



Tools and Services for Digital Library Users

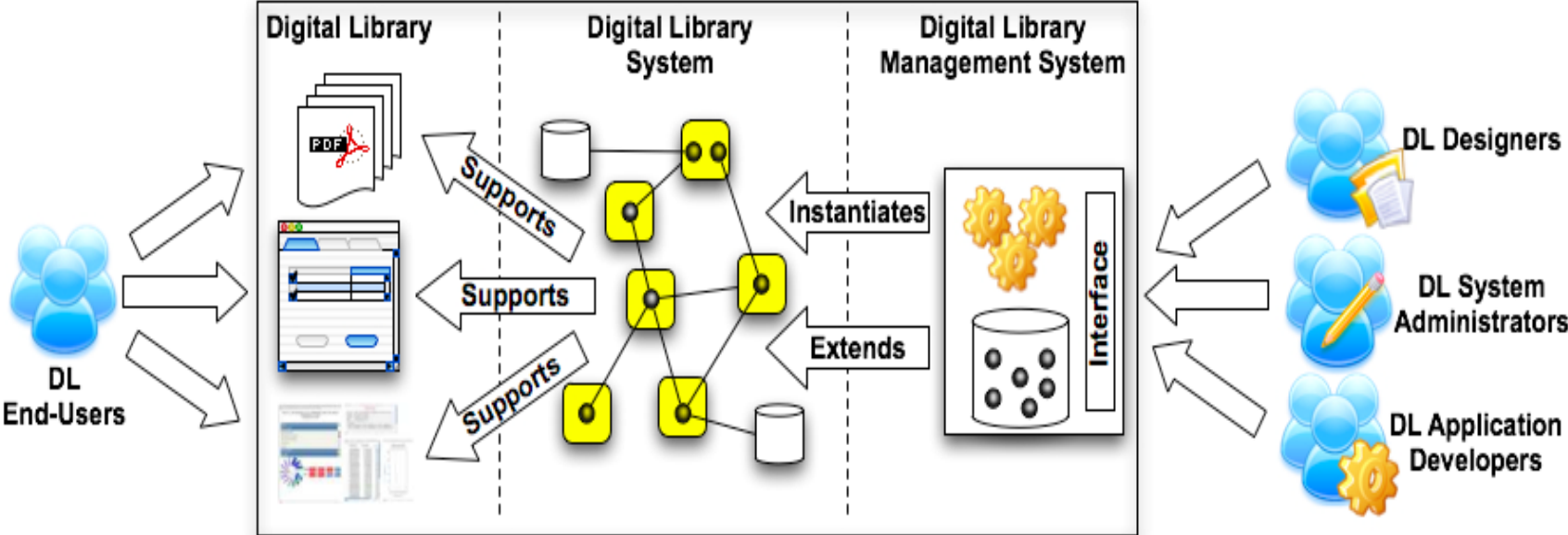
Vittore Casarosa
ISTI-CNR, Pisa, Italy

DELOS-NSDL Summer School
28 May – 1 June, 2007, Settignano, Florence, Italy

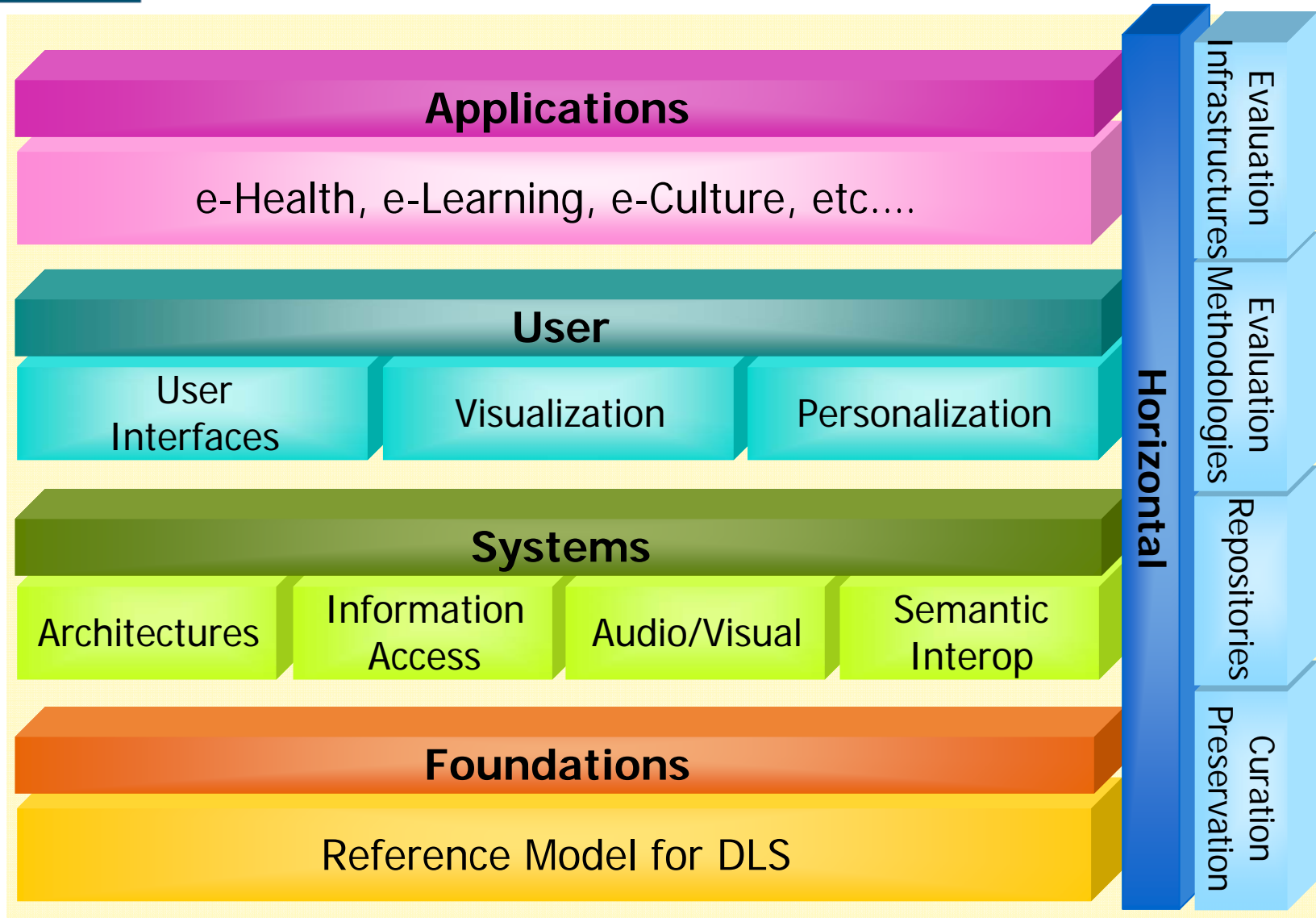
Outline of presentation

- Tools and services provided by a DLMS
- Where the DELOS DLMS fits in the overall view of Digital Libraries
- Architecture of the DELOS DLMS
- Examples of tools and services

