



Innovative Information and Knowledge Infrastructures

How do I find what I need?

Wolfgang Nejdl

L3S and University of Hannover, Germany

www.l3s.de

www.kbs.uni-hannover.de/~nejdl



Overview

■ L3S Background

- Mission and Focus
- Areas, Budgets, Goals
- Project Focus Technology Enhanced Learning
- Project Focus Semantic Web and Digital Libraries

■ Personal Information Management

- Search in Digital Libraries
- Search in Personal Collections
- Knowledge Sharing in Social Networks

■ Future Research Areas and Trends



L3S Mission and Focus

- L3S research focuses on
 - innovative and cutting-edge methods and technologies for three key enablers for the European Information Society:
 - Knowledge
 - Information
 - Learning
- L3S projects focus on
 - digital resources and their technological underpinnings:
 - Semantic web
 - Digital libraries
 - Distributed systems, networks and grids
 - the use of these resources in eLearning and eScience contexts



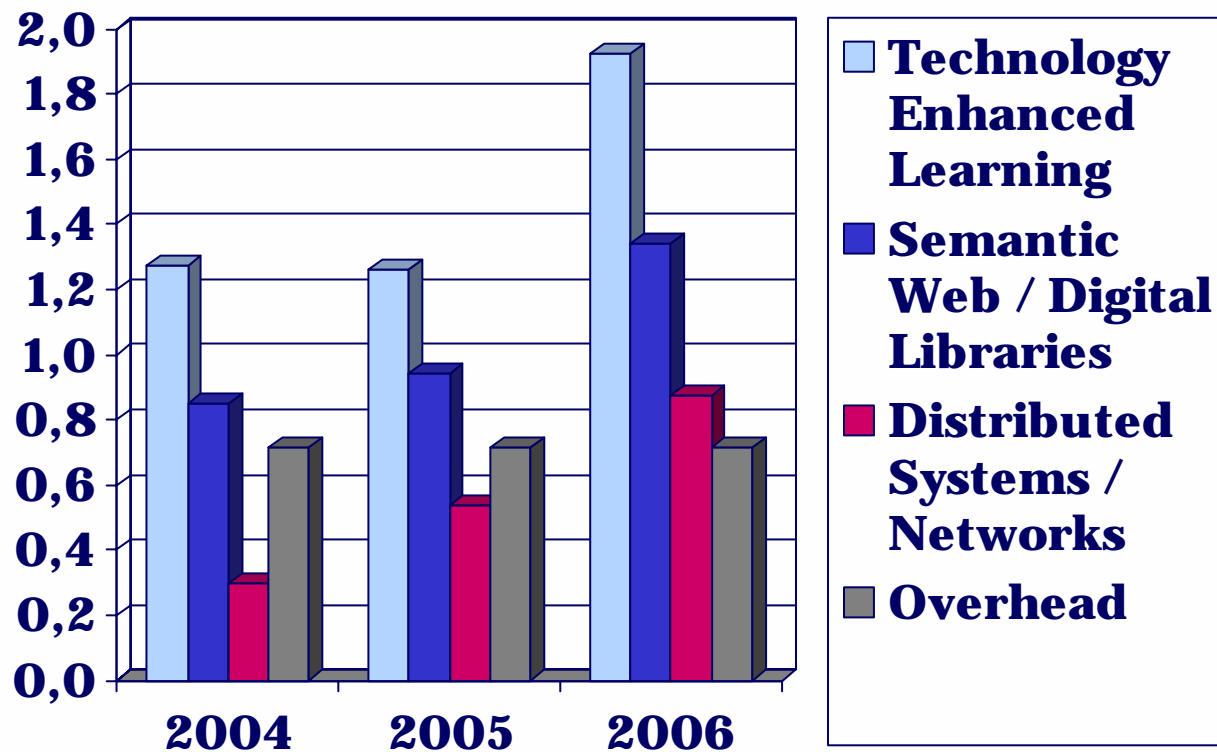
L3S Areas

- Technology Enhanced Learning
 - investigate innovative methods and technologies to support new educational approaches
 - enable advanced learning scenarios in schools, at universities and in companies
- Semantic Web and Digital Libraries
 - provide personalized access to distributed information resources and advanced search and recommendation functionalities
 - enable collaborative and distributed work environments
 - enhance traditional libraries with digital content and personalized library services
- Distributed Systems and Networks
 - investigate loose coupling of services, usage and integration of distributed services in peer-to-peer information systems, ad hoc networks, grid-based environments and service oriented architectures
 - provide infrastructure and services including security, access-control, monitoring and accounting methods especially for virtual organisations



L3S Areas and Budgets

Mill. Euro





L3S Benchmarks and Goals

■ Excellent scientific results

- High quality publications: 3 DBLP listed publications per researcher, 1 of them top publication in the respective area

■ Successful funding record

- 66% third party funding, 33% base funding
- 25% of third party funding from industry/consulting activities

■ Attractive research environment

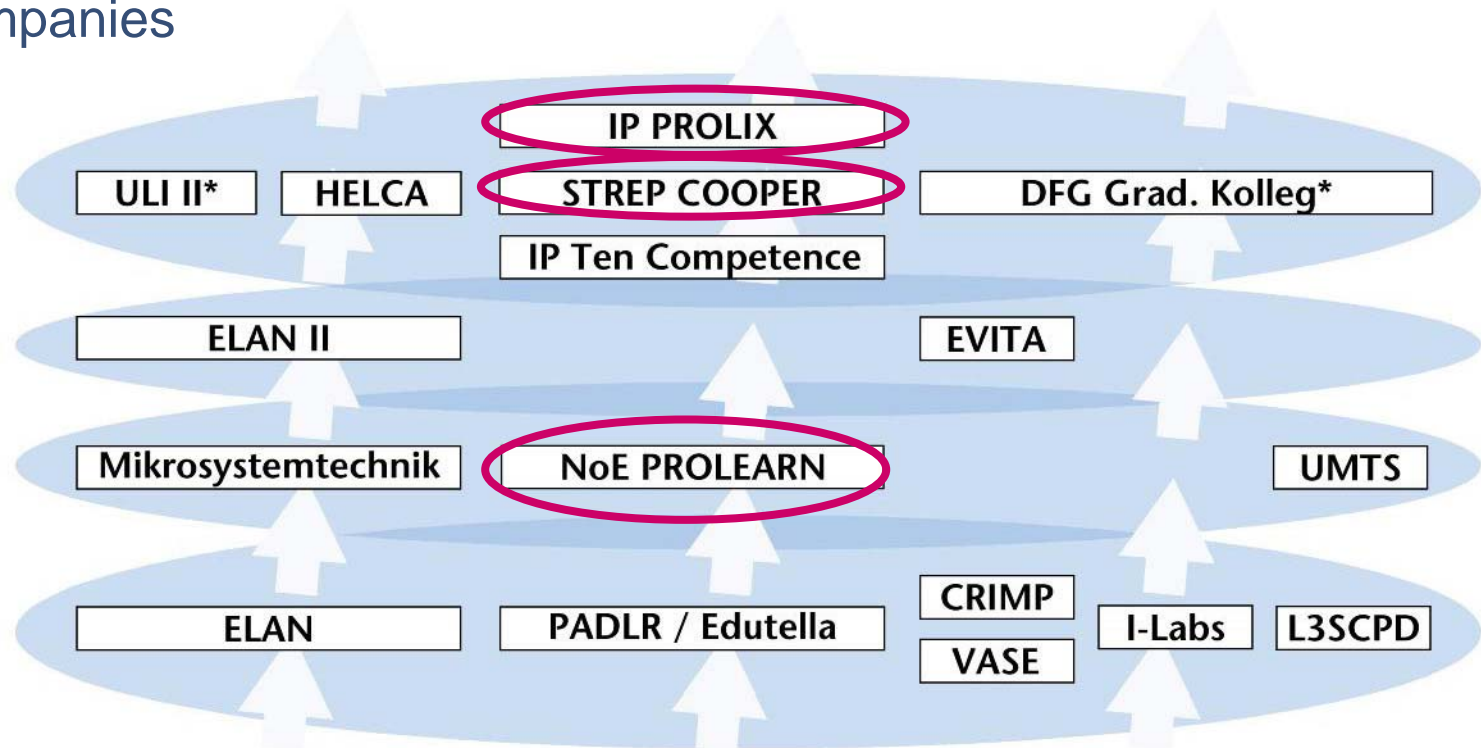
- 8-10 completed Ph.D.'s per year
- L3S researchers cooperate with leading academic institutions in Germany, Europe and worldwide, as well as with local, European and global companies through joint projects
- L3S alumni achieve high ranking positions in business and academia



Area „Technology Enhanced Learning“

Investigate innovative methods and technologies to support new educational approaches

Enable advanced learning scenarios in schools, at universities and in companies





Network of Excellence on Professional Learning

Project Coordination: L3S Research Center, Hannover, Germany

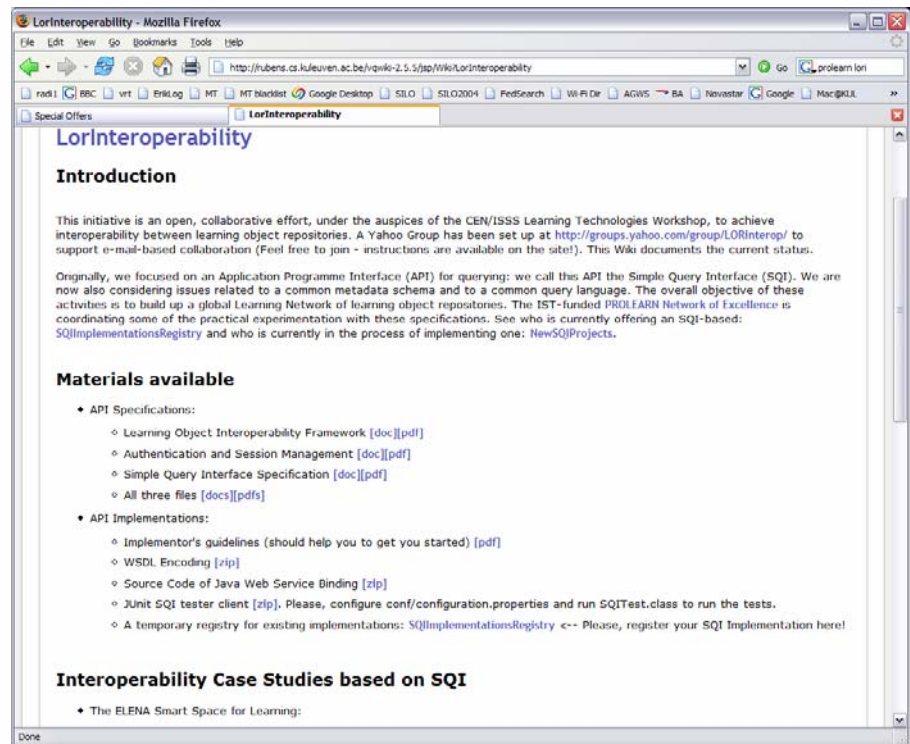
Consortium Members: DFKI Saarbrücken, Germany
Fraunhofer, Bonn & Stuttgart, Germany
Knowledge Media Institute, Milton Keynes, UK
HEC, Paris, France
WU Vienna, Austria
IMC information multimedia communication AG, Germany
Open University, Maastricht, Netherlands
and others

