



DEPARTMENT OF
INFORMATION
ENGINEERING
UNIVERSITY OF PADOVA



Annotations as a means for enhancing collaboration in eScience infrastructures

(Keynote Address)

Maristella Agosti

Information Management Systems Research Group
Department of Information Engineering
University of Padua, Italy



19th Hellenic Conference of Academic Libraries, 3-5 November 2010, Athens, Greece



Outline

1. From Digital Libraries to Information Infrastructures
2. Digital Annotations
3. A Use Case of an eScience Infrastructure: an “Evaluation” Infrastructure



From Digital Libraries to Information Infrastructures



Setting the scene of digital libraries 1/2

- The term “Digital Library” (DL) is used to refer to systems that are heterogeneous in scope and yield very different functions
- These systems range from digital document and metadata repositories, reference-linking systems, archives to complex systems that integrate advanced digital library services
- DL represents the **meeting point of many disciplines**: data management, information retrieval, library sciences, document management, information systems, the Web, image processing, human-computer interaction, digital curation



Setting the scene of digital libraries 2/2

- Despite the young age of the field, it has made a long journey from its initial conception to present and has reached a level of maturity that did not exist fifteen/twenty years ago: substantial knowledge and experience have been accumulated
- This has permitted the identification of the principal ideas behind the field and the development of the **Digital Library Manifesto** that sets the ground rules for the field, facilitating the integration of research and proposing better ways of developing appropriate systems

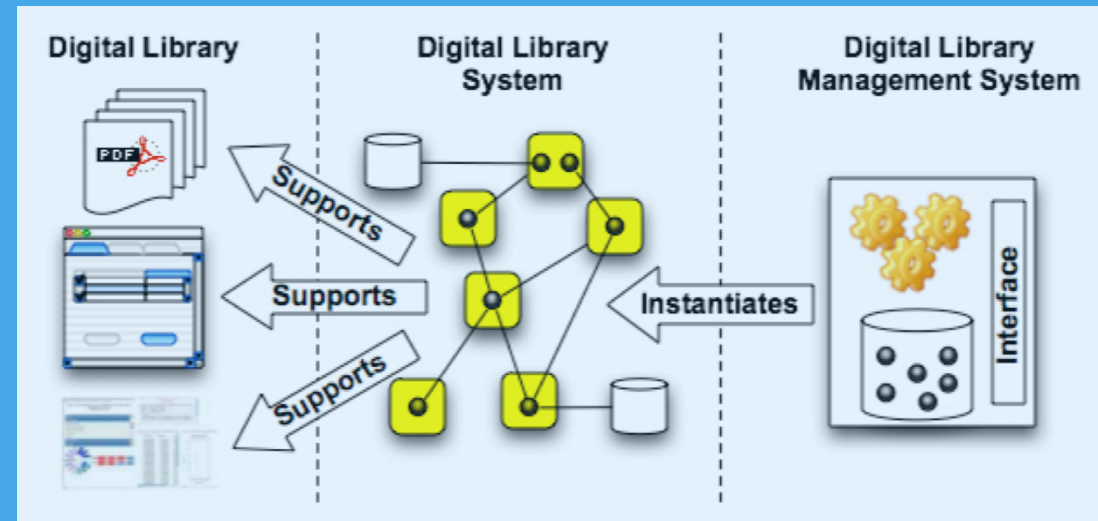
Reference: L. Candela, D. Castelli, Y. Ioannidis, G. Koutrika, P. Pagano, S. Ross, H.-J. Schek, H. Schuld. *The Digital Library Manifesto*. DELOS Network of Excellence on Digital Libraries, 2006



The Digital Library Manifesto

A Three-tier Framework

- A DL is an evolving organisation that comes into existence through a series of development steps that bring together all the necessary constituents
- There are three distinct notions of “systems” developed along the way forming a three-tier framework: DL, DLS, and DLMS
- The three-tiers correspond to three different levels of conceptualisation of the universe of DL





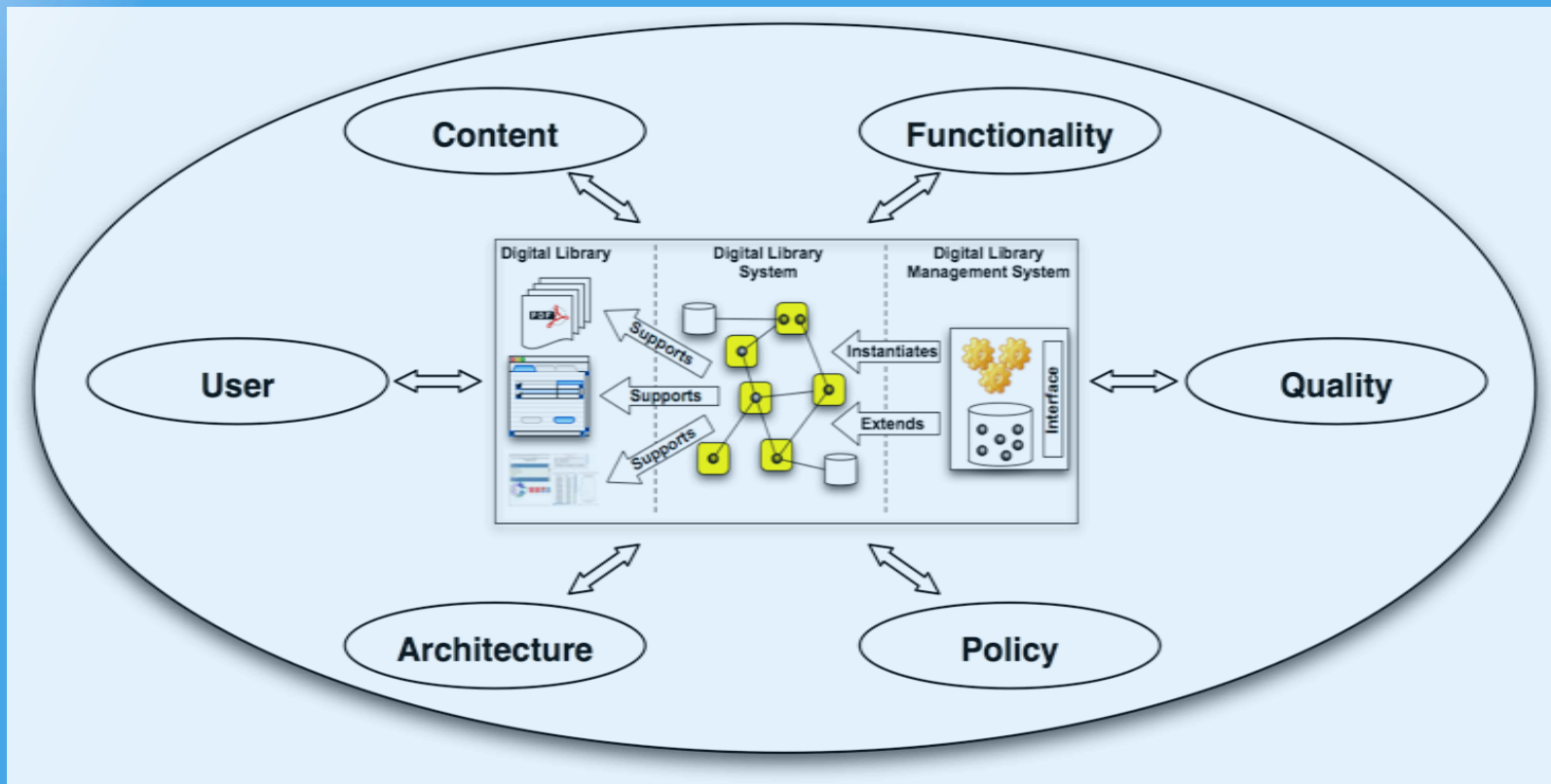
Definitions of DL, DLS, and DLMS

- **DL:** An organisation, which might be virtual, that collects, manages and preserves for the long term rich digital **content**, and offers to its **user** communities specialised **functionality** on that content, of measurable **quality** and according to a codified **policy**
- **DLS:** A sw system that is based on a defined (possibly distributed) **architecture** and provides all functions required by a particular DL; users interact with a DL through the corresponding DLS
- **DLMS:** A generic sw system that provides the appropriate sw infrastructure both
 - to produce and administer a DLS incorporating the suite of functions considered fundamental for DL
 - to integrate additional software offering more refined, specialised or advanced functions