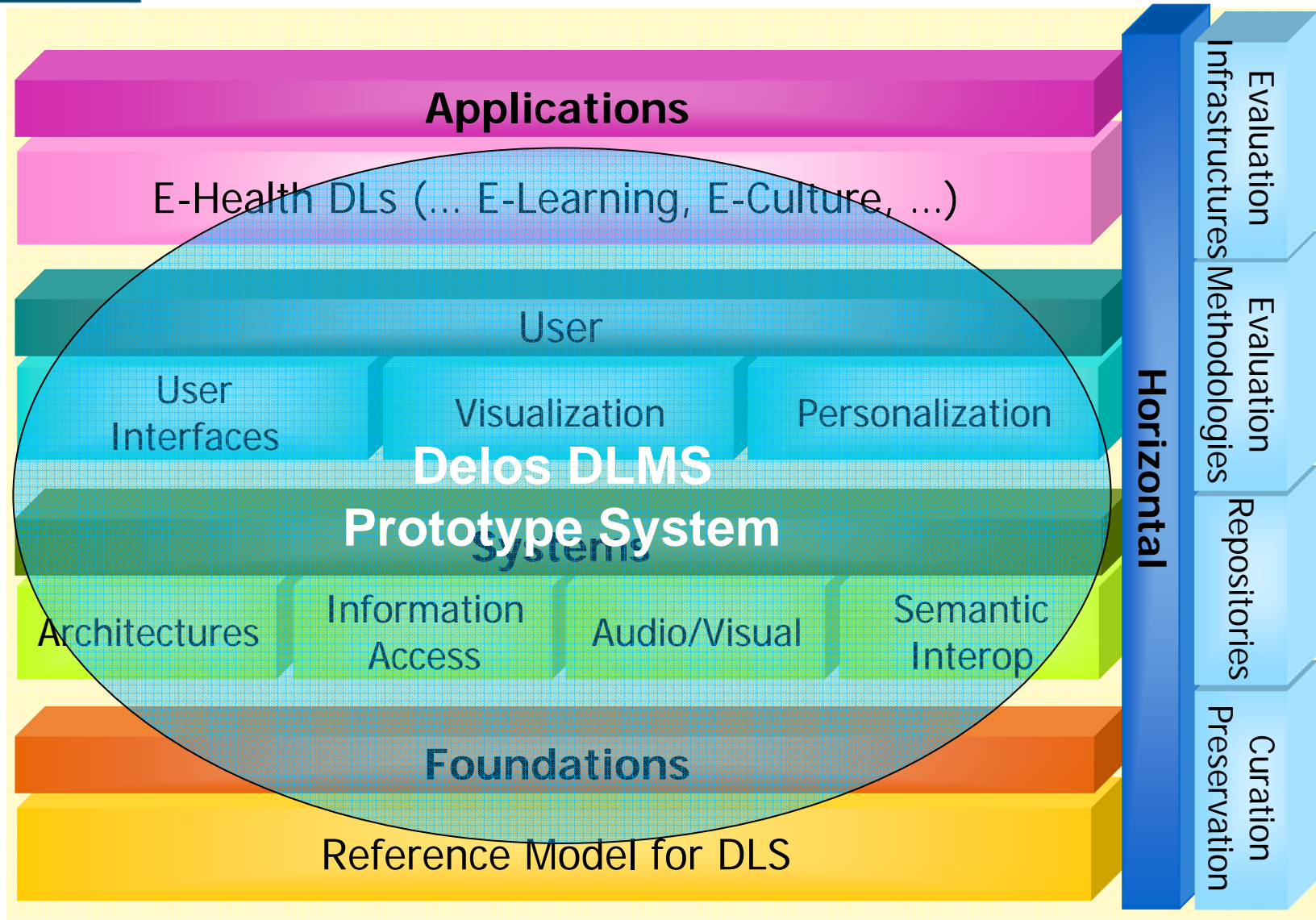
A conceptual framework



DELOS Research Directions



The DELOS DLMS prototype



The DELOS DLMS

- Use the SoA/P2P infrastructure of OSIRIS/ISIS to coordinate search building blocks and application processes to retrieve and work with dynamic and mobile information.
- DELOS members provide knowledge and services for additions to and replacement of existing OSIRIS/ISIS DL functionality such as
 - User Interfaces
 - Feature Extraction for content based retrieval over multi-media objects
 - Visualization
 - Indexing

- **3D-CBR - 3D Content Based Retrieval**
- **CBIR - Content Based Image Retrieval**
- **DELOS DLMS - Digital Library Management System**
- **getRole - Role Mining with Cluster Analysis**
- **IEMSR - Metadata Schema Registry**
- **iGesture - Gesture Recognition Framework**
- **ITR - Item Recommender**
- **ISIS - Interactive Similarity Search**
- **MESSIF - MEtric Similarity Search Implementation Framework**
- **MILOS - Multimedia Content Management System**
- **MINERVA - Peer-to-peer Web Search Engine and BINGO! - Focussed crawler**
- **MM4U - A Component Framework for Personalized Multimedia Applications**
- **O'GRAPE - Osiris GRaphical Process Editor**
- **OSIRIS - Open Services Infrastructure for Reliable und Integrated process Support**
- **OSIRIS-SE – OSIRIS - Stream-Enabled**
- **P2P DL - Peer to Peer Digital Library**
- **RPextract - Music Feature Extractor**
- **Sightseeing4U - Development of personalised mobile multimedia applications**
- **SOMToolbox - Implementations of Self-organizing map models**
- **Transformation4U - Transformation of Multimedia documents for mobile applications**
- **VBI-ERAT-LUPA - Integration of Complementary Archaeological Sources**
- **xSMART - Semi-automatic context-aware authoring tool**

Delos DLMS

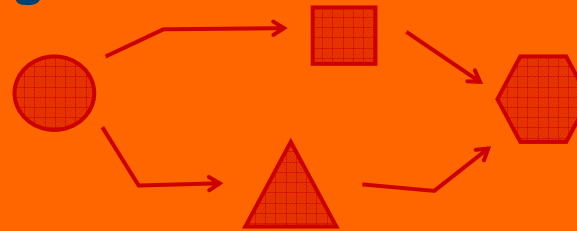
Applications

ISIS (Interactive Similarity Search Services)

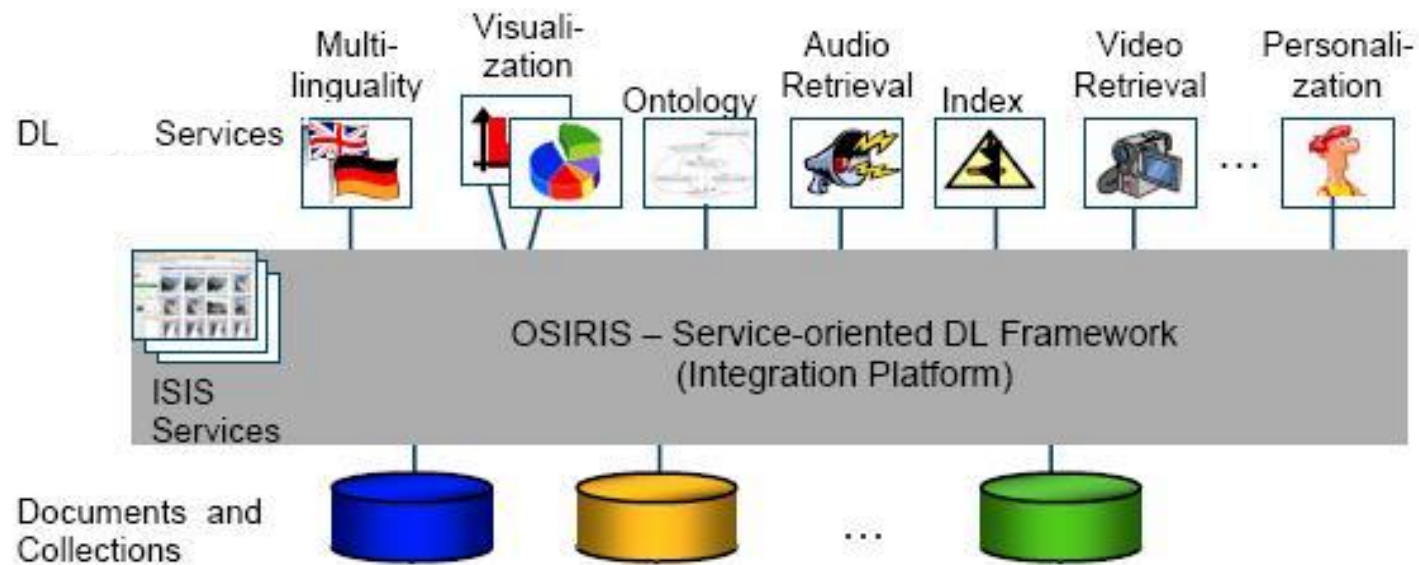
Other services...



