eScience – eSciDoc – Grid

Eine disziplinübergreifende Arbeitsumgebung für die Max-Planck-Gesellschaft

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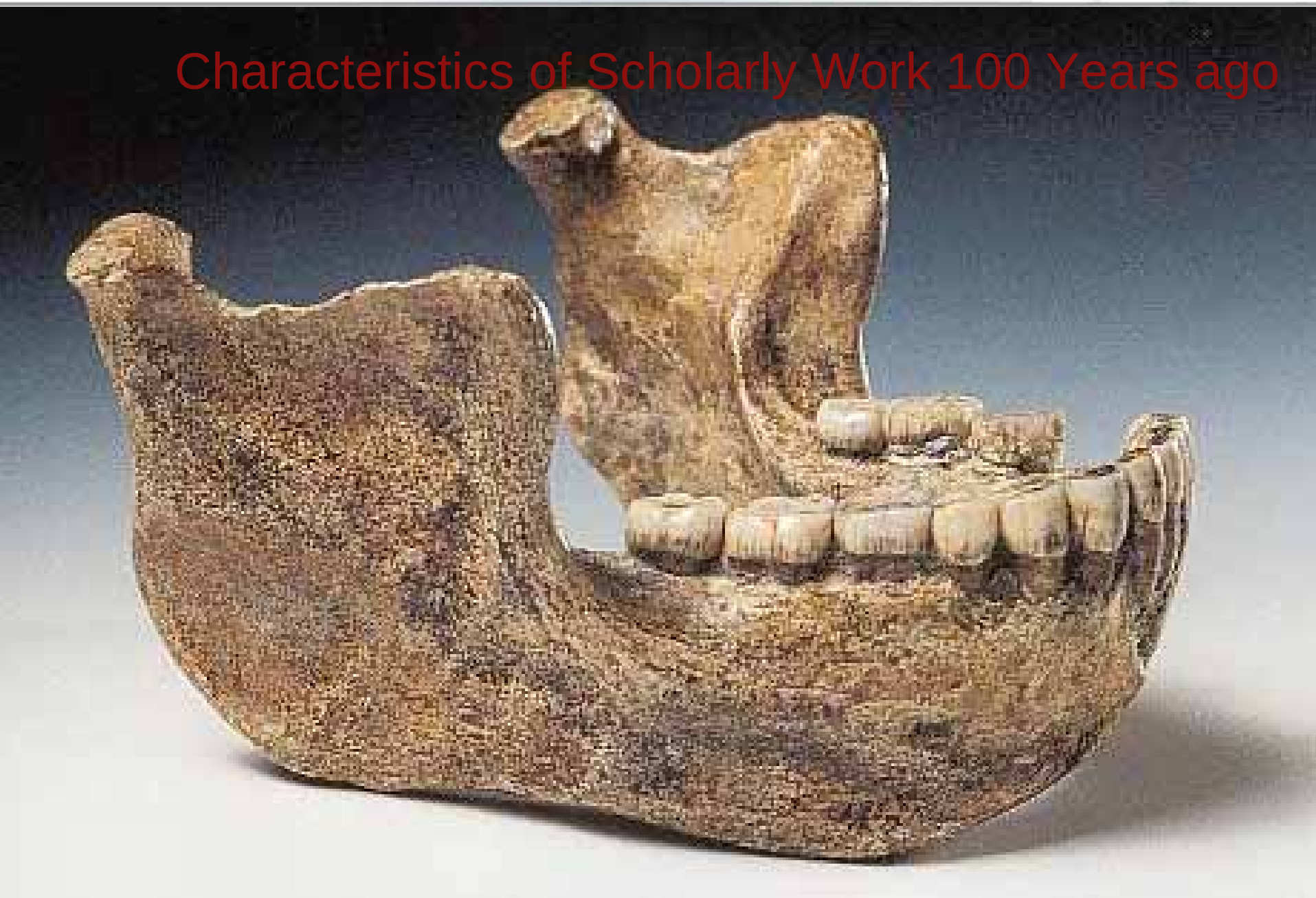
FIZ Karlsruhe

II. Göttinger Grid Seminar
Göttingen
13. September 2007

Agenda

- Characteristics of Scholarly Work
- eScience
- The eSciDoc Approach
- Grid

Characteristics of Scholarly Work 100 Years ago

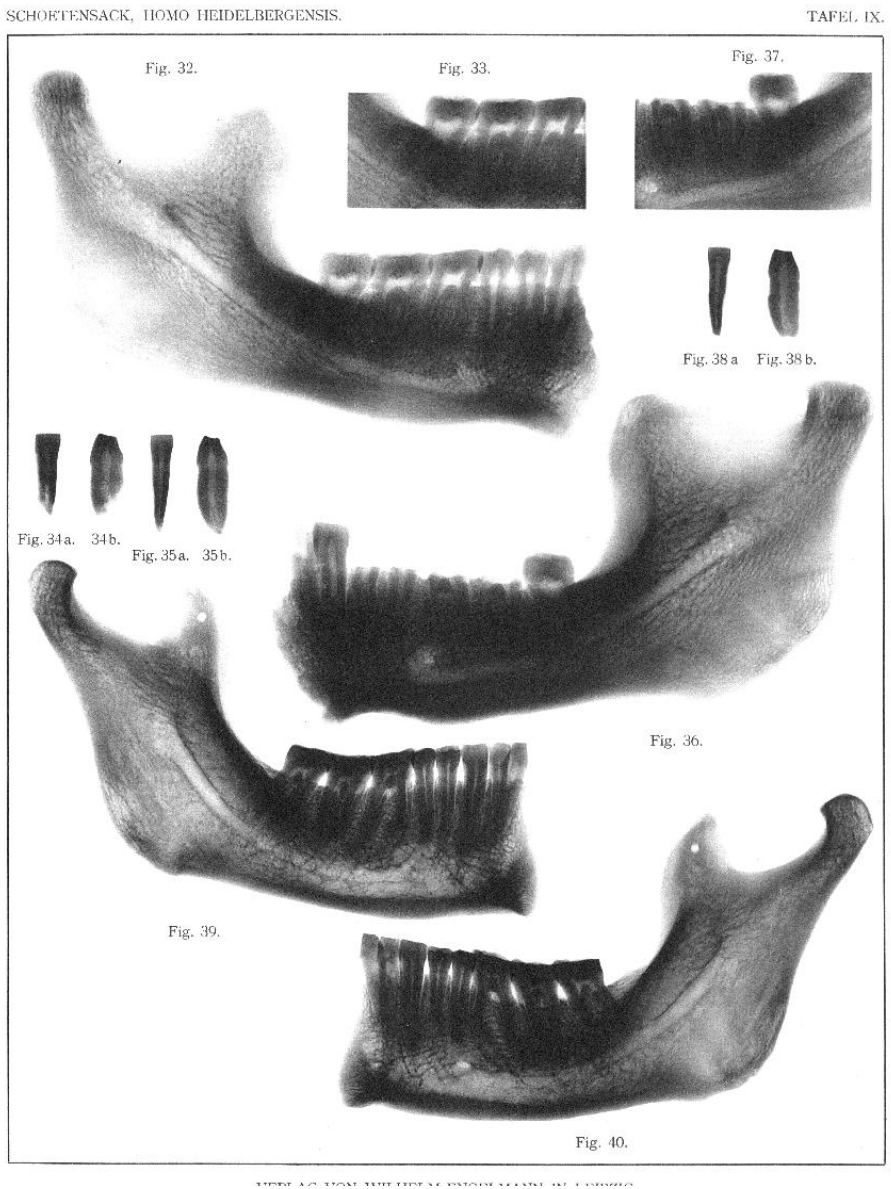


Individuals

Prof. Dr. Otto Karl Friedrich Schoetensack
1850 - 1912

Radiology

State-of-the-art research technique, discovered in 1895 by Wilhelm C. Röntgen.



