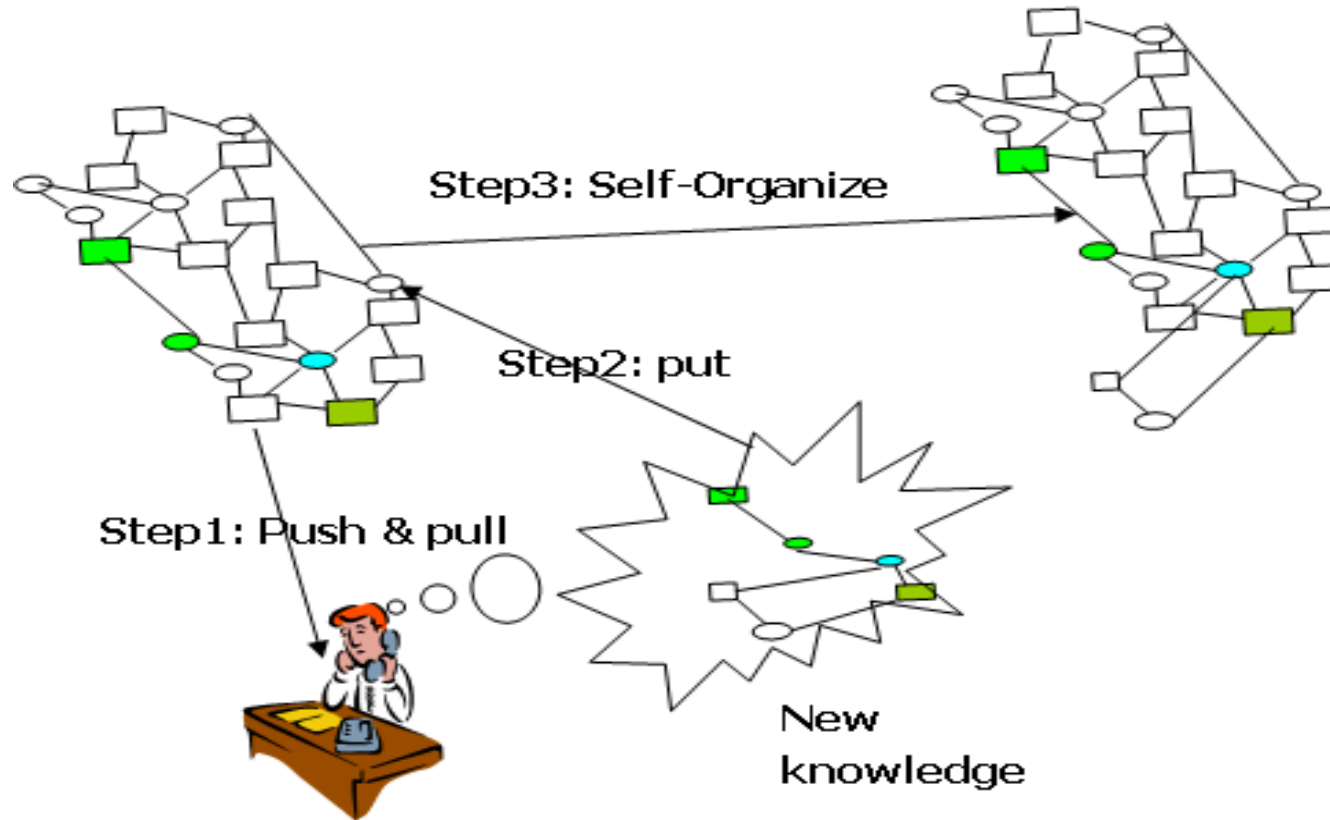
Conceptual Structure of the CE (1)



EL:
Electronic Library
AHA:
Adaptive Hermeneutic Agents
WGDS
Web-based Group Debating
Space

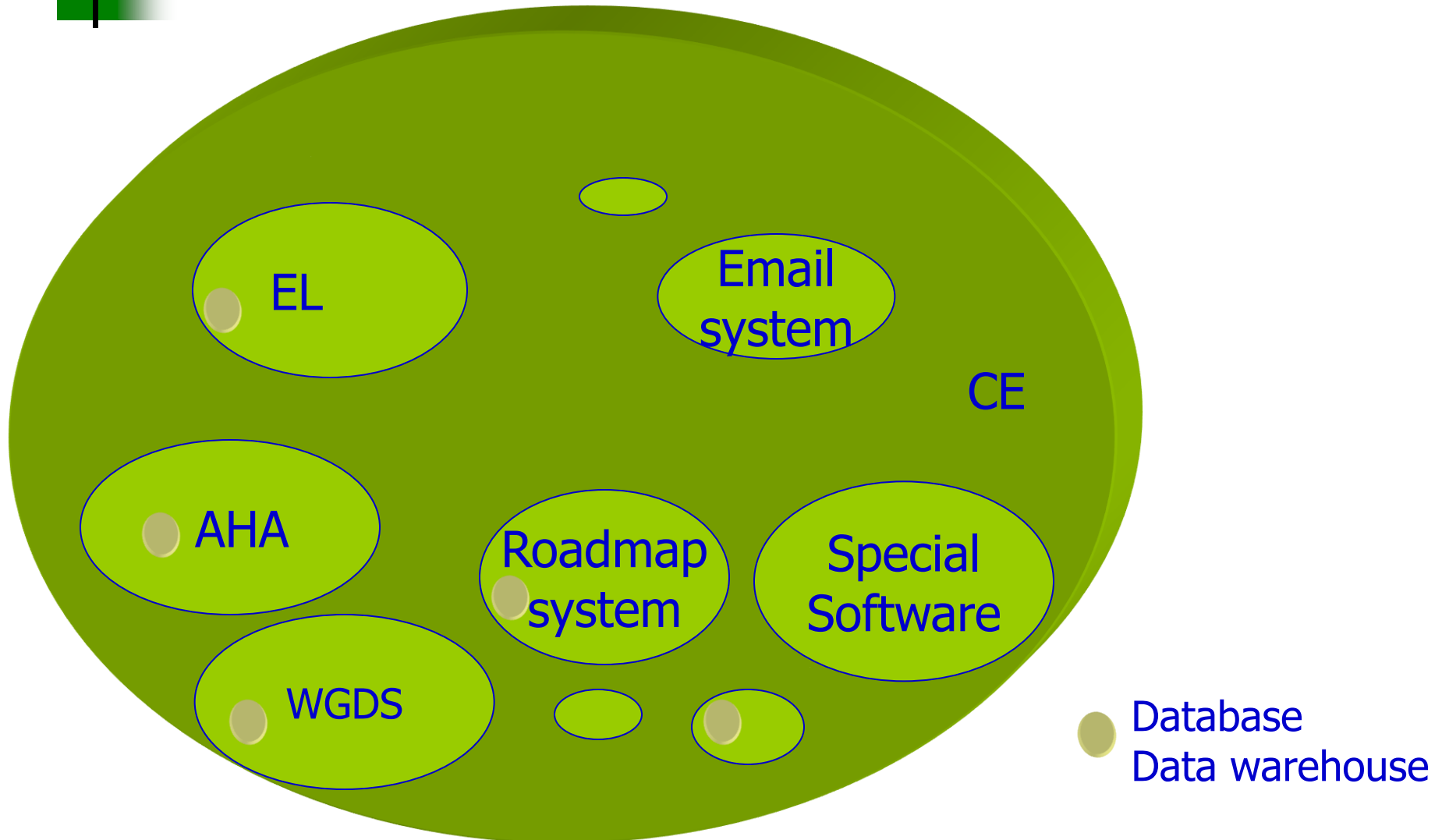
CE for JAIST Nanatsudaki Model

Conceptual Structure of the CE (2)