Digital Library Manifesto

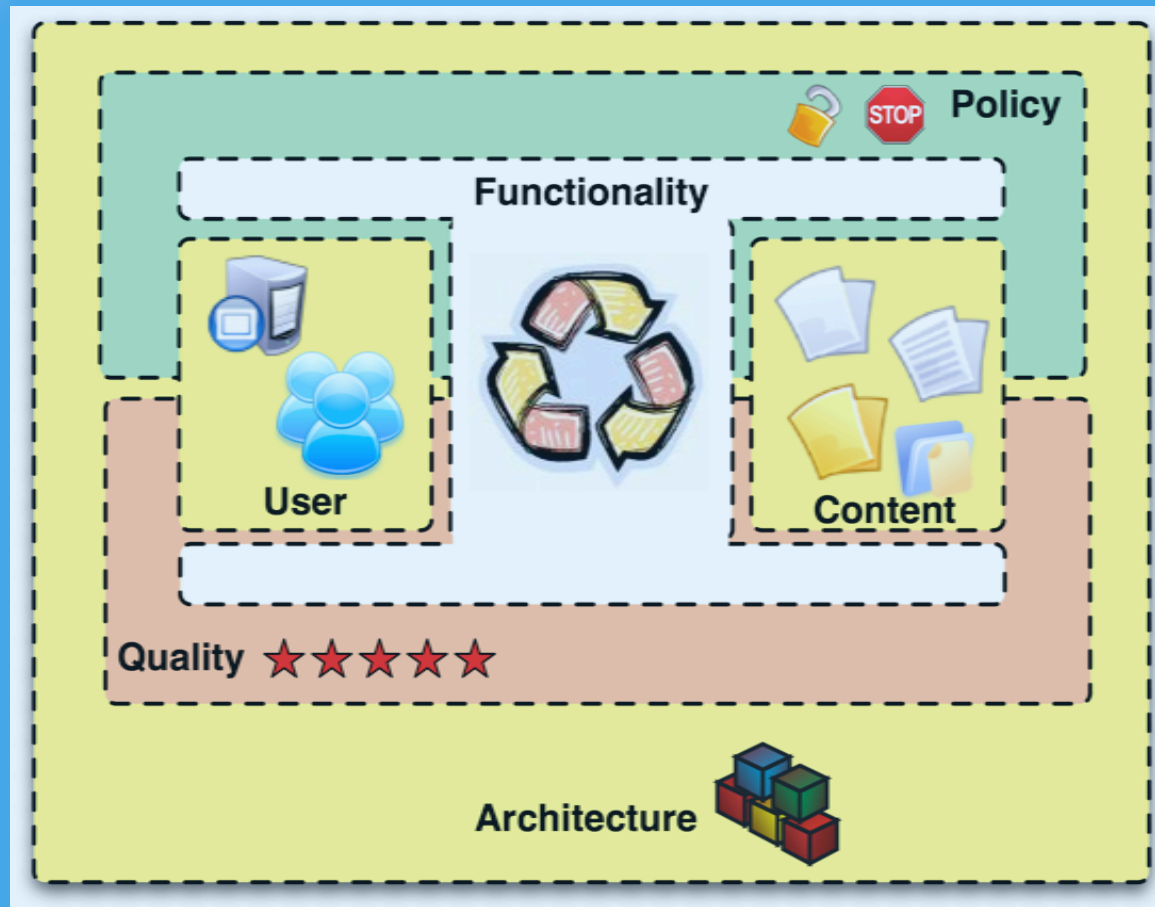
Main Concepts





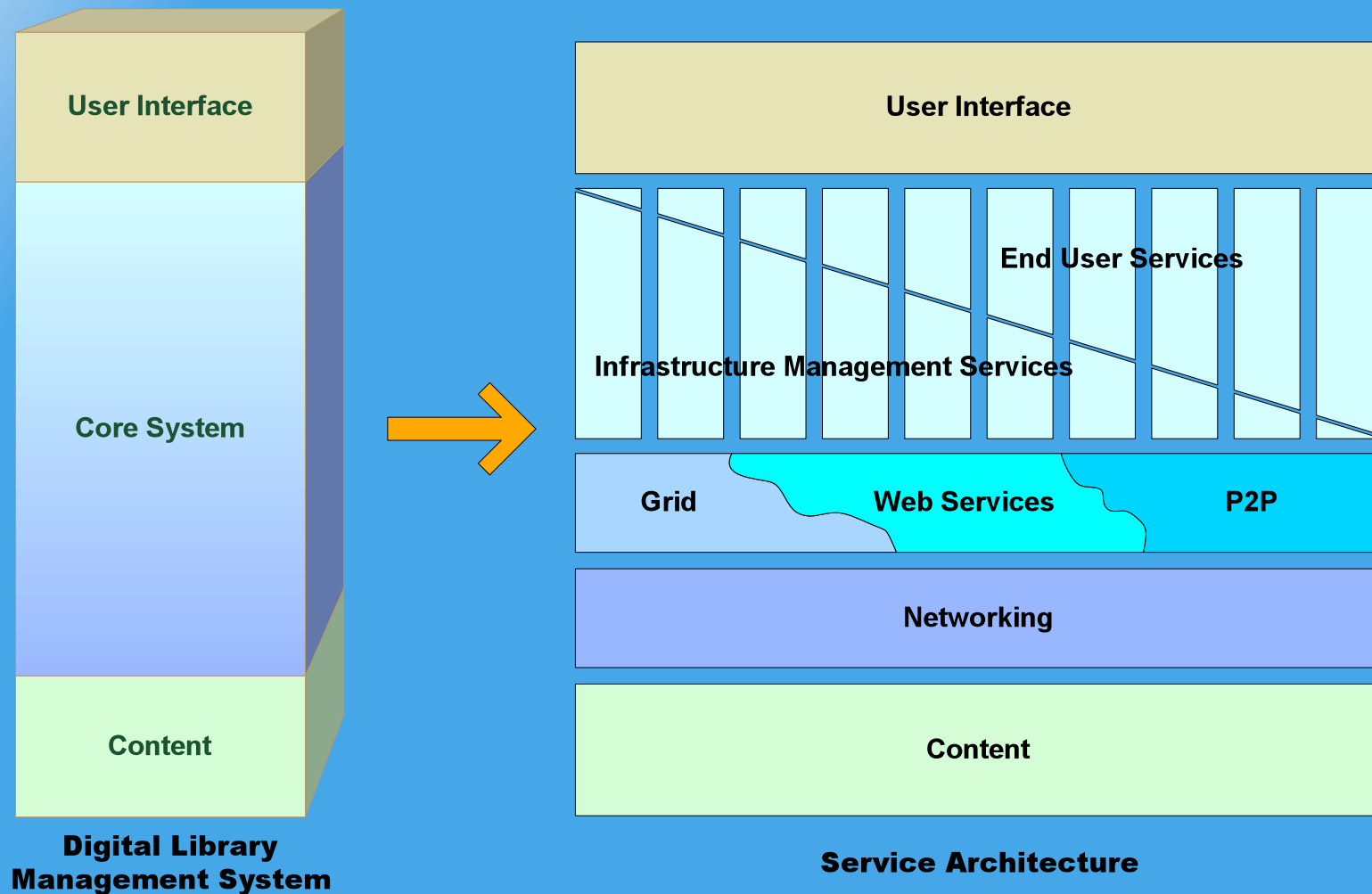
The Digital Library Universe

The Main Concepts in Perspective



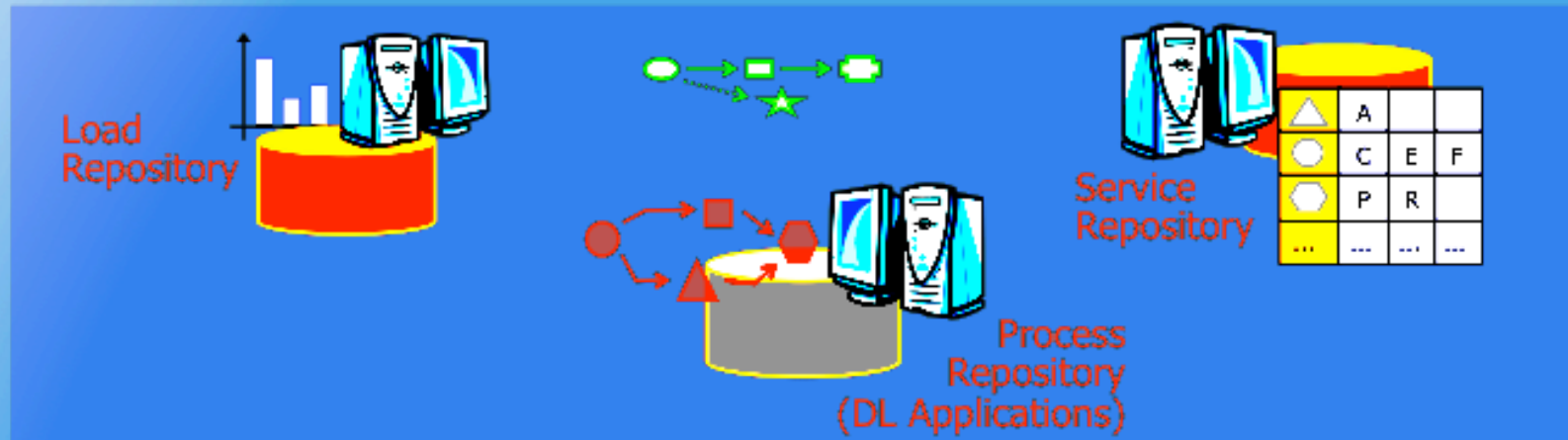


From “one” system to a service architecture

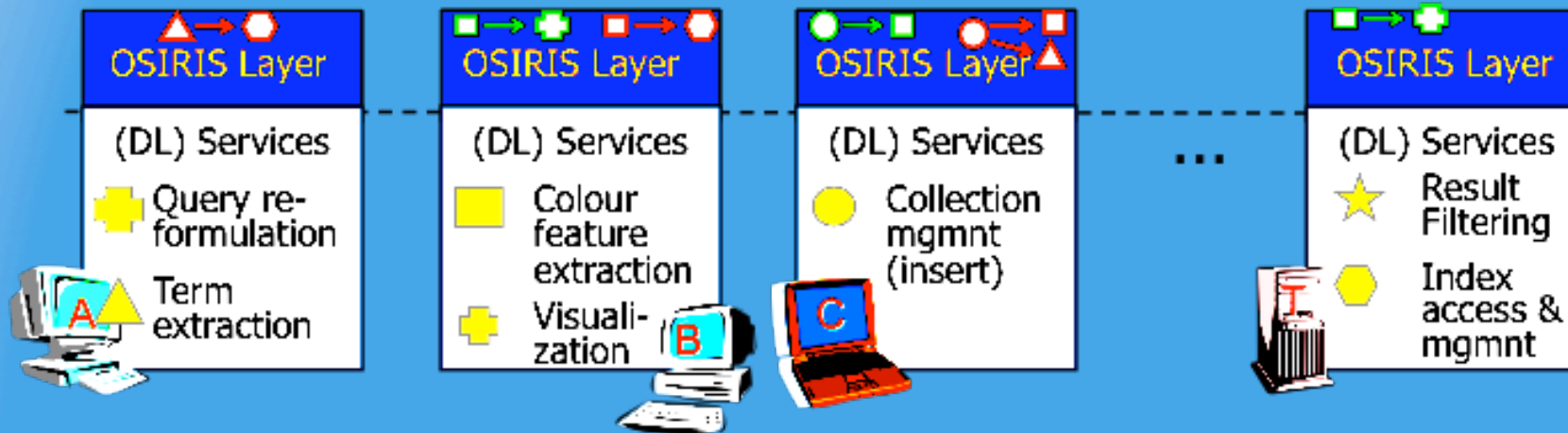




DelosDLMS: a service oriented architecture