DER UNTERKIEFER DES HOMO HEIDELBERGENSIS

AUS DEN SANDEN VON MAUER BEI HEIDELBERG

EIN BEITRAG
ZUR PALÄONTOLOGIE DES MENSCHEN

VON

OTTO SCHOETENSACK

MIT 13 TAFELN, DAVON 10 IN LICHTDRUCK

LEIPZIG
VERLAG VON WILHELM ENGELMANN
1908

Publication of research results

VORWORT.

Der den Gegenstand vorliegender Abhandlung bildende menschliche Unterkiefer wurde in den 10 km südöstlich von Heidelberg anstehenden, in der Literatur als Sande von Mauer bekannten fluviatilen Ablagerungen aufgefunden. Das Alter dieser Sande wird nach den darin angetroffenen Säugetierresten gemeinhin als altdiluvial angegeben; einige darin vertretene Arten lassen aber auch deutliche Beziehungen zu dem jüngsten Abschnitte des Tertiärs, dem Pliozän, erkennen. So durfte man vermuten, daß etwa in diesen Schichten sich findende Menschenknochen bedeutsame Aufschlüsse über die Morphogenese des menschlichen sowie überhaupt des Primatenskelettes geben würden. Diese Annahme hat nunmehr durch den Fund der Mandibula Bestätigung erfahren.

Ich habe mich bemüht, in dieser Schrift vor allem eine möglichst erschöpfende Beschreibung des Fundobjektes und der — bei fossilen Menschenresten äußerst wichtigen — Fundumstände zu geben. Bei den vergleichenden Studien habe ich mich im wesentlichen auf das von den Direktoren der hiesigen Universitätssammlungen, den Herren O. Bütschli, M. Fürbringer und W. Salomon, sowie von Herrn H. Klaatsch in Breslau mir in entgegenkommendster Weise zur Verfügung gestellte Material gestützt. Letztgenannter Freund sowie Herr G. Port standen mir bei meinen Untersuchungen mit ihren reichen Erfahrungen bei, die mir insbesondere bei den diagraphischen und Röntgenaufnahmen sehr zustatten kamen. Die Herren Gorjanović-Kramberger in Agram und J. Fraipont in Brüssel waren so liebenswürdig, mir Gipsabgüsse fossiler Unterkiefer zu überlassen. Ferner lieh mir Herr Assistent W. Spitz bei den photographischen Aufnahmen freundlichst seinen Beistand. — Allen diesen Herren sei hiermit herzlicher Dank ausgesprochen.

Universität Heidelberg im September 1908.

Otto Schoetensack.

With a little help
from his friends …


Arctic Ocean
Arctic Ocean
Greenland
Iceland
Suomi Finland
Sverige Sweden
Norge Norway
Россия Russia
United Kingdom
Polska Poland
Deutschland Germany
Україна Ukraine
France
Italia Italy
España Spain
Türkiye Turkey
Canada
United States
North Atlantic Ocean
Kazakhstan
Mongolia
中国 China
日本 Japan
Iraq
Iran
Afghanistan
Pakistan
India
Saudi Arabia
Egypt
Libya
Algeria
Mauritania
Mali
Niger
Chad
Sudan
Nigeria
Ethiopia
Kenya
DR Congo
Tanzania
Angola
Zambia
Namibia
Botswana
Madagascar
South Africa
Mexico
Cuba
Venezuela
Colombia
Brasil Brazil
Peru
Bolivia
Chile
Argentina
South Pacific Ocean
South Atlantic Ocean
Indian Ocean
Australia
Indonesia
Papua New Guinea
ประเทศไทย Thailand
New Zealand

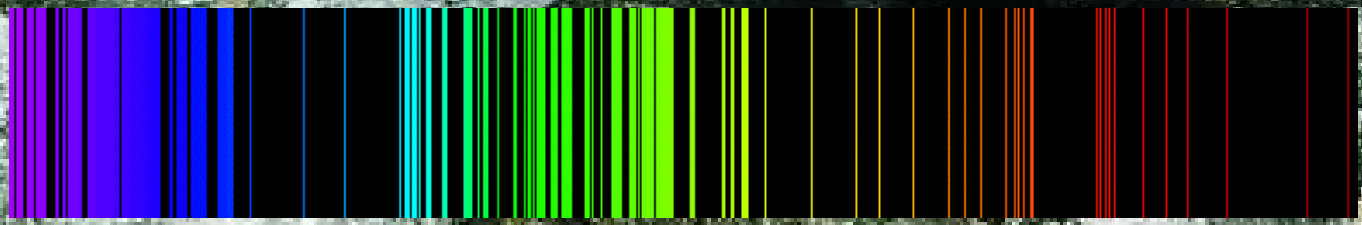
Characteristics of Scholarly Work 100 Years ago

- Individuals or small groups of scientists
- Results of research published in printed journals or books
- Some reference journals for information retrieval
- Communication by letters
- State-of-the-art research techniques