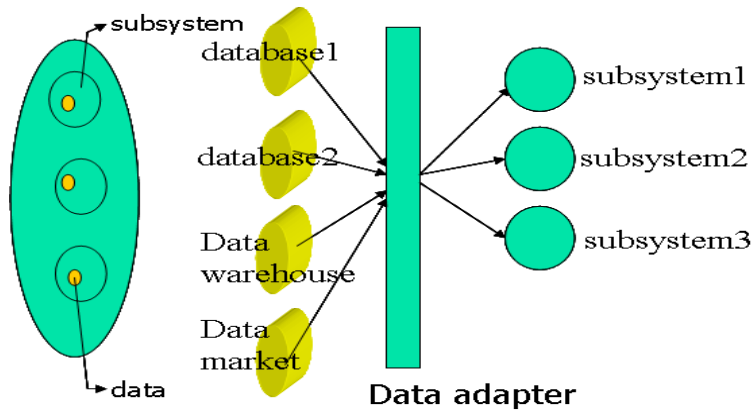


A general process of knowledge creation
understood as a part of a network

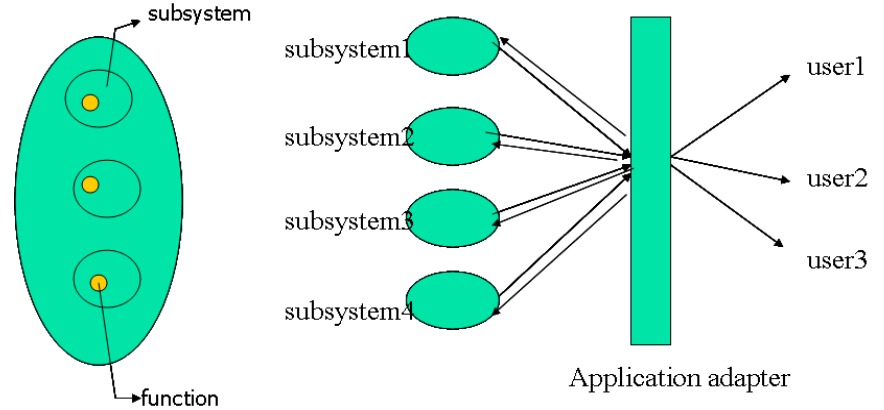
Problem: Information Island



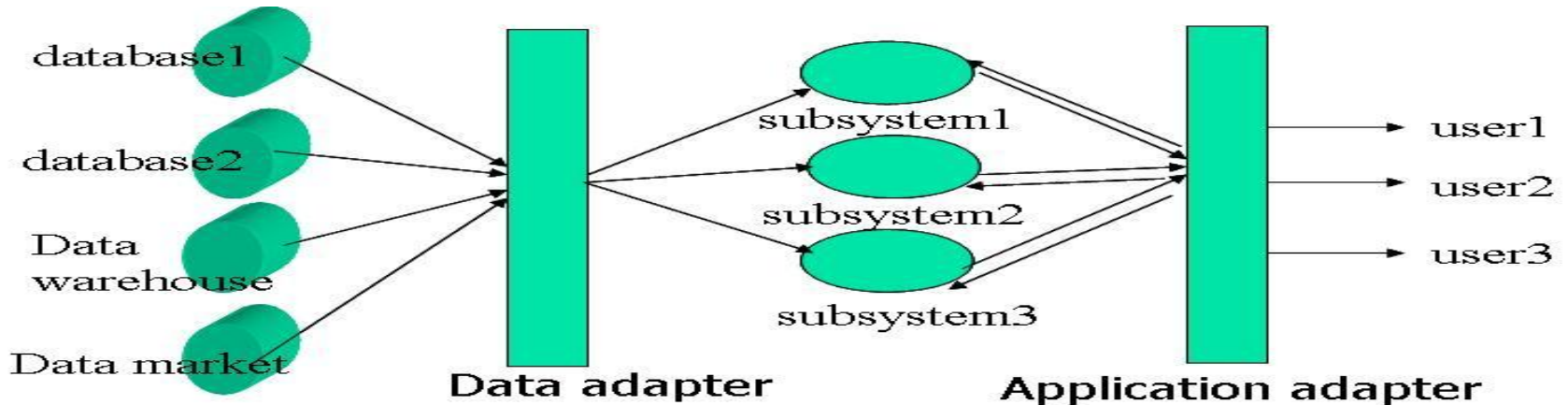
Integration Adapters



a) Data adapter embedded in systems



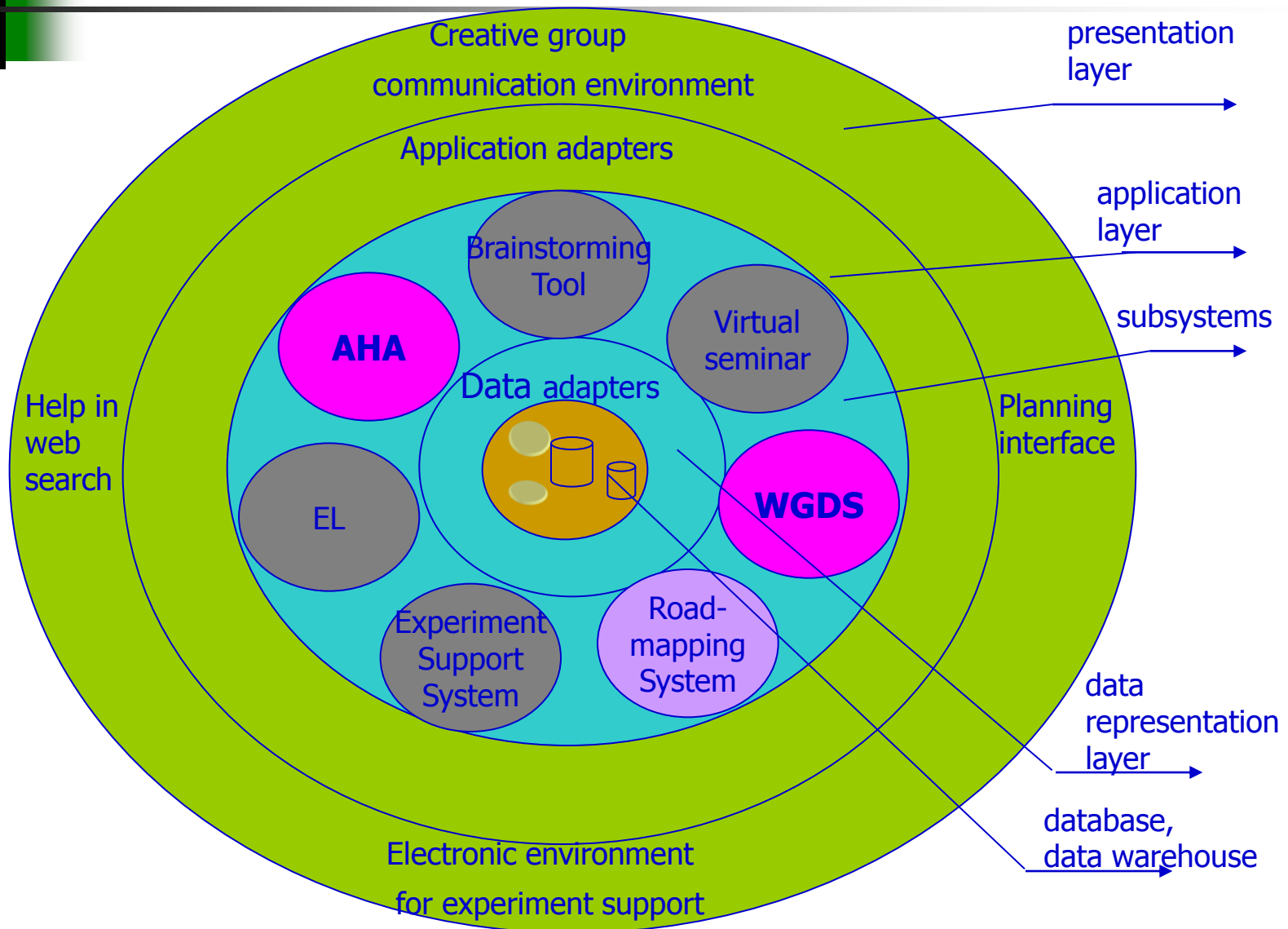
b) Application adapter embedded in systems



c) Data adapter and application adapter embedded in systems

Development of a CE for a research institute

A Framework of the CE

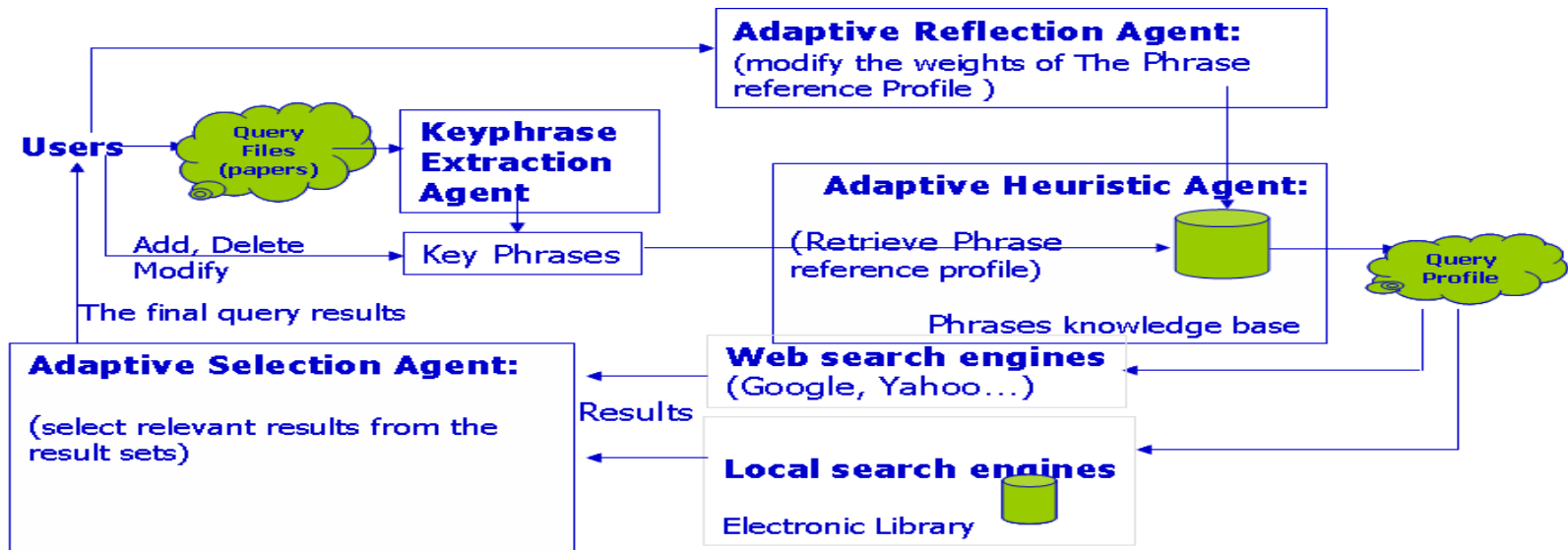


Functional Specification of a CE

- 1) Searching for Related Work;
- 2) Expressing a Users Thoughts;
- 3) Describing and Sharing Read Literature;
- 4) Seminar Discussions;
- 5) Review of Work of Other Users;
- 6) Supporting Experiments;
- 7) Planning a New Research Project.

Modular Architecture of a CE

- 1) Information Retrieval Module;
- 2) Personal Workspace Module;
- 3) Group Communication Module;
- 4) Planning and Roadmapping Module;
- 5) Experiment Module.

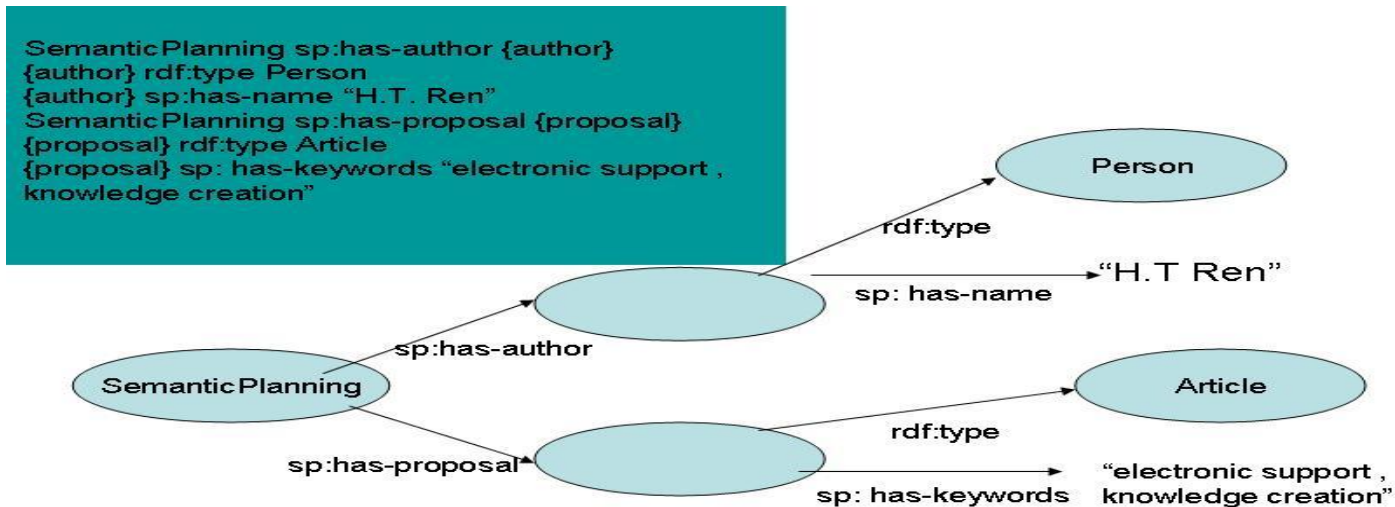


Information Retrieval Module

Knowledge Representation and Metadata

RDF --- A powerful ontological metadata model:

- 1) The Validating RDF Parser (VRP)
- 2) The RDF Schema Specific Database (RSSDB)
- 3) The RDF Query Language (RQL).