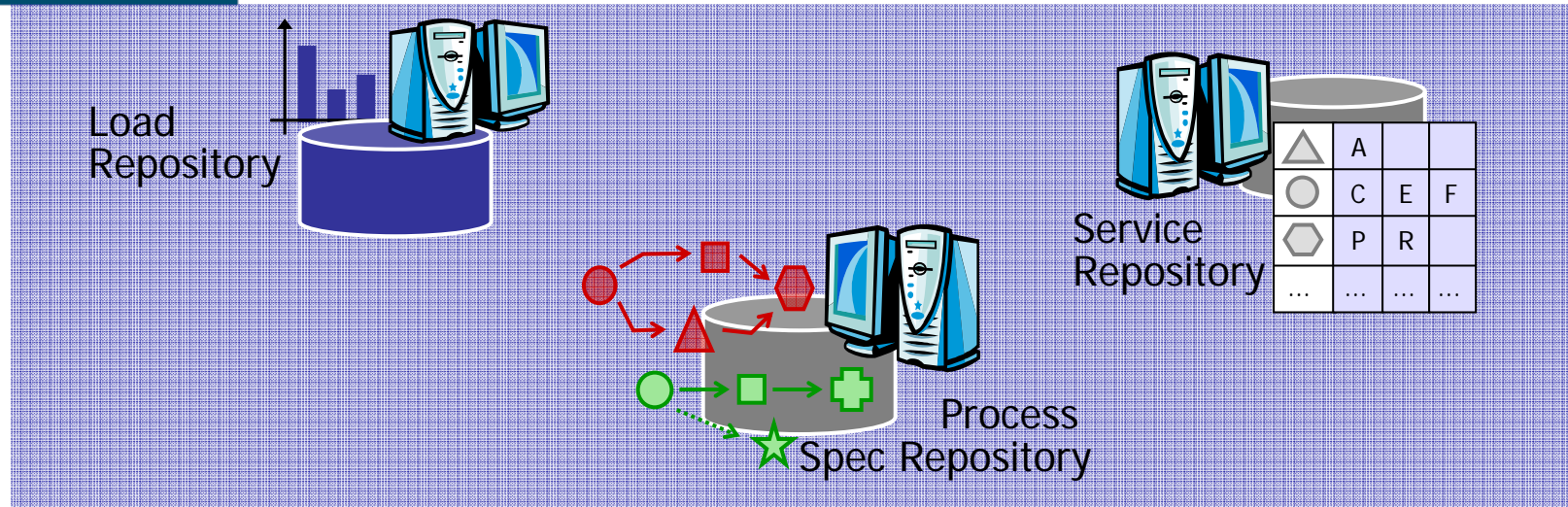
OSIRIS (Service Management and Service Composition)