Associated Members: Stanford University, US
CMU, Pittsburgh, US
Swedish Educational TV, Sweden
Klett Publishing, Germany



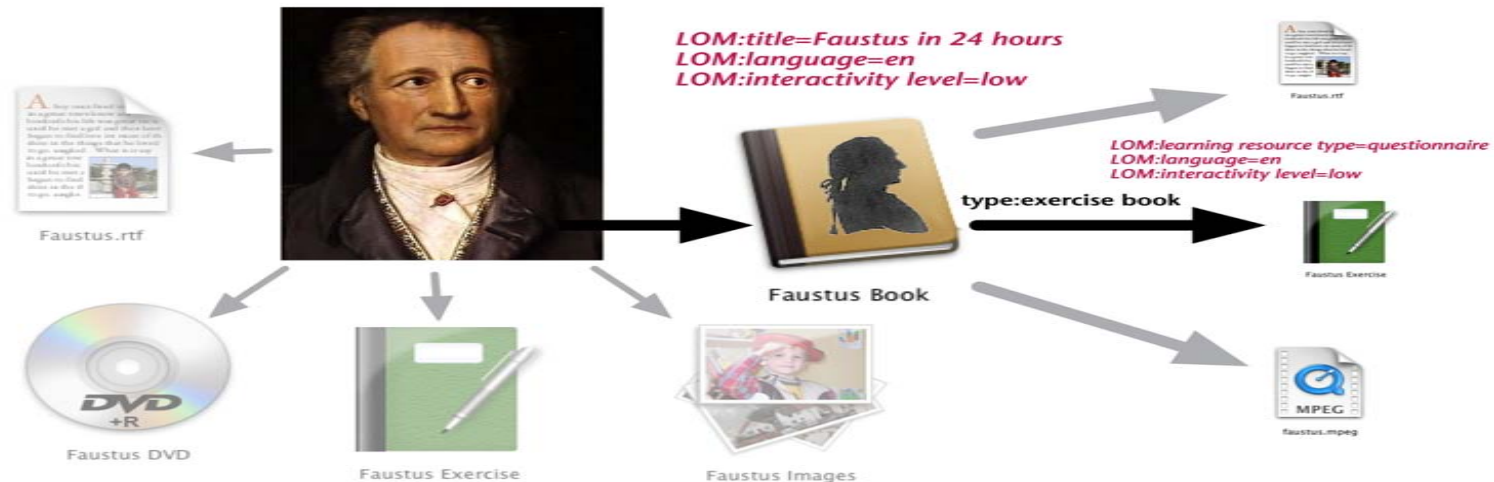
Metadata, Brokerage and Interoperability

- Focus on standards, distributed and heterogeneous systems
- Simple query interface (SQI) integrating
 - iClass, Celebrate, Ariadne, Merlot, EduSource, Nime, Edna, Elena, IMS,...
- IEEE working group





Cornelsen Publishing: Consulting



Cornelsen offers online access to learning materials

- Classical: books, papers, seminars, media like PDFs, movies, audio-files, ...

Goal: Improve searching capabilities

Solution: Semantic Annotation of Learning Objects

- Standards: LOM, RDF
- Tools: Jena, Sesame, SHAME, MySQL



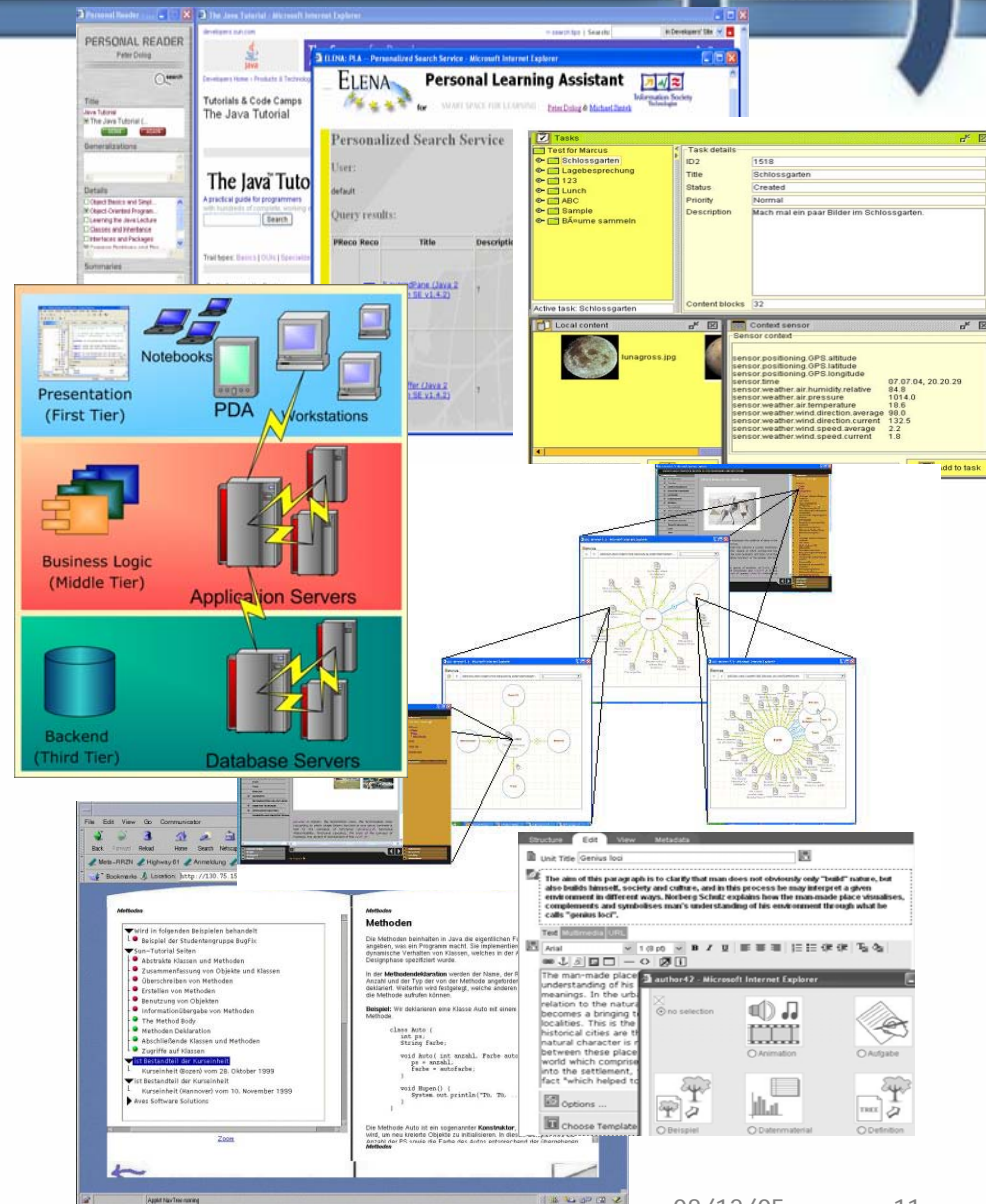
Personalisation

■ Overview of recent approaches (technology and learning) to identify major cornerstones and gaps:

- To map the state of the art in the area of personalized adaptive learning
- To focus on learner modelling
- To define requirements for corporate e-learning

■ Joint effort with

RAFT, ALE, Elena, AIR,
COOPER





Rule-Based Personalization

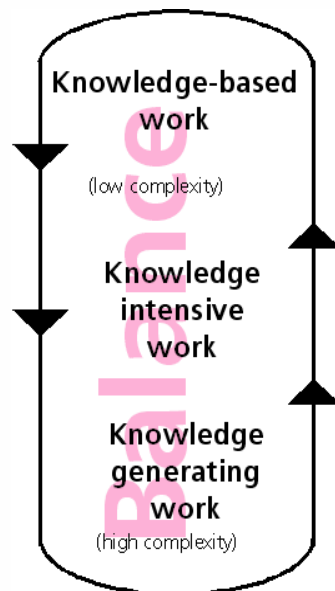
- Personalization in Distributed e-Learning Environments. P. Dolog, N. Henze, W. Nejdl, M. Sintek. 13th Intl. World Wide Web Conference, May 2004, New York.
- Model-driven design of web applications with client-side adaptation. S. Ceri, P. Dolog, M. Matera, W. Nejdl. 4th Intl. Conference on Web Engineering, Munich, July 2004, Best paper award.

Link-Based Ranking and Personal Recommendations

- PROS: a Personalized Ranking Platform for Web Search. P. Chirita, D. Olmedilla, W. Nejdl. 3rd Intl. Conference on Adaptive Hypermedia and Adaptive Web-Based Systems, Aug. 2004, Eindhoven.



Learning Arrangements for Knowledge Work Management



- Miller WC. **Fostering intellectual capital**. HR Focus, 1998, January, 75 (1), pp 9-10 about **Knowledge Workers**:

"Their main value to an organization is their ability to gather and analyze information and make decisions that will benefit the company. They are able to work collaboratively with and learn from each other."

- Clearly, we have to integrate
 - work and information / knowledge access with
 - knowledge sharing and learning
- PROLEARN goals include to **enable employees to learn while solving working tasks**.
That includes arranging work in a way that there are learning incentives, that means in a didactically reasonable way.



Upcoming Events

WWW2006 - Refereed Track: E* Applications: E-Commerce, E-Business, E-Science, E-Learning, and E-Communities

http://www.w2006.org/tracks/estar.php

Erste Schritte Aktuelle Nachrichten - ...



Edinburgh
International Conference Centre
May 22-26, 2006



15th International World Wide Web Conference

Enquiries

About the Conference

- Overview
- Call for Papers
- Conference Chairs
- Delegates
- Pre-registration
- Volunteers
- Conference Series
- Contact Info
- About ECS

Edinburgh

- About EICC
- Edinburgh
- Scotland
- Top Twenties
- Links

Conference Organisers

Electronics and Computer Science

In association with



Refereed Track: E* Applications: E-Commerce, E-Business, E-Science, E-Learning, and E-Communities

Internet and Web technologies enable new kinds of applications, usually prefixed with a capital "E" as in E-Commerce, E-Business, E-Learning, E-Science or E-Communities. Such applications are often innovative in their use of these technologies, and support or require new work, learning, or business scenarios. Furthermore, focusing on these E* Applications leads to new requirements as well as to interesting new technologies or extensions of existing ones.