RDF graph: (the metadata of user profile)

Summary of Chapter 3

A framework and a detailed specification of a CE for the support scientific research:

- 1) Meet user requirements;
- 2) Support for JAIST Nanatsudaki Model;
- 3) Express all critical functions;
- 4) Influence the work on the prototype CE;
- 5) Provide reference for the evaluation of a CE.



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Selected Functions

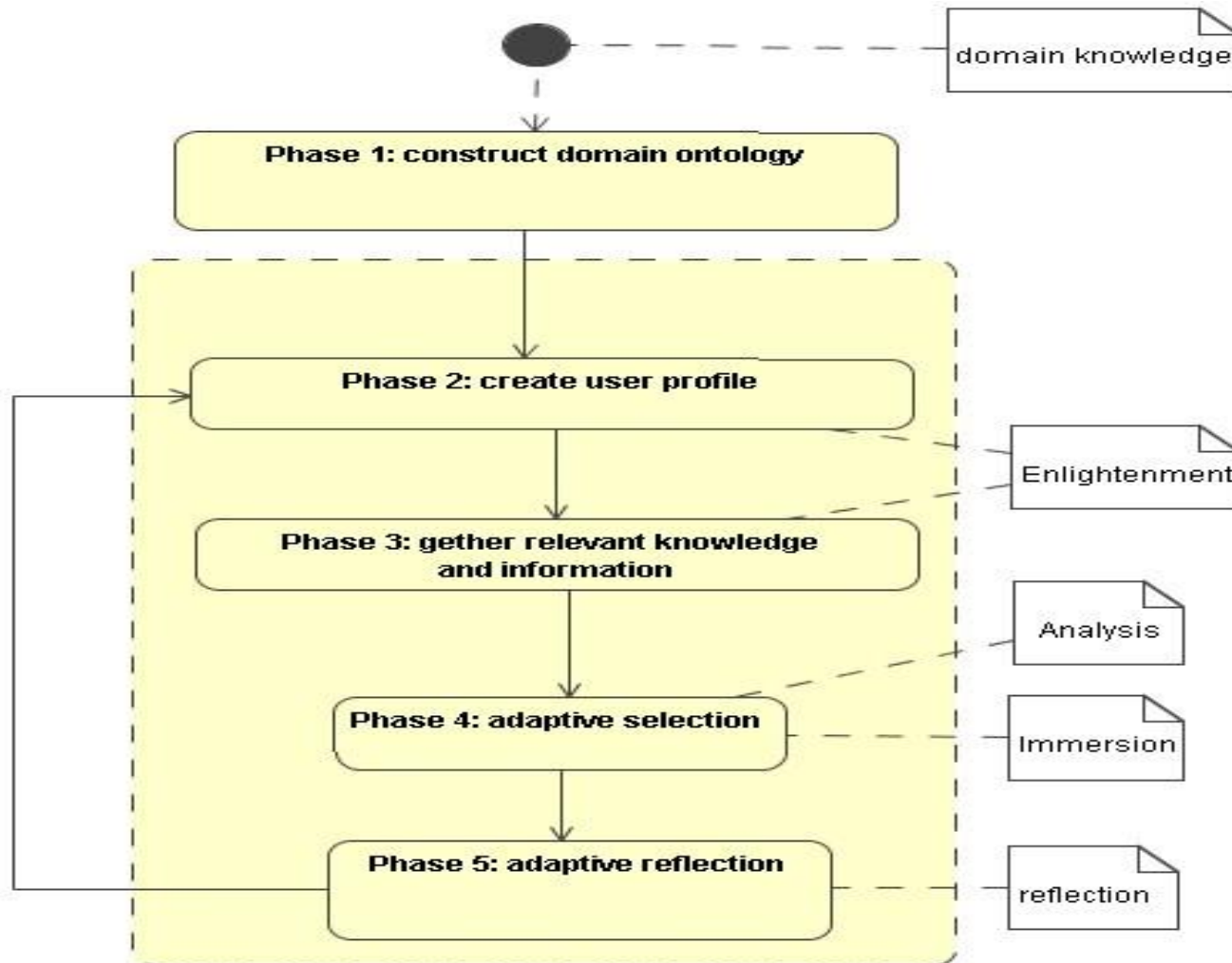
- Adaptive hermeneutic: (AHA)
 - Help in web search
 - Special search in texts-specialized text mining
- Creative group communication environment (WGDS)
 - Posting papers
 - Debating panels
 - Brainstorming panels
 - Casual knowledge sharing
- Planning and roadmapping systems

Purpose of the AHA

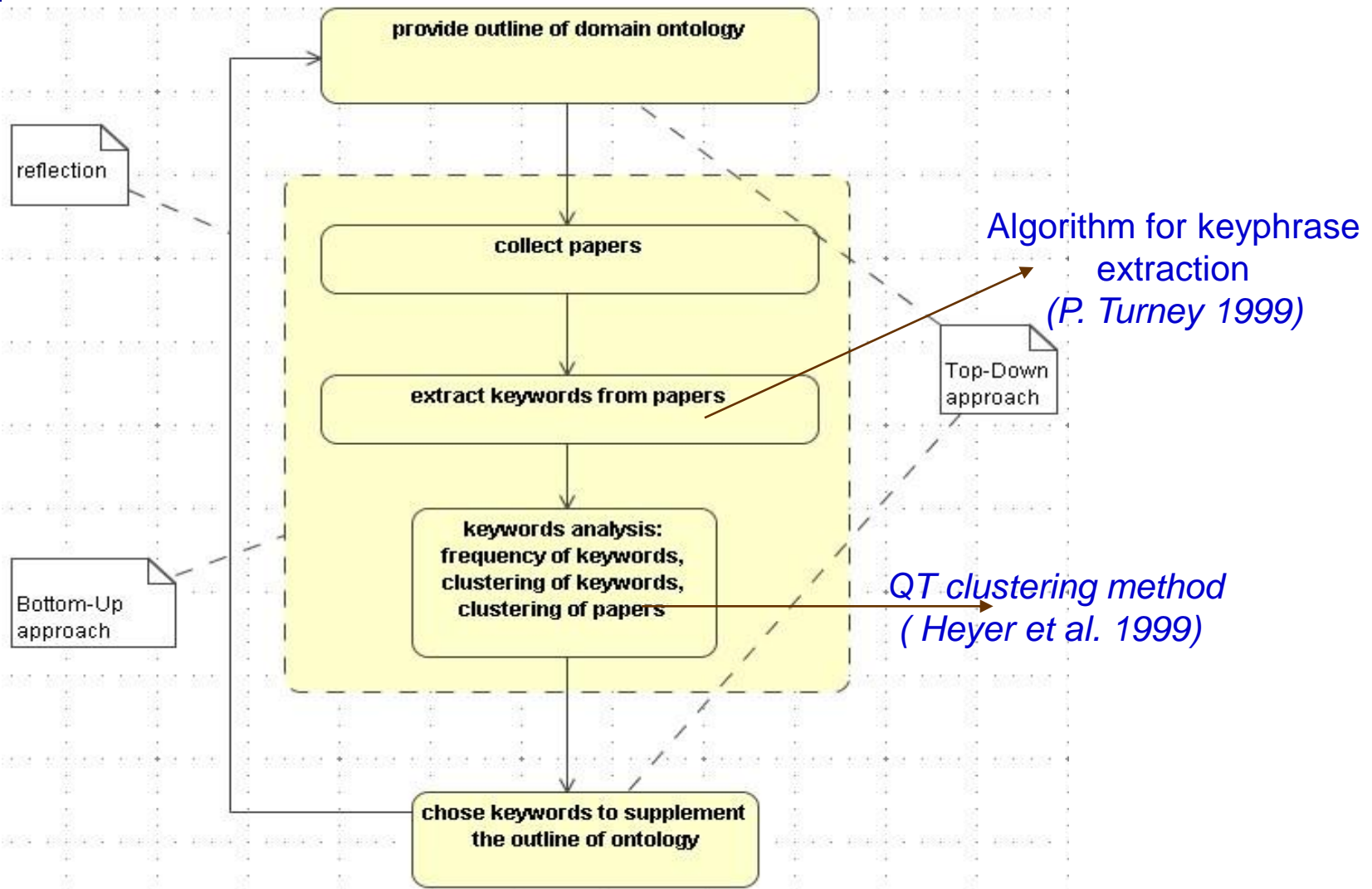
Adaptive Hermeneutic Agent (AHA)

- 1) to meet user requirements;*
- 2) to support for basic process of scientific knowledge creation;*
- 3) to stress intuitive and personalized aspects of the search and of interpretation of search results;*
- 4) to adapt to web search engines but add to them own adaptive functionality.*

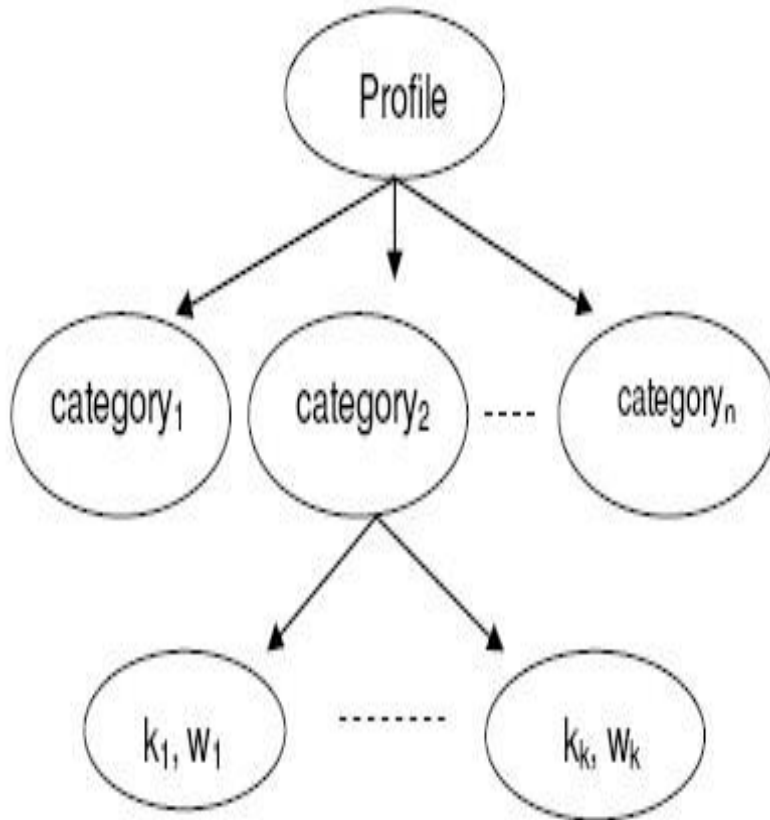
A General process of hermeneutical activity



