

Decoupling is a golden rule
- not only for software architecture

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Decoupling

Modular structure of (large) systems:

- flexibility
- adaptivity
- scalability



Current status



Individual DMLs:

- in most cases scattered
- often rather limited scale
- limited resources (now and projected)

Typical situation at local DMLs:



Open Infrastructure for Mathematical Content

It is not really just a „**library**” that we need

An open infrastructure for mathematics needed:

- a rich and extensible collection of:
 - interoperating tools
 - and services
- distributed collaboration enabled

A community needed to share the content:

- libraries
- IT infrastructures involved



It is time for new awareness

Open mathematical knowledge infrastructure with:

- single-point gateway to possibly wide range of content resources
- new interoperable attitude among mathematicians
- two-way linking to other knowledge infrastructures



Grand challenge:

Foundation of an Open Mathematics culture

Leveraging awareness of the urgent necessity

- to promote Mathematics as the binding core for emerging technology developments
- new Open positioning

Vision: open mathematical publishing and communication
(longer term)



Possible short- and mid-term initiative



Constituting a community around infrastructure based on:

- DRIVER international infrastructure (COAR)
- and EuDML experience

This would enable WDML to offer

- a consistent and sustainable aggregation and federation
of the DMLs over the world

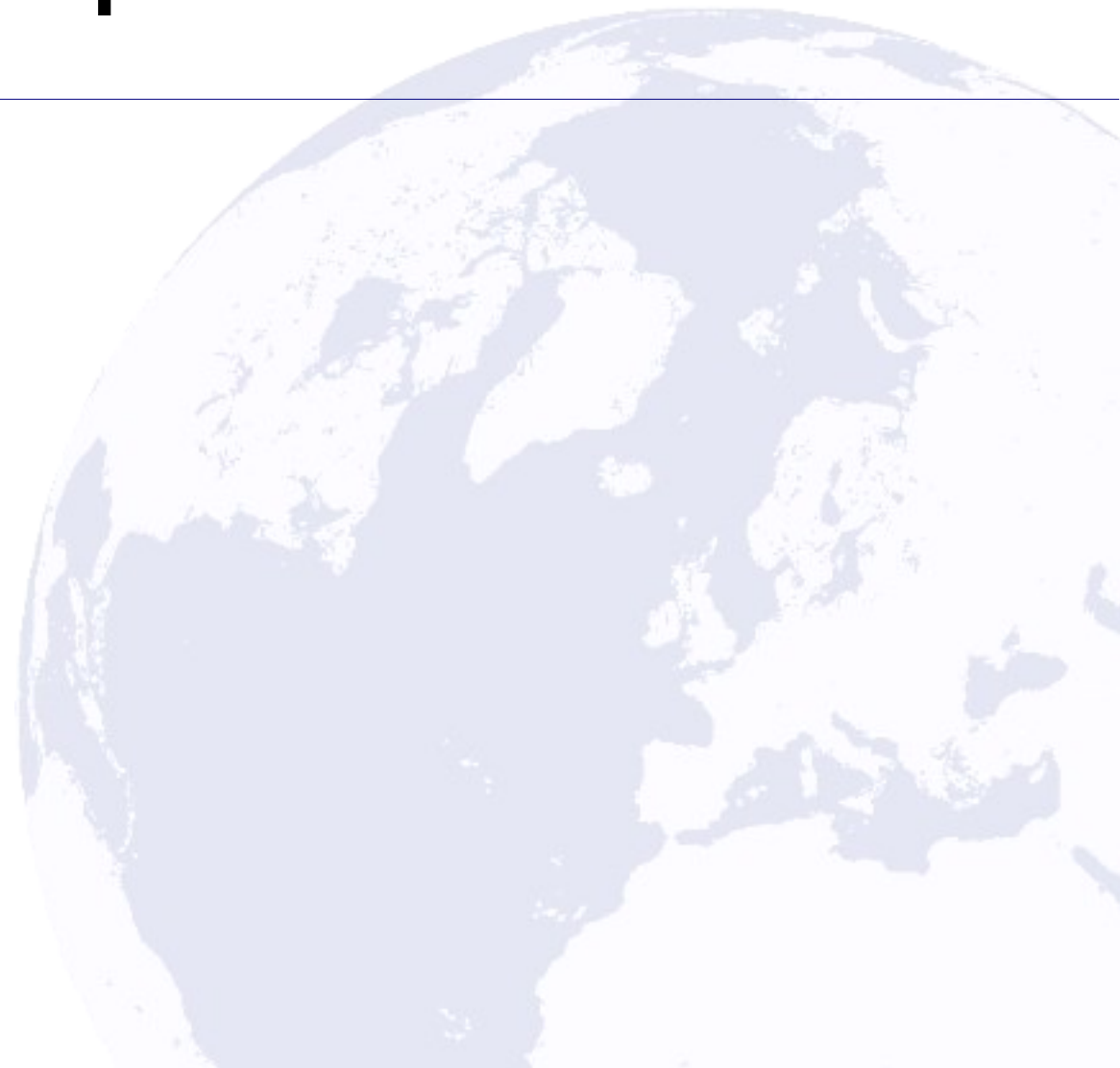


Out of DRIVER's experience:

An indication resulting from DRIVER's guidelines specification:

Providing a common denominator for the scattered community proved very successful both in practical terms as well as being inspiring.

It also proved that building sustainable distributed infrastructures and managing large collections is more an IT than a library task.



What does it mean for WDML?



Suggestion applicable to the development of tools
to be shared among the DMLs:

Such an initiative should not be limited
to aggregation of individual collections, but offer:

- rich tools
- a future-proof development environment
- infrastructural support to the involved parties
- (besides end-users)

- and possibly offer DMLs hosting and long term preservation
wherever needed



Different layers, different people

Community layer - librarians and mathematicians

Infrastructure layer - IT people:

- software developers
- system administrators

Complementary community layer :

- users of mathematics
- suppliers of fresh ideas

Significance of two-way communication patterns



Librarians

Take care of the content:

- Support, make available and share
- Care for metadata in the case of unstructured content

Ensure direct interaction with:

- scientists as content creators and suppliers
- research organisations representing funders



IT people and organizations

Provide:

- infrastructure and services, software and experience
- hosting and supporting services to content providers
(libraries, journals, publishers, digital collections' managers)
- long-time preservation and curation for content providers



Another DRIVER's experience:

„build around the standard”

Success beyond expectations:

- ❖ People tend to conform to standards

Set up a light-weight infrastructure ready for adaptive moves:

- ❖ as technology evolves
- ❖ as legal awareness grows

Document: ‘Driver Guidelines for Open Access Repositories’



Let the infrastructure live ...

- Open means **extensible** and **scalable**
(and recyclable, and in result future-proven)
- Provide tools and provide hooks for other tools to be developed
- Provide machine access to content and services
- Allow others to analyze the material
- Allow scientists to contribute:
content, comments, tools and services
- Provide tools and environment for collaborative work



Look ahead, not only behind ...

- Prepare for machine analysis
- Prepare for machine generated content
- Invent functionalities
- Be open for new ways of communication
- Prepare for new types of the content

- Be ready for interdisciplinary collaborations
- Be ready for constituting collaborative mathematics infrastructures



Let people communicate ...

- Project **Polymath**
- Collaborative mathematics
- Team work - communication about content

- We have the content
- Let people co-work: comment, share in groups, solve problems
- Support different activity types - seminar, workgroup, syllabus

Reference (one of many): **Initiative by Tim Gowers**
<http://www.hypios.com/thinking/2010/01/13/massively-collaborative-mathematics-lessons-from-polymath1/>



Infrastructure open for diverse content

- Open for grey literature
- Open for working papers and repositories
- Open for enhanced publications
- Promotion of new networked quality assurance forms
- Participatory culture
- Fundamental role of proactive educational usage forms of the mathematical content



Future vision



Global integrated IT platform for mathematical content

- open operational model

Collaborative effort of content provision and enrichment

- cluster-like multiscale concept

Novel participatory funding schemes:

- costs shared among contributors



Some incentives and motivations:

Necessary fundamental contributions of mathematics
to next-generation computing systems

Necessary contributions to big-data based science
and technology

Mathematics everywhere



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On behalf of the CeON (Centre for Open Science),
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It has all started a long time ago ...