The E* Applications Track, new to WWW in 2006 (but unifying and broadening previous WWW tracks in each of E-commerce, education, and applications), provides a unique forum both for describing innovative E* applications and scenarios as well as innovative technologies for these areas. We welcome both studies relating to specific classes of E-Applications and to cross-cutting issues. Relevant topics include, but are not restricted to, the following:

- Service architectures** — distributed Web services; web service technologies for e-Applications; embedded Web applications; Web standards for E* applications; data protection, security and privacy; ubiquitous computing and internet appliances; recommendation, reputation, and trust systems; computational markets for information services
- Data management** — distributed and peer-to-peer-based learning and e-science repositories; scientific metadata and annotation management; intellectual property and digital rights management; data and workflow provenance for e-Science; scientific data quality and data cleaning
- Web-based collaboration and communities** —

News


- Celebrate Memorial Day in Edinburgh
- Conference chairs receive research recognition
- Conference handover starts countdown to WWW2006
- Former NATO spokesman launches media day
- US legal scholar to speak at WWW conference
- Greatest Briton accolade for Web Inventor

EC-Tel 2006 - First European Conference on Technology Enhanced Learning - Mozilla Firefox

http://www.ec-tel06.org/

Erste Schritte Aktuelle Nachrichten - ...

Google technology enhanced learn Suche PageRank AG Rechtschreibprüfung Optionen technology enhanced



EC - TEL 2006

- Home
- Topics
- Important Dates
- Organization
- Venue
- Workshops
- Social Events
- Related Events
- Links

Crete, Greece - October 1-5, 2006

First European Conference on Technology Enhanced Learning

Innovative Approaches for Learning and Knowledge Sharing
Organized by Professional Learning Cluster

With the shift towards the knowledge society, changing working conditions and the continuous evolution of information and communication technologies, peoples' knowledge and skills need continuous up-dating. Technology-enhanced Learning is one of the strategic objectives of the EU/IST Work Programme, with the goal of improving the efficiency and cost-effectiveness of learning, for individuals and organizations, independent of time, place and pace. Innovative infrastructures, methods and approaches are needed to reach this goal, and will facilitate transfer and sharing of knowledge between individuals and in organizations.

The First European Technology Enhanced Learning Conference provides a unique forum for all research related to Technology-enhanced Learning, as well as its interactions with knowledge management, business processes and work environments. We welcome submissions describing innovative research on all relevant issues, focusing on aspects from computer science, business and/or education, as well as experience reports and case studies describing innovative applications of new learning environments and approaches.

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Suchen: Abwärts suchen Aufwärts suchen Hervorheben Groß-/Kleinschreibung beachten

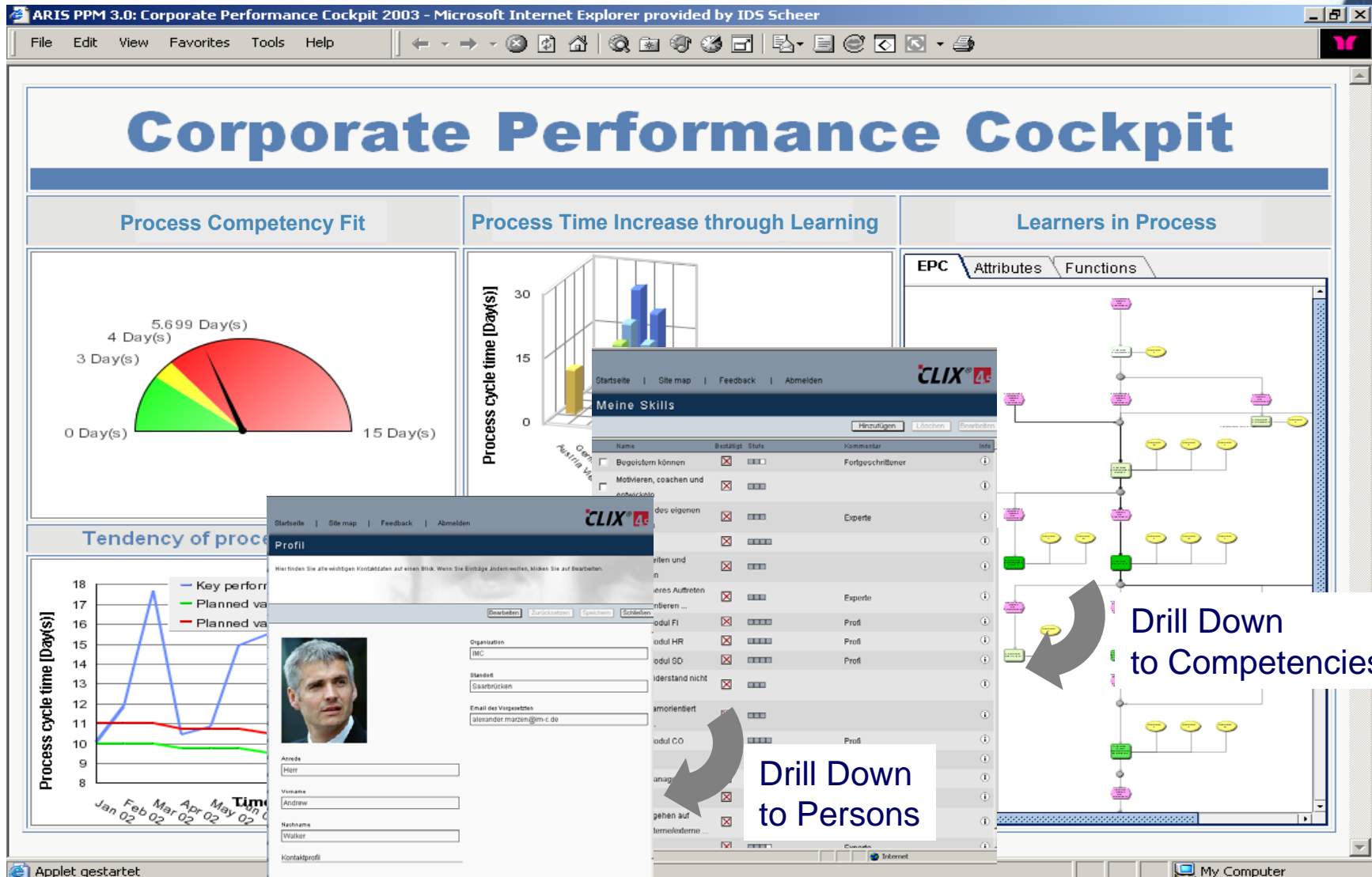


PRocess-Oriented Learning and Information eXchange

Project Coordination: imc information multimedia communication AG, Germany

Consortium Members: IDS Scheer, Saarbrücken, Germany
Synergetics NV/SA, Belgium
Giunti Interactive Labs, Italy
L3S Research Center, Hannover, Germany
WU Vienna, Austria
and others

Project Highlights: Integration of Business Models and Learning Processes
SOA Reference Model OBELIX: Open Business Enterprise Learning and
Information Systems eXchange Architecture
Corporate Performance Cockpit



Drill Down to Competencies

Drill Down to Persons



Collaborative Open Environment for Project-Centered Learning

Project Coordination: L3S Research Center, Hannover, Germany

Consortium Members: LTDesign, Munich, Germany
WebRatio, Milano, Italy
Politecnico di Milano, Italy
Open University, Maastricht, Netherlands
and others

Project Highlights: Integration of Business Process Models and Data / Application Design
IMS Learning Design in Project-Centered Learning
Collaboration, Recommendation and Knowledge Sharing



PRO-LC Research Cluster

■ Cluster of major European projects focussing on Professional Learning

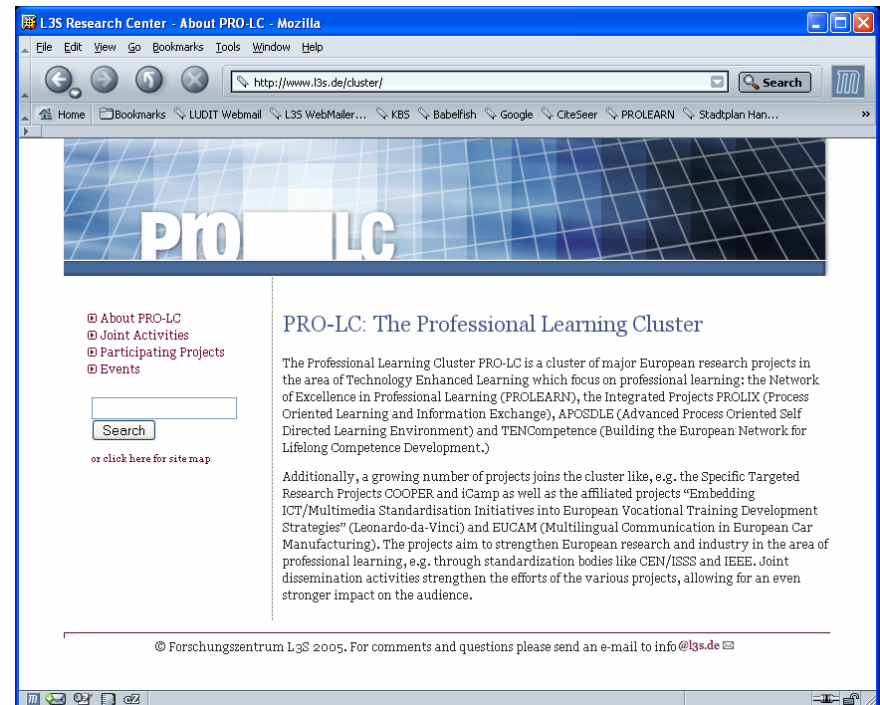
- about 50 Mio Euro
- about 40 core partners

■ Cooperating Projects

- NoE PROLEARN
- IP PROLIX
- IP TENCompetence
- IP APOSDLE
- several STREPs, including COOPER

■ Enabling integration beyond the borders of PROLEARN

- Integrating research areas and communities
- Extending outreach to research and industry
- Providing input on strategic research directions and funding programmes