Phase1: Construct Domain Ontology



Phase2: Create User Profile



```
- <scientific_interests_root id="-1" org="Nakamori-lab" email="hongtao@jaist.ac.jp" name="H.T Ren's Profile">
- <node id="1" name="1. Knowledge creation and transformation">
- <node id="2" name="1.1. Theory of knowledge creation">
- <node id="3" name="1.1.1. Knowledge transformation (conversion)">
  <leaf id="4" name="knowledge sharing" weight="10" />
  <leaf id="5" name="informal communication" weight="9" />
  <leaf id="6" name="conceptual knowledge" weight="6" />
</node>
- <node id="7" name="1.1.7. Creative space: a network model of knowledge creation">
  <leaf id="8" name="knowledge creation processes" weight="1" />
  <leaf id="9" name="creative space" weight="2" />
</node>
</node>
- <search_items id="11">
  <last_search id="12" searchdate="2007-02-21" folder="hongtao_20070221_001" index="yes" />
  <search_preference id="13" search_engines="google" document_types="doc and pdf" maximum_of_returns="10" />
</search_items>
- <potential_collaborators_root id="14">
  <within_project id="15" collaborator_name="Tian Jing" email="jtian@jaist.ac.jp" address="" />
  <outside_project id="16" collaborator_name="Adam Wierzbicki" email="adamw@pjwstk.edu.pl" address="" />
</potential_collaborators_root>
</scientific_interests_root>
```

Hierarchy structure of the user's profile

An example of user profile presented in XML

Phase 3: Gather Relevant Knowledge

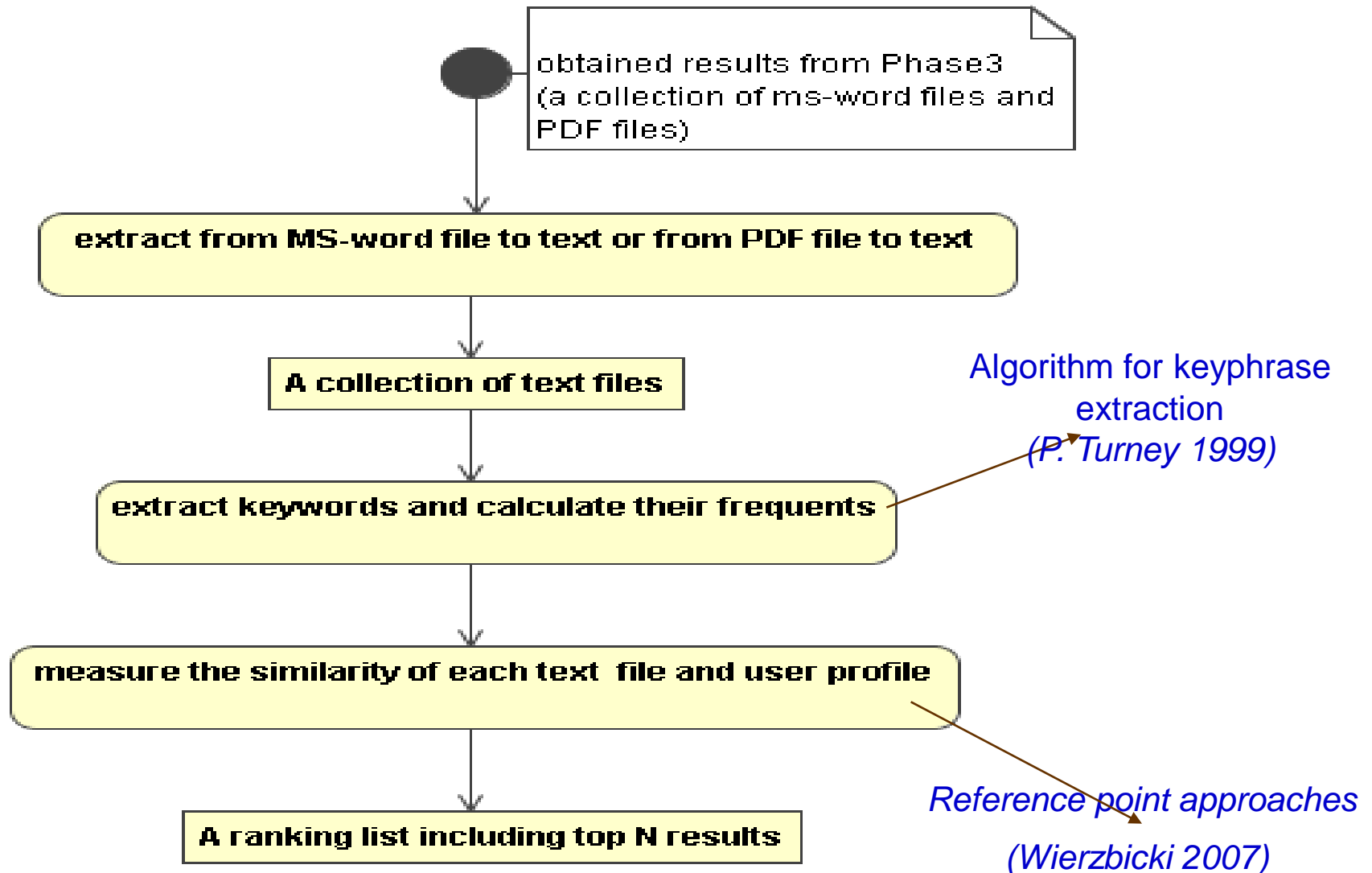
The input of the download agent:

- 1) Import user profile;*
- 2) Select search engines;*
- 3) Select the maximum number of the returns.*

The output of the download agent:

A collection of relevant documents.

Phase 4: Adaptive Selection



Phase 5: Adaptive Reflection

1) Modify user profile;

(add new keywords, delete existing keywords, modify the weights of keywords, etc).

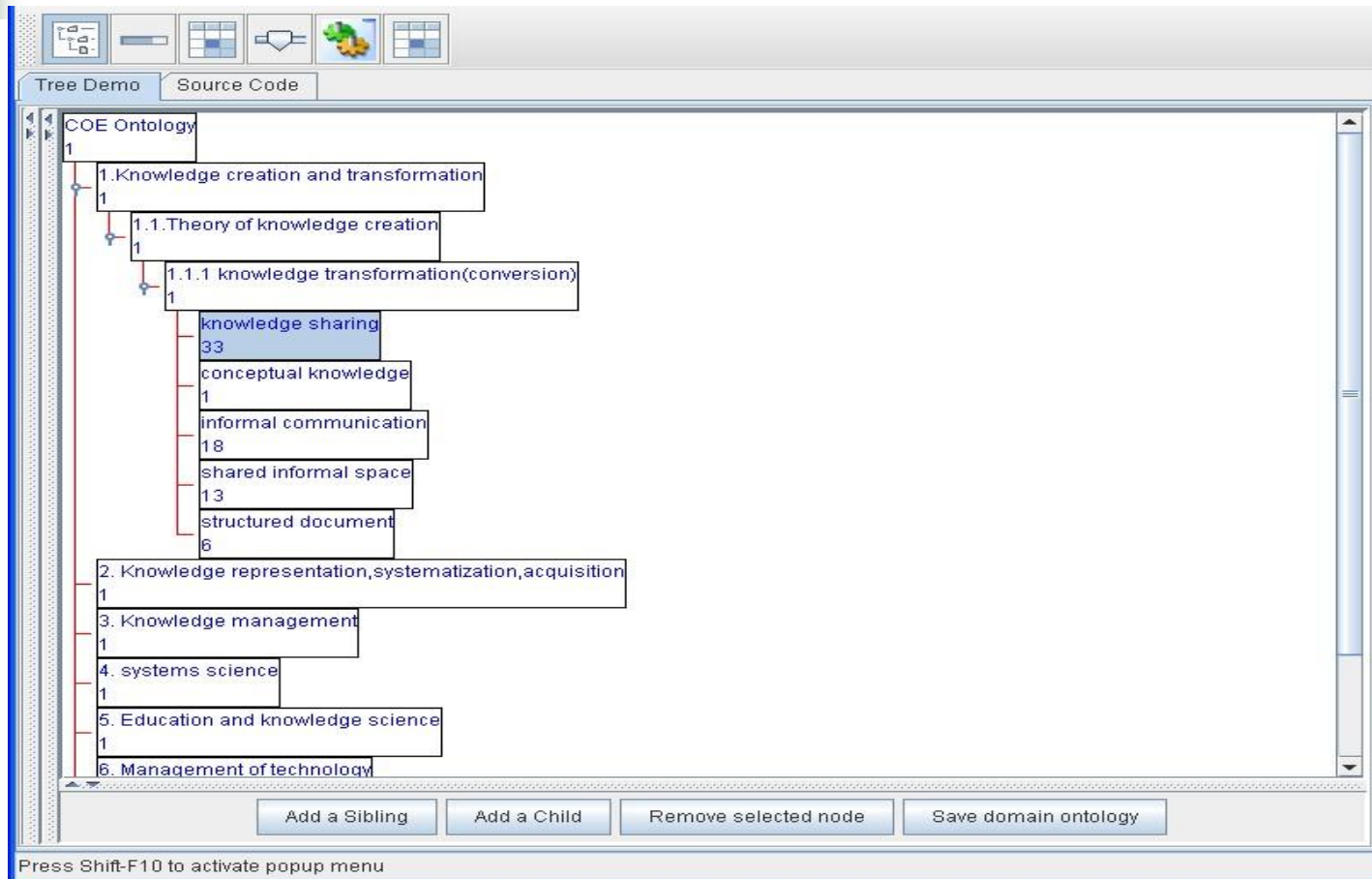
2) Make user's interests explicit.