Libraries entering the digital age:

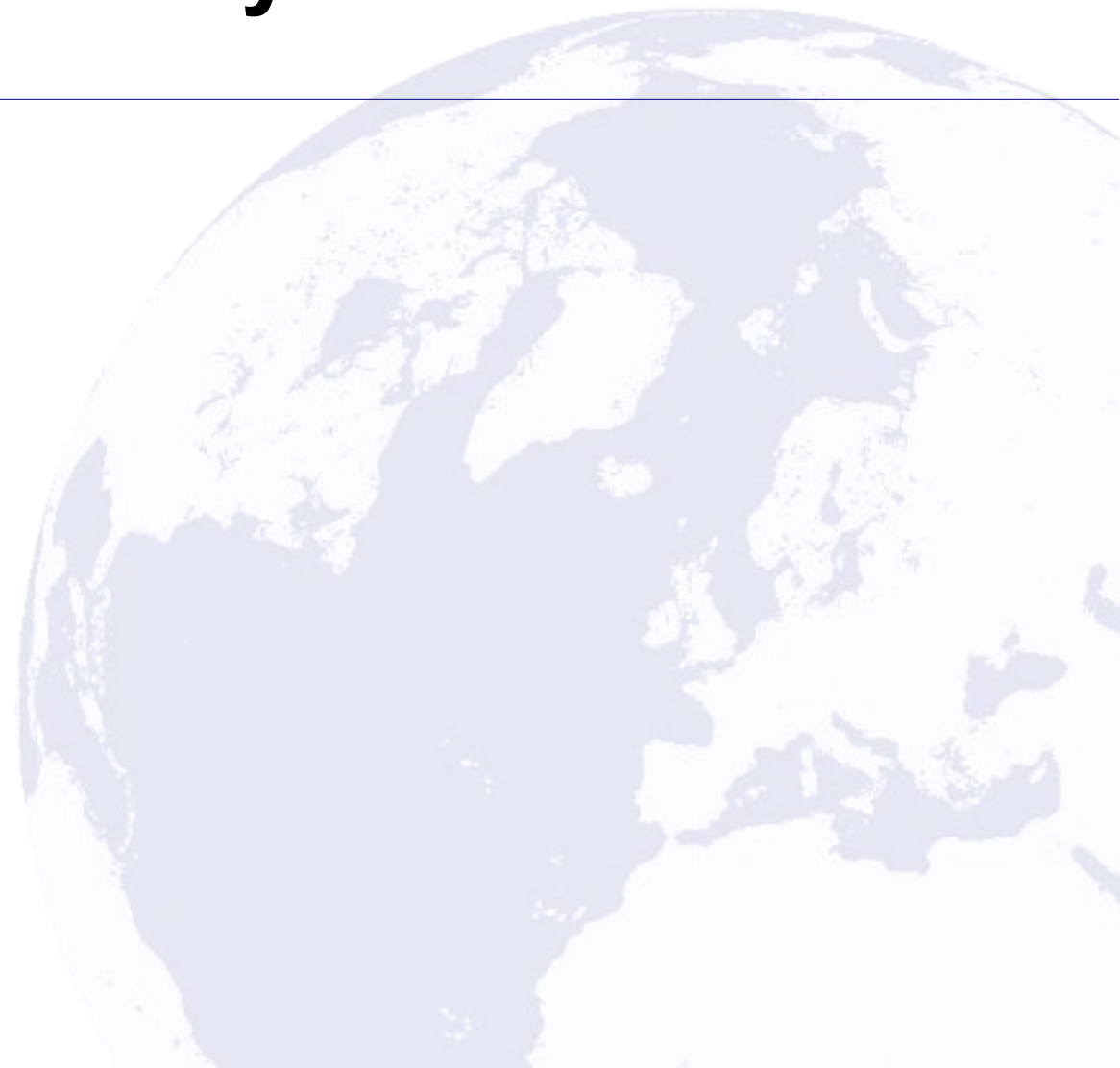
- initially electronic library catalogues
- and OPACs (Online Public Access Catalogs)

Second stage:

- monolithic applications entered the game:
 - separate digital libraries and repositories



Today



Today's situation:

- metasearch engines and aggregators

Today's challenge:

- It is time for **infrastructural approach**

