



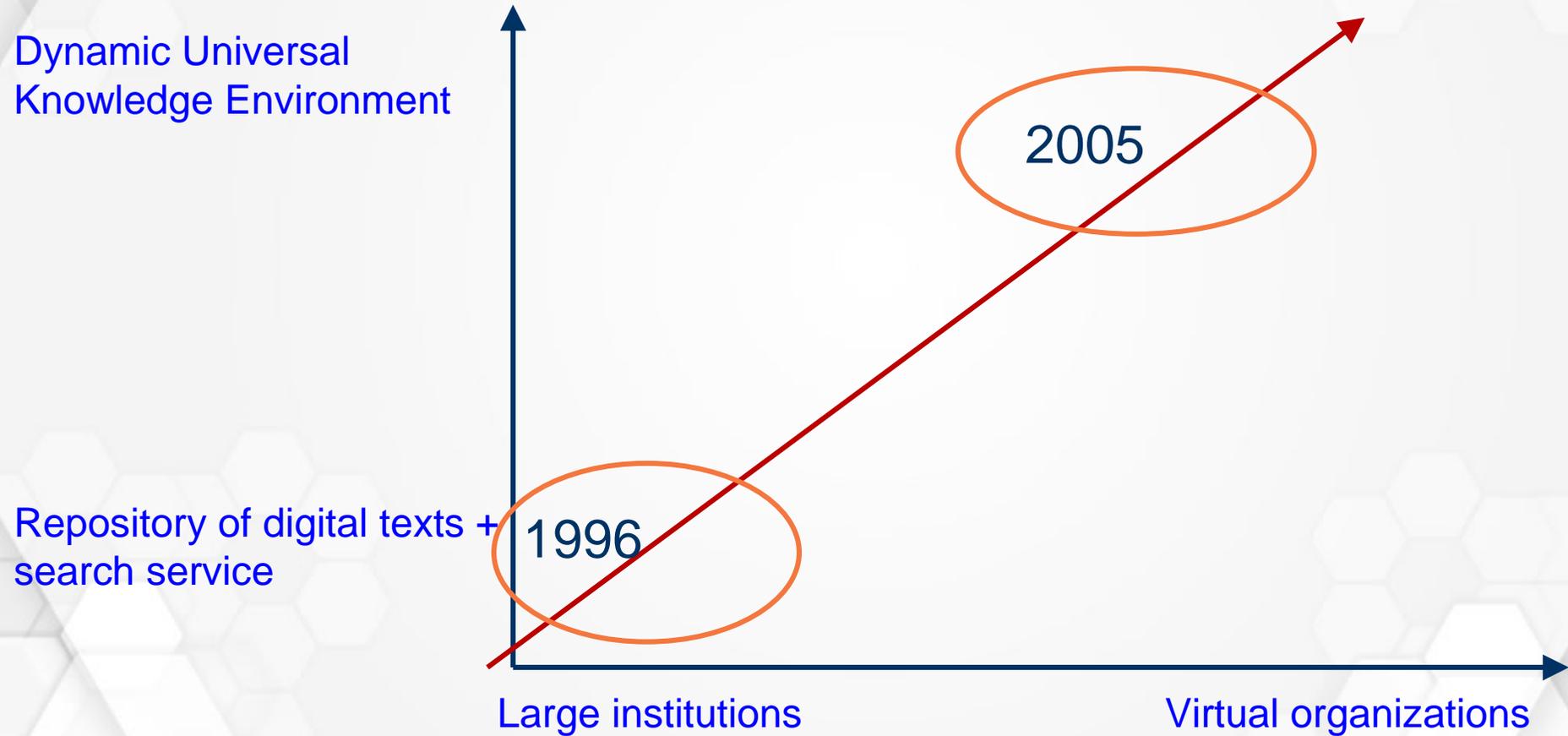
Diligent

**A Digital Library Infrastructure
on Grid Enabled Technology**

Virtual digital libraries: The DILIGENT Project

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The DLs evolution



New information objects

Live documents

- a fixed text
- a pollution map
- a table summarizing data from millions of observed satellite measures
- a graph reporting an analytical trend of certain information extracted from a great amount of observed data