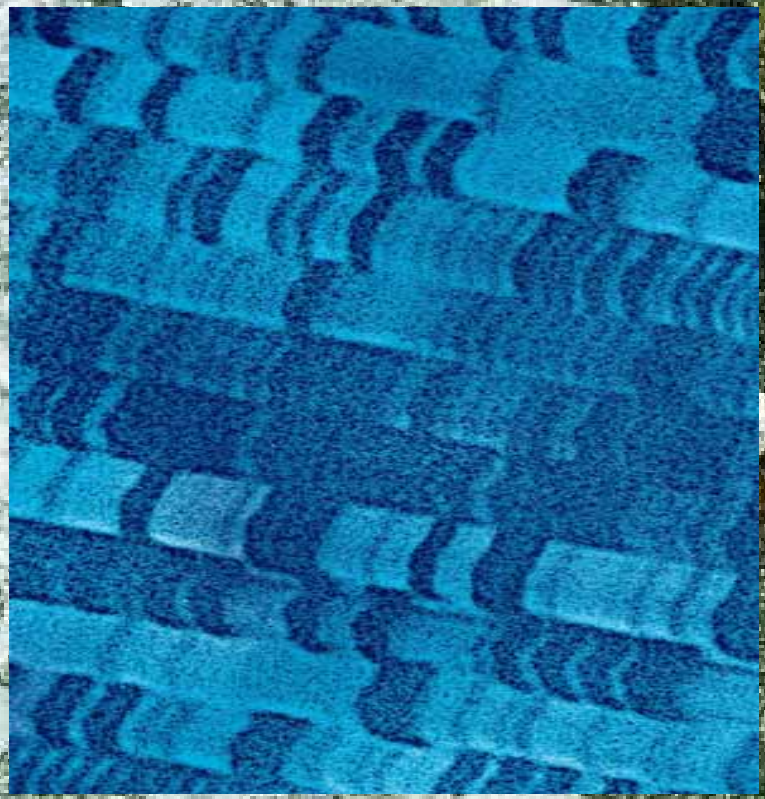
e SciDoc PROJECT

Characteristics of Scholarly Work Today

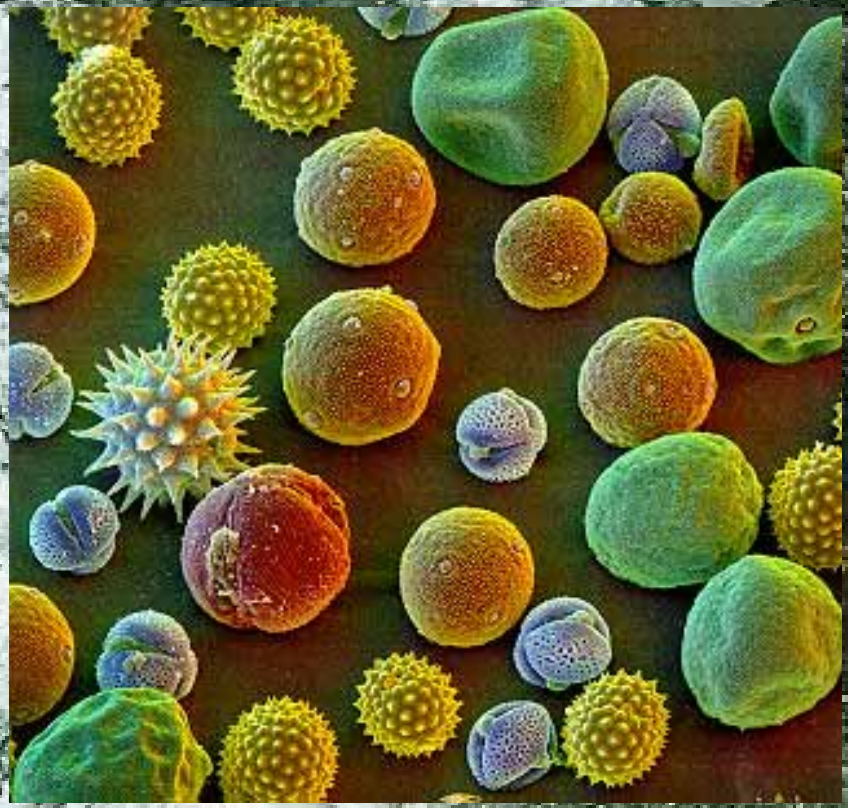
Chemical Analysis



DNA Analysis



Pollen Analysis



Computer Tomography


Arctic Ocean
Arctic Ocean
Greenland
Iceland
Canada
United States
Mexico
Cuba
North Atlantic Ocean
Venezuela
Colombia
Brasil
Brazil
Bolivia
Chile
Argentina
South Pacific Ocean
South Atlantic Ocean
Suomi Finland
Sverige
Norge
Україна
Ukraine
France
España
Spain
Italia
Italy
Algeria
Libya
Egypt
Mauritania
Mali
Niger
Chad
Sudan
Nigeria
Ethiopia
Kenya
DR Congo
Tanzania
Angola
Zambia
Namibia
Botswana
South Africa
Madagascar
Россия
Russia
Kazakhstan
Mongolia
中国
China
日本
Japan
Iraq
Iran
Afghanistan
Pakistan
India
Saudi Arabia
ประเทศไทย
Thailand
Indonesia
Papua New Guinea
Indian Ocean
Australia
New Zealand

Characteristics of Scholarly Work Today

- Interdisciplinary research
- Data-driven scientific workflows
- Results published in print or/and electronic media
- Online databases for information retrieval
- Communication by phone, e-mail, and videoconferencing
- State-of-the-art research techniques

Outline

- Characteristics of Scholarly Work
- eScience
- The eSciDoc Approach
- Grid

eScience is Enhanced Science

eScience is about global collaboration in key areas of science and the next generation of infrastructure that will enable it.

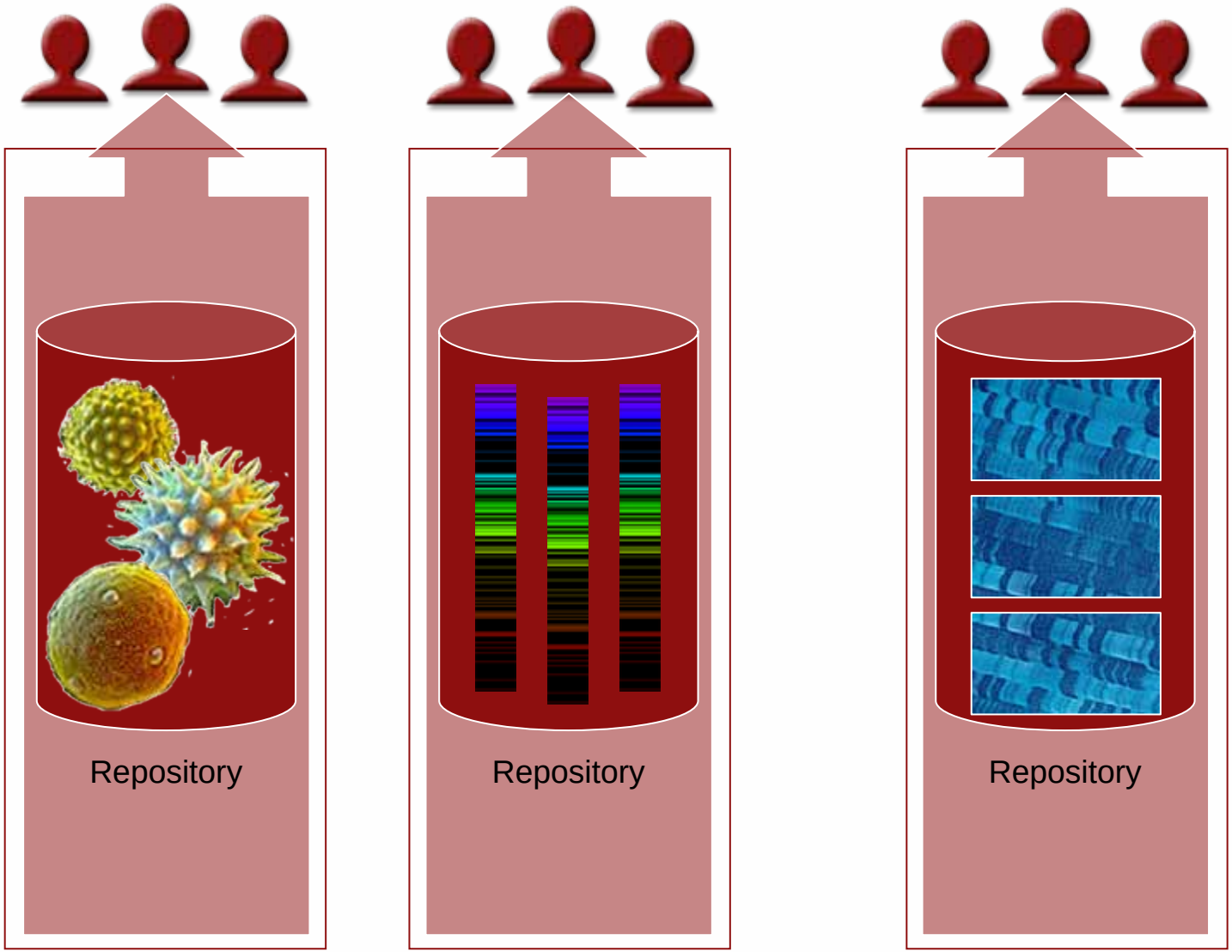
John Taylor
Director General of Research Councils Office of Science and Technology, UK