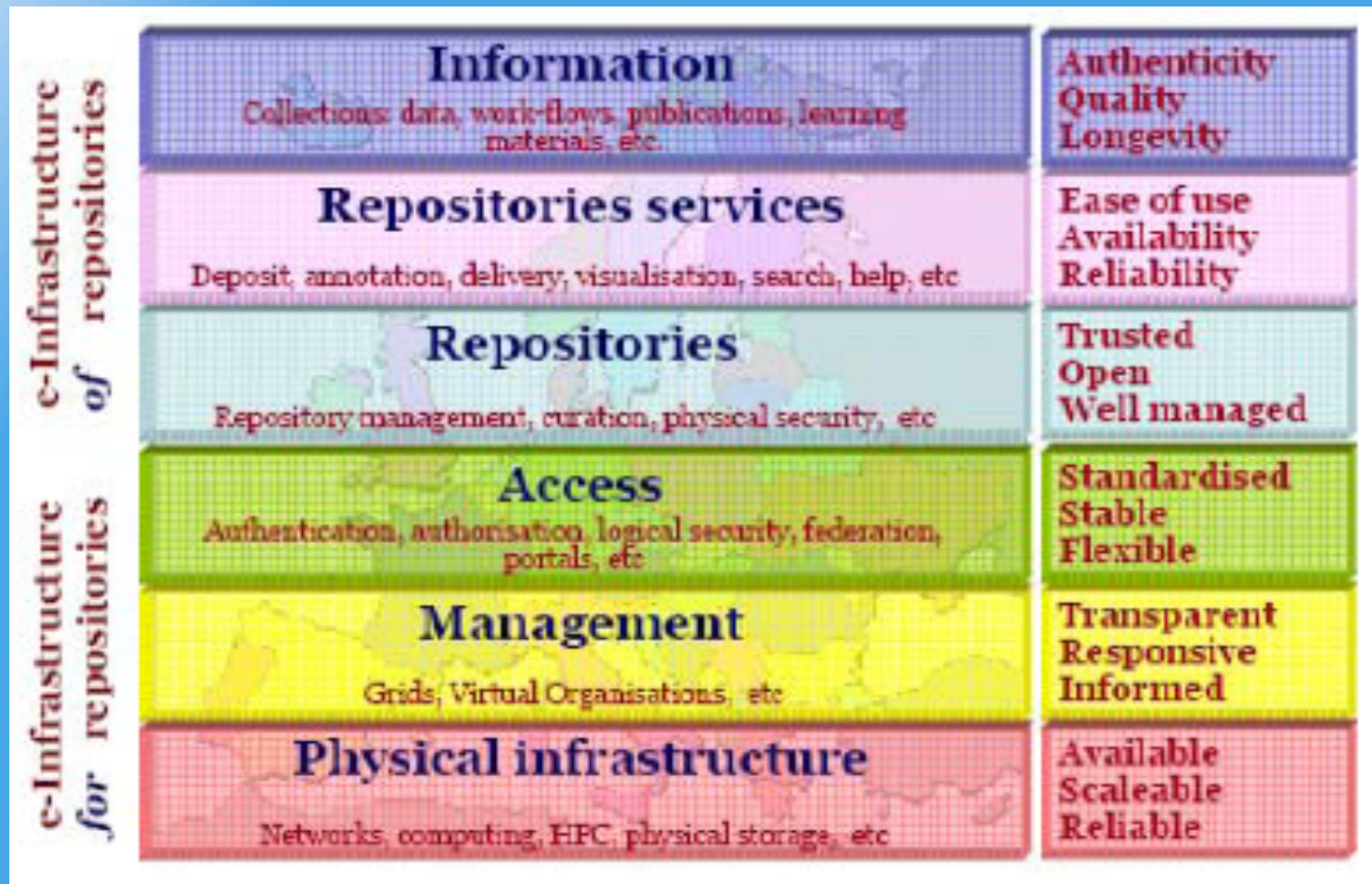
Core System Services



Local OSIRIS Layers
Service Providers



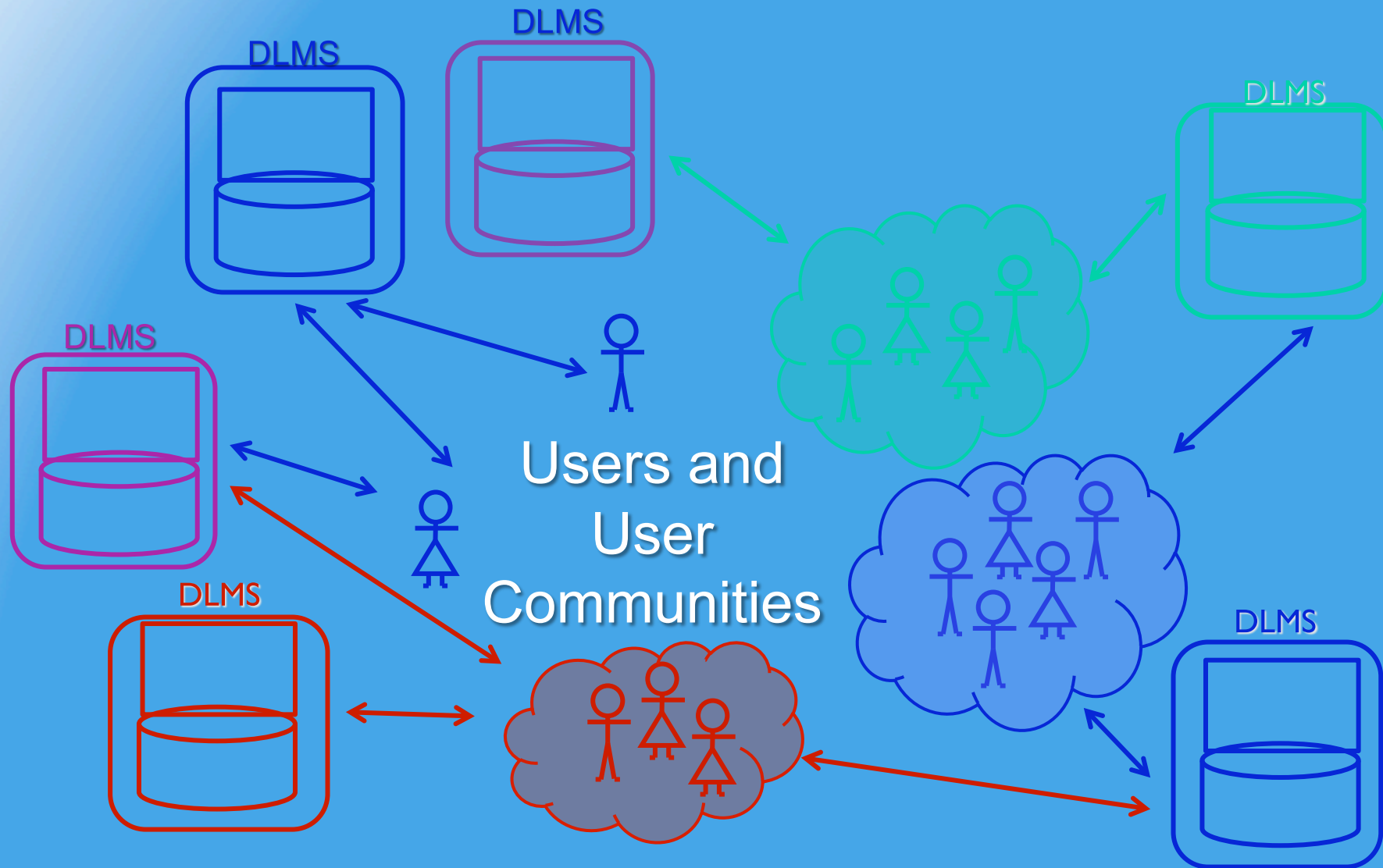
The e-Infrastructure concept



Reference: Enzo Valente (Director of GARR, the Italian Academic & Research Network, <http://www.garr.it/>). *National Research and Education Networks for Digital Cultural Content*. DC-Net public launch, Rome, 17 February 2010.