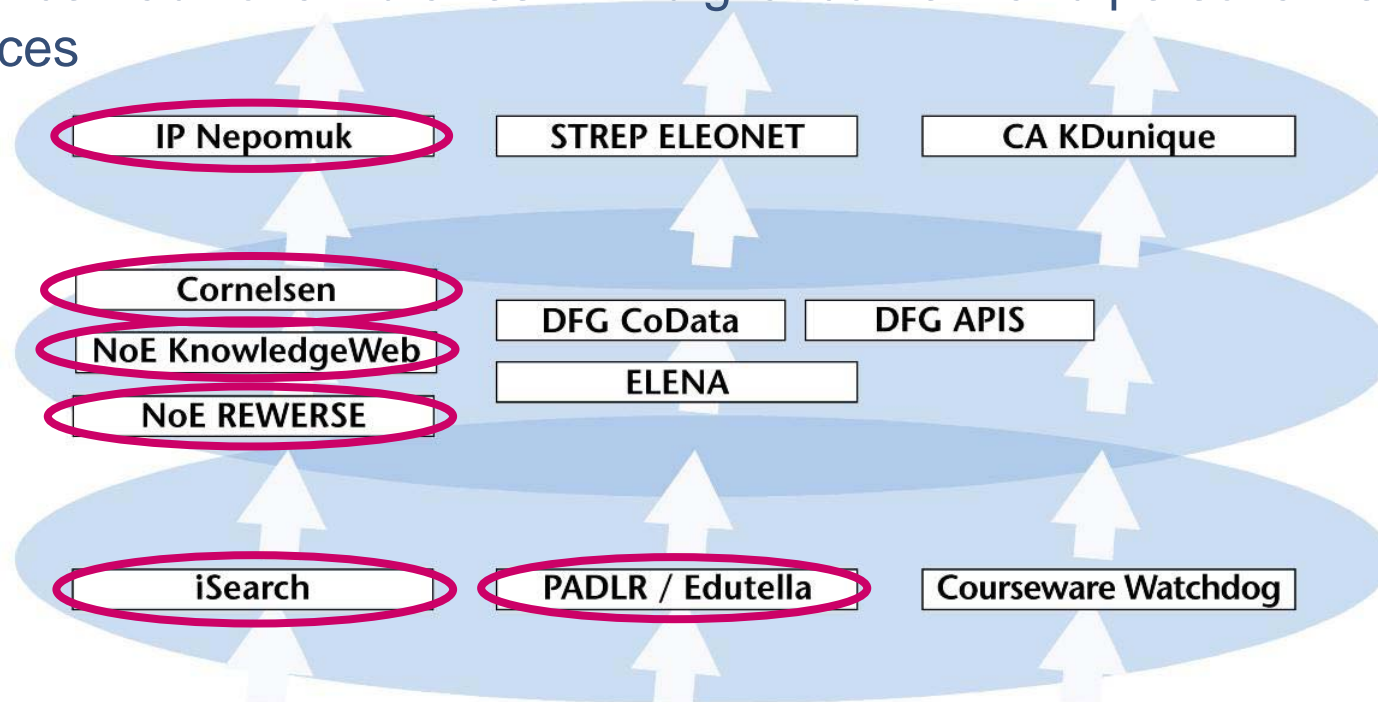


Area „Semantic Web and Digital Libraries“

provide personalized access to distributed information resources and advanced search and recommendation functionalities

enable collaborative and distributed work environments

enhance traditional libraries with digital content and personalized library services



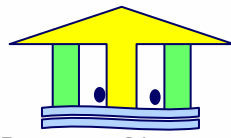
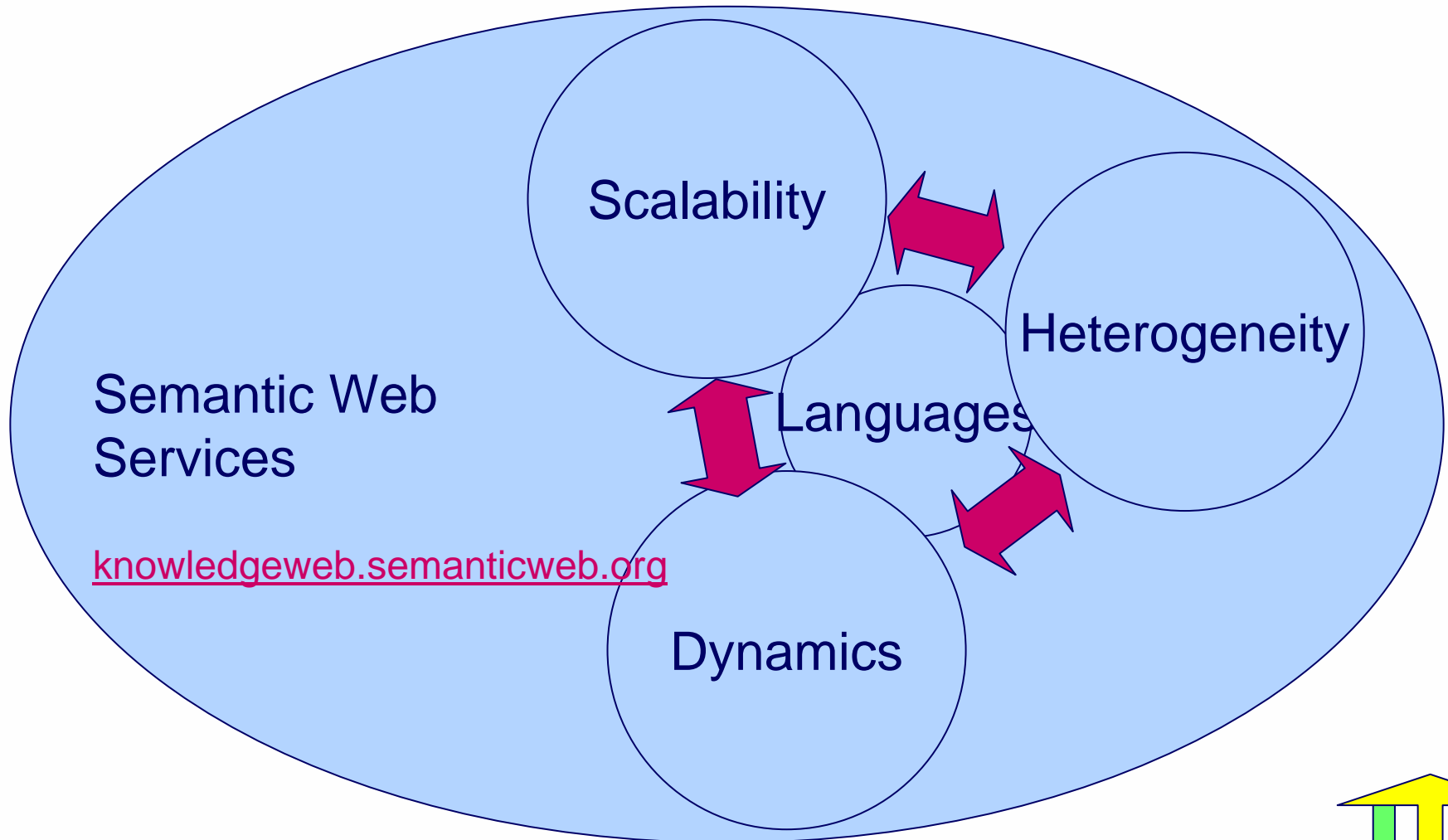


Networks of Excellence

- Started in 2004: Two EU/IST FP6 Networks of Excellence in the areas of
- Knowledge technologies and semantic web
 - NoE KnowledgeWeb (L3S as core partner)
 - NoE REWERSE (L3S as core partner)
- Duration of networks: 4 years
- Number of partners: 20 (30 for REWERSE)
- Budget per network: 6-7 Mill. Euro



Network of Excellence I: KnowledgeWeb





Network of Excellence II: REVERSE

Reasoning on the Web with Rules and Semantics

How to get and retrieve data?

Distributed Information Systems on the Web

How to protect data?

Trust, Security, and Policies

How to personalize data?

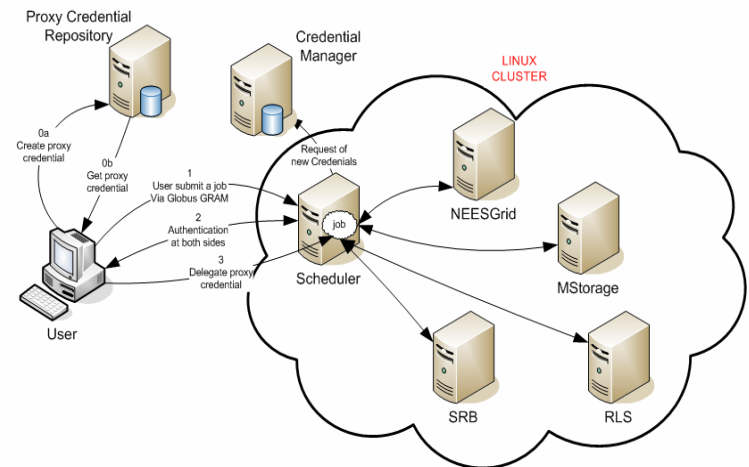
Personalization and Adaptation

Selected application areas:

Personalized Web systems

Web-based decision support

Bioinformatics Semantic Web



DAIS
The Database and Information Systems Laboratory
at The University of Illinois at Urbana-Champaign
Large Scale Information Management



www.reverse.net

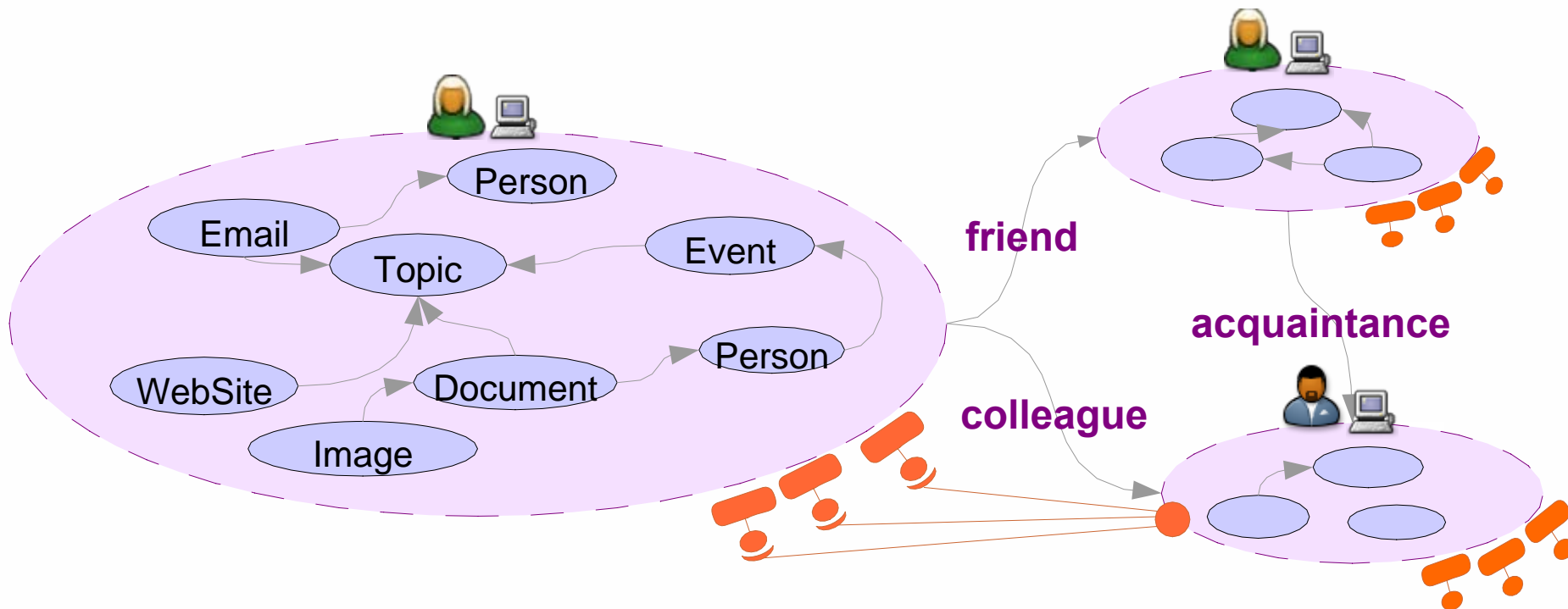


Policies and Trust Negotiation

- “No Registration Needed: How to Use Declarative Policies and Negotiation to Access Sensitive Resources on the Semantic Web”. R.Gavriloaie, W.Nejdl, D.Olmedilla, K.Seamons, M.Winslett. 1th European Semantic Web Symposium, May 2004, Heraklion
- “Driving and Monitoring Provisional Trust Negotiation with Metapolicies”. P. A. Bonatti, D. Olmedilla. IEEE 6th International Workshop on Policies for Distributed Systems and Networks, Jun. 2005, Stockholm
- “Negotiating Trust on the Grid”. J.Basney, W.Nejdl, D.Olmedilla, V.Welch, M.Winslett. 2nd Workshop on Semantics in P2P and Grid Computing at the 13th Intl. World Wide Web Conference, May 2004, New York