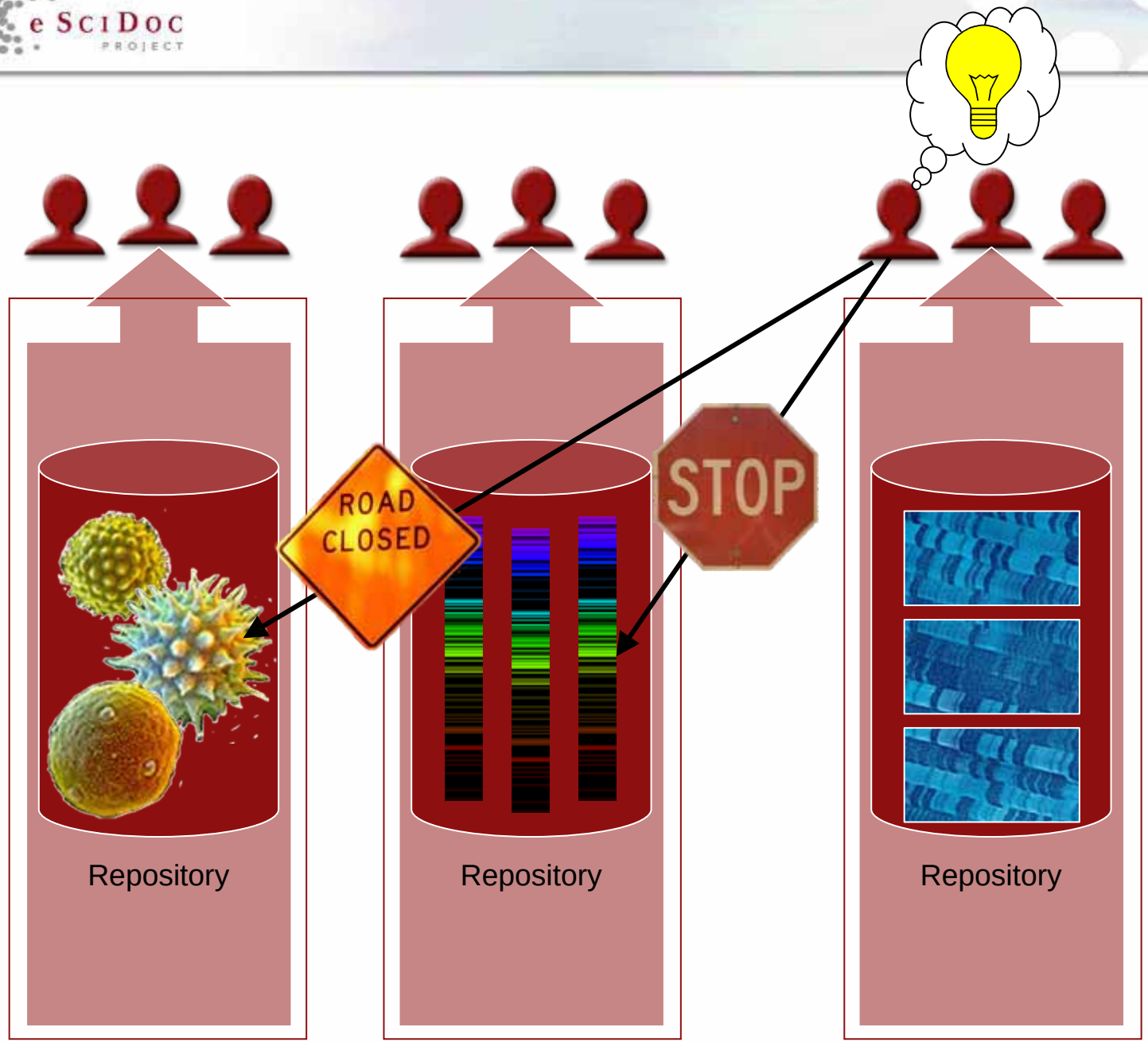
Library

Information Management
used to be simple

Current Research is Data-driven

- Direct access to primary data and intermediate work results is essential.
- Interdisciplinary work is becoming increasingly important, so systems have to span scientific disciplines
- The contents of an institutional repository form the “institutional memory” of an organization or company.
- Just like human memory, they should allow for associating information objects in novel contexts, thus creating new ways of research.

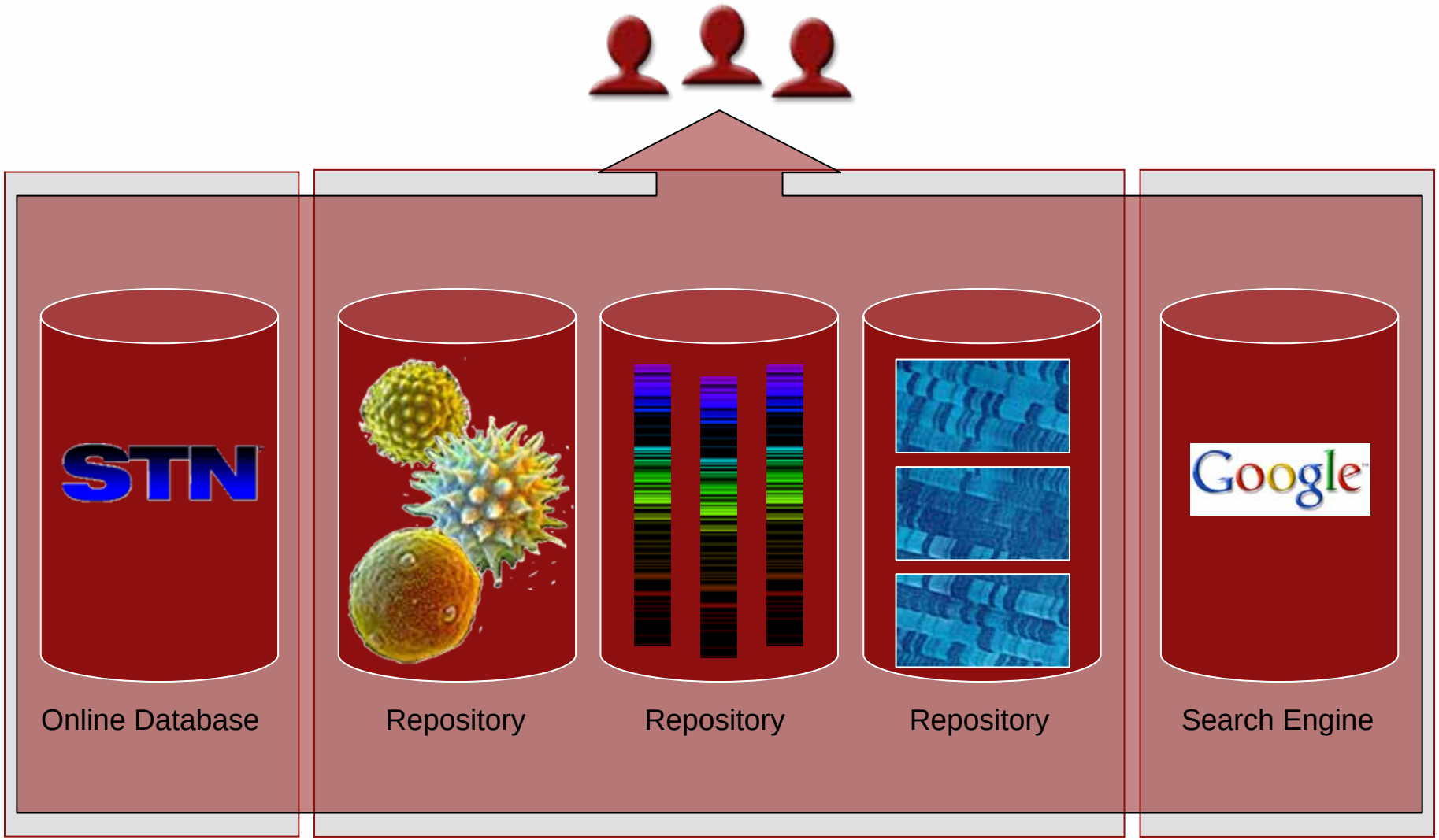

Repository
Repository
Repository


ROAD CLOSED
STOP
Repository
Repository
Repository

Information Management is a Key Issue

E-Science imposes new requirements onto existing information management processes and solutions:

- Ever-growing amounts of information
- Instant access without barriers
- Integration of heterogeneous information sources within and outside of an organization
- Manifold of object types and metadata formats
- Need to integrate information sources with existing and new applications


STN
Google
Online Database
Repository
Repository
Repository
Search Engine

Turning Static Objects into ‘Living’ Knowledge

- e-Scholarship allows to publish all intermediate results of knowledge generation from first ideas, theories, discussions with peers to final results
- eScience Infrastructures need to support scholars already in the early steps of this process, thus enabling their users to share their work in progress with peers
- Thinking a step further leads to interactive authoring environments with support for collaboration and annotations

Characteristics of Scholarly work tomorrow

- Worldwide interdisciplinary collaboration
- „Virtual organizations“
- Electronic publication of the whole continuum of data from primary data to final results
- Heterogeneous data sources for information retrieval
- Instant multi-channel communication
- Integrated platforms for information, communication, and publishing

- eSciDoc addresses these challenges!

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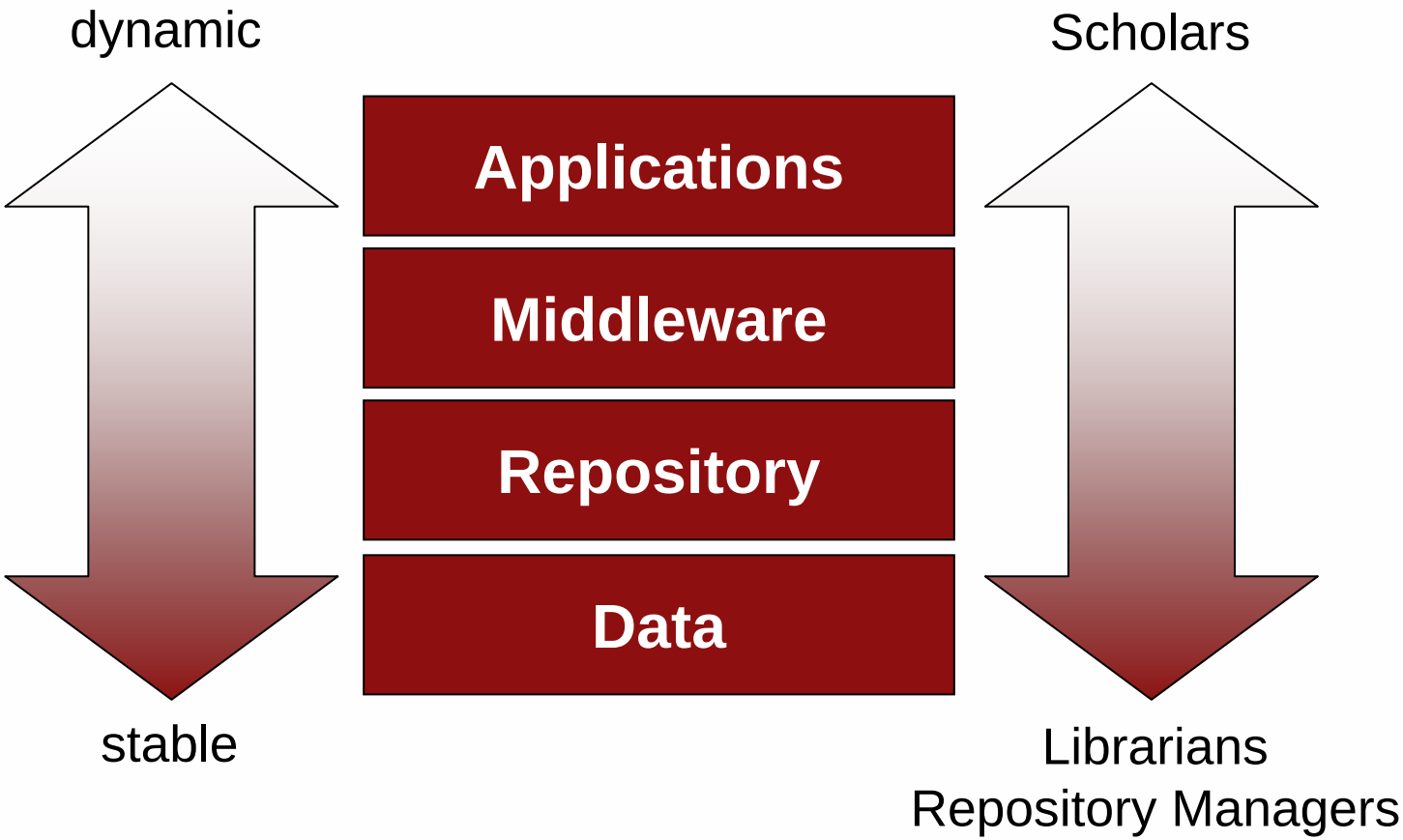
Project Setup and Mission