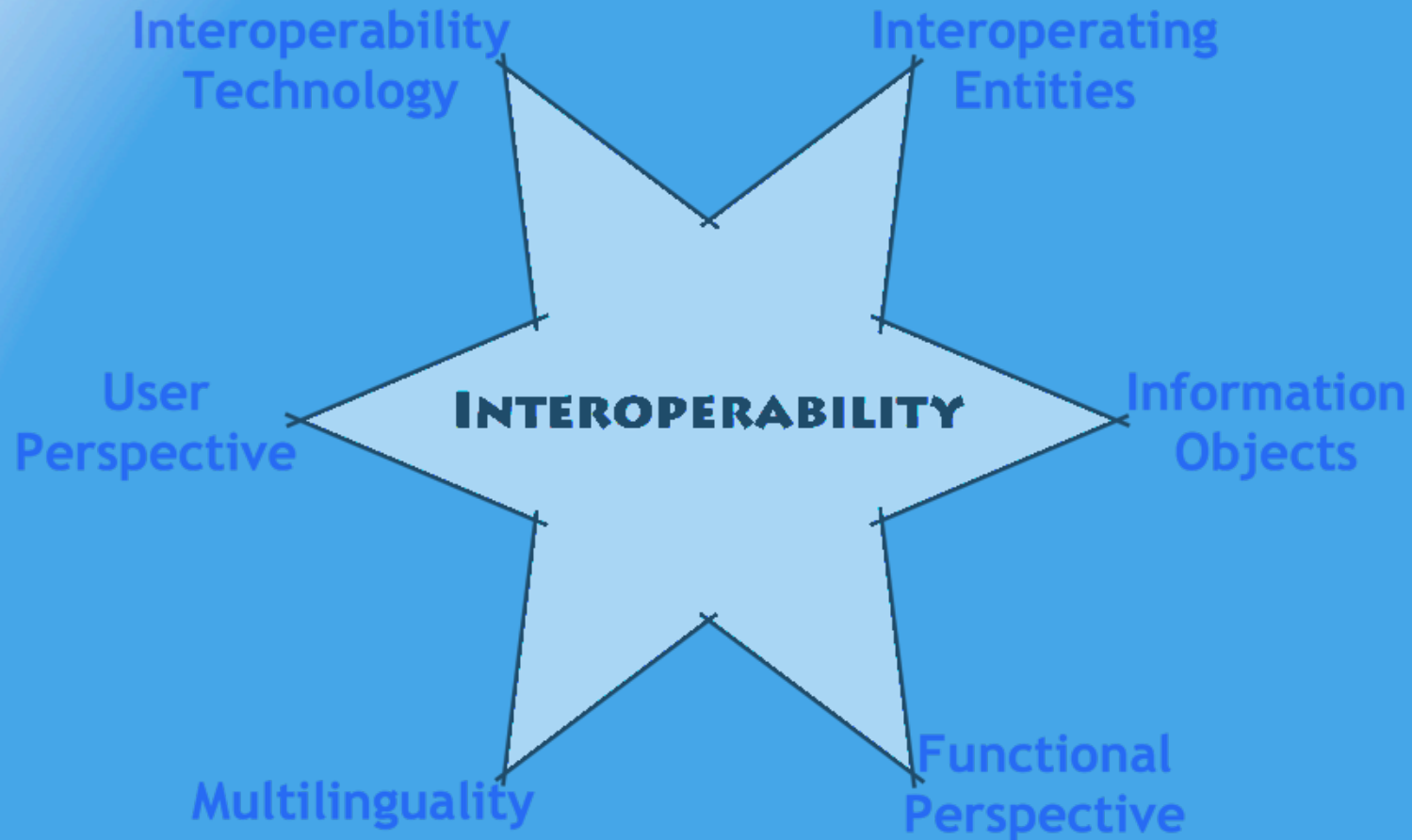


Users want to add and share contents





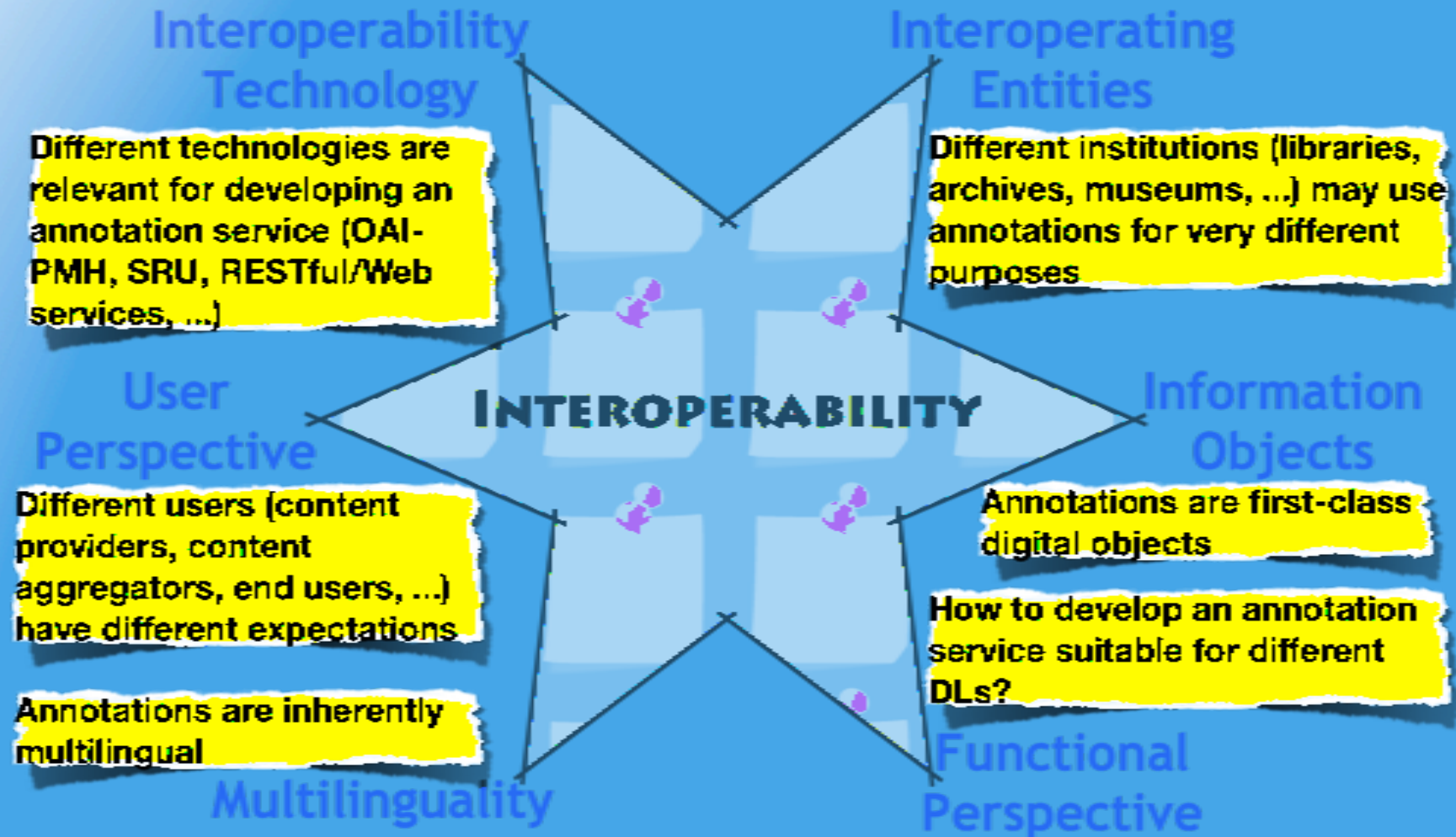
Dimensions of interoperability



Reference: S. Gradmann. *Interoperability of Digital Libraries: Report on the work of the EC working group on DL interoperability*, 2007.



The share of contents through annotations





Digital Annotations



What are annotations ? (1/2)

- A very well-established practice and widely used
- A way for merging personal contents with available information resources
- A means for improving collaborative work practices
- **Annotations as Metadata:** annotations can be considered metadata, that is, additional data which relate to an existing content and clarify the properties and semantics of the annotated content
- **Annotations as Content:** differently from the previous case, annotations are additional contents which concern an existing content



What are annotations ? (2/2)

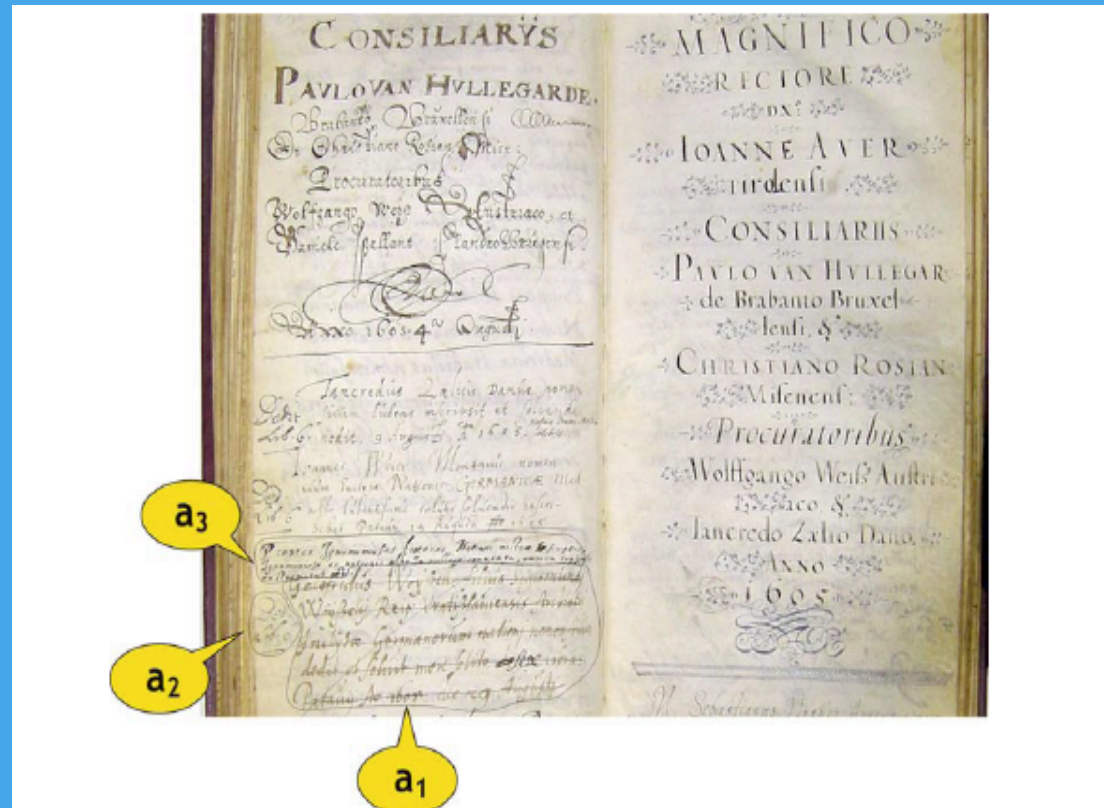
- **Annotations constitute a hypertext:** they allow the creation of new relationships between existing contents, by means of links that connect annotations together with existing content
- **Annotations as a kind of context:** they introduce a new content layer aimed at elucidating the meaning of underlying documents, so that annotations can make hidden facets of the annotated documents more explicit
- **Annotations as dialog acts:** they are part of a discourse with an existing content, where not only the single statement within the discourse is taken into consideration, but also its position and type within the discourse structure



Historical annotations

Italia, Padova, Archivio dell'Università di Padova, Archivio antico, *Matricula Nationis Germanicae artistarum*, reg. 465, c. 69v

In this case the managed annotations are used by the University Administration



a1: *Godefridus Woyszel, filius Sigismundi Woysseii reipublicae Vratislaviensis archiatri, inclitae Germanorum nationi nomen suum dedit et solvit more solito sex libras. Patavii anno 1605 die 29 augusti* (Godfrey Woyszel, Sigmund's son, from Bratislaw, enrolled and paid 6 liras)

a2: *Dedit libras 6* (he paid 6 liras)

a3: *Propter ignominiosas litteras Nationi nostrae scriptas ignominiose ex Nationis albo in publico conventu, omnium consensu, extirpatus est* (he was ignominiously expelled by the Council of Association, because he wrote an ignominious letter to the Association)



Historical glosses

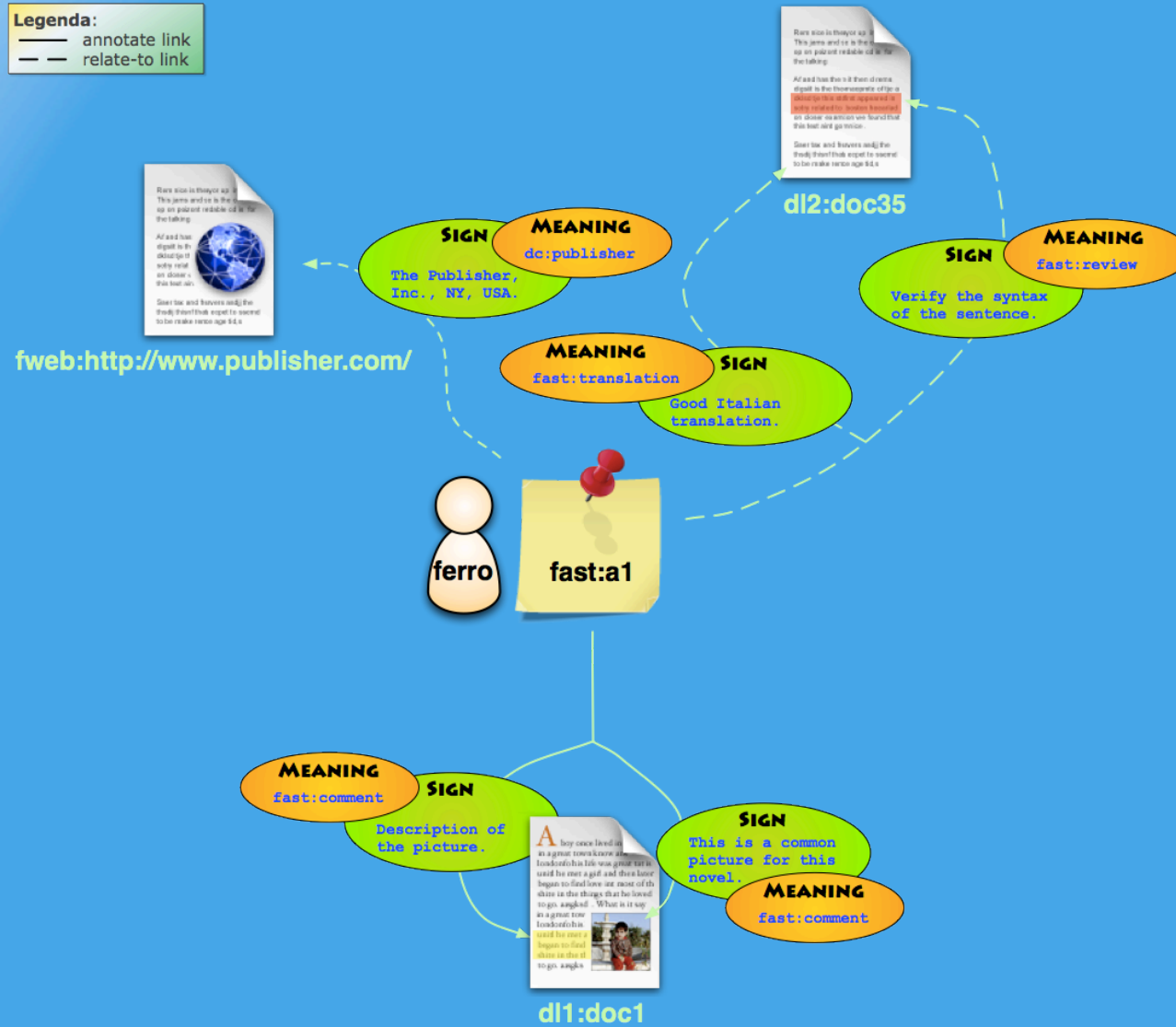
- Italia, Bologna, Biblioteca Comunale dell'Archiginnasio, Salatiele, *Ars notariae*, ms B 1484, c. 12r
- In this case the annotations contain additional contents that describe the original work
- Metadata not only describe resources but also are resources themselves