International Report on Mediterranean Sea Chlorophyll Distribution during year 2003

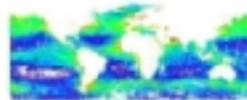
1. Scientific and Societal Concerns

Any scheme to monitor the ocean biota and their environment must strive to address the major scientific and societal concerns of the day pertaining to marine life. This section summarises some major concerns that emerged during discussions at the meeting. Many other concerns could have been included, but space precludes a complete listing of concerns.

1.1. Biodiversity and Conservation

Marine biodiversity is not easy to assess and is generally poorly known. There are many complicating factors, including a three-dimensional, fluid, mobile environment, its vastness, and its challenging depths. Away from shore, primary producers and primary grazers are usually small, drifting forms that undergo spatial variability and seasonal changes.

The larger invertebrate grazers have a range of life history stages, often with planktonic and benthic phases. Many large animals are migratory. Ocean habitats can be linked by the dispersal of planktonic larvae, and in this way, the systems can be interconnected even at a distance.

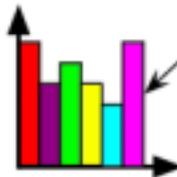


Jan - Apr 2003

Finally, the higher-order diversity of life is much greater in the oceans than in terrestrial systems—there are 13 unique phyla in the oceans and only one on land. Marine biodiversity is essentially the evolutionary history of life. In general, long-term environmental stability seems to increase biodiversity and, conversely, global climate change can be expected to decrease it.

	X1	X2	X3	X4	X5	X6	X7	X8	X9
Y1	12	13	15	26	11	34	45	45	54
Y2	32	12	46	67	21	22	44	12	44
Y3	23	33	56	77	32	44	12	55	33
Y4	44	34	12	55	34	45	12	22	44

Measures of yyy



Values of xxx

Automatically updated with the most recent data

Dynamic Universal Knowledge Environments

- In order to satisfy this demand we need:
 - ◆ New DL systems able to provide innovative services, especially capable of supporting multimedia and multi-type information objects
 - ◆ Fast and unexpensive DLs development models, based on sharing and reuse of resources

Which technology?

• The Grid technology

- ◆ Large processing and storage capabilities for handling the wide variety of multimedia and multi-type information objects
- ◆ Controlled sharing of resources

DILIGENT

A Digital Library Infrastructure on Grid Enabled Technology

Participants

- Italian National Research Council – ISTI (Italy, Scientific Co-ordinator)
- European Research Consortium for Informatics and Mathematics (France, Administrative Co-ordinator)

- University of Athens (Greece)
- Swiss Federal Institute of Technology Zurich -ETH Zurich (Switzerland)
- Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. – IPSI (Germany)
- University for Health Informatics and Technology Tyrol (Austria)
- University of Strathclyde (United Kingdom)

- Engineering Ingegneria Informatica SpA (Italy)
- Fast Search & Transfer ASA (Norway)
- 4D SOFT Software Development Ltd. (Hungary)

- European Organization for Nuclear Research (Switzerland)

- European Space Agency – ESRIN (Italy)
- Scuola Normale Superiore (Italy)
- RAI Radio Televisione Italiana (Italy)

DILIGENT objective

Create a test-bed **Digital Library Infrastructure** that will allow members of dynamic virtual research organizations to create on-demand transient digital libraries based on shared computing, storage, multimedia, multi-type content and application resources