- NEPOMUK**
- **Desktop:** Help individuals in managing information on their PC
 - **Semantic:** Make content available to automated processing
 - **Social:** Enable exchange across individual boundaries



Personal Semantic Web: *a semantically enlarged intimate supplement to memory*

Social protocols and distributed search

NEPOMUK enabled peers



Driven by today's needs, in the spirit of seminal visions

Inspired by sociological perspectives

on group forming

Viral Communication (Reed)

on innovative IT-based interaction & feedback

Social translucent systems
(Erickson & Kellogg)

Smart Mobs (Rheingold)

on network modeling & algorithms

Social network research;
Small world property;
Power law distribution
(Barabasi, Huberman)

Link based authority algorithms,
recommender algorithms (Perugini)

Today necessary technologies & communities exist:

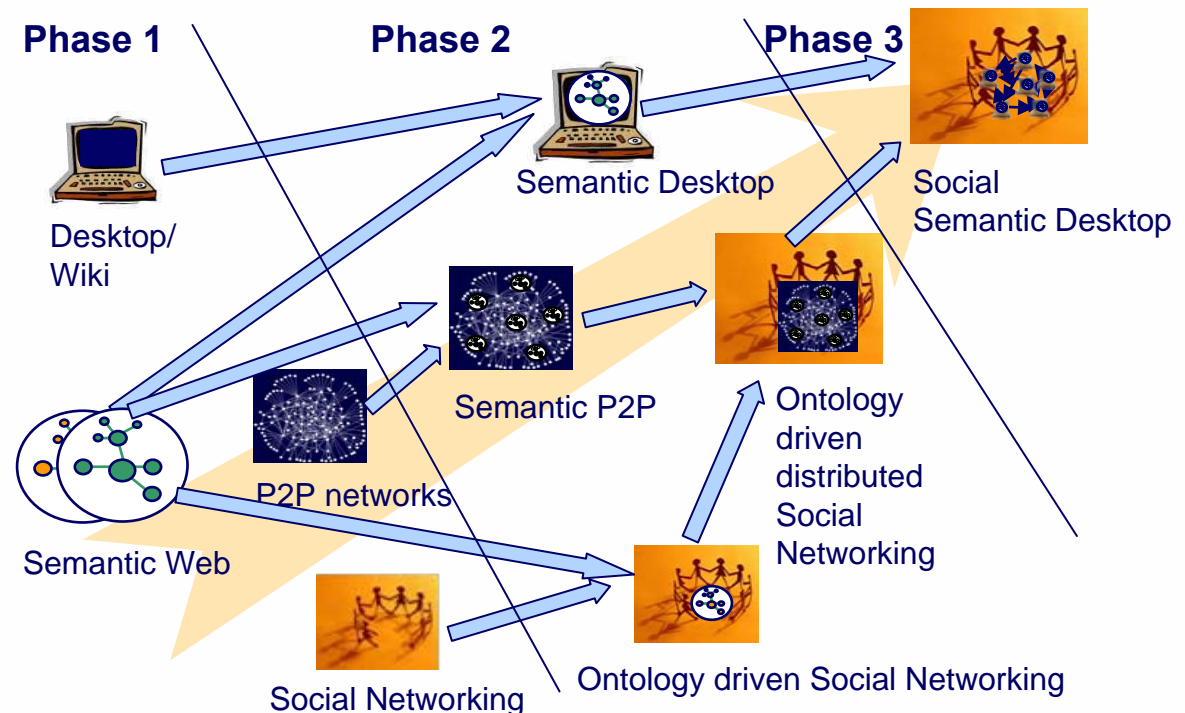
Standardized metadata: Semantic Web

Scalable distributed infrastructure: P2P Computing

Knowledge articulation and interaction: Desktop Technology

Human centric information exchange: Online Social Networks

Challenge: Extension & merging of research streams





iSearch on the Web

How can we personalize Web Search using the largest collection of manually created web metadata? (ODP Project www.dmoz.org, 4 million links, 65.000 editors, but still only 0.1% of Google's database)

- **Using ODP Metadata to Personalize Search**, by P. Chirita, W. Nejdl, R. Paiu, C. Kohlschütter. 28th Intl. ACM SIGIR Conference on Research and Development in Information Retrieval, Salvador, Brazil, 2005

How can we find related pages using the hyperlinks between Web pages to infer relations between pages or topics and recommend appropriate types of Web pages (E.g., hubs or authorities, etc.)?

- **Finding Related Hubs on the Link Structure of the WWW**, by P. Chirita, D. Olmedilla, W. Nejdl. 3rd Intl. IEEE/WIC/ACM Conference on Web Intelligence, Beijing, China, 2004

How can we exploit social network information to rank emails and detect spam?

- **Mailrank: Global Attack-Resistant Whitelists for Spam Detection**, by P. Chirita, J. Diederich, W. Nejdl: CIKM, Bremen, 2005



Edutella: A Distributed Semantic Web Infrastructure

Project JXTA	
Project Info Home Background News Downloads FAQ Help	Project Project Home News Members Resources: Mailing Lists Source Code Issue Tracking
Developer Resources Getting started Tutorials View projects Join Project JXTA Login Mailing lists Report bugs	Project: edutella If you reg <hr/> Summary: RDF-based Metadata Infrastructure for P2P Applicat Category: services License: The Sun Project JXTA Software License
Documentation Project JXTA docs Protocol Spec License Governance	Overview <p>This project is a multi-staged effort to scope, specify, architect infrastructure for JXTA.</p>
Weekly Stats Dec 29, 2001 Members 7 867	Initial Services <ul style="list-style-type: none"> • Query Service: Standardized query and retrieval of RDF me • Replication Service: Provide data persistence / availability data integrity and consistency. • Mapping Service: Translate between different metadata vo between different peers. • Annotation Service: Annotate materials stored anywhere in
	Vision <p>Provide the metadata services needed to enable interoperability applications.</p>

Started in 2001 as part of PADLR, building block for EU/IST FP5 ELENA Smart Learning Space (personalized, distributed queries)

Edutella: A P2P Networking Infrastructure Based on RDF, by W. Nejdl, B. Wolf, C. Qu, S. Decker, M. Sintek, A. Naeve, M. Nilsson, M. Palmer, T. Risch. 11th WWW, 2002. my most cited paper.

Super-peer-based routing strategies for RDF-based peer-to-peer networks, by W. Nejdl, M. Wolpers, W. Siberski, C. Schmitz, M. Schlosser, I. Brunkhorst and A. Löser. Web Semantics 1 (2), Feb. 2004

Top-k Query Evaluation for Schema-Based Peer-to-Peer Networks, by W. Nejdl, W. Siberski, U. Thaden, W. Balke. 3rd Intl. Semantic Web Conference , Hiroshima, Nov. 2004



Overview

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- Project Focus Semantic Web and Digital Libraries

■ Personal Information Management

- Search in Digital Libraries
- Search in Personal Collections
- Knowledge Sharing in Social Networks

■ Future Research Areas and Trends



Personal Information Management

The problem is not to store it – we must be able to find it again!

Information is

- Distributed - peer-to-peer or federated
- Semi-structured / metadata or structure information or unstructured / fulltext
- Associated to contexts and tasks
- Retrieve information from institutional repositories
- Re-find information in your personal collection
- Share information in your social network



Searching in Digital Libraries

Which library should I turn to when I look for an appropriate article?

Project: Federated Access in a Library Network (VASCODA)

■ Participants: L3S, TIB, Bielefeld Library

■ Goal: Single search interface for several libraries

■ Requirements:

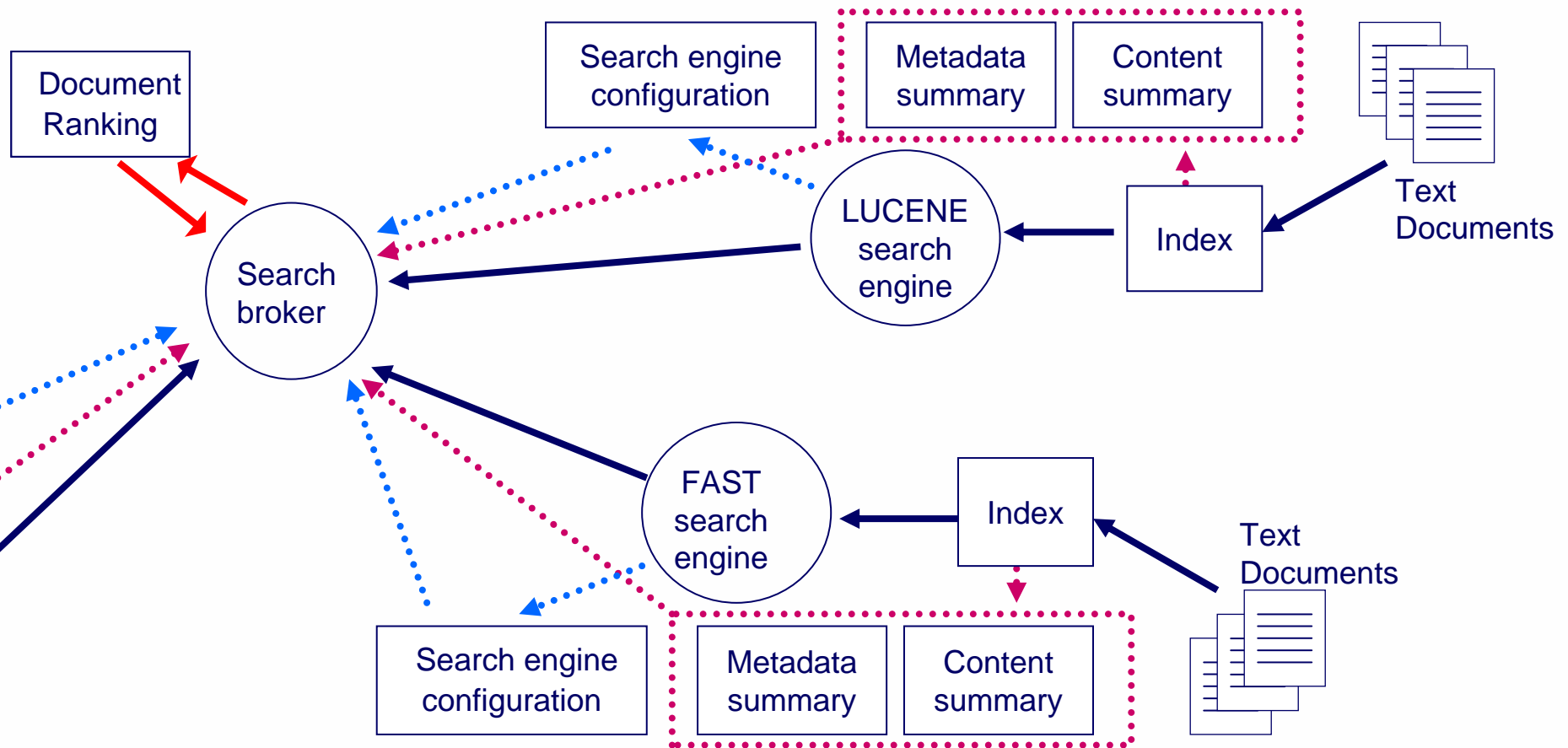
- Libraries use search engines (not databases) to store their metadata and full-text
- Different infrastructures are used (TIB: LUCENE, Bielefeld: FAST)
- Integrated metadata and full-text search is needed