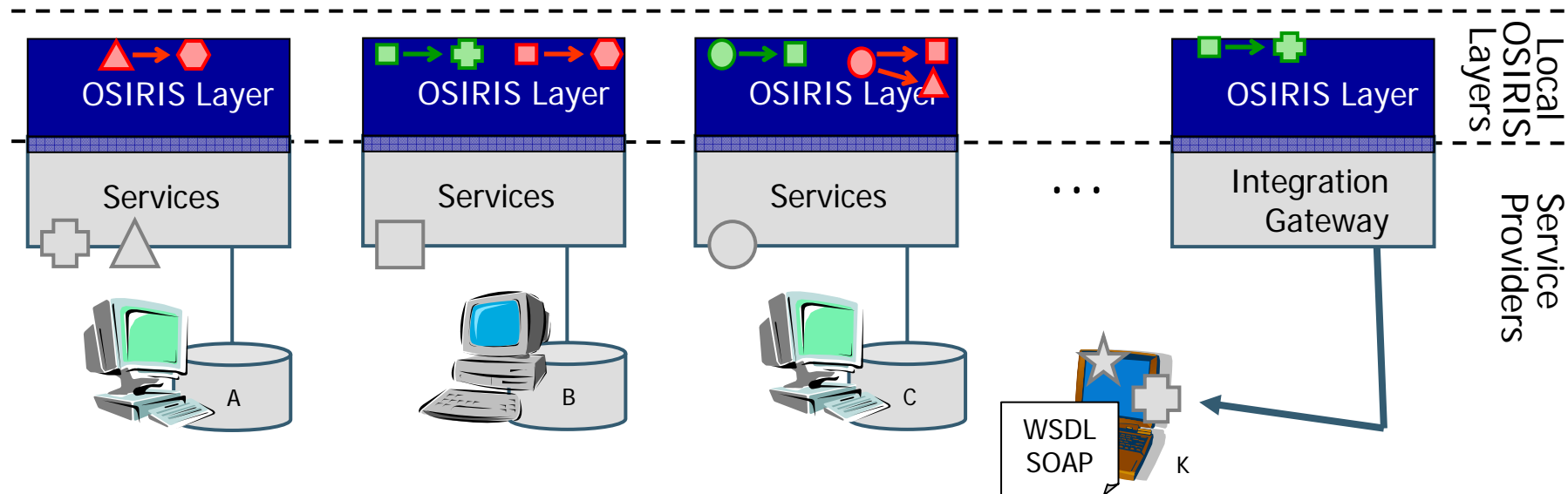
DELOS DLMS



OSIRIS Architecture

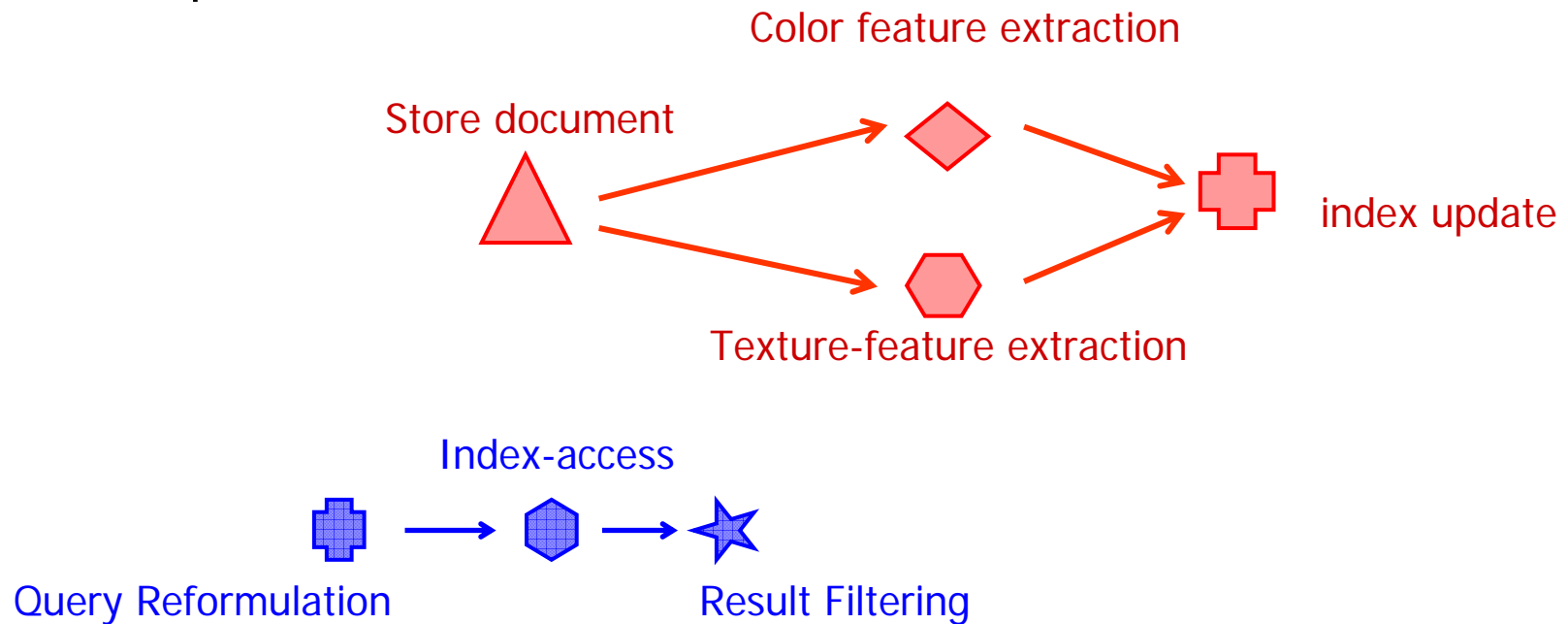


Core System Services

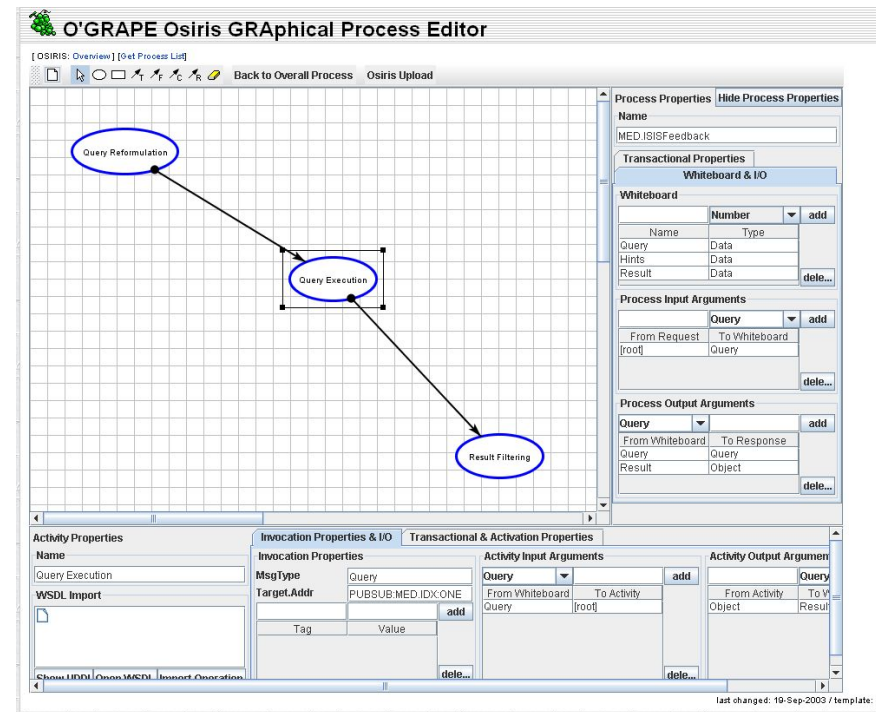
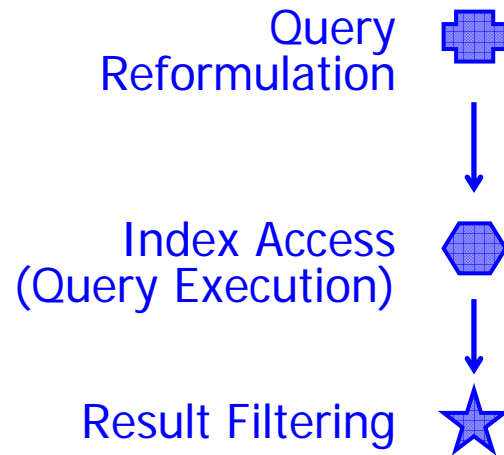


Local OSIRIS Layers
 Service Providers

- The infrastructure for DLMS must be modular/service oriented for dynamic combination of services
 - Examples:



Composite service design

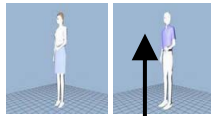


Integration 1st Phase

ISIS / OSIRIS
 (ETH / U. Basel)



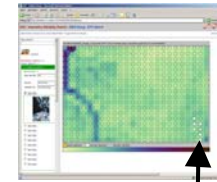
3D
 Retrieval
 (U. Firenze)



Audio
 Retrieval
 (TU Vienna)



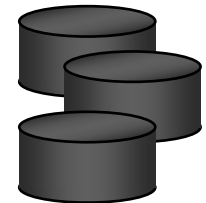
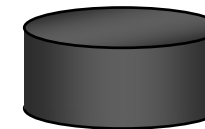
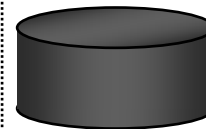
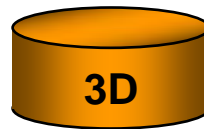
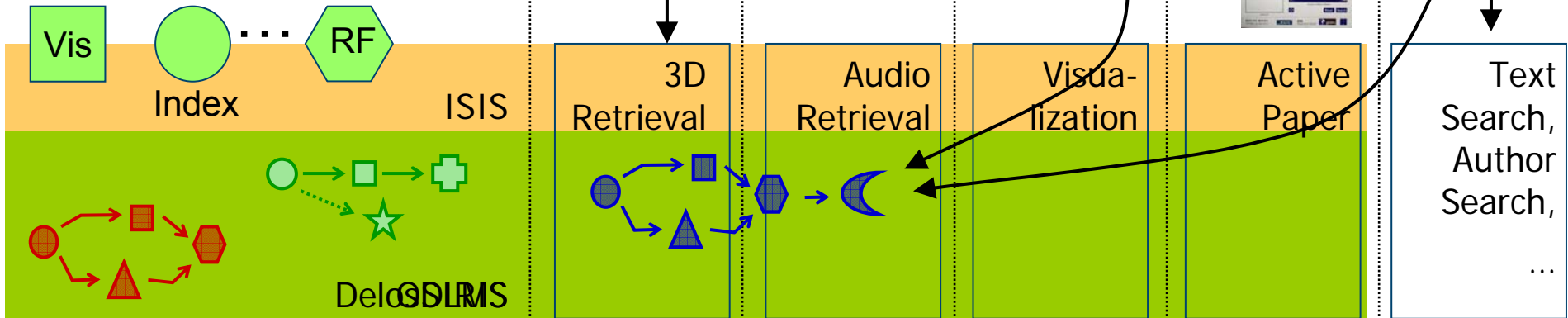
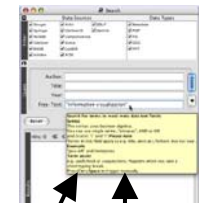
SOM
 (U. Kon-
 stanz)



Paper++
 (ETHZ)

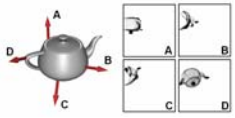


Daffodil
 (U Duis-
 burg)

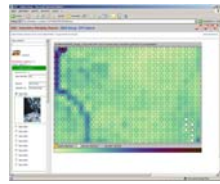


Integration 2nd Phase

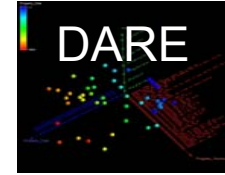
3D Feature Extractor



Interactive SOM



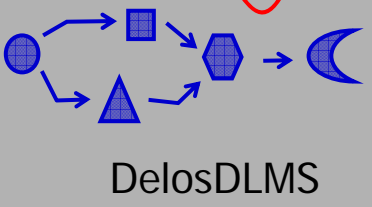
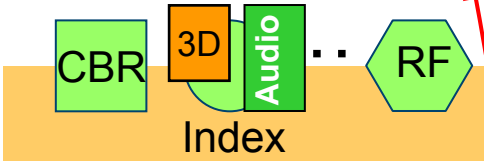
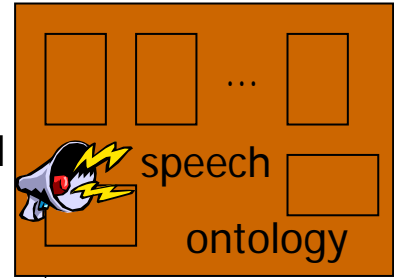
iPaper Annotations



MedioVis



CoCoMa

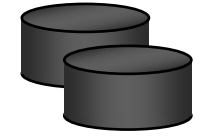
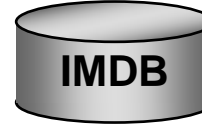
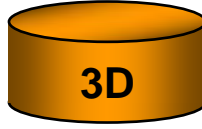
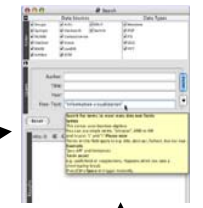