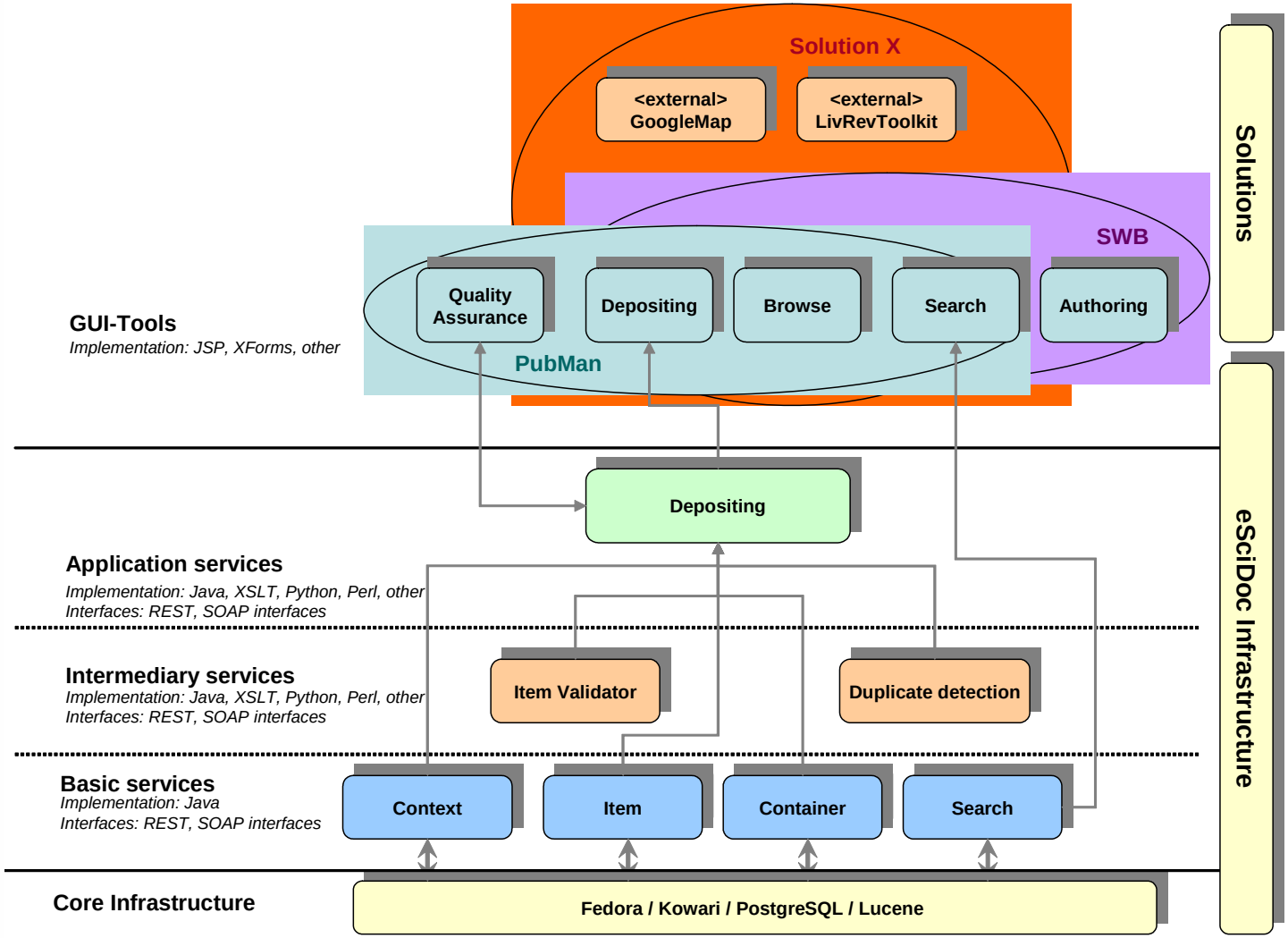
- eSciDoc is a joint project of the Max-Planck-Society (MPS) and FIZ Karlsruhe
- 6 million € five-year grant (2004 – 2009) from the German Federal Ministry of Education and Research

- It aims to build an integrated information, communication and publishing platform for web-based scientific work, exemplarily demonstrated for multi-disciplinary applications in the MPS
- eSciDoc is not a mere research project, but aims at establishing an innovative productive system