■ See also DB/IR Panel at SIGMOD'05
and the references cited in the appropriate report





Federated Search Scenario





Synchronization of resource descriptions

- Common format on exported index statistics (overall number of documents; for every term: document frequency, sum of term frequencies)
 - Luis Gravano, Kevin Chang, Hector Garcia-Molina, Carl Lagoze, and Andreas Paepcke. STARTS: Stanford Protocol Proposal for Internet Retrieval and Search. SIGMOD 1997
 - Noah Green, Panagiotis G. Ipeirotis, and Luis Gravano. SDLIP + STARTS = SDARTS: A Protocol and Toolkit for Metasearching. JCDL 2001
- Updating policy is based on monitoring history
 - Panagiotis G. Ipeirotis, Alexandros Ntoulas, Junghoo Cho, Luis Gravano. Modeling and Managing Content Changes in Text Databases. ICDE 2005



Issues and planned functionality

■ Distributed index organization

- William H. Mischo. Digital Libraries. Challenges and Influential Work, D-Lib Magazine, July/August 2005

■ Database selection

- L. Si, R. Jin, J. P. Callan, and P. Ogilvie. A language modeling framework for resource selection and results merging. CIKM 2002

■ Efficient distributed retrieval

- Wolf-Tilo Balke, Wolfgang Nejdl, Wolf Siberski, and Uwe Thaden. Progressive Distributed Top-k Retrieval in Peer-to-Peer Networks. *21st Intl. Conference on Data Engineering, Tokyo, April 2005*
- Wolf-Tilo Balke, Wolfgang Nejdl, Wolf Siberski and Uwe Thaden. DL meets P2P - Distributed Document Retrieval based on Classification and Content. *European Conference on Research and Advanced Technology for Digital Libraries (ECDL 2005), Vienna, Austria, September 2005. Best paper award.*



Searching in Personal Collections

- Why is it so hard to find what you need on your desktop –
“You still use Google even for files stored on your computer?”
- Current desktop search engines use only full text index
- People tend to associate things to certain contexts
- For desktop search we need to support contextual information in addition to full text!
 - Relationships between information items (citations)
 - Relationships based on interactions (email exchange, browsing history)
 - Relationships between different types of items (authorship, publication venues, email sender information, recommendations)
 - Other situational context



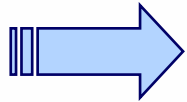
Scenario 1: The Need for Context Information

- Alice and Bob are working together in the L3S research group
- Alice is currently writing a paper about searching and ranking on the semantic desktop and wants to find some good papers on this topic, which she remembers she stored on her desktop
- Some time ago Bob sent her a very useful paper on this topic as an attachment to an email, together with some useful comments about its relevance to her new semantic desktop ideas
- ***Will Alice find the paper from Bob when issuing a query on the desktop, using the search terms “semantic desktop” ?***



Context Metadata & Information Search / Exchange

- Users tend to associate things to certain contexts



Contextual information should be used to enrich search results on the desktop, as well as to enrich knowledge sharing

- Supporting Search: 3 types of user web search behavior:
 - Informational
 - Resource seeking
 - Navigational (especially relevant for the desktop)
- Supporting knowledge sharing in communities
 - Share more than documents



Context Information is necessary!

■ Problems:

- (Mail) Documents sent as attachments lose all contextual information as soon as they are stored on the PC
- (Web) When searching for a document we downloaded from the CiteSeer repository, we would like to retrieve not only the specific document, but all the referenced and referring papers which we already downloaded as well

■ Current desktop search approaches don't make use of desktop specific information, especially contextual information, like:

- **Email** context
- **Web** context
- **Publication** context



Representing Context by Semantic Web Metadata

■ Metadata for resources can be created by appropriate metadata generators

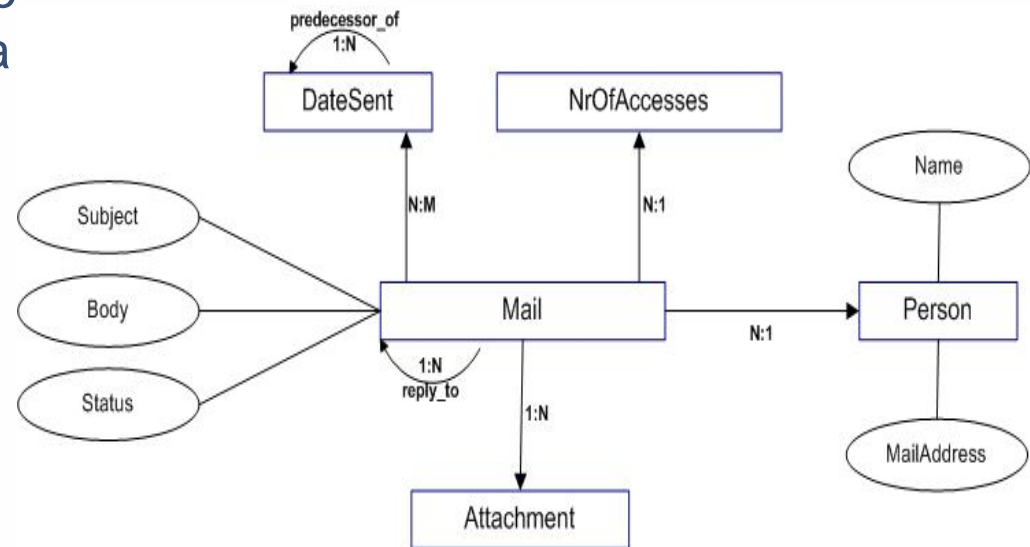
■ Ontologies specify context metadata for:

- Emails
- Files
- Web pages
- Publications

■ Metadata have to be application-independent!

→ Store Metadata as RDF

- generated and used by whatever application you can think of





Beagle++ Desktop Search



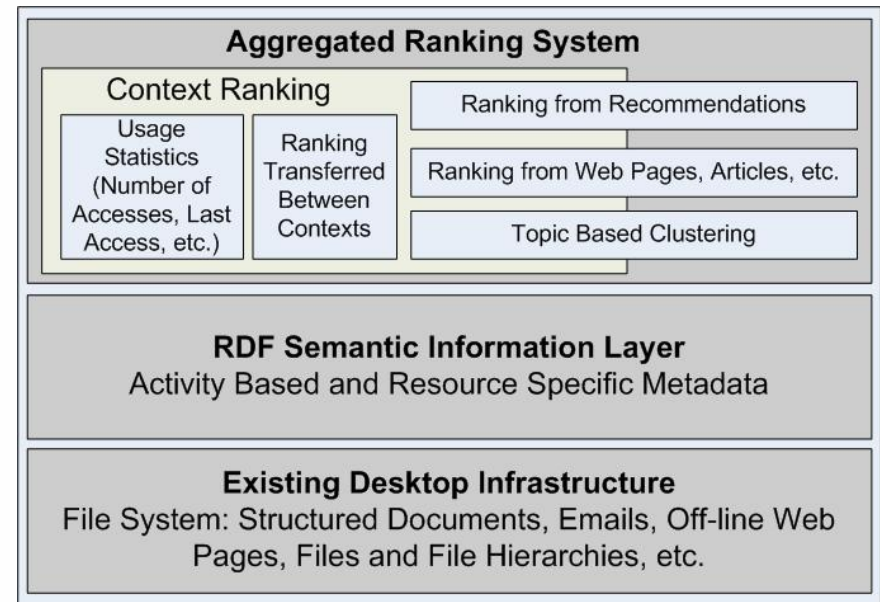
- Beagle++ is our extension of the open source Beagle search project, enabling it to exploit context information
- ***Event triggered metadata generation:***
 - RDF metadata are generated based on ontologies for specific contexts (email, web, etc.)
 - Indexing and metadata generation on the fly
 - Triggered by events upon occurrence of file system changes
 - Notification functionality provided by the *inotify-enabled linux kernel*



Beagle++ Layer Architecture

Context is nice 😊

- because it allows us to better organize and find information
 - because it gives us the possibility to compute the value / importance of resources
- ranking of resources








Beagle++: Find more than documents


Beagle Search (alpha)


Search terms: semantic desktop Anywhere Find

 **Ranking on Semantic Desktop From Bob <bob@l3s.de>**
 Received Today, 2:56 PM
 Ranking: 4.58203
 Folder: *Inbox* (Local)
[Open](#)
[Attachment: chirita05activity.pdf](#) [Show context information](#)

 **sauermann2003.pdf, in folder pdfs**
 Last modified Today, 2:42 PM
 Title: Gnowsis Thesis
 Author: Sauermann
 Pages: 107
 Ranking: 4.03238
 Using **Semantic** Web Technologies ... build a **Semantic Desktop** ... borders. The **Semantic** Web, which ... By transferring **Semantic** Web technologies ... to a **desktop** computer, this ... call the **Semantic Desktop**. The aim ...
[Open](#) [Send to...](#) [Reveal in file manager](#) [Show context information](#)

 **search_and_ranking.pdf, in folder pdfs**
 Last modified 2 days ago, 3:39 PM
 Pages: 16
 Ranking: 3.87364
 on the **Semantic Desktop** ... arrival of **desktop** search applications, ... on the **desktop**. However, even ... because these **desktop** search applications ... of utilizing **desktop** specific characteristics, ... on the **desktop** should be ...
[Open](#) [Send to...](#) [Reveal in file manager](#) [Show context information](#)

 **Recommendations_in_Social_Networks_by_Sharing_and_Exchanging_Semantic_Context.pdf, in folder pdfs**
 Last modified Today, 2:21 PM
 Pages: 14
 Ranking: 3.57834
Semantically Rich Recommendations ... and Exchanging **Semantic** Context ... explores how **semantically** rich complex ... the user **desktop** and show ... groups share **semantically** rich recommendations ... and how **semantically** rich recommendations ...
[Open](#) [Send to...](#) [Reveal in file manager](#) [Show context information](#)

 **The Social Semantic Desktop, in folder - NOT ON DESKTOP**
 Title: The Social **Semantic Desktop**. In DERI ...
 Author: S. Decker and M.Frank
 Ranking: 3.39047
[Find on Google](#) [Cited by: search_and_ranking.pdf, in folder pdfs](#) [Show context information](#)

Best 5 results of 20 are shown. [Show Previous Results](#) [Show More Results](#)



Beagle++: Display additional context

Beagle Context

Activity Based Metadata for Semantic Desktop Search

Authors:

⇒ Paul - Alexandru Chirita

⇒ Rita Gavriloaie

⇒ Stefania Ghita

1. Searching and Ranking on the Semantic Desktop

2. Semantically Rich Recommendations in Social Networks for Sharing and Exchanging Semantic Context

more ..