Loosely coupled

Loosely coupled

Loosely coupled

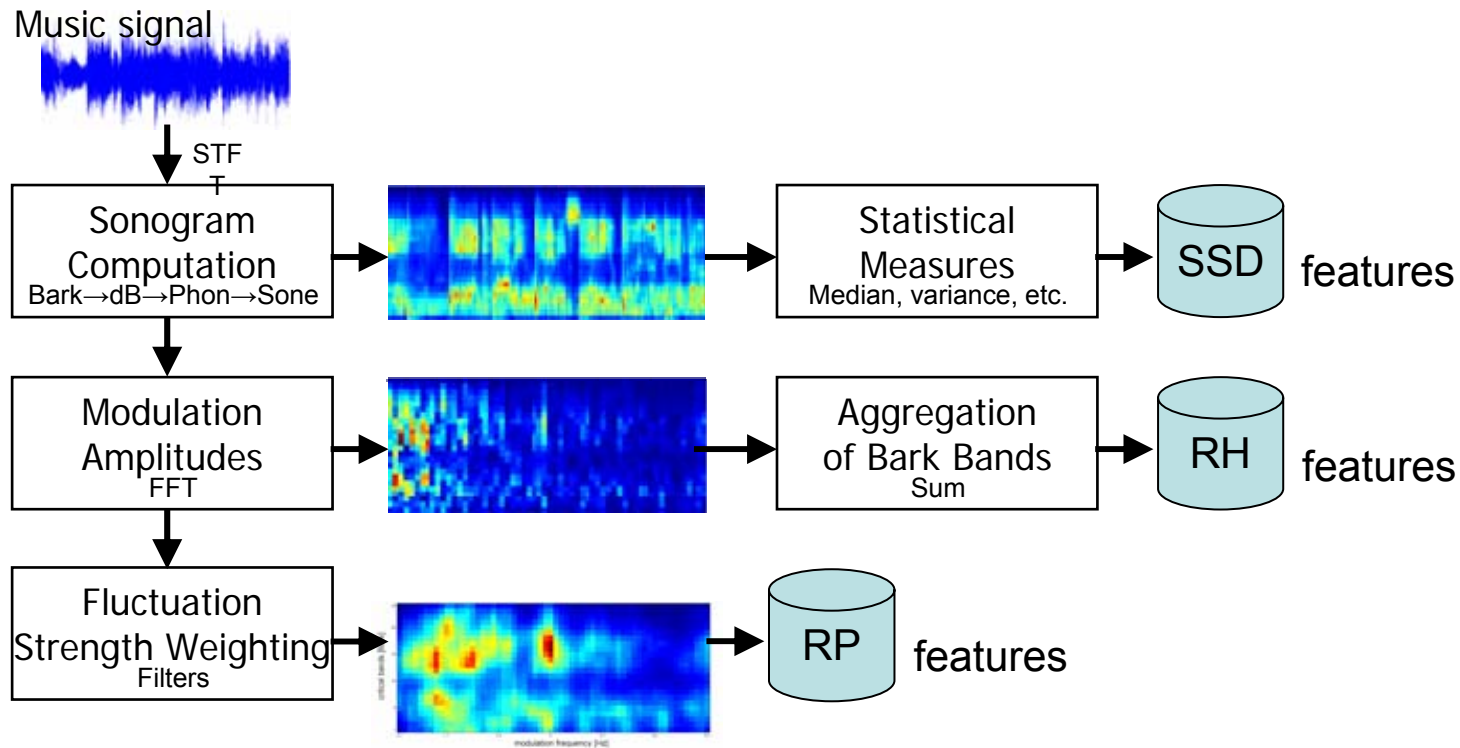
Daffodil



A few examples

- Music retrieval
- Video retrieval
- 3D images retrieval
- Compound documents
- Annotation
- Interfaces
 - DAFFODIL
 - MEDIO VIS
- Speech and Natural Language input
- Visualization
 - Fast Map
 - Self Organizing Maps (SOM)
 - DARE

- How can we search for audio similarity? Features...
- Specialized (award-winning) audio feature extractors




- **Metadata search**
 - Search for words in subtitles
- **Keyframe search**
 - Image similarity on frames

Searching subtitles

The image shows a screenshot of a search results page. On the left, a search bar contains the text 'gun'. A yellow callout bubble with the word 'GUN' in red capital letters points to the search bar. The search results are displayed in a grid of six thumbnails, each with a number (1-6) and a '1.000' rating. The thumbnails show various scenes: 1. A person in a dark room. 2. A boat on a lake. 3. A Miramax logo. 4. A person in a red booth. 5. Two men in suits. 6. A close-up of a man's face. A second yellow callout bubble points to the sixth thumbnail, containing the text: 'Well, you see how they use that GUN... to pierce your ears?'

Keyframe Similarity Search

key words:

 search

[feedback options >>](#)
[meta options >>](#)
[content options <<](#)
[advanced >>](#)

key words:

faces:

similar to:

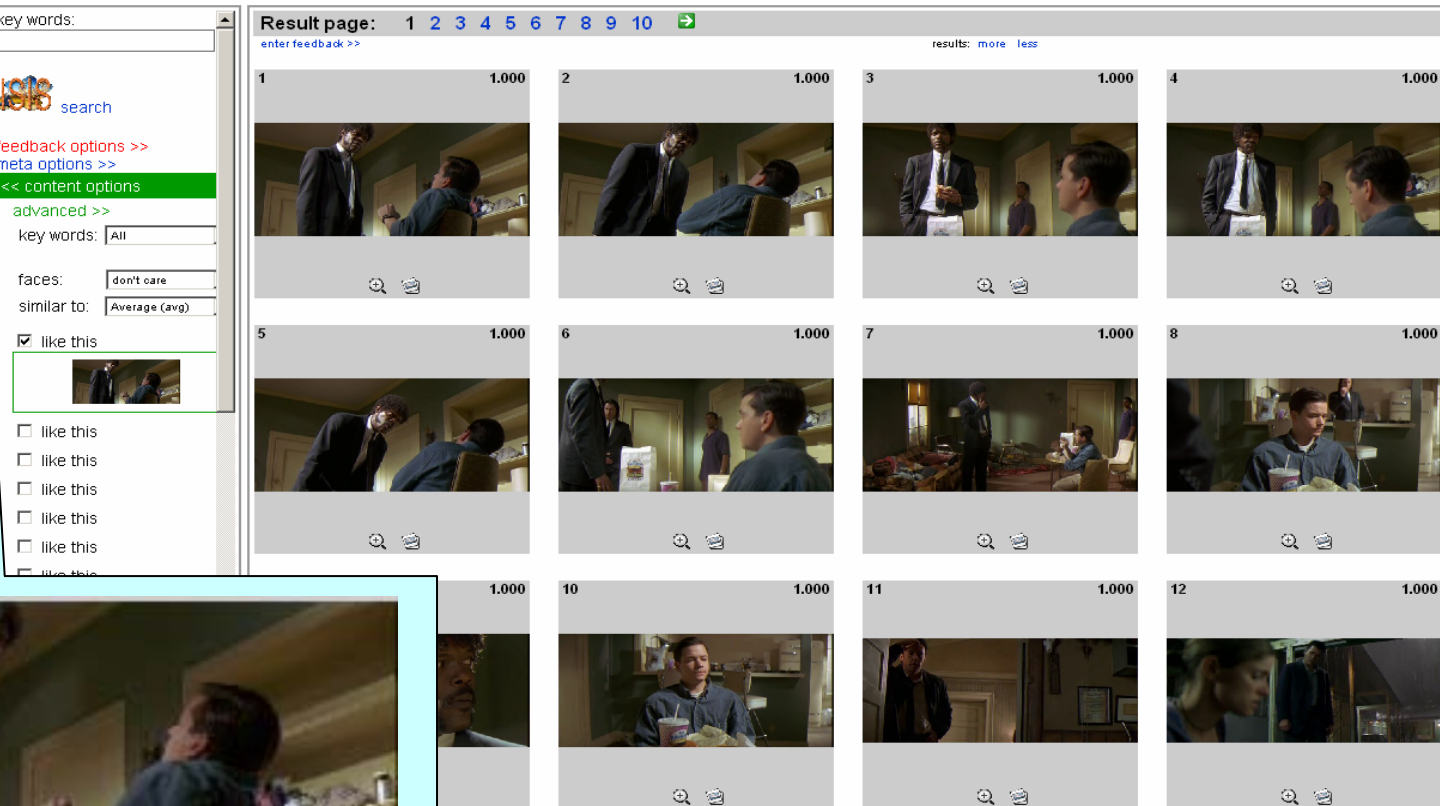
like this

like this
 like this
 like this
 like this
 like this

Result page: 1 2 3 4 5 6 7 8 9 10 [enter feedback >>](#)

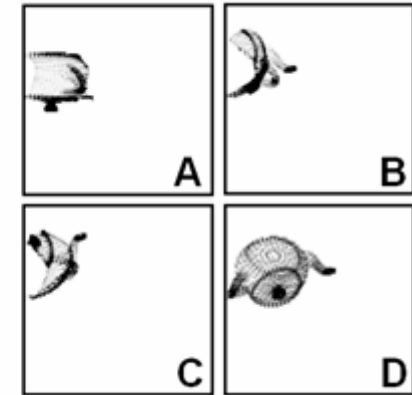
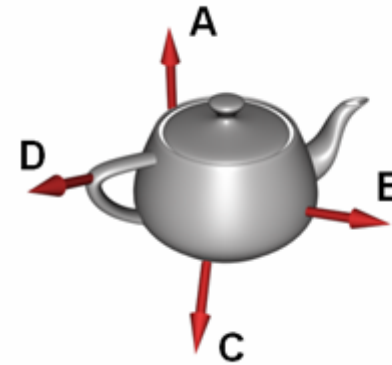
results: [more](#) [less](#)

