Recent Progress of European Projects for Digitising Mathematics –

An Essential Contribution for the Construction of the

Digital Mathematical Library DML

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ICIAM 2003, Sydney, July 2003

Overview

- 1. The aims and mission of DML
- 2. The DML Planning Group
- 3. Main problems for the installation
- 4. Working on the content
- 5. Current patches of the DML

Aims and mission

- DML should offer all mathematical publications world-wide in digital form
- DML should care about retrospective digitization of printed publications
- DML should develop convenient access facilities which can be used at affordable rates

Planning the DML

- White paper from John Ewing, Executive Director of AMS
  - http://www.ams.org/ewing/Twenty_centuries.pdf
- Planning Project coordinated by Cornell University Library
  - http://www.library .cornell.edu/dmlib/…
  - ..toward the establishment of a comprehensive, international, distributed collection of digital information on published knowledge in mathematics.

Planning the DML

- Steering Committee, IMU Liaison Committee
- Working groups
  - Content
  - Metadata
  - Rights and Licenses
  - Archiving
  - Economic Model
  - Technical Standards
- First meeting in Washington D.C., July 2002
- Discussion at JMM Baltimore, January 2003
- Steering Committee in Grenoble, March 2003
- Final meeting in Göttingen, May 2003

Copyright problems

- Principle: Preparation of a digital version of a printed-only publication is not covered by the copyright for the printed version. It needs new approval from the author(s).
- There is a variety of copyright situations:
  - National laws apply
  - Different authors for one article from different countries
  - Journals are international
  - Publishers have productions in different countries
- There are several interests involved:
  - Authors have an interest to make their achievements visible
  - But even without financial benefit from their publication they want to have protected it by copyright.
  - Universities and institutions claim rights for publications produced by their staff.

Copyright problems

- Authors, publishers and/or editors have to be asked for a licence to retrodigitize an article and to make it accessible in the web.
- Solution methods:
  - Write to every author and other party involved
  - Write to publishers/editors only (Elsevier, JSTOR)
  - Employ copyright clearance organizations (e.g. VGWort in Germany)
- Practical solution:
  - In mathematics the authors' interest in making their results visible is prevailing. They do not expect any revenues from their articles
  - Bona fide approach: Get the licence from the editors/publishers and lock the access if an author complains.

Content dimensions

- T - Time: When should it start and how far back should should it go?
- Material of relevant current interest
  - 80% of citations older than 10 years
  - First mathematical journals started at the beginning of the 19th century
- M - Side to side: Where is the borderline between mathematics and ”non-mathematics”?
- L - Top to bottom: Different kinds of levels
- G - Back to front: Initial digitisation and publication activities are and will be mainly located in Europe and North-America

Digitization projects

- NUMDAM, ERAM, ICM (Warsaw)
- DIEPER (Digitised European Periodicals), European project, - Mat. Sbornik
- Gallica, collection of retrodigitised material, BNF
- JSTOR, Elsevier Backfiles
- Cornell University Math Collection
- Colombian Mathematical Heritage, Victor Albis
- Digitised Chinese Math, Tsinghua University Library
- KISTI, Korea
- In preparation: RusDML, ItalDML, IbamDML, projects in other European countries