⇒ Wolfgang Nejdl

⇒ Raluca Paiu

Conference:

⇒ In Proceedings of the 2nd European Semantic Web Conference, Heraklion, Greece

Year:

May, 2005

Cited papers:

1. S. Decker and M. Frank. The Social Semantic Desktop. In DERI Technical Report 2004-05-02, 2004.

2. P. Dolog, N. Henze, W. Nejdl, and M. Sintek. Personalization in distributed elearning environments. In Proceeding of the 13th World Wide Web Conference, 2004.

3. L. Sauermann. Using Semantic Web Technologies to Build a Semantic Desktop. Master's thesis, TU Vienna, 2003.

more ..

Citing papers:

1. W. Nejdl and R. Paiu. I know I stored it somewhere - Contextual Information and Ranking on our Desktop.

2. P. Chirita, S. Ghita, W. Nejdl, and R. Paiu. Searching and Ranking on the Semantic Desktop.

3. S. Ghita, W. Nejdl, and R. Paiu. Semantically Rich Recommendations in Social Networks for Sharing and Exchanging Semantic Context.

more ..

Location:

⇒ Email

Sender: Bob

Received: Today, 2:56 PM

Wolfgang Nejdl

08/12/05

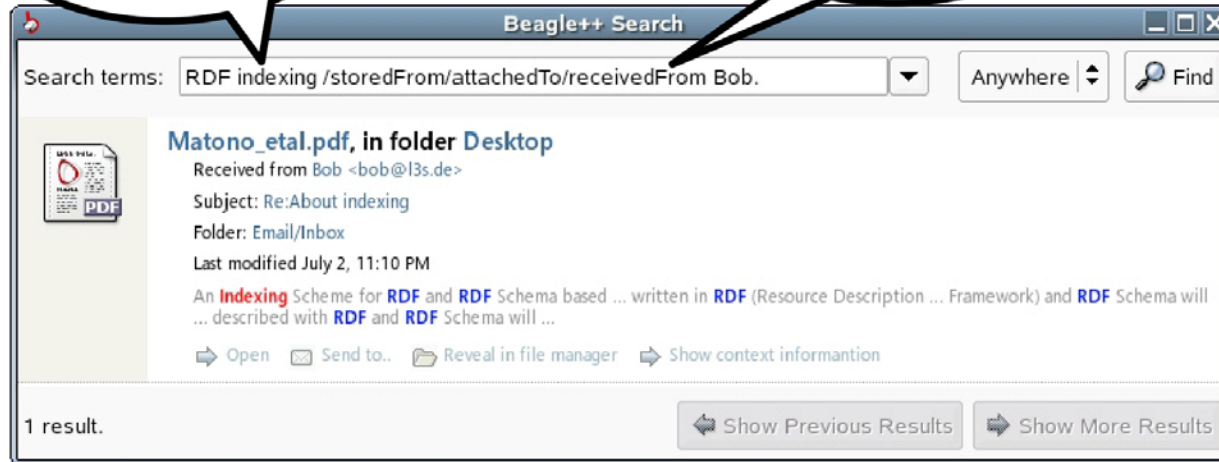
42



Integrating Keyword and Metadata Search

**Text
keywords**

**RDFS
properties**

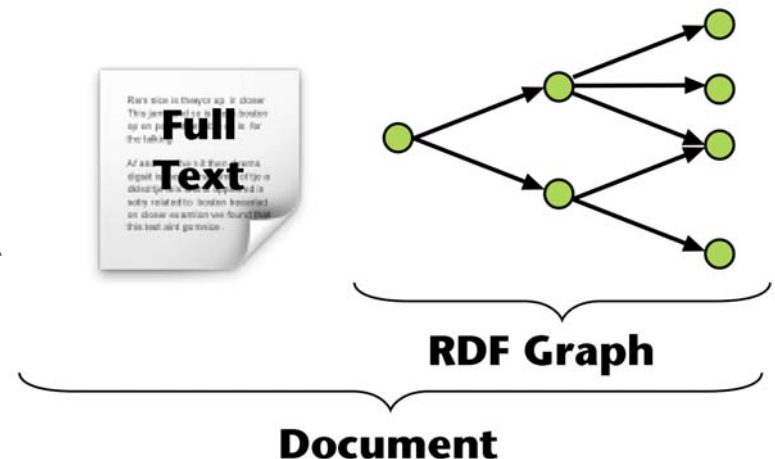


- Search text and metadata on the desktop
- Search efficiently in a user-friendly way
- Simple query language
- No complete schema knowledge necessary



Documents / RDF Fragments

- Metadata stored as RDF graphs, each document has a corresponding RDF fragment
- Extended documents consisting of both full-text and metadata properties
- Our query model supports the operator selection, projection and union, intersection and set difference
- Support for approximate and imprecise metadata queries
- Separation between metadata statements is ensured by positional indices

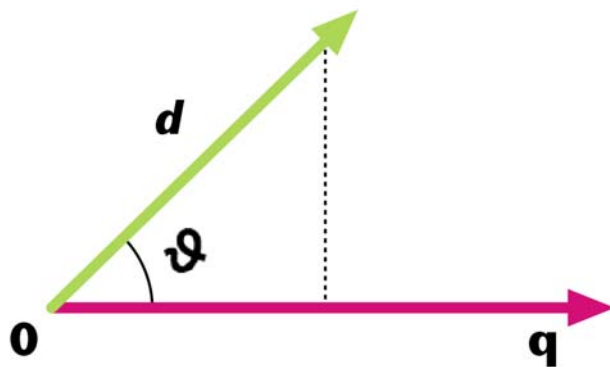




Vector Space Model

- Documents and queries have the same structure
- Queries are compared to full text documents
- Results are ranked according to the similarity of documents with the query

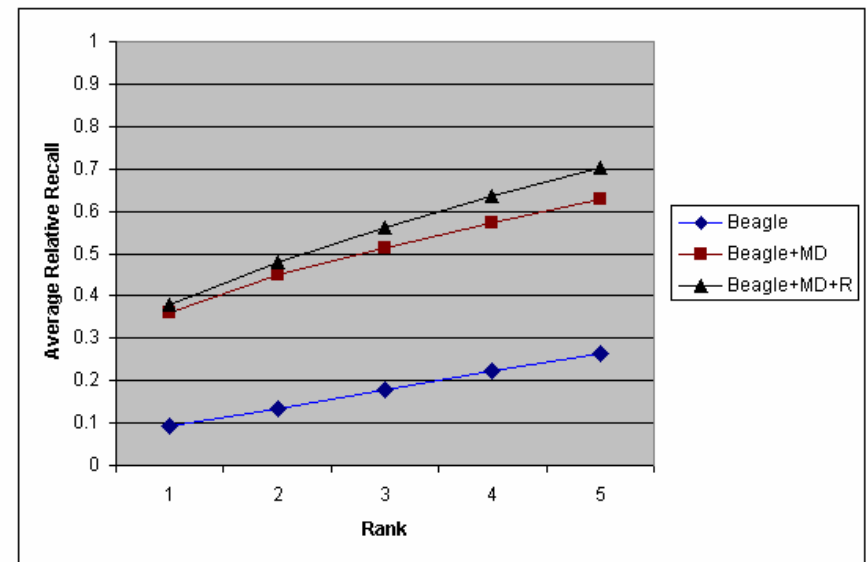
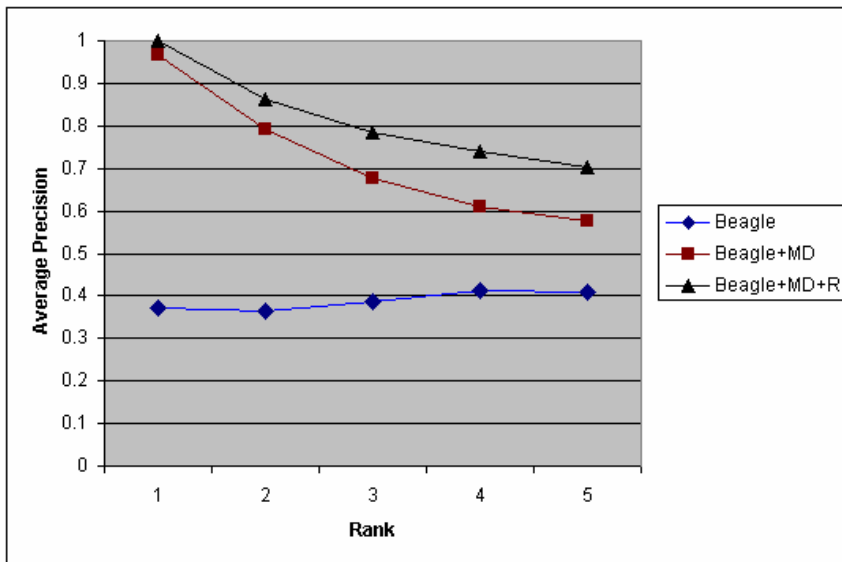
$$\rho(q, d) = \frac{\sum_{t \in q \cap d} w_q(t) * w_d(t)}{\|q\| * \|d\|}$$



- Documents and queries are represented as t-dimensional vector terms
- Similarity is influenced only by the terms which occur in both vectors