1	1.000	2	1.000	3	1.000	4	1.000
5	1.000	6	1.000	7	1.000	8	1.000
9	1.000	10	1.000	11	1.000	12	1.000

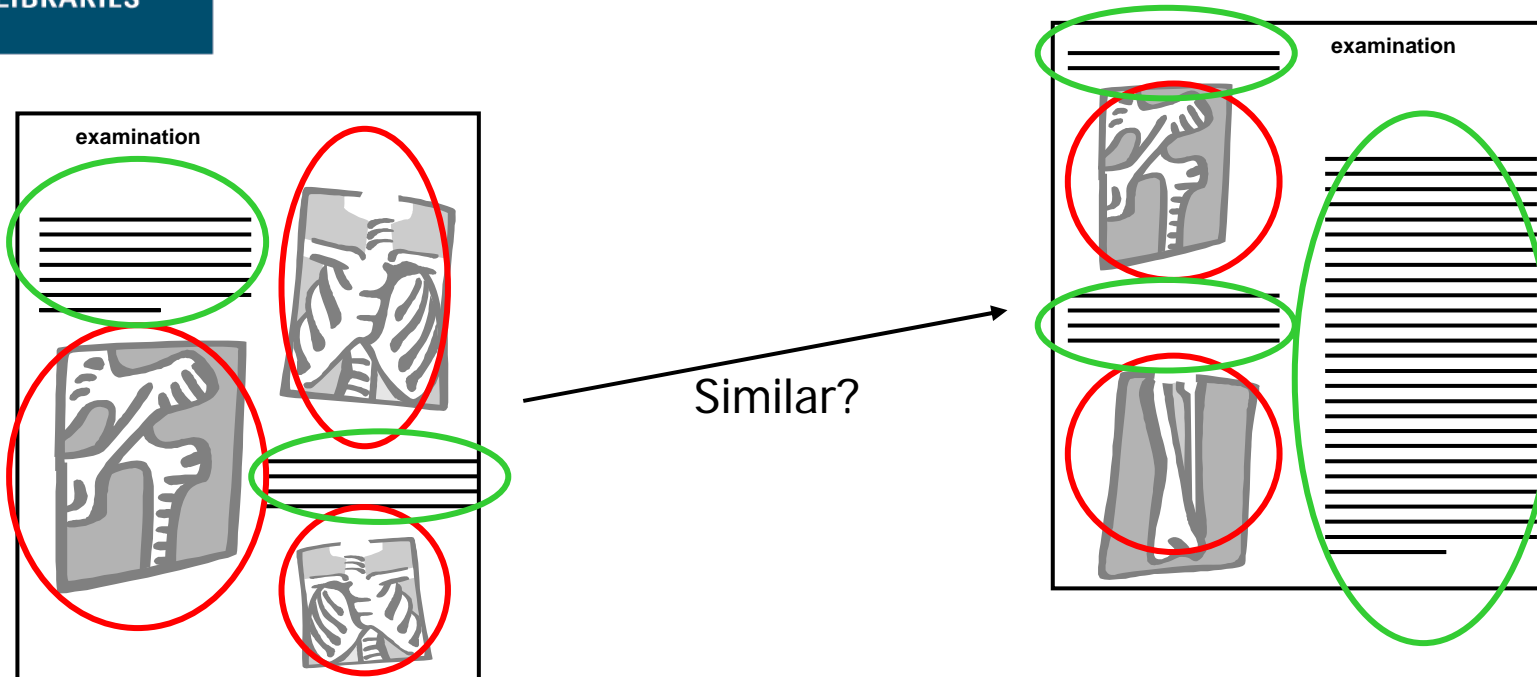


3D Retrieval

- Content-based 3D object retrieval
- Features are **3D descriptors** based on curvature correlogram