(user profile)

3) Enclose the Hermeneutic (EAIR spiral)

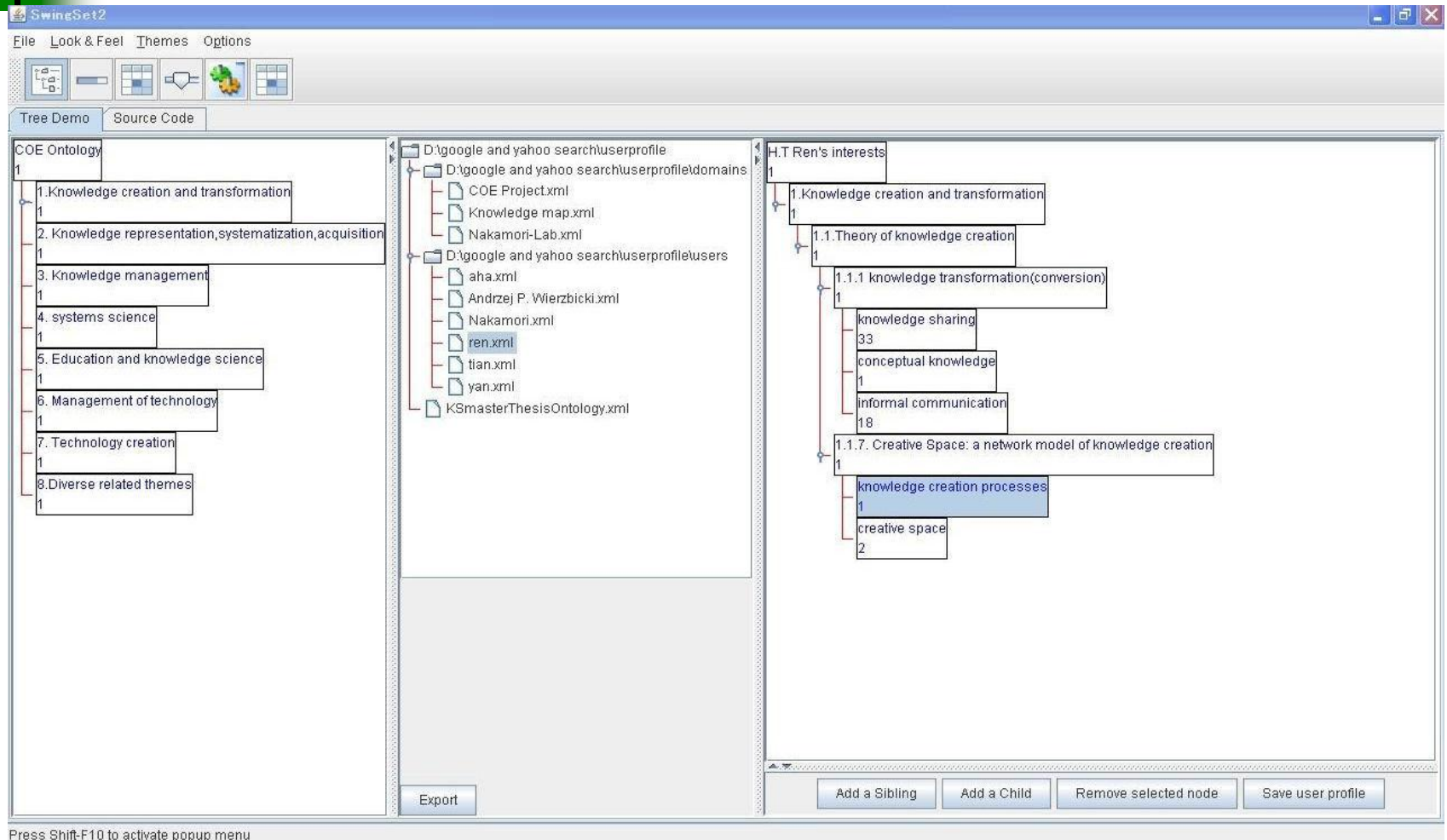
Implementation of a Prototype CE(1. AHA)

User Interface of the AHA(1)



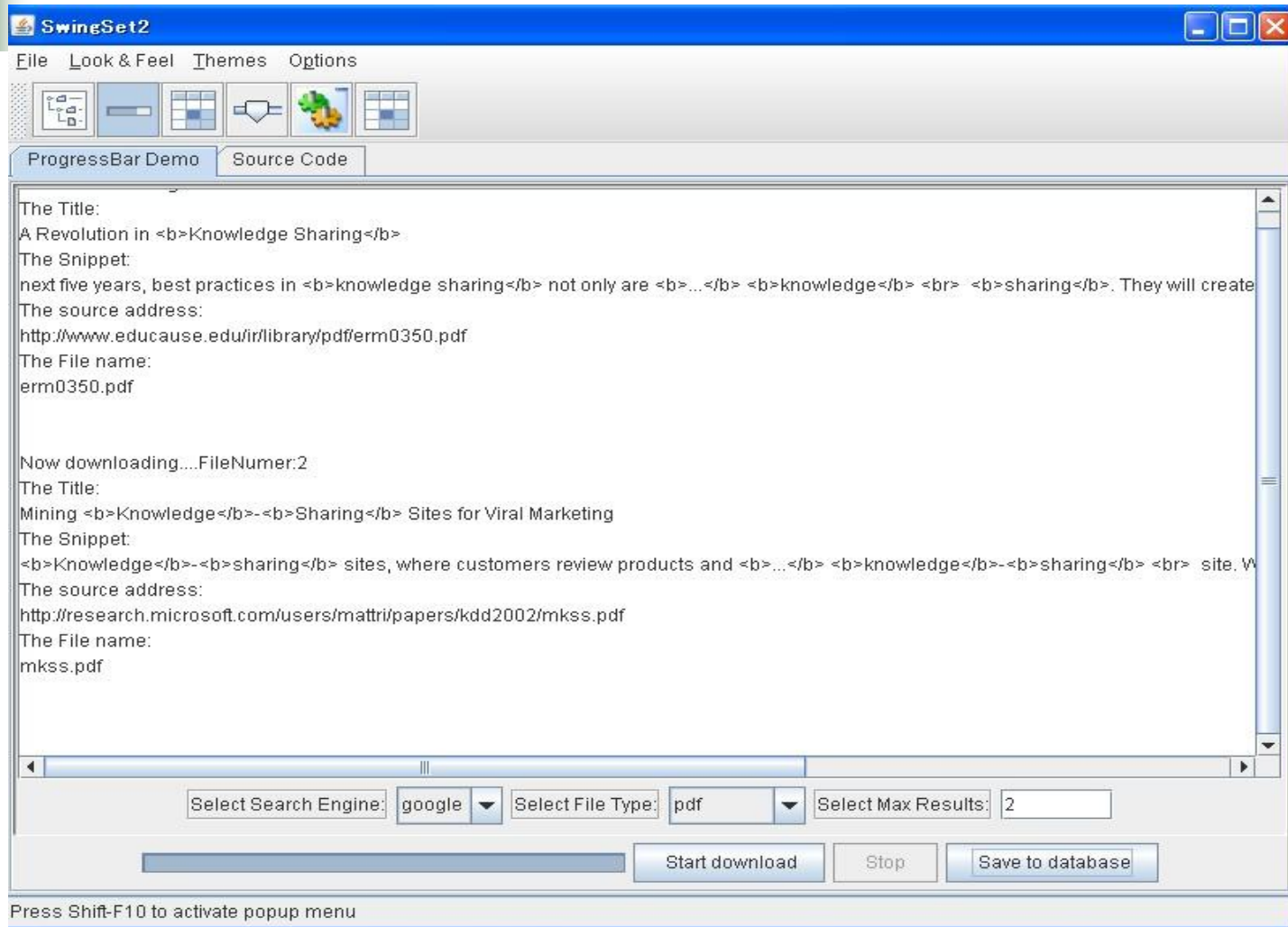
The domain ontology editor

User Interface of the AHA(2)



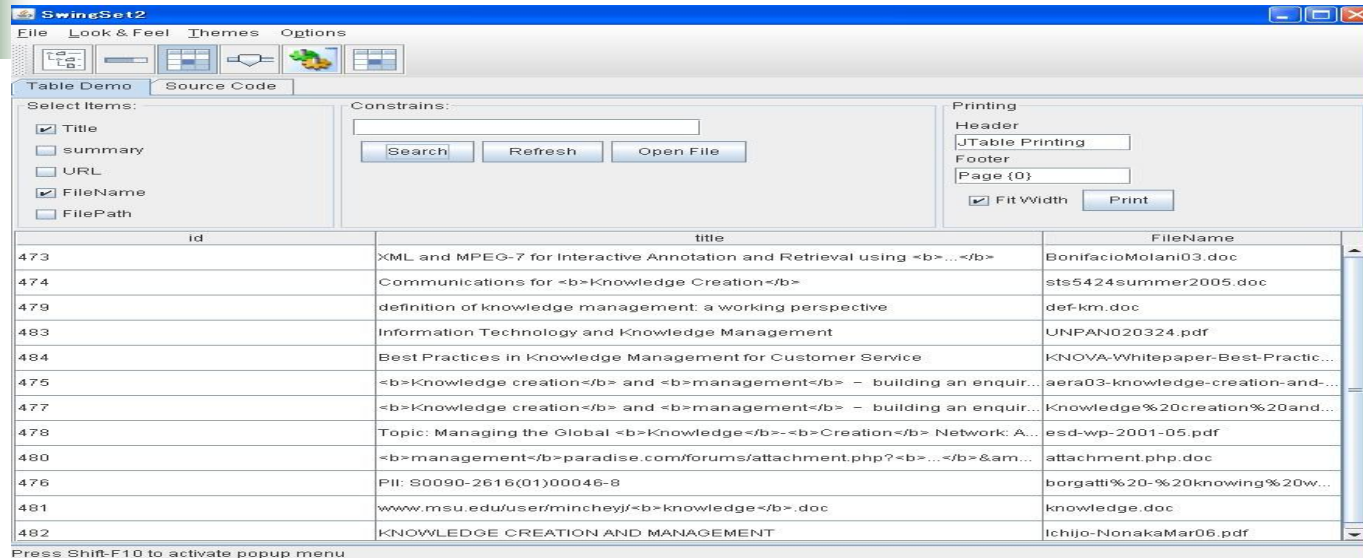
The main interface of creating user profile

User Interface of the AHA (3)

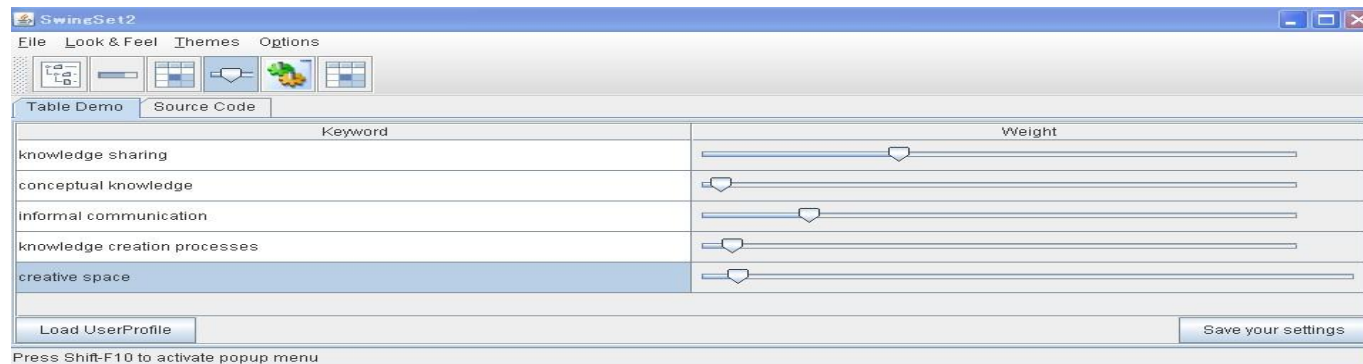


The interface of the download agent

User Interface of the AHA (4)