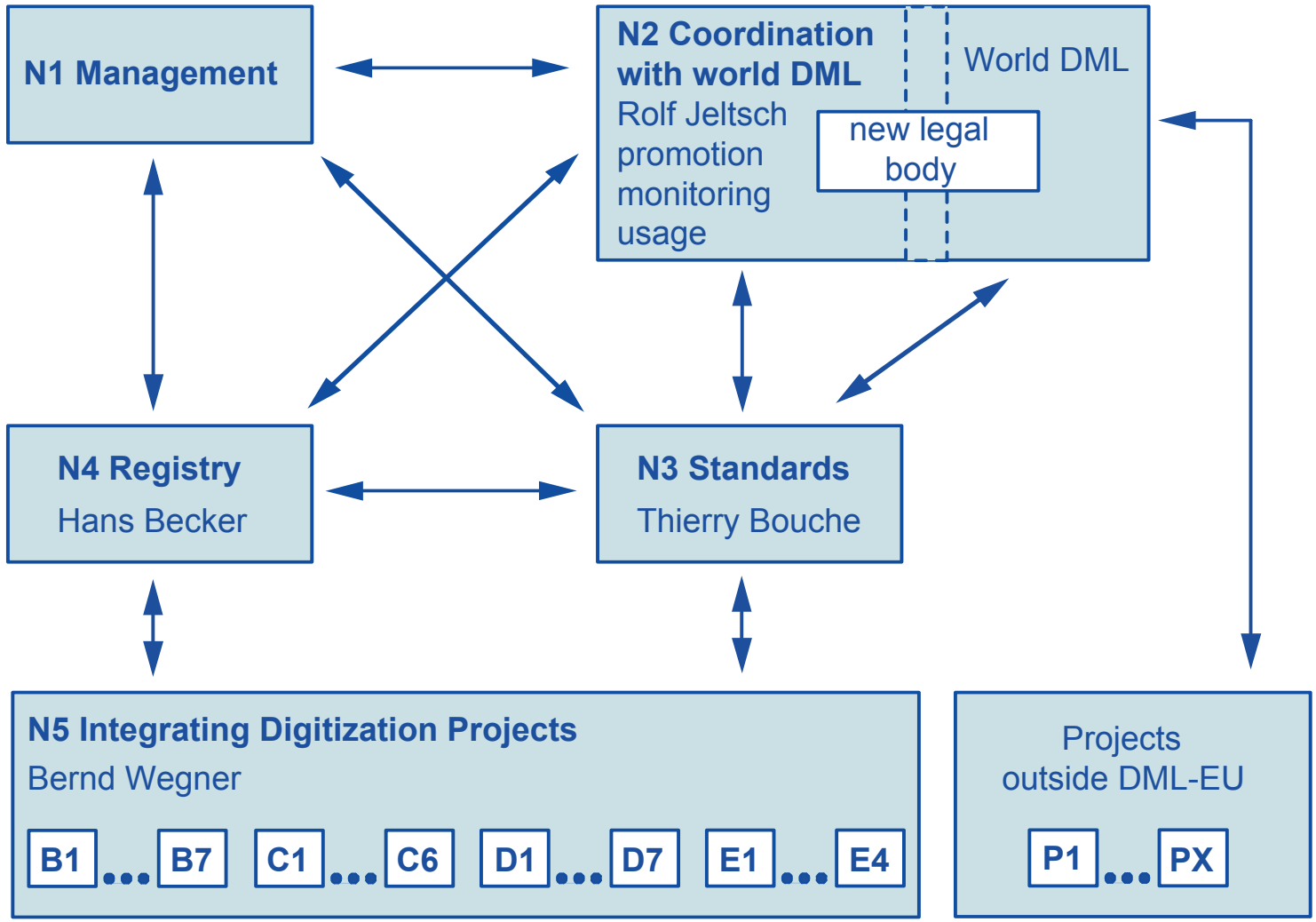
General types of e-offers

- LINK, Ideal, Elsevier Science, Kluwer online, Blackwell, Hindawi, Turpion, Ingenta, Emerald etc.
- AMS, SIAM, OuP, CuP etc.
- Euclid, Sparc, ELibM,
- The ArXiv (previously LANL)
- MPRESS
- EULER
- Math-Net, MathGuide, MathGate
- MathML, Open Math, OMDoc, Latex, TEX

DML-EU in FP6

- Slot in the FP6: Integrated Infrastructure Initiative I3
- Call on December 17, 2002
- Main Problem:
  - no funding for massive digitisation
  - needs networking activities and joint research activities
- Main objectives:
  - create a framework for DML in Europe
  - provide this for local and national digitisation projects in Europe

The DML-EU net



DML-EU Registry

- *Register information on*:
- digitised content
- content under consideration for digitisation
- content available for digitisation
- tools for handling
- standards
- copy right issues
- content parameters

Integrating projects

- support of regional digitisation projects
- support of efforts to find local funds
- adhere to international standards
- use of international know how
- define a test bed
- design a project, if not done already
- coordinate applications
- apply for funding independently from DML-EU

Some running projects

- ERAM (Electronic Research Archive in Mathematics)
- EMANI (Electronic Mathematics Archiving Network Initiative)
- RusDML/ РусЭМБ (Russian Digital Mathematics Library)

What is ERAM?