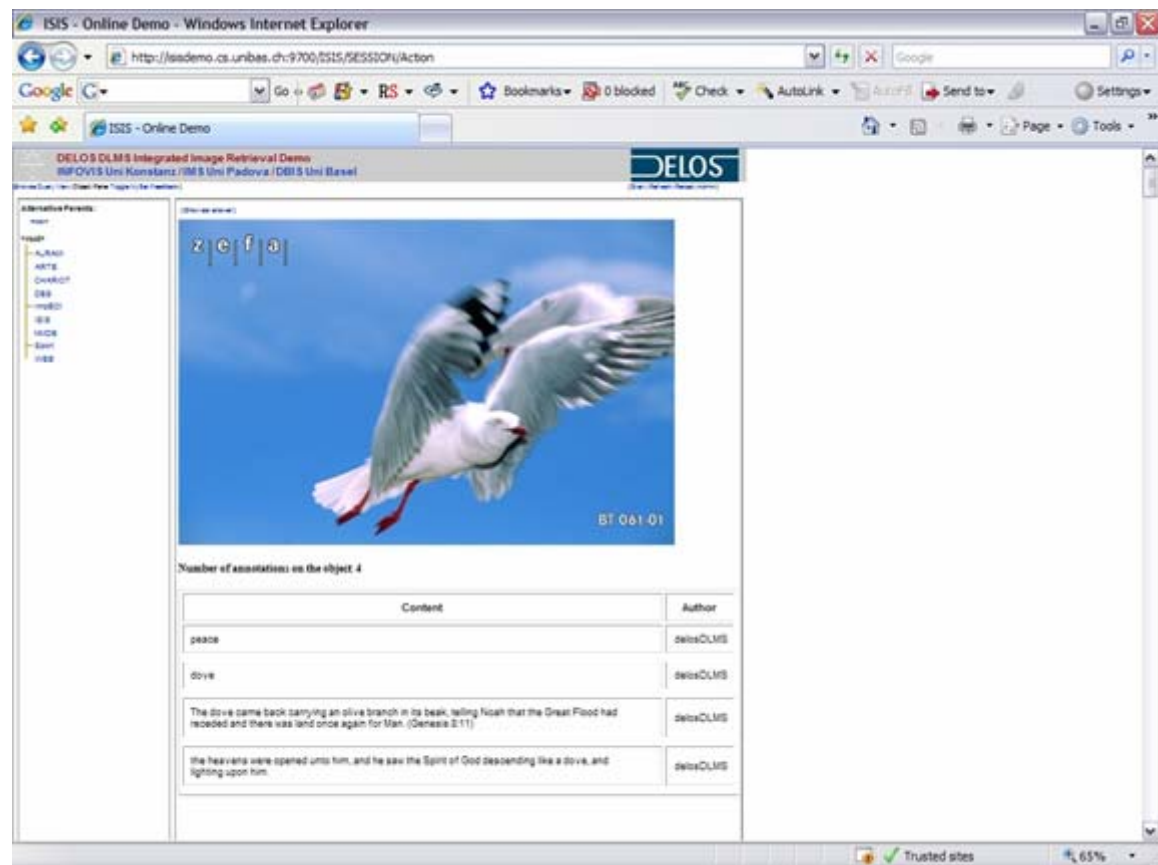


Compound documents



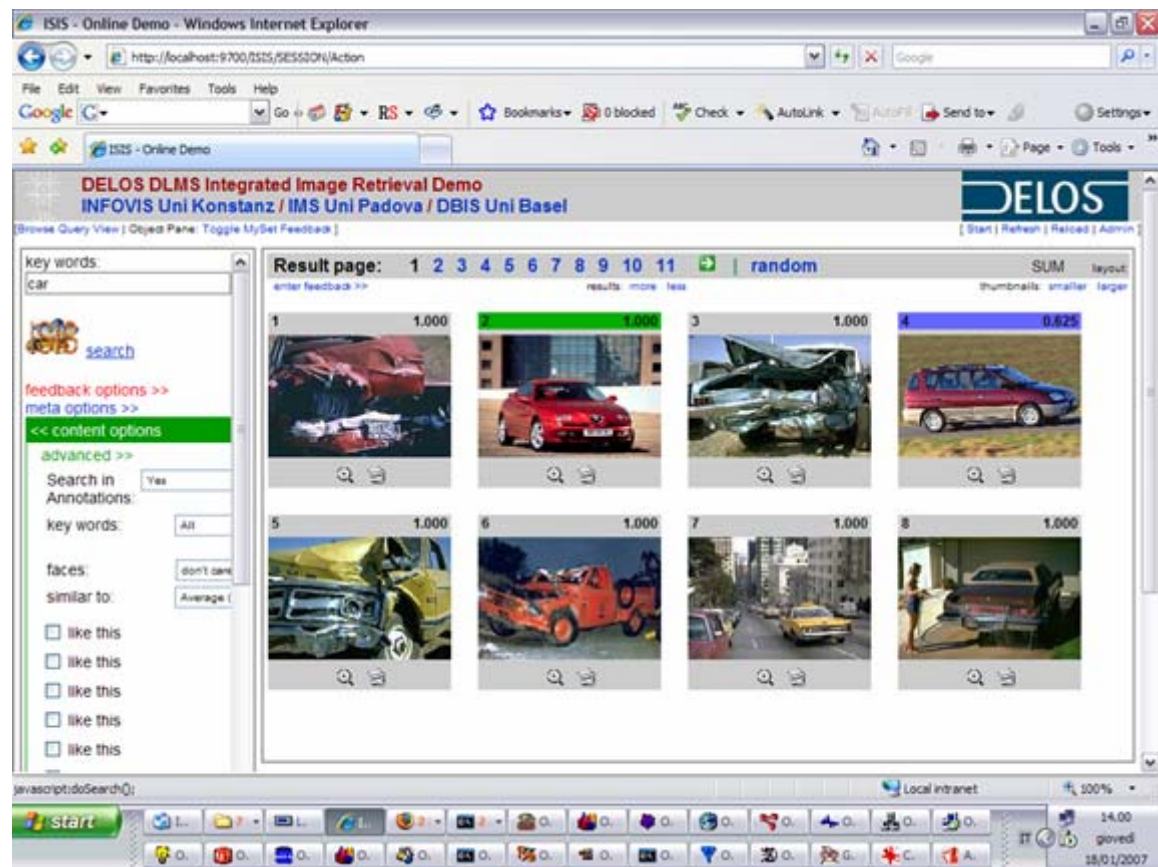
- Example of application: similarity search in virtual digital health records

- Annotations are displayed together with all other meta data of an object

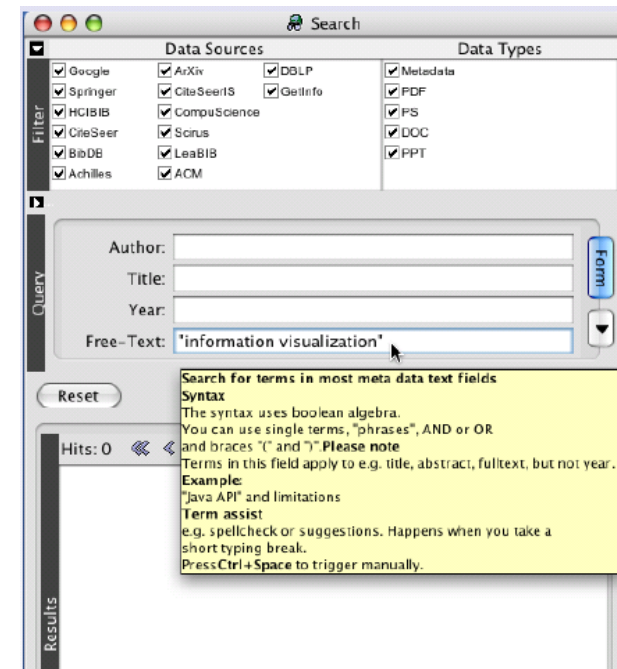


Keyword search
can be
performed on:

- metadata only
- **annotations
only**
- **both**



- Pre-existing Interface:
 - Access multiple DLs
 - Store personalized folders of search results
- Seamless Integration of ISIS/OSIRIS content-based image similarity search into Daffodil

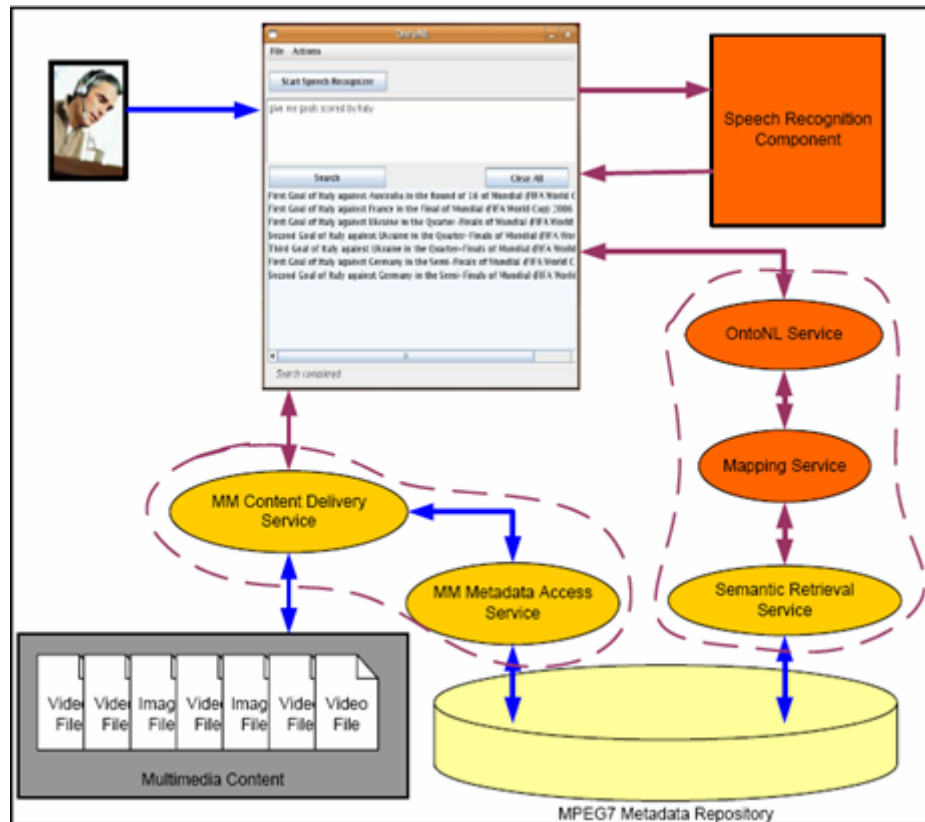


User interface: MedioVis

- User-centered support of analytical and browsing-oriented search strategies
- Easy-to-use visual search and exploration in DLs
- Multiple coordinated views to simultaneously use different visualizations
- Zoomable user interfaces
- Simple integration of external information sources from the Web (e.g. Google Maps)