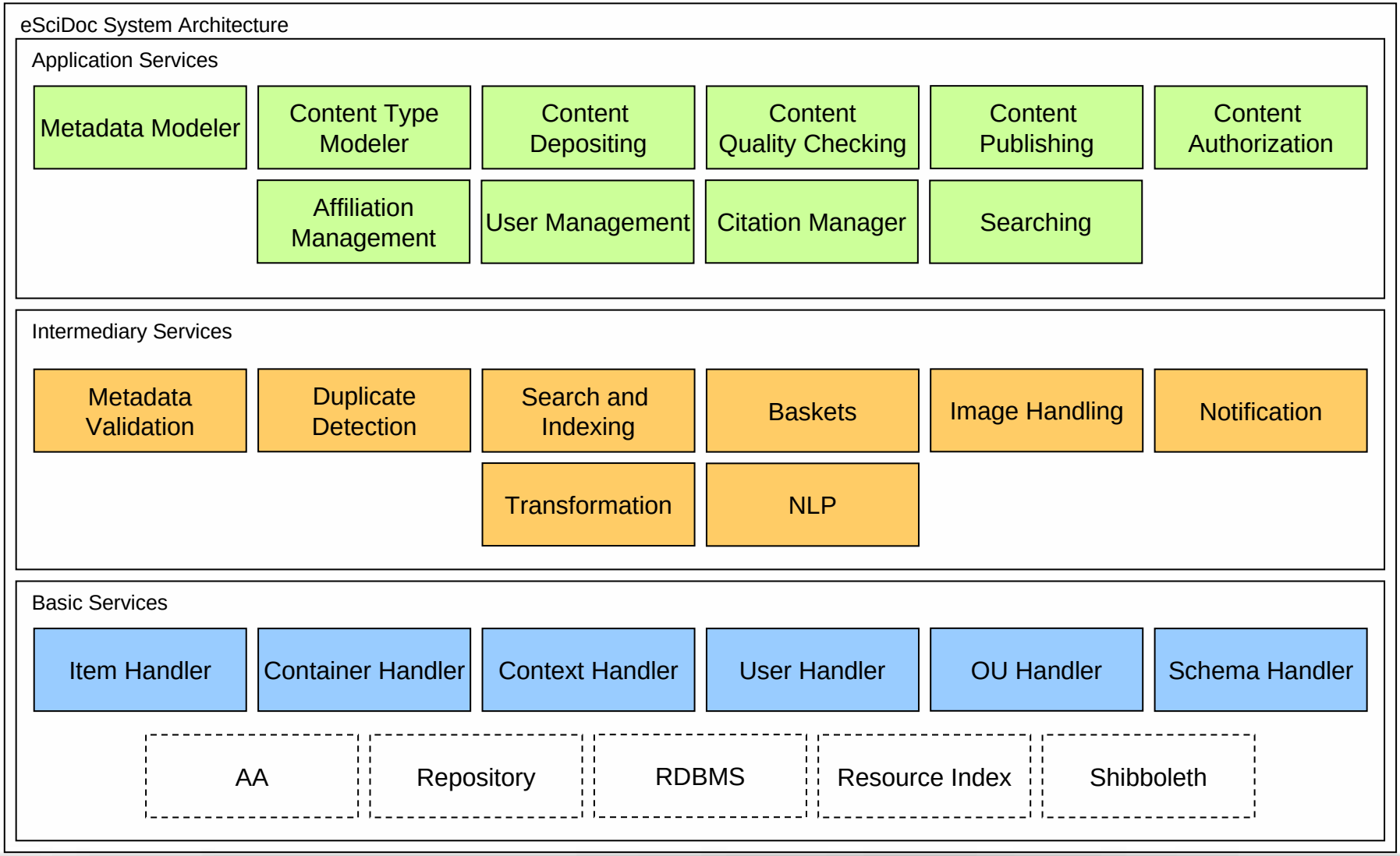
Hierarchy of Persistence



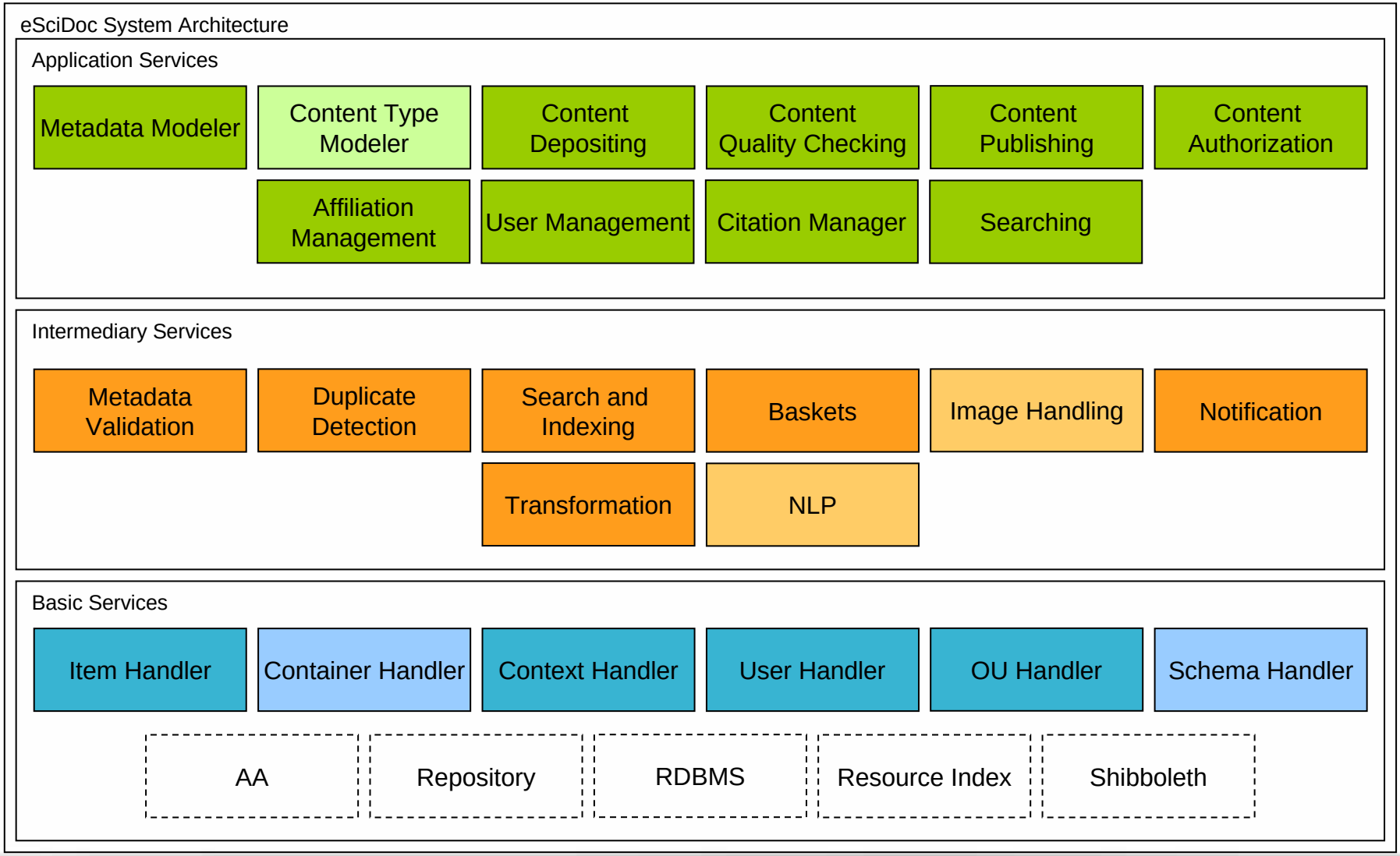
Infrastructure and Solutions



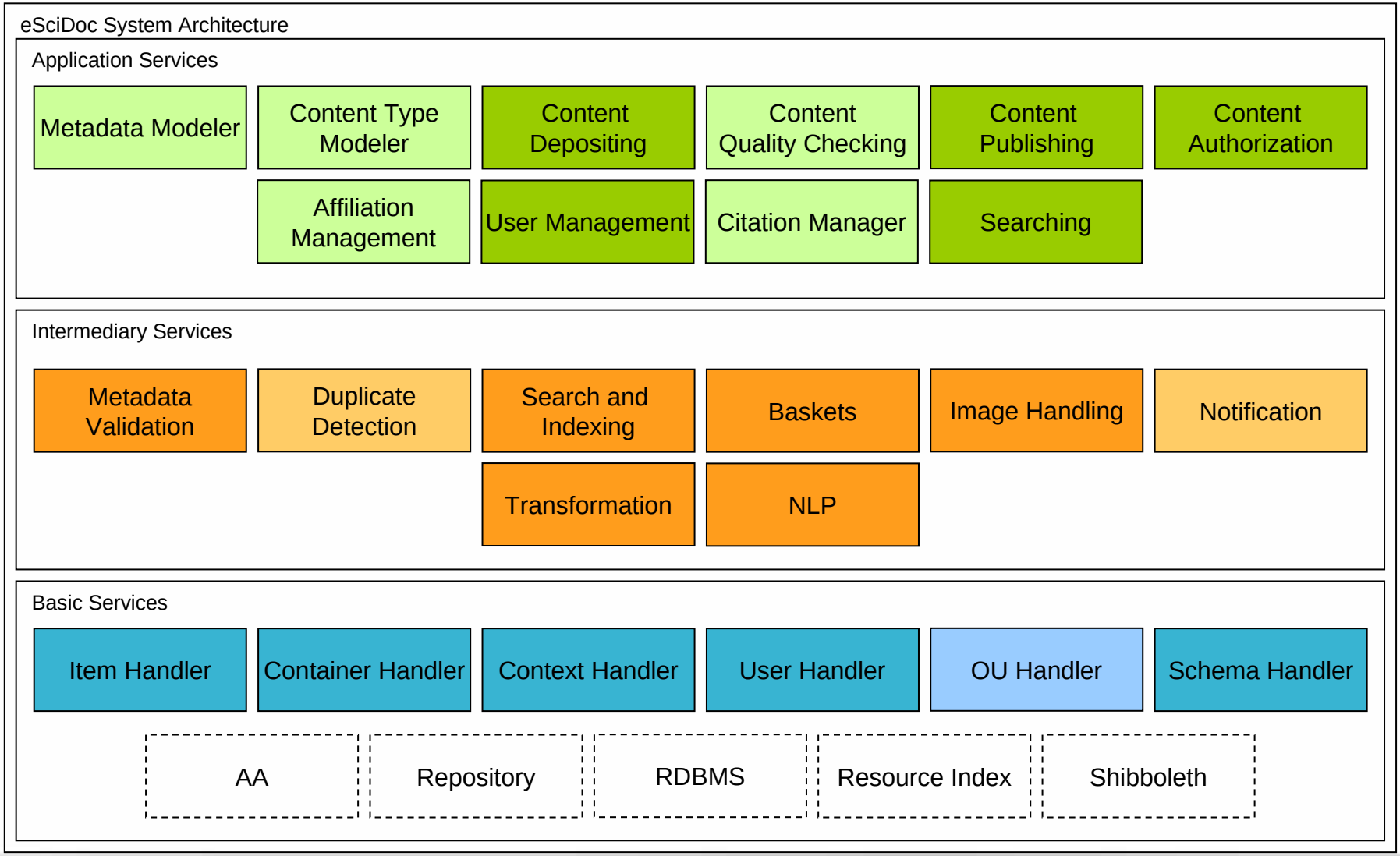
Schematic View of Service Infrastructure



Schematic View of Publication Management



Schematic View of Scholarly Workbench



Key Features

- Extremely flexible and adaptable content model
- Standards-based persistence layer (METS, XML)
- LTA-aware
- Fine-granular authorization
- Distributed authentication (Shibboleth)
- Support for domain-specific metadata profiles
- Object relations and ontologies
- Application-agnostic design of the infrastructure
- Service-oriented architecture
- REST and SOAP API
- Integration of many community-provided services and software packages

eSciDoc Infrastructure

- The eSciDoc Infrastructure is a middleware, which
  - encapsulates the repository
  - implements the Basic Layer

- The infrastructure is an “enabling technology“:
  - Scholars can focus on domain-specific application logic when building new applications
  - Existing and proven implementation of common functionality (basic services)
  - Ensures interoperability and compliance with important standards
  - Operation of the production environment is managed by a fully-fledged data center