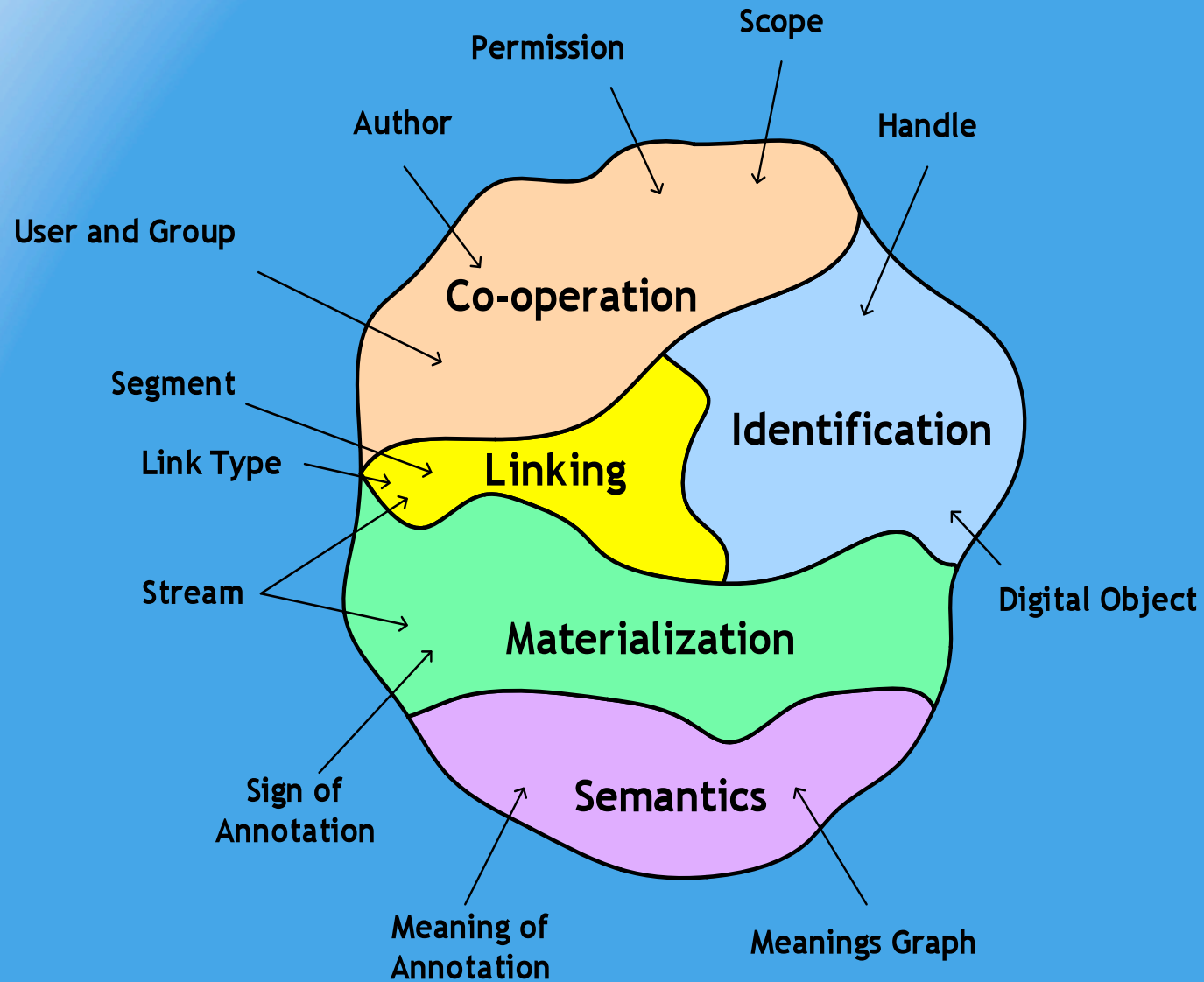
Annotation model: overview

Legenda:
— annotate link
- - - relate-to link





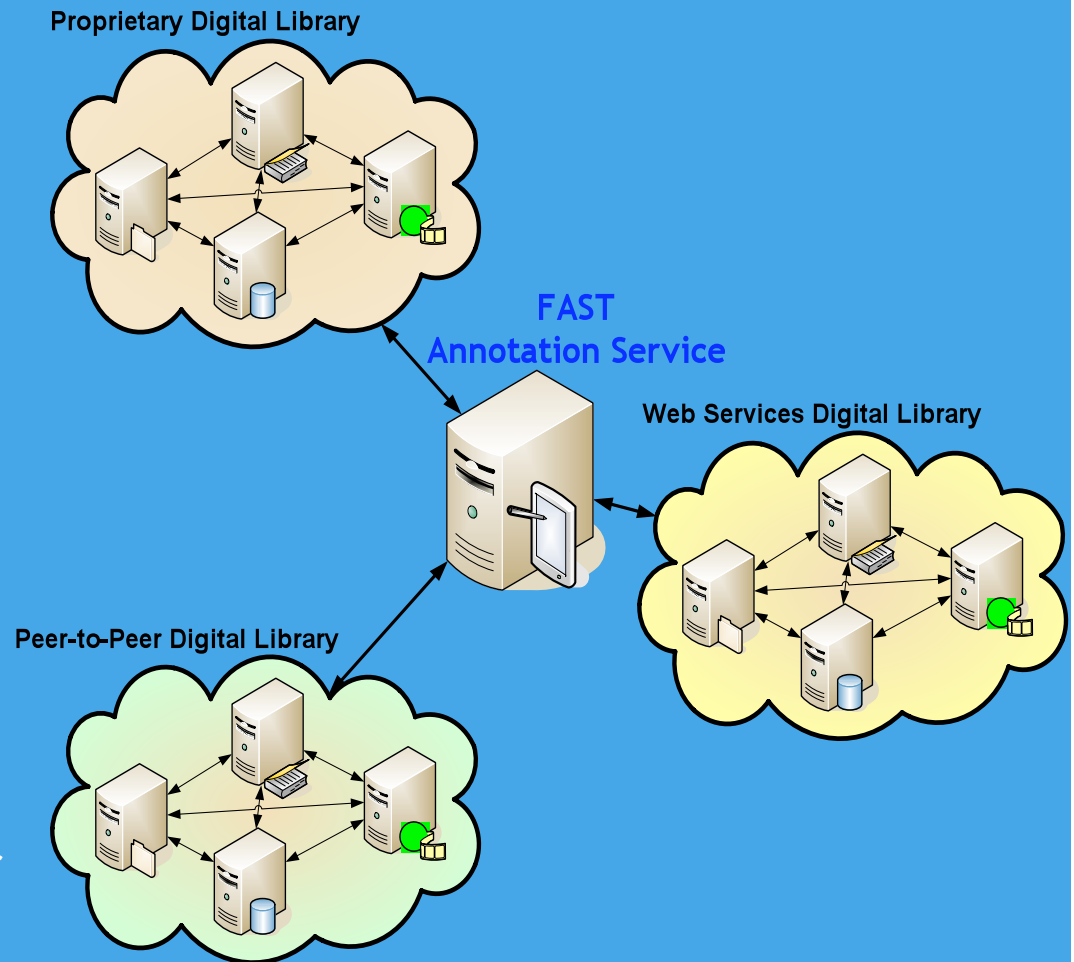
Annotation concepts





An annotation service for the user

- The User can
 - Add
 - Store and keep
 - Share with others (human and sw tools)
 - Use when it is useful
 - Search
- The Annotation service as a tool
 - For keeping memory of thoughts
 - To integrate and relate information resources managed by different DLS
 - That supports the integration of different DLS
 - For retrieving relevant information managed by different services and/or DLS also using the hypertext paradigm





Annotation service in DelosDLMS - I



Annotation service in DelosDLMS - 2

- Annotations are displayed together with all other metadata of an object

The screenshot shows a web browser window titled "ISIS - Online Demo - Windows Internet Explorer". The address bar displays "http://isisdemo.cs.unibas.ch:9700/ISIS/SESSION/Action". The page content includes a header for "DELOS DLMS Integrated Image Retrieval Demo" and "INFOVIS Uni Konstanz / IMS Uni Padova / DBIS Uni Basel". A central image of a white dove in flight is shown with the text "z | e | f | a |" overlaid. Below the image, a table lists annotations for the object.

Number of annotations on the object: 4

Content	Author
peaoc	delosDLMS
dove	delosDLMS
The dove came back carrying an olive branch in its beak; telling Noah that the Great Flood had receded and there was land once again for Man. (Genesis 8:11)	delosDLMS
the heavens were opened unto him, and he saw the Spirit of God descending like a dove, and lighting upon him	delosDLMS



Annotation service in DelosDLMS - 3

- Keyword search can be performed on metadata only (marked in gray), on annotations only (marked in green), or on both (marked with blue color)

ISIS - Online Demo - Windows Internet Explorer

http://localhost:9700/ISIS/SESSION/Action

DELOS DLMS Integrated Image Retrieval Demo
INFOVIS Uni Konstanz / IMS Uni Padova / DBIS Uni Basel

key words: car

search

feedback options >>
meta options >>
<< content options
advanced >>
Search in Annotations: Yes
key words: All
faces: don't care
similar to: Average (

Result page: 1 2 3 4 5 6 7 8 9 10 11 | random SUM layout: thumbnails: smaller larger

1 1.000 2 1.000 3 1.000 4 0.625

5 1.000 6 1.000 7 1.000 8 1.000

Local intranet 100%

14.00 giovedì 18/01/2007



Annotation service in TELplus


The European Library Portal


The screenshot shows the homepage of The European Library. At the top, there is a navigation bar with links for HOME, COLLECTIONS, LIBRARIES, and ORGANISATION. Below this is a search bar with the text "wien" entered. The search results section shows a list of filters for "You are searching in:", including catalogues from national libraries, digital collections, audio and printed music, images, manuscripts, maps, journals, children's literature, theses and dissertations, and personal selection. The "all collections from:" filter is selected, and the country is set to Austria. There are also links for "Browse all the collections", "Browse collections from:", "Browse collections by subject", and "Search collections by description".

The European Library searches the content of European national libraries.

NEWS - 14/05/09
TEST NEWS 1

SUBSCRIBE TO OUR NEWSLETTER
Find out more and subscribe to our bimonthly [Newsletter](#)

EXHIBITIONS

Challenge your knowledge of history and geography! Discover our new exhibition space: [The Napoleonic Wars](#). Still on display: the unique [buildings](#) and the magnificent [treasures](#) of the great national libraries of Europe. Enjoy your visit.