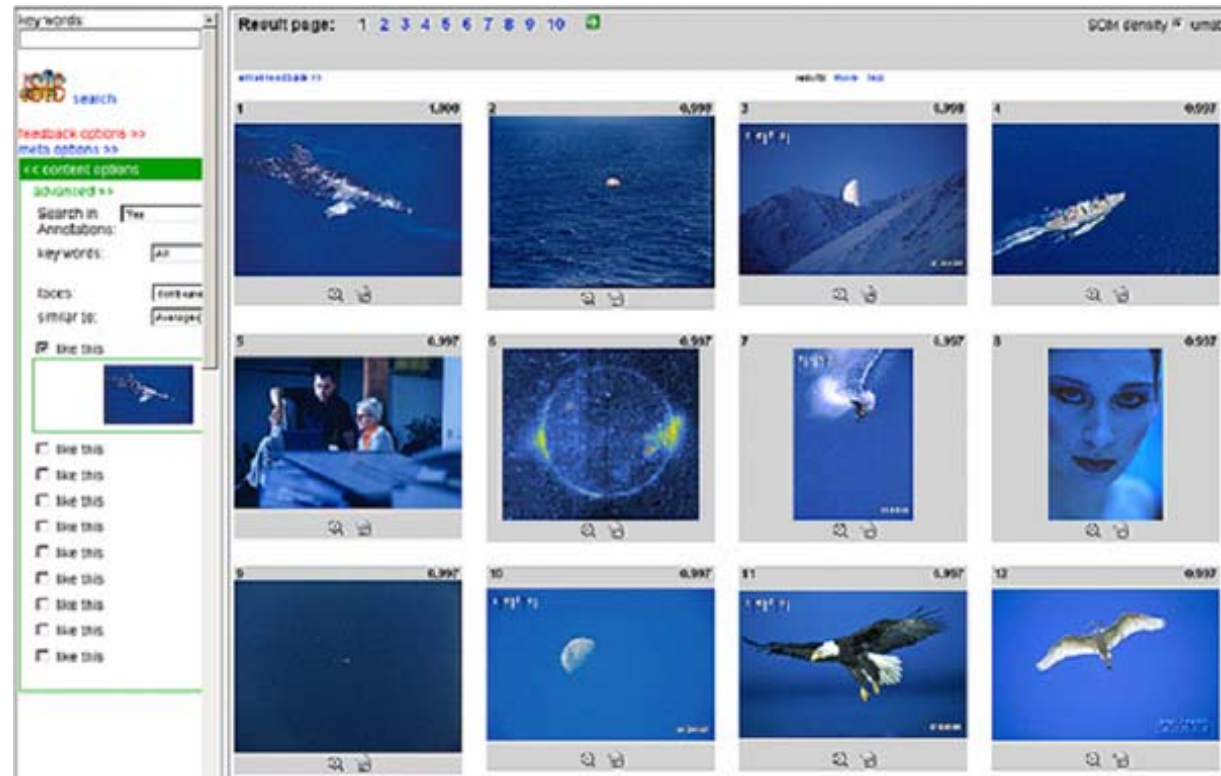
Speech and NL Input



OntoNL Demonstrator Service – Oriented Architecture:
 Speech and Natural Language Interface for Knowledge Acquisition on top of MPEG7 metadata repository

- ✓ Speech Recognition GUI
- ✓ NL Processing is a standalone service
- ✓ Its output is transformed to particular queries
- ✓ Various knowledge repositories may be accessed

2D visualization of image similarity ranking



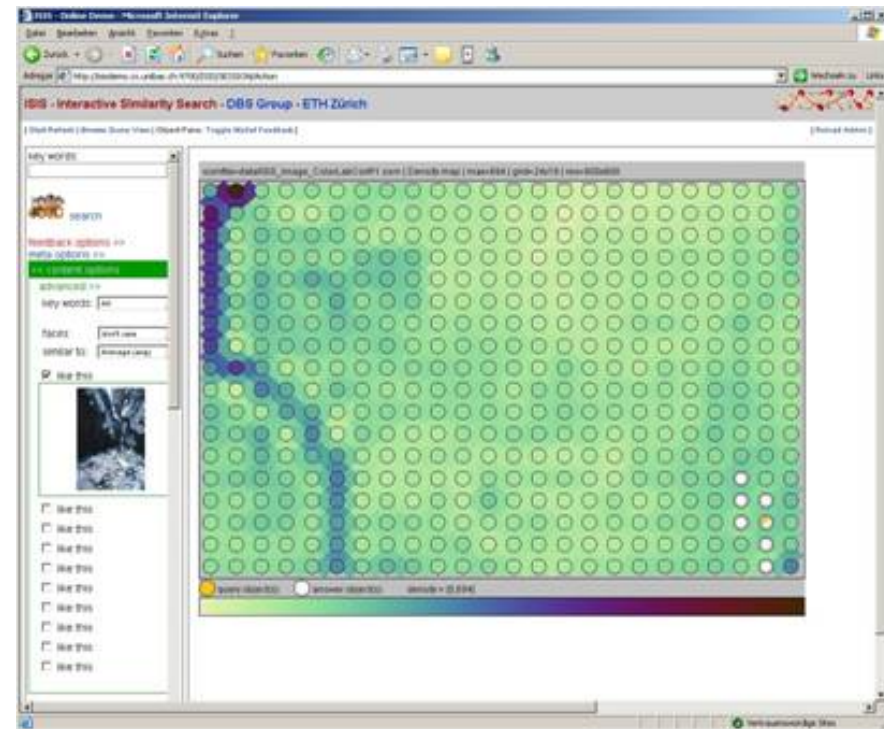
FastMap



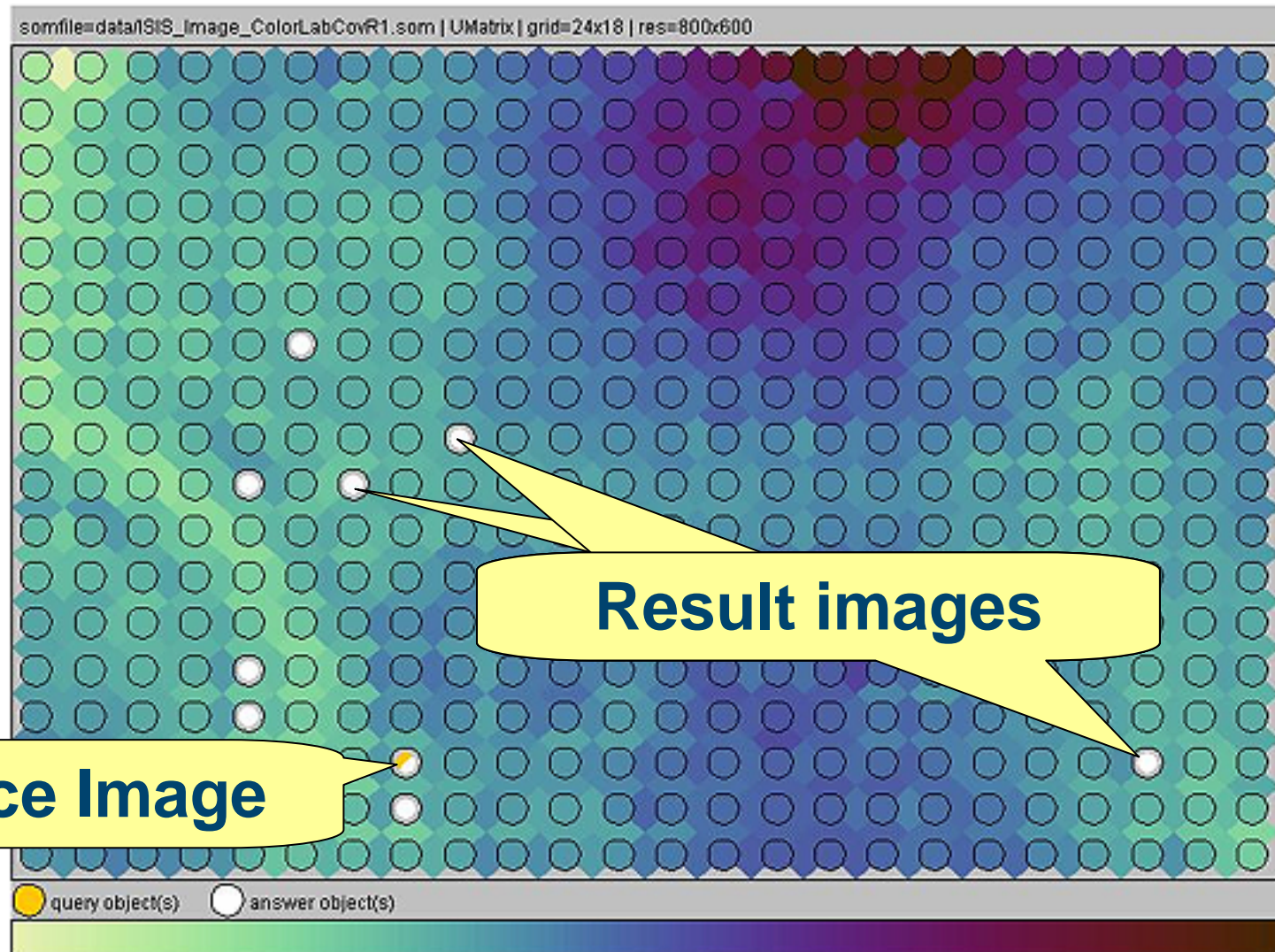
**Groups (clusters)
of similar images
easily identified**

SOM Visualization

- Another 2D Visualization of similarity relationships
- Based on self organizing maps
 - Popular in data analysis
 - Suited for browsing of large databases
- Displays **complete** feature space:
 - Find dense clusters
 - localization of query object and query results



SOM Visualization



- Another tool to explore *large* data sets
 - 3D representation
 - Position, color and size of points represent attributes
- Works on *structured* data sets metadata, not content.
- integrated into MedioVis interface