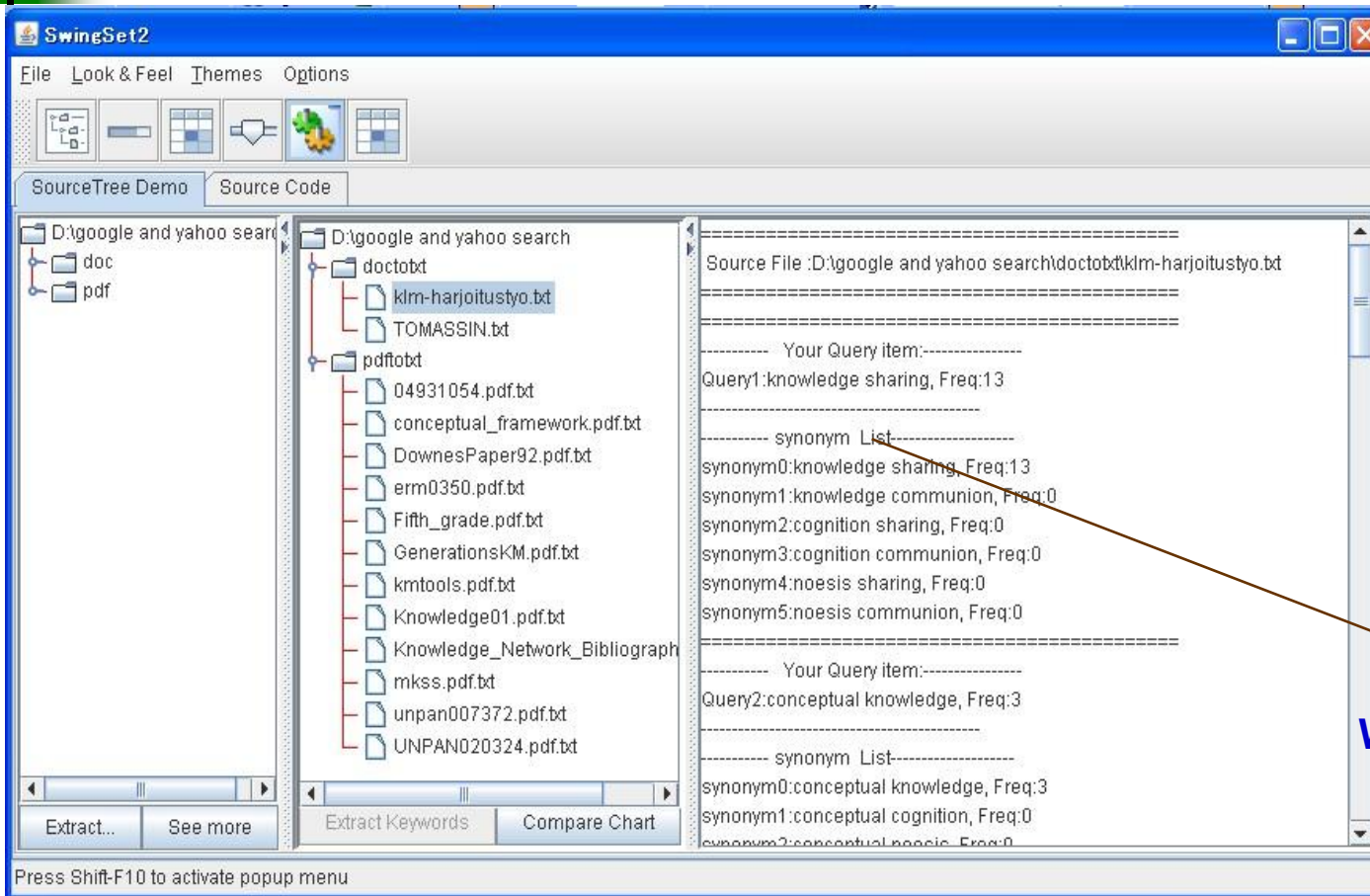


The interface of management of download files



The interface of modifying reference profile

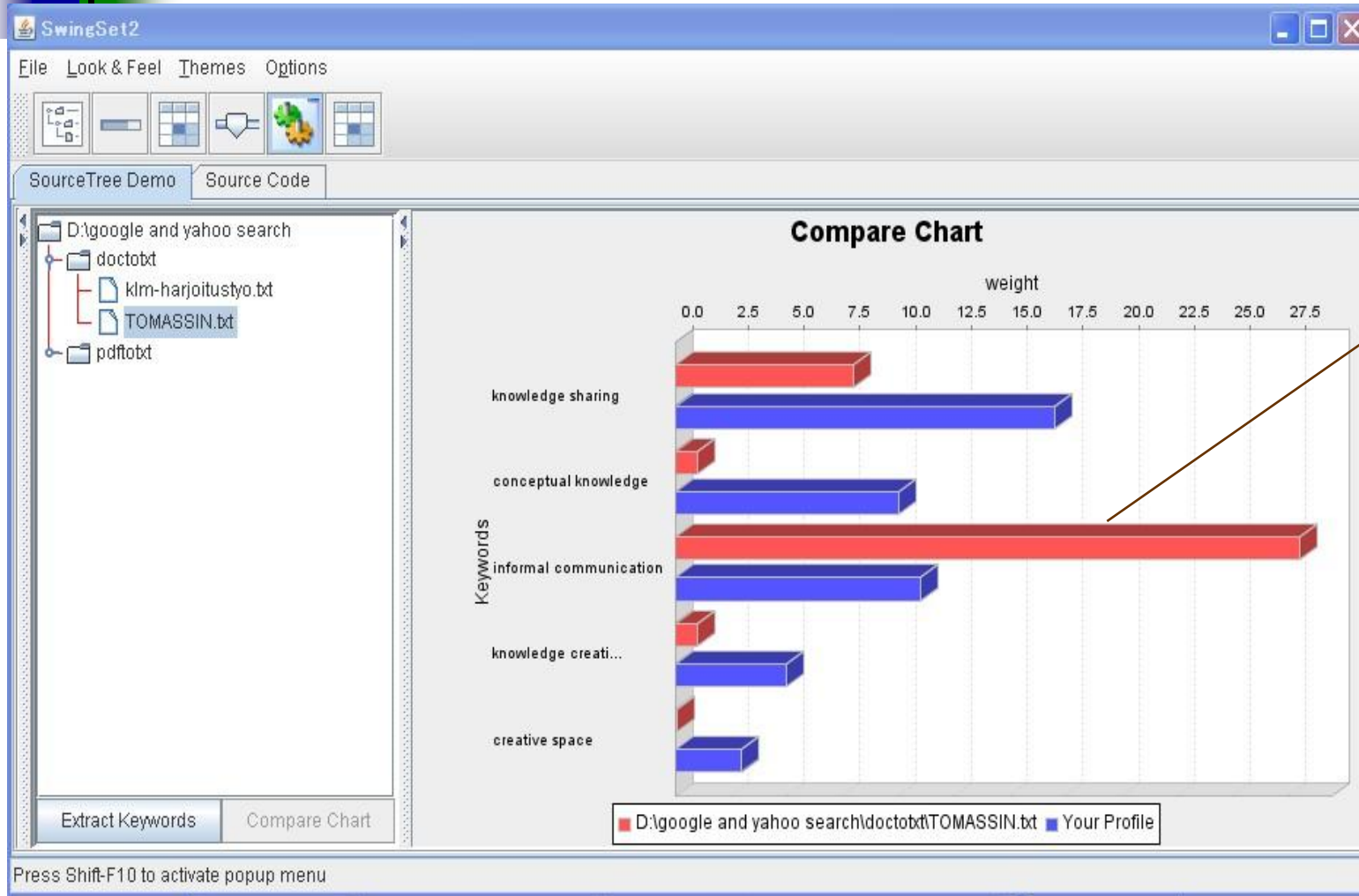
User Interface of the AHA (5)



**Technique:
Wordnet prolog**

The interface of text processing

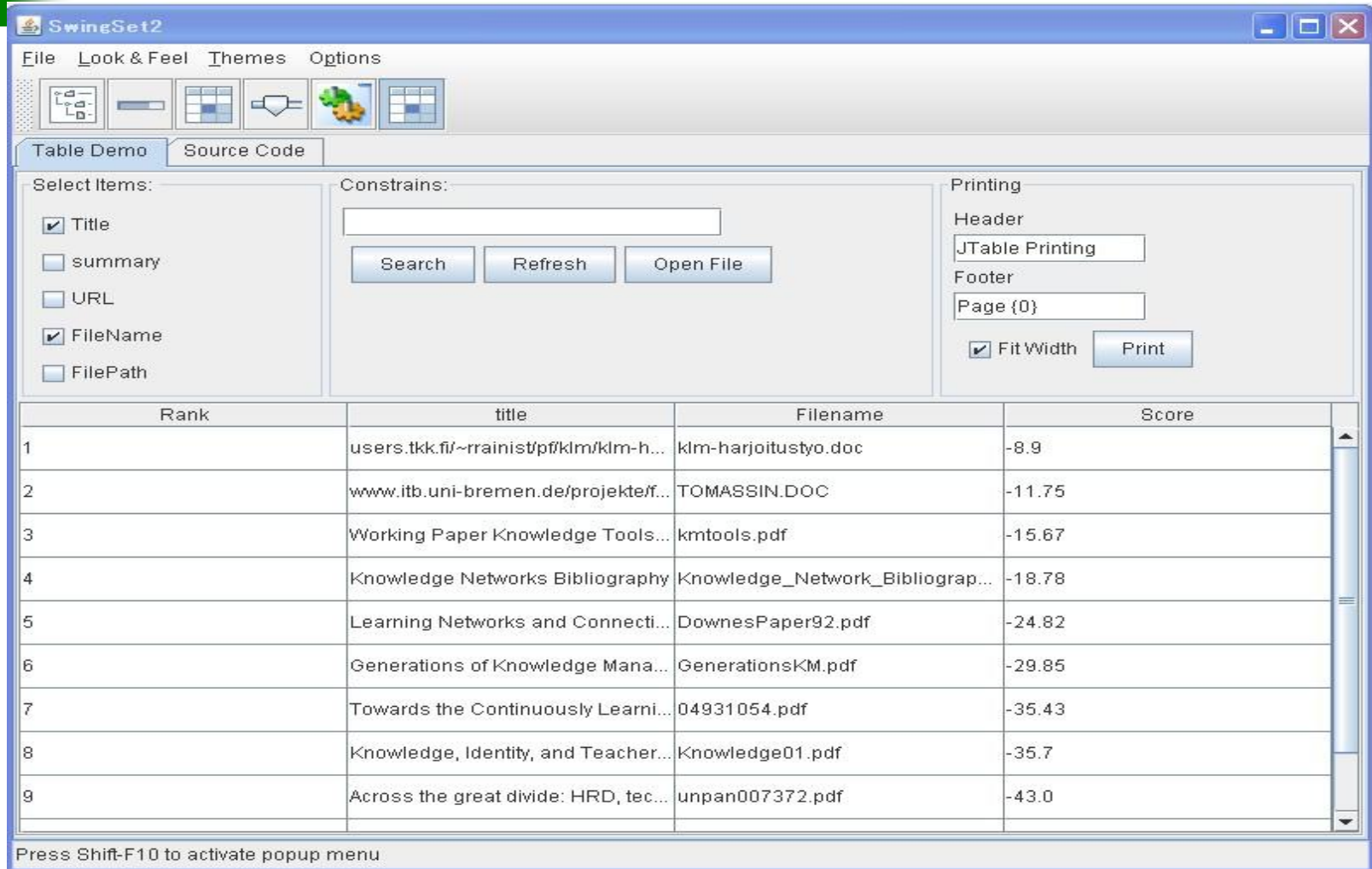
User Interface of the AHA (6)