- JFM: Jahrbuch über die Fortschritte der Mathematik
- capture the content of the JFM in a ***database***
- scan selected items covered by the JFM for storage in an electronic ***archive***
- extend the content of the archive by other selection methods and provides links to the database
- funded by DFG

ERAM - 2003

- Data keyboarded for the whole period 1868 - 1943
- Free access to the database via EMIS
- All data available now
- Combined offer with Zentralblatt MATH, accessible with April 2003
- Digital content at SUB Göttingen in ERAM: approx. 1.000.000 pages
- 12.000 links available from the JFM-database

ERAM selected journals

- Aequationes matematicae - Birkhäuser
- Commentarii mathematici Helvetici - Birkhäuser
- Geometric and functional analysis - Birkhäuser
- Inventiones mathematicae – Springer
- Mathematische Annalen - Springer
- Mathematische Zeitschrift - Springer
- Matematicheski Sbornik – RAS
- Metrika - Springer
- Numerische Mathematik - Springer
- Semigroup forum - Springer

ERAM

JFM

The Jahrbuch Project
Electronic Research Archive for Mathematics
(ERAM)

1868-1930 (only few gaps; data increase every month)

| Content | Project description | Advanced SEARCH | Free SEARCH |

Start Retrieval | **Help for searching** | Clear Form

Author is (are) `Clebsch, A.`

[Lastname *or* Lastname, Initial *Example:* Lie *or* Lie,S]
[*Several authors:* Name1, Initial1; Name2, Initial2 *Example:* Klein,F; Lie,S]

Title contains the words

Global index contains the words

Source contains the words

Classification is (are)

JFM. No.: [Changed!! e.g. search for volume 2: JFM 02* or 02*]

Reviewer:

The above fields are connected with: **and** ◉ **or** ○

Restricted search:

Publication year: to

Document type: Book ☐ Journal article ☐ Thesis ☐

Search results - Netscape

File Edit View Go Communicator Help

Your query: au = (CLEBSCH, A*)

Answers 1-10 (of 57)

[New query form]

Display | checked entries | html | complete | Unmark all

1. ☐ JFM 01.0045.04 **Clebsch, A.**
Ueber eine Eigenschaft der Functionaldeterminanten. (German)
Borcharrdt J. LXIX. 355-358. *Published:* (1868)
MSC 1991: *26B10, *Reviewer:* Netto, Dr. (Berlin)

2. ☑ JFM 01.0234.02 **Clebsch, A.**
Note sur les surfaces algébriques. (French)
C. R. LXVII. 1238. *Published:* (1868)
MSC 1991: *51N35 14J25, *Reviewer:* Kretzschmer, Dr. (Frankfurt a.O.)

3. ☐ JFM 01.0258.01 **Clebsch, A.**
Ueber die Flächen vierter Ordnung, welche eine Doppelcurve zweiten Grades besitzen. (German)
Borchardt J. LXIX. 142-147. Berl. Monatsber. 1868. *Published:* 1868
MSC 1991: *14J25 14J17, *Reviewer:* Schuhmann, Dr. (Berlin)

4. ☐ JFM 02.0058.02 **Clebsch, A.**
Zur Theorie der binären algebraischen Formen. (German)
Gött. Nachr. 405-409. 1870.*) Clebsch Ann. III. 265-267. 1870. *Published:* 1870
, *Reviewer:* Netto, Dr. (Berlin)

5. ☐ JFM 02.0062.01 **Clebsch, A.**; **Gordan, P.**
Ueber biternäre Formen mit contragredienten Variabeln. (German)
Clebsch Ann. I. 359-400. 1869. *Published:* 1869
, *Reviewer:* Netto, Dr. (Berlin)

6. ☑ JFM 02.0064.01 **Clebsch, A.**; **Gordan, P.**
Ueber die Theorie der ternären cubischen Formen. (German)
Clebsch Ann. I. 57-89. 1869. *Published:* 1869
, *Reviewer:* Netto, Dr. (Berlin)

Document: Done

1. ☐ JFM 01.0234.02

Clebsch, A.

Note sur les surfaces algébriques.

(French)

Title in English: Note on algebraic surfaces.