Consumers



DILIGENT DL infrastructure

Service A

Service B

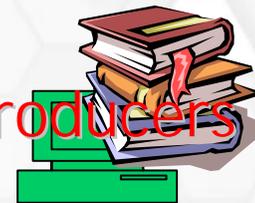
Service C

DLCreation
service

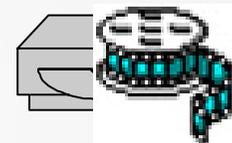
Service D

Service E

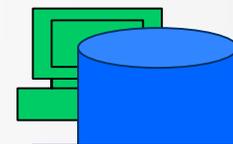
Producers



3D processing



simulation

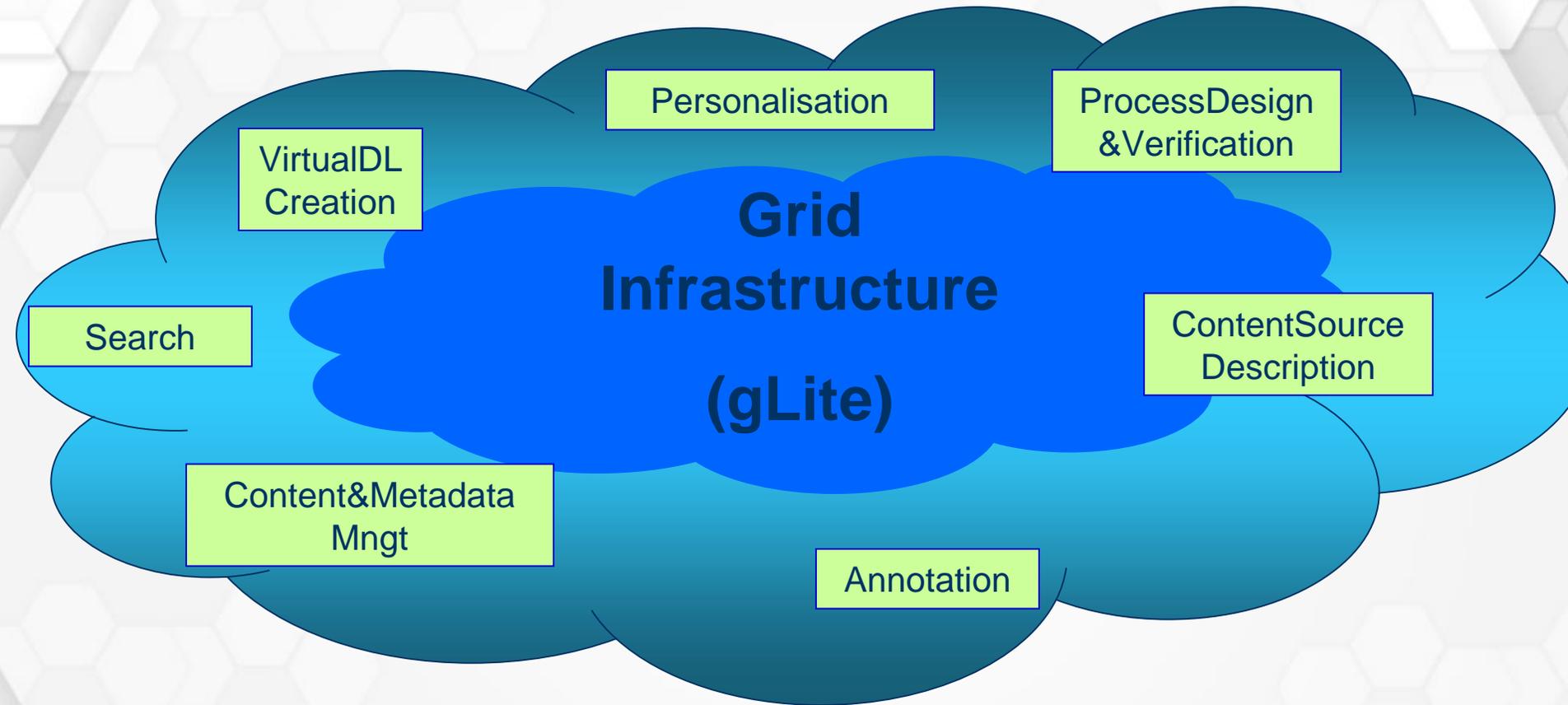


Feature
extraction



Speech
recognition

DILIGENT DL Infrastructure



- The high computing and storage capabilities will be obtained by relying on the Grid infrastructure
- The DILIGENT project will develop the knowledge management services and the services that are needed to handle them