Technique:
JFreeChart

Graphical presentation of similarity of
each file and the user profile

User Interface of the AHA (7)



A ranking list of the search results

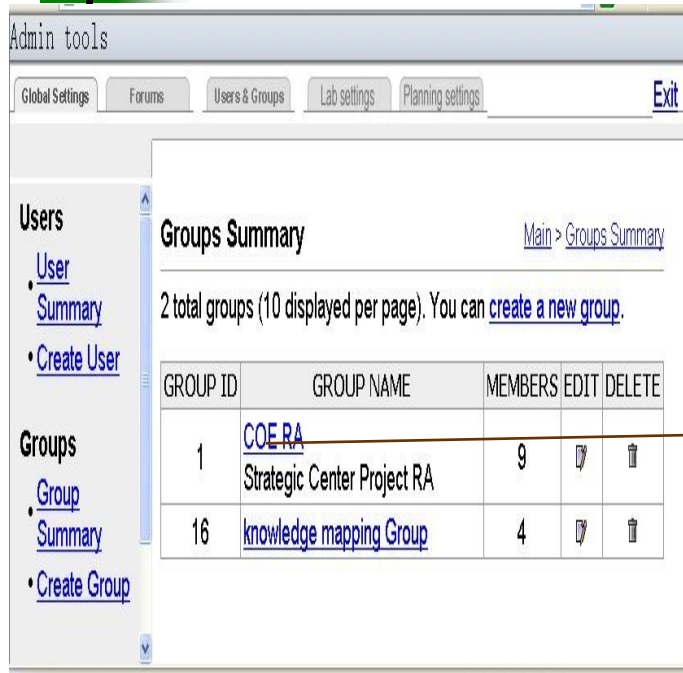
The Purpose of the WGDS

Web-based Group Debate Space (WGDS)

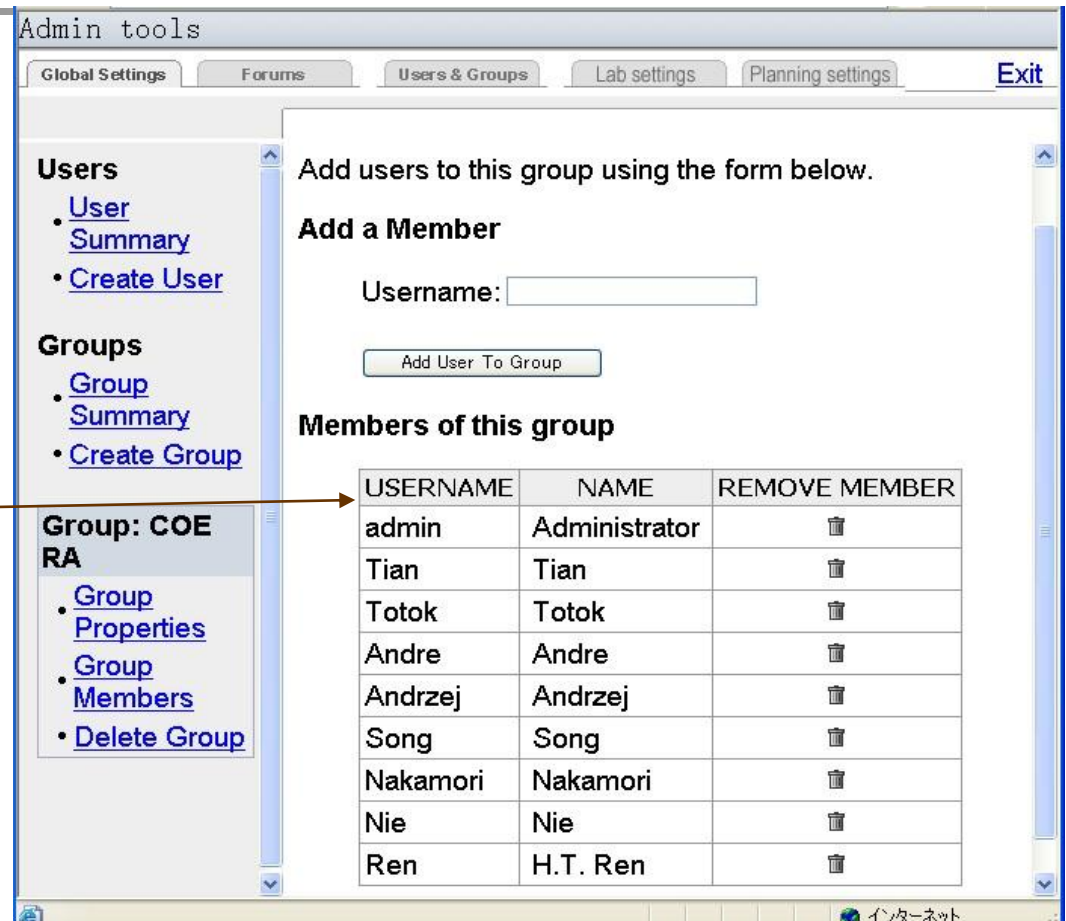
The expected benefits from the WGDS are:

- 1) Providing a web-based space for further debate after a seminar;
- 2)Support for personal knowledge sharing;
- 3)Support for group knowledge creation;
- 4)Promoting communication in a group.

User Interface of the WGDS (1)

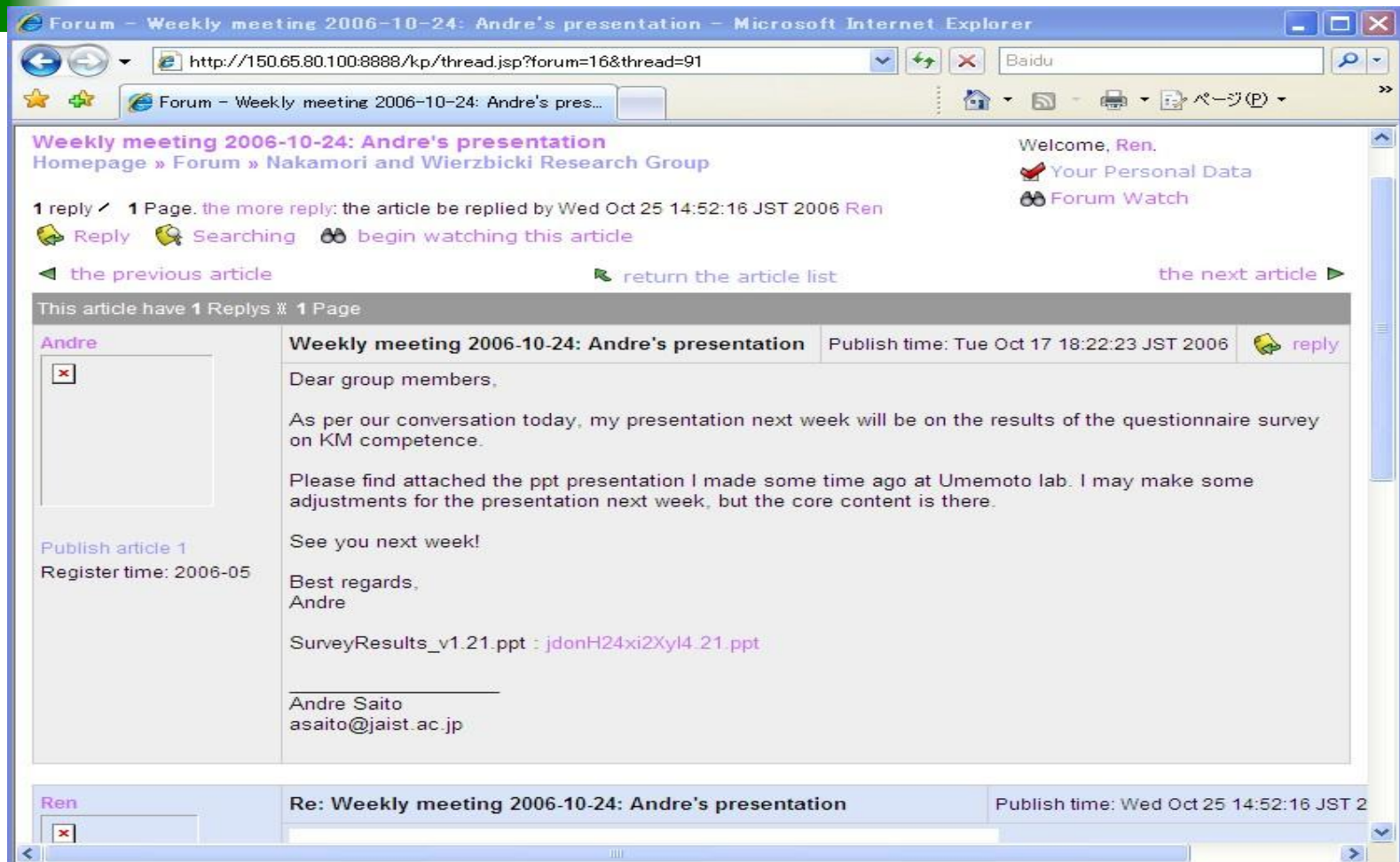


Group summary



Member summary

User Interface of the WGDS(2)



An example of web-based critical debate

Summary of Chapter 4

A prototype CE for scientific research at JAIST:

1. AHA; (**Original idea: *stress intuitive and personalized aspects of the search and of interpretation of search results***)
 - 1) **Making explicit** of the search input (ontology-based);
 - 2) **Graphical presentations** of the search results;
 - 3) **Adaptive Selection** by user's interests (user profile);
 - 4) **Support for the spirals of *Hermeneutic*.**
2. WGDS;
3. Support for planning;
4. EL.



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Goals of Constructing an Ontology of COE Program

- 1) To clarify the use of the **concept of Knowledge Science** in this Program and make explicit ;
- 2) To represent a **vocabulary of terms** used in this COE Program;
- 3) To help in the development of a software subsystem designed to **support hermeneutic search** of literature in the CE.

Bottom-up approach

Bottom-up: the data and data processing (by CE)

- 1) Collecting 43 papers;
- 2) Extracting the keywords;
- 3) Counting the frequency of keywords;
- 4) Choosing pairs of keywords occurring with non-zero frequency;
- 5) Making a QT clustering.