[J] C. R. LXVII. 1238.

Published: (1868)

Analog wie man Curven in Geschlechter theilt (cf. Clebsch und Gordan, Theorie der Abel'schen Functionen, oder Cremona Preliminari di una teoria geom. delle superficie), kann man auch Flächen eintheilen. In dasselbe Geschlecht gehören zwei Oberflächen n^{ten} und m^{ten} Grades, wenn sich von ihren Gleichungen $f=0$, $\varphi=0$ die eine auf rationale, algebraische Weise in die andre transformiren lässt, so dass jedem Punkt der einen nur ein Punkt der andern entspricht. Verfasser giebt nun an, was man als Ordnungszahl dieser Geschlechter ansehen kann. Er nimmt der Einfachheit wegen nur Rücksicht auf Flächen mit regelmässigen Singularitäten, d. h. solchen, die sich entweder auf jeder Fläche selbst oder auf ihrer Reciproken finden. Dann ist Ordnungszahl des Geschlechtes die Zahl p der willkürlichen Constanten einer Fläche $n-4^{\text{ten}}$ Grades, welche durch die Doppel- oder Rückkehr-Curven (arêtes de rebroussement) auf der betrachteten Fläche n^{ten} Grades $f=0$ gelegt werden kann. Clebsch zeigt, dass diese Zahl für alle Flächen desselben Geschlechtes constant bleibt.

[Kretzschmer, **Dr. (Frankfurt a.O.)**]

Subject heading: Achter Abschnitt. Analytische Geometrie. Capitel 3. Geometrie des Raumes B. Algebraische Curven und Flächen

MSC 1991:

*51N35 Questions of classical algebraic geometry
14J25 Special surfaces

Keywords: Algebraic surfaces

Editor: Bolondi, G. (Trento)

DVI PS PDF TeX On line ordering services

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2. ☐ JFM 02.0064.01

Clebsch, A.; Gordan, P.

Ueber die Theorie der ternären cubischen Formen.

(German)

[J] Clebsch Ann. I. 57-89. 1869.

Published: 1869

Brioschi hat in den C. R. 1863 eine typische Darstellung der ternären cubischen Formen gegeben. Hier wird eine ähnliche typische Darstellung entwickelt, indem Methoden auseinandergesetzt werden, alle zu jener Function gehörigen algebraischen Formen durch vier Covarianten und drei in Bezug auf die Liniencoordinaten u_{1}, u_{2}, u_{3} lineare Zwischenformen auszudrücken. Um aber auch zugehörige Formen bequem und naturgemäss durch einfache zugehörige Formen darzustellen, wird ein zweites System gegeben, bei dem die Grundformen aus vier zugehörigen Formen und drei in Beziehung auf x linearen Zwischenformen bestehen. -- Der Formelreichthum der Arbeit macht es uns unmöglich, diese Abhandlung ins Einzelne zu verfolgen, ohne bis zum Einzelnsten zu kommen.

[Netto, **Dr. (Berlin)**]

Subject heading: Zweiter Abschnitt. Algebra. Capitel 2. Theorie der Formen.

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Display | checked entries | html | complete | Unmark all

Ueber die Theorie der ternären cubischen Formen.
Clebsch, A., Gordan, P.

In Periodicals
Mathematische Annalen Volume: 1

Ueber die Theorie der ternären cubischen Formen.

Von A. Clebsch und P. Gordan in Giessen.

Eine typische Darstellung der ternären cubischen Formen hat, auf Grund seiner Erweiterung der Hermite'schen Theorie der „formes associées," Hr. Brioschi in den Comptes Rendus von 1863, erste Hälfte, p. 661 gegeben. Der vorliegende Aufsatz hat den Zweck, die Resultate des Hrn. Brioschi, oder vielmehr eine der seinigen ähnliche typische Darstellung aus der Theorie der ternären cubischen Formen zu entwickeln, und die dabei auftretenden Gestalten mit dieser Theorie in Zusammenhang zu bringen. In diesem Sinne wird das Folgende vielleicht für Diejenigen nicht ohne Interesse sein, welche der Theorie dieser Formen ein näheres Studium widmen.

§. 1.

Grundformeln.