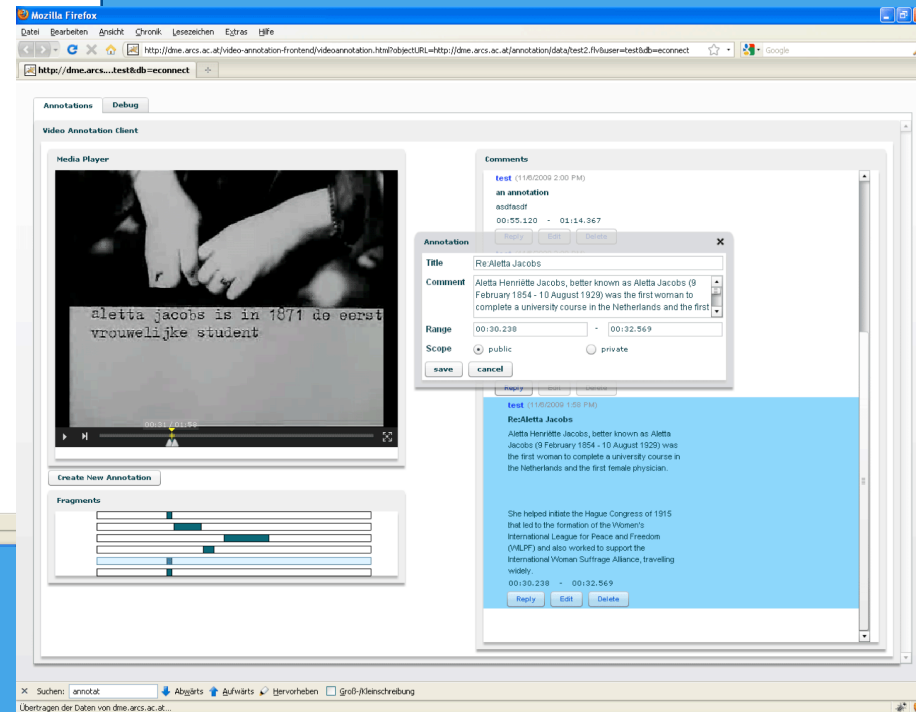
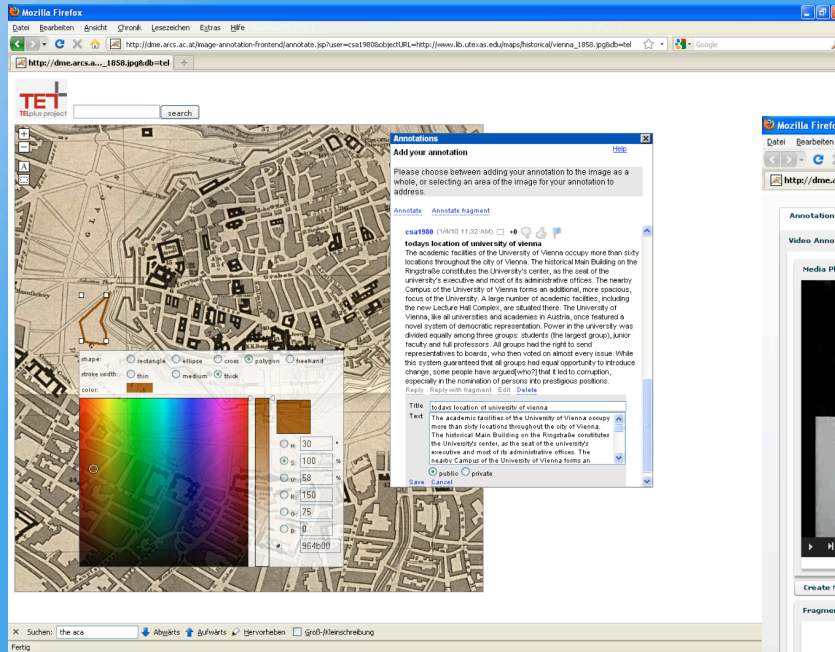
VIDEO TUTORIAL

The Video Tutorial is designed to help new visitors discover all search possibilities offered by The European Library portal.

FAQ's | Jobs & Careers | Policy | Terms of service | Sitemap | Contact & Feedback | © 2005-2009 The European Library
KB The European Library is hosted by the [Koninklijke Bibliotheek](#) - Koninklijke Bibliotheek, The Netherlands (KB).



Annotation sharing in TELplus

Image Annotation Frontend

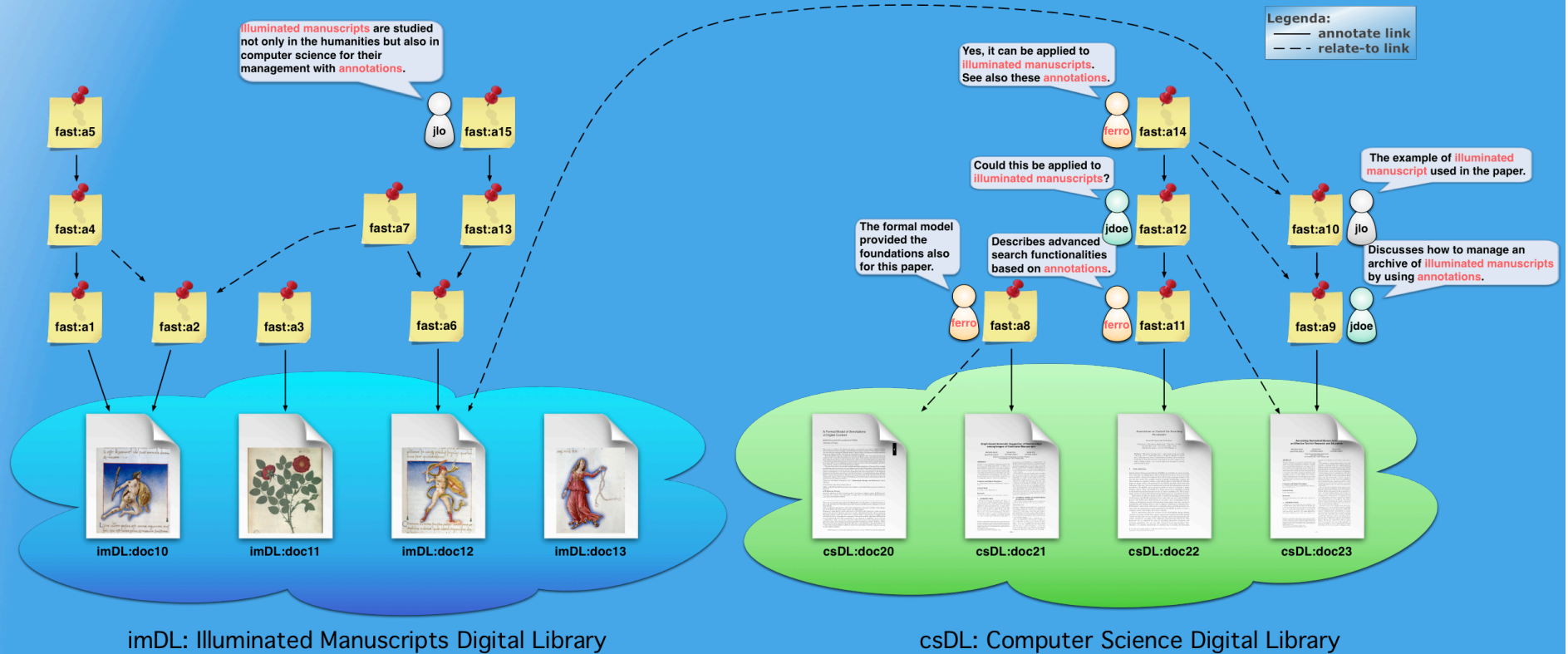


Video Annotation Frontend



Annotations to enhance collaboration

Retrieving information from different sources
making use of annotations





A Use Case of an eScience Infrastructure: an “Evaluation” Infrastructure



eScience Infrastructure for Evaluation

- **Reasons for the Evaluation of Information Search Tools:**
 - For selection of tools
 - For comparing different search methodologies in building a new tool or service
- **Critical issues in evaluation:**
 - Scientific validity
 - Realistic for the applications that will be using the search tool



Scientific validity

- The evaluation must use valid metrics, methodology, and statistics
- The evaluation must be conducted at a large-enough scale to be statistically valid or it must be properly labeled as “exploratory” (for better understanding of the issues)
- The tests must be “repeatable” if possible



Test collection methodology

- Locate a suitable **collection of documents** that mirror the environment being tested
- Create a set of **test questions** that would be asked in that environment
- Determine which documents in the collection are the correct answers (**relevant documents**) for these test questions



Curation of eScience data

The **scientific data** produced during an evaluation campaign should be **archived, enriched, curated, preserved**, and properly **cited** in order to ensure their future **accessibility and re-use**

- A Digital Library or an eScience Infrastructure represent the natural choice for managing, making accessible, citing, curating, enriching, and preserving all the information resources produced during an evaluation campaign
- The current evaluation methodology has been mainly focused on ensuring **experiment reliability** and **comparability** rather than **modelling, organizing** and **managing** the scientific data produced during an evaluation campaign



DIRECT: a digital library for eScience



Introduce a conceptual model

- It makes clear what are the entities entailed by the information space of an evaluation campaign, their features, and their relationships



Develop common metadata formats

- It provides meaning to the data, enable their sharing, re-use, and keeping track of their lineage



Adopt a unique identification mechanism

- It allows for explicit citation and easy access to the scientific data and it supports the enrichment of the scientific data



Manage all the aspects of an evaluation campaign

- Track set-up, management of document collections, creation of topics, experiments submission, relevance assessments, common tools for statistical analyses and reporting, common XML format for data exchange



Example of Supported Functionalities





Example of Supported Functionalities

more than 5.6 million documents

DIRECT
DISTRIBUTED INFORMATION CAMPAIGN TOOL

DIRECT for the Cross Language Evaluation Forum (CLEF)

Assessed Documents / Total Documents: 10,2452/1,176

Update progress: 54% order contribution

Document Preview: An employee of the German Federal Publishing house in Berlin shows some new copies of covers of the new Palestinian passports here 11 April. The printing house had received an order to print 1.5 million Palestinian passports for Palestinian citizens and the last 120,000 passes will be printed in the next coming days.

Creation of Topics

DIRECT for the Cross Language Evaluation Forum (CLEF)

DOI Task Descriptive Statistics

Scientific Production

Statistical Analyses

Performance Measures



DIRECT for the Cross Language Evaluation Forum (CLEF)

Experiment Submission

Task ID	Task Name	Priority	Task Points	Description	View	Details	Assessments
102415GREDLEF-MONO-DE	title	2	3,3043 PM	porter jgltex lucene			
115GREDLEF-MONO-DE	title	1	3,2924 PM	porter lucene			
10GREDLEF-MONO-DE	description	5	3,2813 PM	merged porter jgltex lucene term			
10GREDLEF-MONO-DE	description	1	3,2813 PM	porter jgltex lucene term			
10GREDLEF-MONO-DE	description	4	3,2813 PM	porter term lucene			
10GREDLEF-MONO-DE	description	3	3,2813 PM	porter term lucene			