DILIGENT functional view

Application specific functionality

Portal Generator

Feature
Extraction

Visualization

Process Management

Process
Execution &
Reliability

Process
Design &
Verification

Query Process
Optimization

DL Creation&Management

Keeper

Broker&MatchMaker

Information
Service

DL Generator

Dynamic VO
Support

Index&Search Management

Search

Index

DataFusion

Content Source
Description & Selection

Personalization

Content&Metadata Management

Annotation

Metadata Broker

Metadata
Management

Content Security

Content
Management

Content
Wrapper

Storage
Monitor

Architectural View

- **DILIGENT will**
 - ◆ **Adopt gLite as middleware**
 - ◆ **Exploit gLite as software**
 - ◆ **Join the EGEE infrastructure**

DILIGENT- gLite relationship (1)

- DILIGENT **adopts** gLite as Grid Middleware

The DILIGENT application will be composed by

- ◆ services provided by the DILIGENT project
- ◆ services provided by the gLite distribution

Both DILIGENT and gLite services will be deployed on the DILIGENT test-bed infrastructure

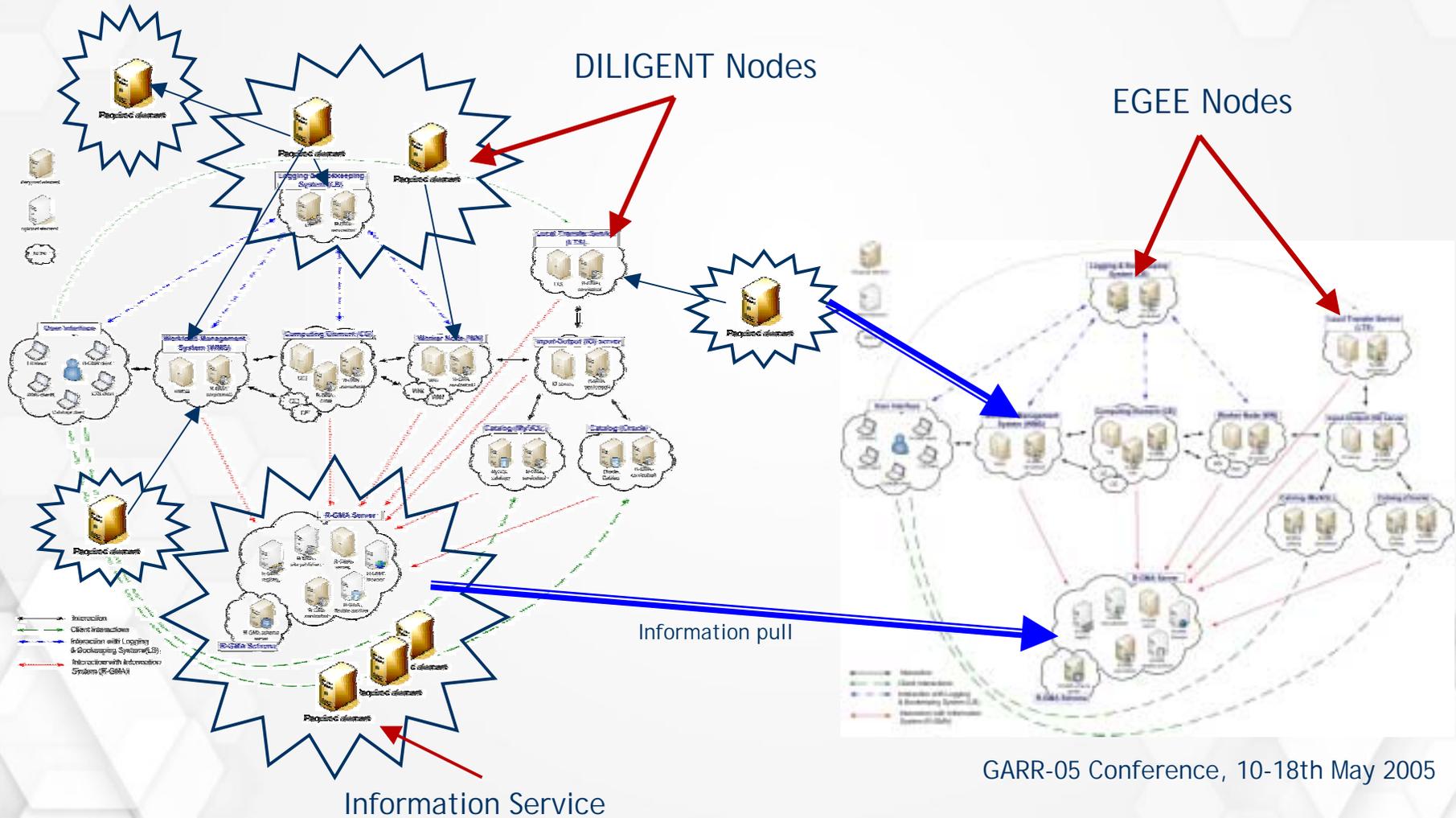
DILIGENT-gLite relationship (2)