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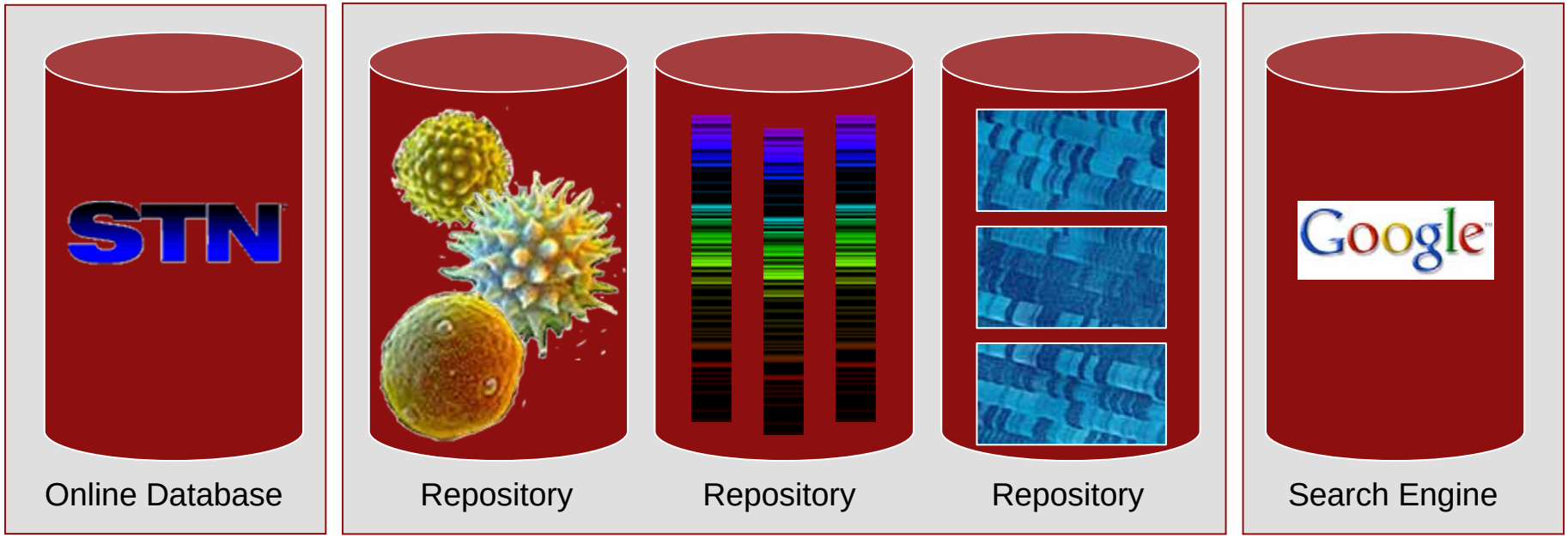
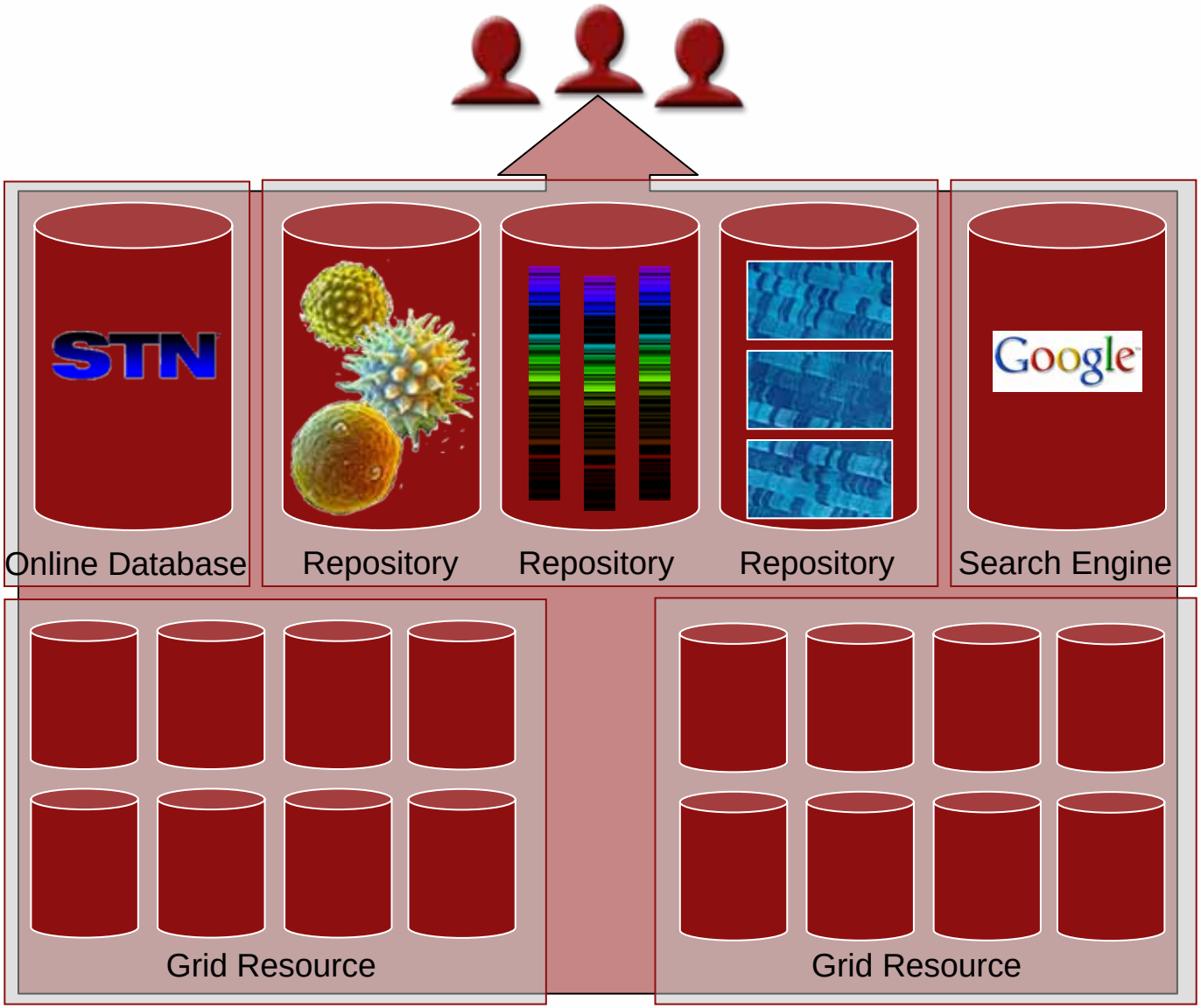
So, where is the Grid?

- Several Max Planck Institutes are partners in existing D-Grid community grids (CG)
- However, there is currently no direct link between eSciDoc and D-Grid or one of its community grids
- Both infrastructures focus on different aspects, but will converge in the future: D-Grid III Wissensschicht


STN
Google
Online Database
Repository
Repository
Repository
Search Engine


STN
Google
Online Database
Repository
Repository
Repository
Search Engine
Grid Resource
Grid Resource

Important Aspects for a Grid Integration

- Common authentication and authorization methods (Shibboleth)
- Support for VOs
- Direct access to storage services in the Grid from within the eSciDoc infrastructure
  (e.g., via SRB or iRODS)
- Allow for linking between resources managed by the eSciDoc infrastructure and by the Grid
  (persistent identification of data!)

Questions

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www.escidoc-project.de