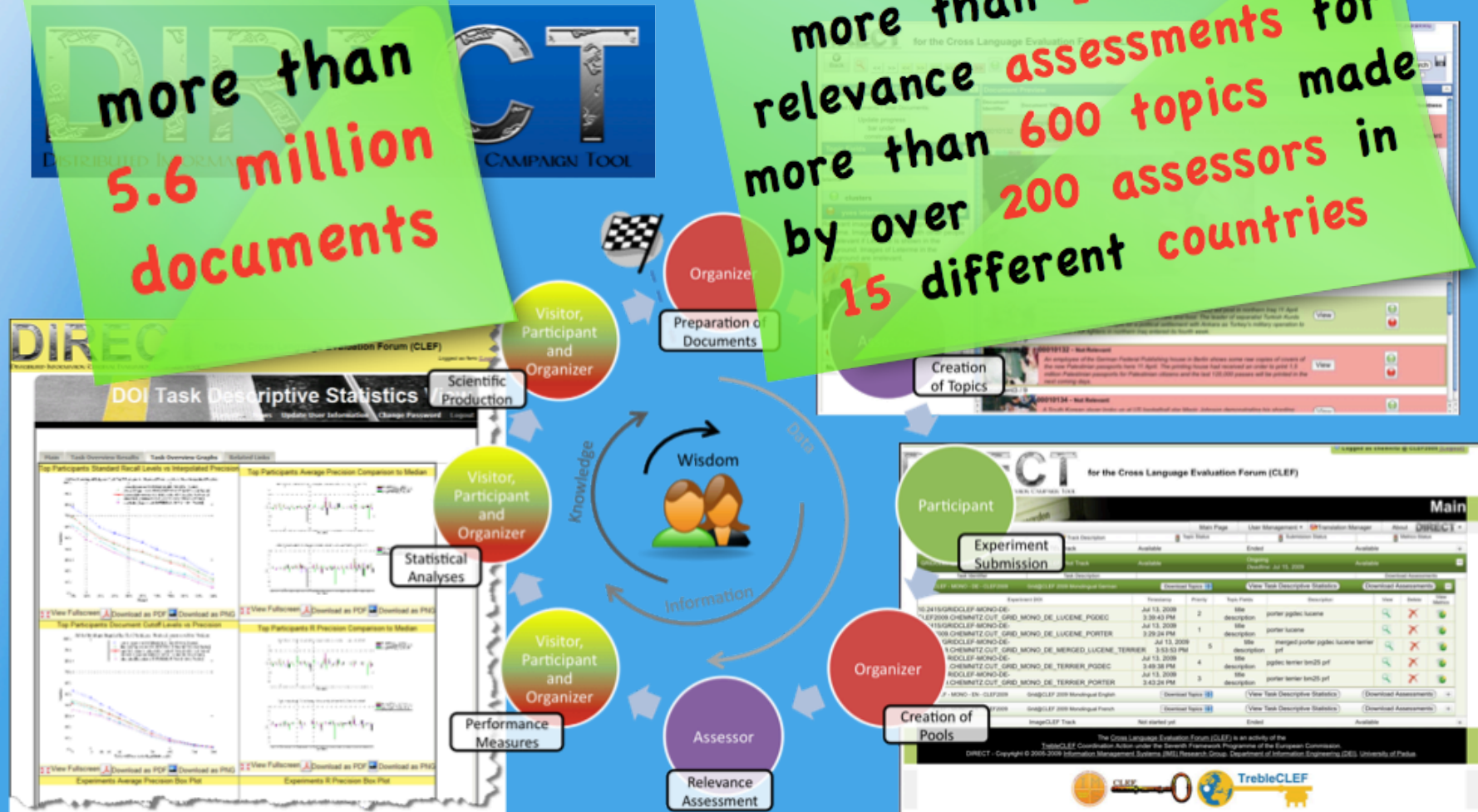
Creation of Pools



Example of Supported Functionalities

more than **5.6 million** documents

more than **1.5 million** relevance assessments for more than **600 topics** made by over **200 assessors** in **15** different countries



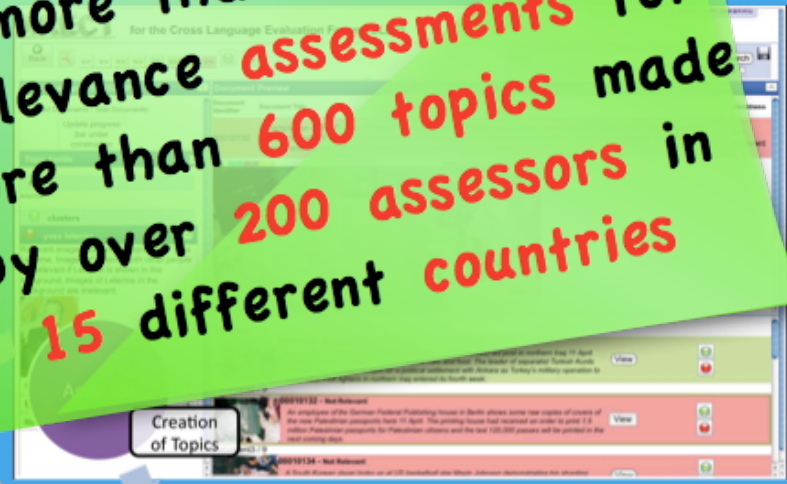
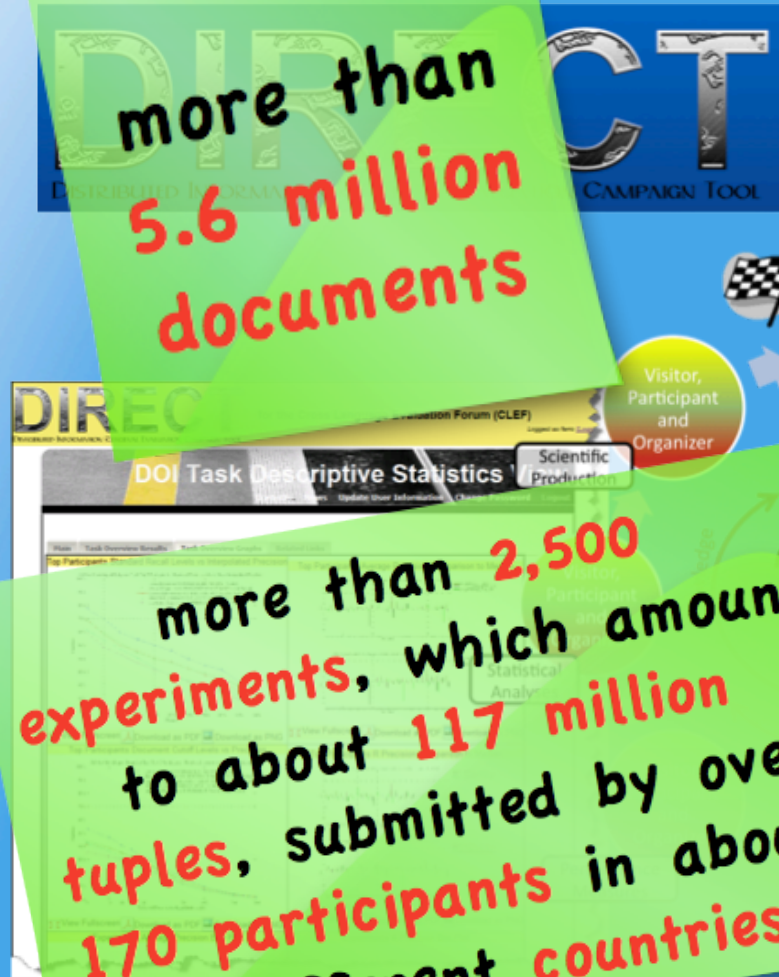


Example of Supported Functionalities

more than **5.6 million** documents

more than **1.5 million** relevance assessments for more than **600 topics** made by over **200 assessors** in **15** different countries

more than **2,500** experiments, which amount to about **117 million** tuples, submitted by over **170 participants** in about **30** different countries





Example of Supported Functionalities

more than **5.6 million** documents

more than **1.5 million** relevance assessments for more than **600 topics** made by over **200 assessors** in **15** different countries

more than **2,500** experiments, which amount to about **117 million** tuples, submitted by over **170 participants** in about **30** different countries

over **5.5 million** performance measures and descriptive statistics; and, about **20,000** plots and statistical analyses graphs





DIRECT: tasks and metrics

DIRECT for the Cross Language Evaluation Forum (CLEF)
DISTRIBUTED INFORMATION RETRIEVAL EVALUATION CAMPAIGN TOOL

Logged as fern [Logout]

DOI Task Descriptive Statistics View

Home News Update User Information Change Password Logout

Main Task Overview Results Task Overview Graphs Related Links

Top Participants Standard Recall Levels vs Interpolated Precision

Top Participants Average Precision Comparison to Median

Top Participants Document Cutoff Levels vs Precision

Top Participants R Precision Comparison to Median

View Fullscreen Download as PDF Download as PNG

View Fullscreen Download as PDF Download as PNG

View Fullscreen Download as PDF Download as PNG

View Fullscreen Download as PDF Download as PNG

Experiments Average Precision Box Plot Experiments R Precision Box Plot



DIRECT: test questions creation

DIRECT for the Cross Language Evaluation Forum (CLEF)

Logged as testassessor @ CLEFTEST [Logout]

Query metropolitan museum new york

Back Next Topic

Ad-Hoc Monolingual CLEFTEST
Info about topic 001-AH-CLEFTEST:
Relevant 1 Not Relevant 1

Query (1 of 5) Show 20 rows

Identifier	Snippet	Aboutness
oai:bnf.fr:catalogue/ark:/12148/cb349601736/description	François Boucher :1703-1770 :the Metropolitan museum of art, New York, 17 janvier-4 mai 1986, the Detroit institute of arts, Detroit, 27 mai-17 août 1986, Galeries nationales du Grand Palais, Paris, 18 septembre 1986-5 janvier 1987 [exposition organisée avec la collab. de la Réunion des musées nationaux]	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
oai:bnf.fr:catalogue/ark:/12148/cb349601736/description	Fine books and manuscripts :including duplicates from the economics collection of Prof. Dr. Arnold Heertje... [auction, New York, Sotheby's, 24 September 1986]	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
oai:bnf.fr:catalogue/ark:/12148/cb349601736/description	The Joshua Starr memorial volume. Studies in history and philology. - @	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
oai:bnf.fr:catalogue/ark:/12148/cb349601736/description	Les mémoires d' un vieux garçon /par A. de Gondrecourt. La mansarde rose /par Xavier Eyma	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
oai:bnf.fr:catalogue/ark:/12148/cb3440074/description	Al-Jamiat, a daily Syrian newspaper	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
oai:bnf.fr:catalogue/ark:/12148/cb3440074/description	The Library of the late George Allison Armour, Princeton, N. J., ...	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
oai:bnf.fr:catalogue/ark:/12148/cb3440074/description	Charles Frohman manager and man, by Isaac F. Marcossian and Daniel Frohman, with an appreciation by James M. Barrie...	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
oai:bnf.fr:catalogue/ark:/12148/cb3440074/description	The art of courtly love /by Andreas Capellanus ;with introduction, translation and notes by John Jay Parry	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
oai:bnf.fr:catalogue/ark:/12148/cb3440074/description	Les aventures de Saturnin Fichet ou La conspiration de la Poquane /par Frédéric Soulié. Les plaisirs du roi /par Pierre Zaccane. Le chiffonnier de Paris :drame en cinq actes et un prologue... /par Félix Pyat	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
oai:bnf.fr:catalogue/ark:/12148/cb3440074/description	The Minor prophets in the Freer collection and the Berlin fragment of Genesis /Henry A. Sanders, ... and Carl Schmidt, ...	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Notes

- A first note on this...
- metropolitan museum ...
- an interesting query...
- Bookmarks
- oai:bnf.fr:catalogue...
- remember it!
- oai:bnf.fr:catalogue...
- Aboutness
- oai:bnf.fr:catalogue...
- oai:bnf.fr:catalogue...
- changes made
- please consider ch...
- History
- 2009-03-25 16:31:47.418
- A note on history

Annotations:

- Data produced by the Assessor
- Information produced by the Assessor
- Knowledge produced by the Assessor
- Information produced by the Assessor
- Knowledge produced by the Assessor
- Data produced by the Assessor
- Data produced by the Organizer



Annotations for enhancing collaboration



in the future PROMISE infrastructure

DIRECT for the Cross Language Evaluation Forum (CLEF)