Wir adoptiren im Folgenden grösstentheils die Bezeichnungen des Hrn. Aronhold. Sei f die gegebene Function dritter Ordnung von x_1, x_2, x_3;

$$f_i = \tfrac{1}{3}\frac{\partial f}{\partial x_i},\quad f_{ik} = \tfrac{1}{6}\frac{\partial^2 f}{\partial x_i \partial x_k}$$

und

$$\Delta = 6\,\Sigma \pm f_{11} f_{22} f_{33}.$$

Als zusammengesetzte Function benutzen wir $uf - \lambda\Delta$, und haben

EMANI partners

- Objectives: Long-term digital archiving & digitisation of mathematical documents
- Structure: Co-operation between content providers and libraries
- Content providers:
  - Springer-Verlag, Birkhäuser Verlag, Teubner Verlag, Vieweg Verlag
  - Journals from the ELibM in EMIS
  - Hopefully others after the initial discussions
- The Mathematical Community is involved through coordinator and advisory board

EMIS
The European Mathematical Information Service

offered by the

European Mathematical Society (EMS)

For fastest access:
Choose your nearest site.

Europe:
Amsterdam, Athinai, Barcelona, Beograd, Berlin (master), Brno, Budapest, Diepenbeek, Dublin, Göttingen, Helsinki, København, Krakow, Lecce, Lisboa, Madrid, Marseille, Moskva, RAS, Moskva, RFBR, Osnabrück, Southampton, Strasbourg, Warszawa, Wien, Zürich

Other:
Adelaide (AU), Ankara (TR), Bogotá (CO), Brasília (BR), Córdoba (AR), Corrientes (AR), Grahamstown (ZA), Ithaca, NY (USA), Kyoto (JP), Lawton, OK (USA), Mexico City (MX), Novosibirsk (RU), Ottawa (CA), Providence, RI (USA), Rehovot (IL), Rio de Janeiro (BR), Seoul (KR), Shanghai (CN)

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- EULER
- Jahrbuch Project
- LIMES
- Reference Levels

Databases
- **MATH** 1931–present
- **MATHDI** 1976–present
- **MPRESS** – preprint index
- Electronic Geometry Models

Electronic Library
- Classics/Opera Omnia
- Journals
- Proceedings/Collections
- Monographs

ICM 2002
International Congress of Mathematicians
Beijing, China, August 20–28, 2002

The **Abel Prize** has come into being.

Contact Addresses

EMANI partners

- Network of libraries with centres of excellence
- State and University Library Göttingen
- Cornell University Library,Ithaca
- Tsinghua University Library, Beijing
- MathDoc, France
  - Orsay mathematics library consortium
  - Cellule MathDoc, Grenoble

- URL: http://www.emani.org

EMANI content

- State and University Library Göttingen
  - 27 journals in ERAM
- Cornell University Library,Ithaca
  - 19 journals in Project Euclid
- Tsinghua University Library, Beijing
  - 55 journals in Chinese Math
- Cellule MathDoc, Grenoble
  - 4 journals in NUMDAM

РусЭМБ - Objectives

- Make all Russian mathematics electronically available
- Make all Russian mathematics easily accessible
- Disseminate information on Russian mathematics world wide
- Establish the Russian part of the DML or DML-EU – global distributed virtual libraries in mathematics
- See the German-Russian Seminar for details

РусЭМБ - Workflow

- Russian Partners:
  - GPNTB Moscow,
  - RAS,
  - Supporting libraries,
  - Russian editors and publishers
- German Partners:
  - SUB Göttingen, TIB Hannover,
  - TU Berlin / Zentralblatt MATH

РусЭМБ - Workflow

- Preparation of metadata by Zentralblatt
  - Collect the information journal by journal
  - Add missing information
  - Add missing reviews
  - Correct errors in metadata
  - Standardise bibliographic information
- Delivery of metadata to digitisation centres,
  - reviews included,
- Digitisation at SUB and GPNTB
  - Immediate generation of permanent URLs

РусЭМБ - Workflow

- Preparation of final metadata in Russian and English
  - Structural data
  - Archiving data
  - Technical descriptions
- Installation of bilingual access
- Distribution of content to all partners (and additional parties of interest)
- Parallel and preparatory activities
  - Development of tools and structures
  - Caring about rights and licenses

Adresses

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