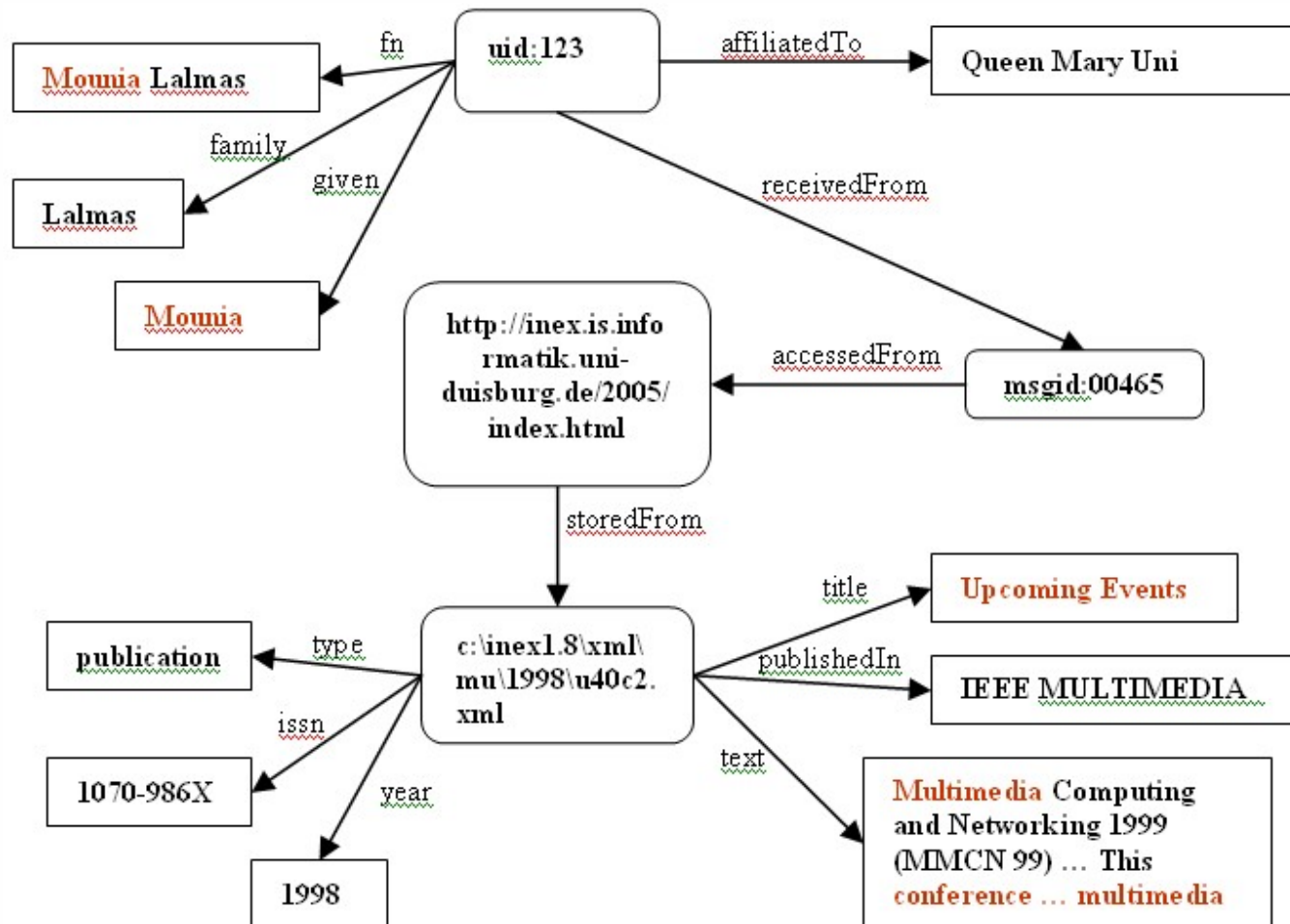


First experients showed improved precision & recall





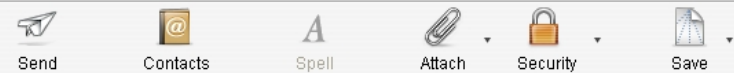
Larger test scenario for the INEX benchmark





Knowledge Sharing in Social Networks

1. Local metadata generators
 - Browsing history
 - Email information
 - Files
2. External sources such as Citeseer or DBLP
3. Interactions with other agents (friends, peers from my community)
 - But: I really want to differentiate between different agents and their context information and value their information differently!



From: Raluca PAIU <paiu.raluca@home.ro> - Home.Ro

▼ Reply-To: paiu.raluca@home.ro

▼ To: |

Subject:

Body Text Variable Width



Peer-Sensitive ObjectRank [1]

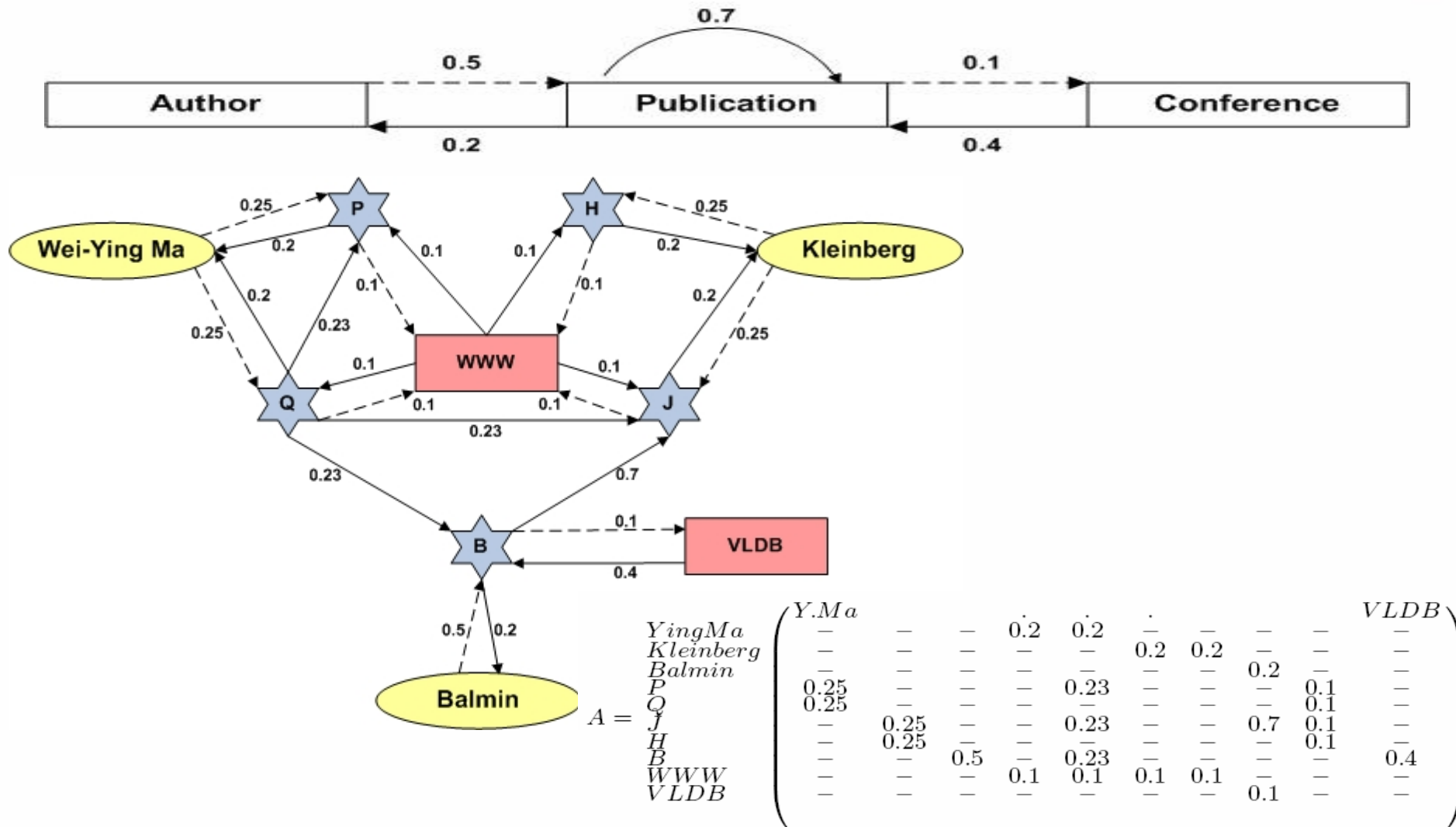
- Step 1: start with PageRank formula – random surfer model

$$\mathbf{r} = \mathbf{d} \cdot \mathbf{A} \cdot \mathbf{r} + (1 - \mathbf{d}) \cdot \mathbf{e}$$

- \mathbf{d} = dampening factor
- \mathbf{A} = adjacency matrix
- \mathbf{e} = vector for the random jump
- Step 2: distinguish between different kinds of objects
- ObjectRank variant of PageRank



Peer-Sensitive ObjectRank [2]





Peer-Sensitive ObjectRank [3]

- Step 3: Take provenance information into account
- → **Peer-Sensitive ObjectRank**
- Represent different trust in peers by corresponding modifications in the **e** vector
- Keep track of the provenance of each resource

$$\textit{originates}(r_i, P_n) = \begin{cases} 1, & \text{if } r_i \text{ is in the initial set of } P_n \\ 0, & \text{otherwise} \end{cases}$$

$\textit{trust}(P_i, P_j) \in [0,1]$, the trust value of peer P_i for P_j

$$e_k(P_i) = \max_{j=0}^N \{ \textit{trust}(P_i, P_j) \cdot \textit{originates}(r_k, P_j) \}$$



Knowledge Sharing in Social Networks

Sensitivity Analysis

- Powerlaw trust distributions make peers consultancy resistant
- Bigger peers influence smaller peers

References

- “Peer-Sensitive ObjectRank –Valuing Contextual Information in Social networks”, A. Damian, W. Nejdl, R. Paiu, 6th Intl. Conference on Web Information Systems Engineering, Nov. 05, New York
- “Semantically Rich Recommendations in Social Networks for Sharing, Exchanging and Ranking Semantic Context”, S. Ghita, W. Nejdl, R. Paiu, ISWC, November '05, Ireland
- “Semantically Enhanced Searching and Ranking on the Desktop”, P. Chirita, S. Ghita, W. Nejdl, R. Paiu, ISWC, Semantic Desktop Workshop, November '05, Ireland

Further work in the context of COOPER and NEPOMUK



Overview

■ L3S Background

- Mission and Focus
- Areas, Budgets, Goals
- Project Focus Technology Enhanced Learning
- Project Focus Semantic Web and Digital Libraries

■ Personal Information Management

- Search in Digital Libraries
- Search in Personal Collections
- Knowledge Sharing in Social Networks

■ Future Research Areas and Trends



Future Research Areas and Trends

- Data management moves towards IR and social networks
 - Integration of semi-structured / metadata and fulltext search in federated digital libraries and personal repositories
 - Social semantic desktop: peer-to-peer information access to semantically enhanced resources on connected desktops
 - Personal information management and organization of personal memories
- Information access in the context of work and learning processes is more than data retrieval
 - Integration of data access with business processes and learning environments
 - Collaboration, recommendation and knowledge sharing functionalities extend basic information access on the desktop and other devices