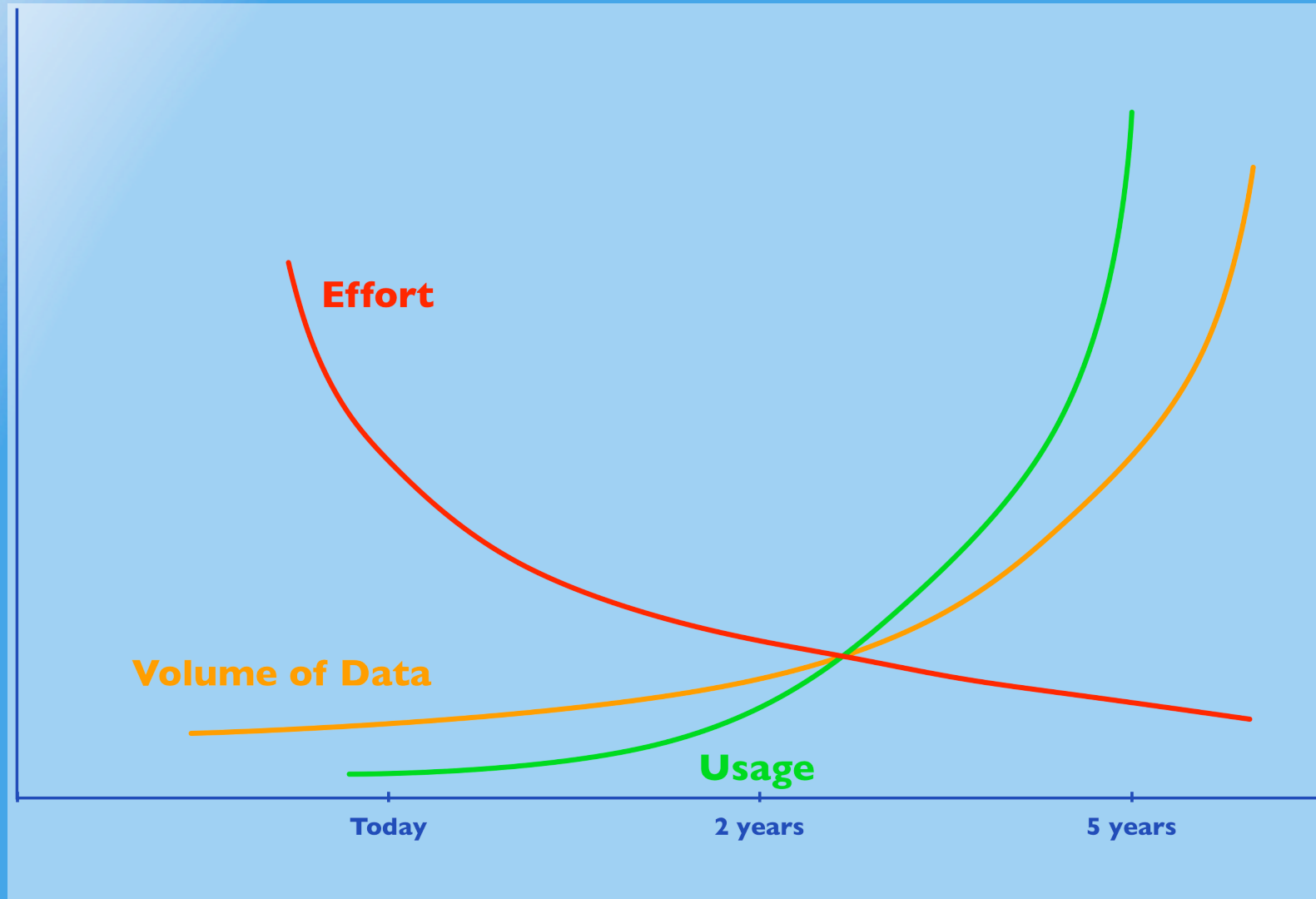
Portal Main Page

Identifier	Parameters	Query Construction	Source Language	Is Pooled	View	Download
10.2415AH-BLI-XZEN-CLEF2007 BOMBAY-LTRC.ITB_HINDI_TITLEDESC_DICE		Dice Coefficient for Similarity	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BOMBAY-LTRC.ITB_HINDI_TITLEDESC PMI		Point-wise Mutual Info (PMI) for Similarity	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BOMBAY-LTRC.ITB_HINDI_TITLE_DICE		Dice Coefficient for Similarity	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BOMBAY-LTRC.ITB_HINDI_TITLE PMI		Point-wise Mutual Info (PMI) for Similarity	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BOMBAY-LTRC.ITB_HINDI_TITLE_DICE	bombay-itr	Using Point-wise Mutual Info (PMI) for Similarity	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BOMBAY-LTRC.ITB_MAR_TITLE_DICE	bombay-itr	Mazathi-English with Title - Using Dice Coeff for Similarity	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BOMBAY-LTRC.ITB_MAR_TITLE PMI	bombay-itr	Mazathi-English with Title - Using Point-wise Mutual Info (PMI)	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BUDAPEST-ACAO_BILING_2	budapest-acad	simple dictionary, best supposed params	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BUDAPEST-ACAO_BILING_3	budapest-acad	simple dictionary, 2nd best	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BUDAPEST-ACAO_BILING_4	budapest-acad	simple dictionary, 3rd best	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BUDAPEST-ACAO_BILING_5	budapest-acad	simple dictionary, 4th best	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BUDAPEST-ACAO_BILING_6	budapest-acad	simple dictionary, 5th best	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BUDAPEST-ACAO_BILING_6	budapest-acad	simple dictionary, 6th best	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BUDAPEST-ACAO_BILING_6	budapest-acad	using wikipedia, best supposed params	AUTOMATIC	hu	true	
10.2415AH-BLI-XZEN-CLEF2007 BUDAPEST-ACAO_BILING_WK02	budapest-acad	with Wikipedia, 2nd best params	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BUDAPEST-ACAO_BILING_WK03	budapest-acad	with Wikipedia, 3rd best params	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BUDAPEST-ACAO_BILING_WK04	budapest-acad	with Wikipedia, 4th best params	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BUDAPEST-ACAO_BILING_WK05	budapest-acad	with Wikipedia, 5th best params	AUTOMATIC	hu	false	
10.2415AH-BLI-XZEN-CLEF2007 BUDAPEST-ACAO_BILING_WK06	budapest-acad	with Wikipedia, 6th best params	AUTOMATIC	hu	false	

Topicality translation for BIL and description only using German as a base language and using Euro



Expected Impact





Thank you for your attention



Acknowledgements

- The author thanks Dr. Costantino Thanos, coordinator of the DELOS Network of Excellence on Digital Libraries for his initial suggestion of addressing the topic of annotations of digital contents and for his continuous advice.
- The reported work has been conducted in co-operation with Dr. Nicola Ferro, member of the IMS research group of the University of Padua.
- The work has been partially supported over the years by different research projects, among those:
 - DELOS Network of Excellence on Digital Libraries (Contract G038-507618)
<http://www.delos.info/>
 - TELplus Targeted Project for digital libraries (Contract ECP-2006-DILI-510003)
<http://www.theeuropeanlibrary.org/portal/organisation/cooperation/telplus/>
 - EuropeanaConnect Best Practice Network (Contract ECP-2008-DILI-52800)
<http://www.europeanaconnect.eu/>
 - EU FP7 PROMISE Network of Excellence (Grant Agreement no. 258191)
<http://www.promise-noe.eu/>



General references

- Caffo, R. (2010). *DC-NET: a European Network for Digital Heritage Research*. Presentation at the DC-NET Conference on “e-Infrastructure for Cultural Heritage”, Royal Library of Belgium, Brussels, 29 October 2010.
- Valente E. (2010). *National Research and Education Networks for Digital Cultural Content*. Presentation at the DC-NeET public launch, Rome, 17 February 2010.
- Lourdi, I., Papatheodorou, C., Doerr, M. (2009). Semantic Integration of Collection Description. *D-Lib Magazine, July/August 2009, Vol. 15, N. 7/8*.
- Gradmann, S. (2007). *Interoperability of Digital Libraries: Report on the work of the EC working group on DL interoperability, 2007*.
- L. Candela, L., Castelli, D., Ioannidis, Y., Koutrika, G., Pagano, P., Ross, S., Schek, H.-J. Schuld, H. (2006). *The Digital Library Manifesto*. DELOS Network of Excellence on Digital Libraries, 2006



References (1/3)

- Agosti, M., Di Nunzio, G. M., Dussin, M., Ferro, N. (2010). 10 Years of CLEF Data in DIRECT: Where We Are and Where We Can Go. In Sakay, T., Sanderson, M., and Webber, W. (Eds), *Proc. 3rd Int. Workshop on Evaluating Information Access (EVIA 2010)*, National Institute of Informatics, Tokyo, Japan, 16-24.
- Agosti, M., Ferro, N. (2009). Towards an Evaluation Infrastructure for DL Performance Evaluation. In Tsakonas, G., Papatheodorou, C. (Eds), *Evaluation of Digital Libraries: An Insight to Useful Applications and Methods*. Chandos Publishing, Complete, Oxford, UK.
- Agosti, M., Braschler, M., Ferro, N., Peters, C., Siebinga, S. (2007). Roadmap for MultiLingual Information Access in The European Library. In Fuhr, N., Kovács, L., and Meghini, C. (Eds), *Proc. 11th European Conference on Research and Advanced Technology for Digital Libraries (ECDL 2007)*, pages 136–147. LNCS 4675, Springer, Heidelberg, Germany.



References (2/3)

- M. Agosti (Ed) (2008). *Information Access through Search Engines and Digital Libraries*. Springer, Heidelberg, Germany, 2008.
- Agosti, M., Berretti, S., Brettlecker, G., del Bimbo, A., Ferro, N., Fuhr, N., Keim, D., Klas, C.-P., Lidy, T., Milano, D., Norrie, M., Ranaldi, P., Rauber, A., Schek, H.-J., Schreck, T., Schuldt, H., Signer, B., and Springmann, M. (2007). DelosDLMS – the Integrated DELOS Digital Library Management System. In Thanos, C., Borri, F., and Candela, L. (Eds), *Digital Libraries: Research and Development. First International DELOS Conference. Revised Selected Papers*, pages 36–45. Lecture Notes in Computer Science (LNCS) 4877, Springer, Heidelberg, Germany.
- Agosti, M., Di Nunzio, G. M., and Ferro, N. (2007). The Importance of Scientific Data Curation for Evaluation Campaigns. In Thanos, C., Borri, F., and Candela, L. (Eds), *Digital Libraries: Research and Development. First International DELOS Conference. Revised Selected Papers*, pages 157–166. Lecture Notes in Computer Science (LNCS) 4877, Springer, Heidelberg, Germany.



References (3/3)

- Agosti, M., Di Nunzio, G. M., Ferro, N., Harman, D., and Peters, C. (2007). The Future of Large-scale Evaluation Campaigns for Information Retrieval in Europe. In Fuhr, N., Kovács, L., and Meghini, C. (Eds), *Proc. 11th European Conference on Research and Advanced Technology for Digital Libraries (ECDL 2007)*, pages 509–512. Lecture Notes in Computer Science (LNCS) 4675, Springer, Heidelberg, Germany.
- Agosti, M., Ferro, N. (2008) A Formal Model of Annotations of Digital Content. *ACM Transactions on Information Systems (TOIS)*, 2008, 26(1): 3:1-3:57.
- Agosti, M., Ferro, N. (2008) Annotations: a Way to Interoperability in DL. In B. Christensen-Dalsgaard, D. Castelli, J. K. Lippincott, B. Ammitzbøll Juri (Eds). *Proc. 12th European Conference on Research and Advanced Technology for Digital Libraries (ECDL 2008)*, LNCS 5173, Springer, 2008, pp. 291-295.