- DILIGENT **exploits** gLite services, components, or modules

DILIGENT services can be designed to include or wrap “pieces of gLite software”

DILIGENT- gLite relationship (3)

The DILIGENT infrastructure **joins** the EGEE infrastructure



Our users (1): Environmental researchers

Implementation of Environmental Conventions

Objective: DLs for supporting the scientists in protecting the environment against pollution

Focus: the control of the marine environment of the Mediterranean Sea

Activities:

- ◆ producing reports
- ◆ prepare conferences
- ◆ analyze data about the environment in case of accidents

Our users (1)

- Large variety of content types (e.g. maps, satellite images, reports)
- Large amount of data
- High processing required to produce useful outcomes
- Participants
 - ◆ **European Space Agency**
 - ◆ Ministero Italiano dell'Ambiente e altri uffici di Guardie Costiere europei
 - ◆ REMPEC - the Regional Marine Pollution Emergency Response Centre (Malta)
 - ◆ UNESCO IOC (Intergovernmental Ocean Committee) (Paris)
 - ◆ ITOPF, International Tanker Owners Pollution Fed. Ltd. and MOIG, Mediterranean Oil Industry Group
 - ◆ ICRAM, Istituto Centrale per la Ricerca scientifica e tecnologica applicata al mare

Our users (2): Culture heritage researchers

ARTE Project

Objective: DLs for supporting the work of teams of researchers working on the humanities domain

Focus: to collaboratively investigate the usage of images and texts in ancient books and to establish semantic relationships among them

Activities:

- ◆ Organization of courses
- ◆ Exhibitions
- ◆ Conferences

- Many multidisciplinary archives
- Strong need of texts, images and videos semantic analysis and search across this heterogeneous documents
- Few resources
- Participants
 - ◆ **Scuola Normale Superiore**
 - ◆ **Rai Radiotelevisione Italiana**
 - ◆ Brown University - Department of Italian studies
 - ◆ Centre de Recherche en Histoire des Sciences et des Techniques
 - ◆ Universidade da Coruña - Research Team on Hispanic Emblematic Literature
 - ◆ University of Glasgow - HATII
 - ◆ Università di Pisa - Facoltà di Lettere e Filosofia - Corso di Laurea Cinema Musica e Teatro
 - ◆ Studio Azzurro Produzioni

Conclusions

- The eInfrastructure is the means that will allow to construct Dynamic Universal Knowledge Environments serving a large number of research communities
- The experience and the services developed by DILIGENT can be exploited by other knowledge-based applications
- The DILIGENT system can serve as a basis for many other applications: e-learning, e-health, e-government

Contacts

www.diligentproject.org

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