A Part of Clusters of papers and keywords

COE Program papers: keywords (genes) : 128

threshold: t = 1

cluster1:

- Papers:
- 04_1_tianjin.txt,
- 04_3_Saito-Medeni-Machado_v2.txt
- 13_1_Ren.txt
- 20017.pdf.txt
- 20038.pdf.txt
- 20063.pdf.txt
- 20068.pdf.txt
- 20219.pdf.txt
- 20074.pdf.txt
- {
- scientific knowledge creation,
- knowledge management,
- knowledge management system,
- i-system,
- laboratory knowledge management,
- knowledge management education,
- curriculum development,
- degree programs,
- knowledge science,
- systems concepts,
- creative environments,
- laboratory knowledge management,
- organizational knowledge creation,
- workflow for process analyses,
- knowledge-creating process,
- soft system methodology,

- concept creation,
- driving objective.
- processes and spirals of knowledge creation,
- pattern of innovation
- }

cluster2:

Papers:

- 09_1_Minh.txt
- 09_2_Nagai-kss04.txt
- 12_2_phan.txt
- 12_3_Tran.txt
- 15_1_Zhang.txt
- 15_2_huang-wei.txt
- 20055.pdf.txt
- 20057.pdf.txt
- 20073.pdf.txt
- 06_1_Hao.txt
- 20177.pdf.txt
- {
- Crosslanguage text summarization,
- text summarization,
- Natural language processing,
- Text Mining,

- Association Rule Mining,
- coreference resolution,
- anaphora resolution,
- clustering algorithm,
- information extraction,
- natural language processing,
- Data mining,
- Knowledge discovery,
- Genetic Algorithm,
- K-means algorithm,
- Text Clustering,
- Ant-based Clustering,
- Semantic Similarity Measure,
- Ontology,
- phrase indexing,
- bioNLP,
- Text summarization,
- sentence extraction,
- SVM,
- Ensemble learning,
- SVM ensemble,
- Crystal Structure Determination,
- Direct Space Method,
- Genetic Algorithms,
- rough sets,
- MEDLINE
- }

cluster3:

Papers:

- 05_1_ma.txt
- 05_3_JieYAN.txt
- 20060.pdf.txt
- {
- Transportation fuel cell forecast,
- systems thinking, Technology creation,
- systemic thinking,
- roadmapping process,
- technology roadmapping,
- technology forecasting,
- interactive planning,
- }

cluster4:

Papers:

- 06_3_Dung.txt
- {
- model selection,
- support vector machine,
- decomposition method
- }

MOT?



Top-down (by human intuition):

Build an outline of the ontology of COE program:

- 1) Read the paper presenting an introduction to this program authored by the program leader (Nakamori 2004);
- 2) Select the keyphrases and concepts;
- 3) Organize an ontology outline with three levels of branches.

Outline of the ontology of COE Program

- 1. Knowledge creation and transformation
 - 1.1. Theory of knowledge creation
 - 1.1.1. Knowledge transformation (conversion)
 - 1.1.2. Environments to support knowledge creation (Ba)
 - 1.1.3. Organizational knowledge creation
 - 1.1.4. Academic and scientific knowledge creation
 - 1.1.5. IS-System: a pentagram of knowledge creation
 - 1.1.6. Theory of knowledge expression and integration
 - 1.1.7. Creative space: a network model of knowledge creation
 - 1.1.8. Innovation
 - 1.2. Creativity and knowledge
 - 1.2.1. Tacit knowledge and creativity
 - 1.2.2. The power and methods of stimulation of intuition in creative processes
 - 1.2.3. The role of emotions in creative processes
 - 1.2.4. Hermeneutics and creativity
 - 1.2.5. Debate and creativity
 - 1.2.6. Experiments and creativity
 - 1.2.7. Imagination and knowledge integration for creativity
 - 1.3. Philosophy of knowledge
 - 1.3.1. Episteme of diverse cultural spheres
 - 1.3.2. Emergence of new concepts in science and technology
 - 1.3.3. Hermeneutics, ontology and hermeneutical horizons
- 2. Knowledge representation, systematization, acquisition
 - 2.1 knowledge representation and integration
 - 2.2 Knowledge systematization
 - 2.1.1. Ontology of knowledge creation and management
 - 2.1.2. International networking and knowledge mapping
 - 2.1.3. Knowledge interest profiles, methods of web search
 - 2.3 knowledge acquisition (data and text mining)
- 3. Knowledge management
 - 3.1 knowledge management in business and industry
 - 3.2 knowledge management in academia
 - 3.3 Information infrastructure for knowledge management
 - 3.4 Development and practice of knowledge management
- 4 Systems science
 - 4.1 Hard (technological, mathematical) systems science
 - 4.1.1 Mathematical complexity theory
 - 4.1.2 Hierarchical systems
 - 4.1.3 Systems of computerized decision support
 - 4.1.4 Multivalued logic (fuzzy and rough sets)
 - 4.2 Soft (sociological, managerial) systems science and methodologies
 - 4.2.1 Systems thinking and soft systems methodologies
 - 4.2.2 Integration of social information in knowledge
- 5 Education and knowledge science
 - 5.1 Education in knowledge sciences
 - 5.1.1 Knowledge creators
 - 5.1.2 Knowledge coordinators
 - 5.1.3 Inter-school educational program
 - 5.2 Distant and electronic education
- 6. Management of technology
 - 6.1 Theory of technology management
 - 6.2 Technology assessment
 - 6.3 Technology foresight
 - 6.4 Technology roadmaps
- 7. Technology creation
 - 7.1 Theory and philosophy of technology
 - 7.2 Selected fields of technology creation
 - 7.2.1 Advanced research on biotechnology by knowledge creation
 - 7.2.2 Strategic knowledge creation on super molecule biomaterials
 - 7.2.3 Strategic knowledge creation on nano-materials
 - 7.2.4 Research strategy on metal catalyst reaction
 - 7.2.5 Conditions for research and development coordination
- theory
 - 7.3 Cooperation with industrial and administrative sectors

Cluster3

Segment of Final Proposal of the Ontology (1)

Based both on the **bottom-up classification** and on the **top-down approach**, the following ontology can be proposed. It is organized as an inverted tree:

1 Knowledge creation and transformation

■ 1.1. Theory of knowledge creation

1.1.1. Knowledge transformation (conversion)

- *knowledge sharing (40), conceptual knowledge (32), informal communication (19), shared informal space (10), cross-language text summarization (6), structured document (4), individual knowledge model (3), processes and spirals of knowledge (1), interdisciplinary communication, communication skill*
 - 1.1.2. Environments to support knowledge creation (Ba)
- *creative environment (1), Ba*
 - 1.1.3. Organizational knowledge creation
- *organizational knowledge creation(17), ensemble learning (1),*
 - 1.1.4. Academic and scientific knowledge creation
- *scientific knowledge creation (32), academic knowledge creation (14), a shortage of researchers (1), research planning (7), research philosophy*
 -continue.....

Segment of Final Proposal of the Ontology (2)

.....continue..... MOT

- 6. Management of technology
 - 6.1 Theory of technology management
- management of technology (1),
 - 6.2 Technology assessment
 - 6.3 Technology foresight
- technology forecasting (7), transportation fuel cell forecast (1)
 - 6.4 Technology roadmaps
- roadmapping (45), roadmapping process (30), technology roadmapping (29)
- 7. Technology creation
 - 7.1 Theory and philosophy of technology
 - continue.....

Cluster 3





Dissertation Outline

1. Introduction
2. Requirements and Theory of Creative Support
3. Development of a Creative Environment (CE) for a Research Institute
4. Implementation of a Prototype CE
5. Constructing an Ontology of COE Program
 - An Application of a CE: Usefulness Test
- 6. Conclusions**

Main Contributions

Originality:

1. **Developing an implementable specification of functionality of a computerized CE for scientific research;**

(Little or no work exists that concerns the actual implementation of complete CEs)

2. **Novel idea of developing the AHA.**

*(Stress intuitive and personalized aspects of the search and of interpretation of search results, **support for Hermeneutics**)*

Usefulness:

1. A prototype CE for a research institute (JAIST), including:
 - 1) Meeting the requirements of scientific researchers;
 - 2) Support for models of creative processes in academia;
2. Extension of the AHA to support ontology formation for COE program.

Other Contributions and Possibilities

1. Providing a computerized CE for our COE program;
2. Developing an Survey On-line Analysis System; (by-product)
3. Developing software components for knowledge acquisition, knowledge representation and text mining;
4. Helping researchers to find potential collaborators by using user profile;
5. Helping in generating social network.

Future Works

- 1) Finishing the construction of ontology of Knowledge Science based on the students' these at JAIST;
- 2) Developing Electronic Library based on the Topic Maps and user profile;
- 3) Finding an adequate mechanism to motivate researchers to share their experience and knowledge;
- 4) Concentrating on supporting the interplay of intuitive and rational, tacit and explicit aspects of knowledge creation.



Main Publications

Journals and Book Chapters

- [1] Ren H.T. & Tian J. & Nakamori & Y. Wierzbicki A.P. (2007) Electronic Support for Knowledge Creation in a Research Institute, **The Journal of System Science and System Engineering (Accepted)**.
- [2] Ren H.T. & Wierzbicki A. (2007). Implementing Creative Environments for Scientific Research, **Journal of Information and Decision Science (Accepted)**.
- [3] Wierzbicki A. & Ren H.T. (2007). Integrated Support for Scientific Creativity, the chapter 8 of the Creative Environments Book **(In press)**
- [4] Tian J & Wierzbicki A.P. & Ren H.T. & Nakamori Y. (2007). Testing the Triple Helix Model, the chapter 2 of the Creative Environments Book **(In press)**

International Conferences

- [5] Ren H.T. & Tian J. & Nakamori Y. & Wierzbicki A.P. (2006). Electronic Support for Knowledge Creation in a Research Institute, KSS'2006, September 22-25, 2006, Beijing, China.
- [6] Ren H.T. & Nakamori Y. (2005). A Prototype System for Using Structured Document to Support Knowledge Sharing, ICSSSM'05 (2005 International Conference on Services Systems and Services Management)
- [7] Ren H.T. & Nakamori Y. (2005). A Network System for Knowledge Sharing in Learning Organization, IFSR2005 (First World Congress of the International Federation for Systems Research)
- [8] Wierzbicki A.P. & Tian J. & Ren H.T. (2006). The Use of Reference Profiles and Multiple Criteria Evaluation in Knowledge Acquisition from Large Databases, 4th US-European Workshop on Logistics and Supply Chain Management June 8&9, University of Hamburg, Germany.
- [9] Tian J. & Wierzbicki A.P. & Ren H.T. & Nakamori Y. (2006). A Study of Knowledge Creation Support in Japanese Research Institute, International Journal of Knowledge and Systems Sciences, Volume 3 Number 1, March 2006, pp7-18.
- [10] Pan D. & Ren H.T. (2003). Research on application Server and Assistant Decision-Making in Bidding system, ICSSSE'03 (The Fourth International Conference on Systems Science and Systems Engineering)