

*What's happening with the  
World Digital  
Mathematics Library?*

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# World Digital Mathematics Library (WDML)

- **Heritage:** All out-of-copyright mathematics
- **Standard:** All published mathematics
- **World:** mathematics from all cultures
- **Mega:** “All” mathematics
  - Interlinked
  - Searchable
  - Computable

# Scope of the WDML

What is mathematics? What are the boundaries?

Statistics? Mechanics? Etc., etc.

Journal articles, books, preprints, lecture notes, . . . ,  
web sites, videos, blogs, PolyMath, MathOverflow,  
computer code, data, . . .

Primary audience: working research mathematicians  
world-wide (long tail), researchers applying math-  
ematics, students, historians of mathematics . . .

★ ★ Copyright and re-copyright

★ ★ Open access

# Uses of the WDML

- Mathematics (science) as a public good
- Foster new research and new applications
- Historians and archivists
- Access in developing and underfunded countries
- Testing ground for new applications
- Discovering new correspondences
- Literature as data
- ...

# WDML History

Late 1990's: initial vision

1998: WDML endorsed by the  
International Mathematical Union (IMU)

2001: IMU issues [Call to All Mathematicians to Make  
Publications Electronically Available](#)

2000's: large digitization projects

2006: IMU Report [Digital Mathematics Library:  
A Vision for the Future](#)

2010: European Digital Mathematics Library (EuDML)

2010: Digital Public Library of America launches with support of Sloan Foundation

2011: Sloan Foundation approaches IMU and National Academy of Sciences (NAS)

June, 2012: Sloan funded WDML workshop in NAS

November, 2012: first meeting of NAS Committee

# Committee on Electronic Information and Communication (CEIC)

- Standing committee of the Executive Committee (EC) of the International Mathematical Union (IMU)
- Established by IMU General Assembly in 1998
- Advises the EC on matters concerning information and communication
- Call to All Mathematicians to Make Publications Electronically Available (2001 & update)
- Digital Mathematics Library: A Vision for the Future (2006)

## CEIC — Current Members

- Thierry Bouche, Institut Fourier, France
- Olga Caprotti, Chalmers University, Sweden
- James Davenport, University of Bath, UK
- Carol Hutchins, Courant Institute, USA
- László Lovász, Eötvös Loránd University, Hungary
- Peter Olver, University of Minnesota, USA (**Chair**)
- Ravi Vakil, Stanford University, USA



# NAS WDML Workshop

`http://ada00.math.uni-bielefeld.de/  
mediawiki-1.18.1/index.php/Main_Page`

- June 1–3, 2012 @ National Academy of Sciences
- 52 participants
- 11 Keynote talks
- 8 Panel discussions
- 4 Breakout sessions

# NAS Digital Math Library Committee

- Co-chaired by  
    Ingrid Daubechies — President, IMU  
    Clifford Lynch — Executive Director,  
        Coalition for Networked Information
- Three meetings: November, 2012, February & May,  
    2013
- Report out September, 2013

## NAS WDML workshop keynote talks

Thierry Bouche: From EuDML to WDML: next steps

John Burns: Digital libraries & the scholarly information lifecycle

Michael Doob: New hardware/software and some implications for smaller digital libraries

Joshua Gans: Alternative models of contribution

Gert Greuel: On access infrastructures to digital libraries

Marek Niezgodka: Decoupling is a golden rule - not only for software architecture

Jim Pitman: Collected and Selected Works

Ulf Rehmann: The DML, its actual state and possible future development

Masakazu Suzuki: Adaptive method for the digitization of mathematical journals

Michael Trott: Mathematical Search

Anders Wndahl: Mathematics literature in Low-Income Countries: availability and issues

## NAS WDML workshop panels

State of the art of local DMLs

Technical challenges, opportunities, goals, strategies

Data bases, digital libraries, encyclopaediae

Developing countries

Business models, libraries, publishers

Mathematical search

Copyright and licensing for bibliographic metadata

Funding agencies and societies

## NAS WDML workshop breakout sessions

Semantics and Services for the WDML

Taking Back Our Rights: Copyright and Publishing in Mathematics

What impact will the coming cloud-based information services have on the WDML?

Sustainable Copyright Ecosystems for DML

# European Digital Mathematics Library

<http://eudml.org>

*“EUDML makes the mathematics literature published in Europe available online, in the form of an enduring digital collection, developed and maintained by a network of institutions.”*

*“We will deliver a truly open, sustainable and innovative framework for access and exploitation of Europe’s rich heritage of mathematics.”*

# Retrodigitized Material

Ulf Rehmann at the University of Bielefeld maintains links for digitized mathematics. His web page

`http://www.mathematik.uni-bielefeld.de/  
~rehmann/DML/dml_links.html`

contains links to 4608 digitized books > 644443 pages  
and 576 digitized journals/seminars > 4303824 pages  
It includes all EuDML material.

★ JSTOR

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# Search and Computability

Central index of digitized mathematics.

Google scholar; Microsoft academic search, etc.

MathSciNet, Zentralblatt Math

Wolfram Alpha:

`http://www.wolframalpha.com/`

Formula search:

★ NIST Digital Library of Mathematical Functions:

`http://dlmf.nist.gov/`

Multilingual and multicultural dictionaries/thesauri.

MSC classification scheme and historical enhancements.

Name authority files: ORCID

Citation resolver: Crossref

Semantic structure:

“Mathematical Knowledge Management”  
markup systems, algorithms, tools and metadata.

# Metadata

Need for open source data and metadata.

Math Reviews (MathSciNet) and Zentralblatt Math.

Formulation of standards.

Allow application development by other parties.

# Administration

- Full time salaried executive
- Control in mathematics community
- Role of IMU?
- Distributed and decentralized
- Completely open data and metadata
- Governing board: funding, priorities, resources, timeline
- Archiving and preservation of electronic files
- “Best practices”

# Key Issues and Challenges

- Organization structure
- Funding
- Scope and focus
- Expanding the online corpus
- Openness of data and metadata
- Intelligent search
- Extensibility
- Involvement of research mathematicians
- Building enthusiasm
- Window of opportunity

# Online Resources

IMU:

<http://www.mathunion.org/>

CEIC:

<http://www.mathunion.org/ceic>

NAS Conference Wiki:

[http://ada00.math.uni-bielefeld.de/  
mediawiki-1.18.1/index.php/Main\\_Page](http://ada00.math.uni-bielefeld.de/mediawiki-1.18.1/index.php/Main_Page)

IMU 2006 Report:

[http://www.mathunion.org/fileadmin/IMU/  
Report/dml\\_vision.pdf](http://www.mathunion.org/fileadmin/IMU/Report/dml_vision.pdf)

EuDML:

<http://eudml.org>

JSTOR:

<http://www.jstor.org>

Ulf Rehmann's List of Digitized Mathematics:

[http://www.mathematik.uni-bielefeld.de/  
~rehmann/DML/dml\\_links.html](http://www.mathematik.uni-bielefeld.de/~rehmann/DML/dml_links.html)

Wolfram Alpha

<http://www.wolframalpha.com/>

PolyMath

<http://polymathprojects.org/>

MathOverflow

<http://mathoverflow.net/>

Digital Public Library of America

<http://dp.la/>

Coalition for Networked Information

<http://www.cni.org/>

ORCID

<http://about.orcid.org/>

Crossref

<http://www.crossref.org/>