

## DELIVERABLE

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### D11.3: EuDML assessment and evaluation — First report

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## Abstract

This evaluation report's findings are that the project is on schedule and good progress has been made in terms of content and functionality.

Some of the work areas need more emphasis: external communication, documentation for the different categories of EuDML users, content growth. These issues are addressed in the concluding recommendations.

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## 1 Introduction

This report shows if and how EuDML satisfies the requirements described previously in deliverable D11.2 EuDML — assessment and evaluation plan (the Evaluation Framework) [4].

In an attempt at completeness, this evaluation is performed from different perspectives: organizational, functional, content, user.

The report closes with a list of recommendations on further steps to be made by the end of the project, so that the main goal of EuDML, to satisfy the information needs of scientists, will be achieved.

## 2 Evaluation results by facets

We will use the following score scale wherever scores apply: **excellent** (fully functional and documented, on schedule), **good** (fully functional but not documented properly, on schedule), **acceptable** (partially functional, on schedule) and **unsatisfactory** (not functional, behind the schedule). The only difference here between **good** and **excellent** is documentation/description. By "proper documentation" we mean henceforth the availability of short documents, or on-line help, describing comprehensively what does EuDML provide and what its users should expect from it.

### 2.1 The EuDML as a project

The last external review of the EuDML project issued several recommendations in September 2011. The EuDML partners answered some of them successfully:

- drafted and followed a new workplan for the second half of the project duration,
- tuned the project's website for the different types of user interest,
- performed a better internal technical coordination (on-line meetings, internal peer-reviews), resulting in a smooth issue of the EuDML Release 1.2 and a clear work path to Release 1.3

Yet some issues are still lingering:

- a basic but comprehensive documentation for the various categories of EuDML users is still missing
- the Scientific Advisory Board, although defined, is not yet involved
- content growth is slowing down

Most of these issues can be addressed by the project partners, but the content growth is externally limited by various monopolistic policies of copyright holders hindering open-access.

This evaluation facet's overall score is **good**: the EuDML project is on schedule and provides a functional Digital Mathematics Library prototype.

### 2.2 The EuDML as a generic digital library

For this evaluation facet, we follow the criteria defined and listed in the DL.org project's Digital Library Reference Model [1], which are grouped by theme (content-oriented, user-oriented...). We will preserve the overall structure, but, to be concise, and because

EuDML satisfies almost all of them, we will only enumerate those items where work still needs to be done. The optional part of the DL model is omitted here in its entirety and replaced by the specific criteria for a *mathematical* Digital Library enumerated in [4] and addressed below, in section 2.3.

Evaluation themes:

- Content  
The Policies regulating every information object are not properly documented.  
Overall score for this perspective: **good** .
- User-oriented  
The user roles and profiles are not properly documented.  
Overall score for this perspective: **good** .
- Functionality  
The functions to manage actors and information objects are not yet documented, in particular how these functions can be organized in workflows, however, the functions enabling collaboration among DL actors/users are scheduled to be implemented after this evaluation.  
Overall score for this perspective: **acceptable** .
- Policy  
The EuDML policies [2] follow the best practice recommendations endorsed by the International Mathematical Union and are described in [3].  
The overall score for this perspective: **excellent** .
- Architecture  
The Digital Library Management System [1] (the set of facilities to set up and maintain the DL) is not properly documented.  
The overall score for this perspective: **good** .

The overall score for this facet is **good** : EuDML qualifies well as a generic digital library according to the *mandatory* and *recommended* criteria defined in the Digital Library Reference Model [1].

## 2.3 The EuDML as a digital mathematics library

For this facet we follow that part of the evaluation framework described in D11.2 EuDML — assessment and evaluation plan [4], which is *specific* to EuDML . Out of that checklist, we will only enumerate here the criteria which are not yet fulfilled, even if they are on schedule to be fulfilled after this evaluation.

### 2.3.1 Content

Of the 9 content-related criteria specified in D11.2, 7 of them are met to date, the remaining two issues are:

- No new European publishers have been persuaded to cooperate with the EuDML ; however, new content-providers joined EuDML in 2012: SIMAI(Società Italiana di Matematica Applicata e Industriale) and UMI(Unione Matematica Italiana) adding the BDIM collection.
- No existing thesauri of mathematical keywords are currently used.

The few items enumerated above are not critical for the current stage of the project, but there is no clear plan to deal with them. They are subject to the recommendations at the end of this report.

All the performance indicators mentioned in D11.2 are met:

- **Diversity of partnership:** EuDML has now 12 content-providers, as expected (12),
- **Critical Mass:** more than 230,000 digital items are currently present in EuDML, above expectation (160.000)
- **Diversity of content:** there are 223 integrated collections to date available in EuDML, above expectation (200).

Overall score for this perspective: **good**.

### 2.3.2 System

The digital library system is the integration of various tools and processes, enabling and helping its users to locate and discover the information they need.

Of the 13 criteria specified in D11.2, 10 are met to date, the remaining three are listed below:

- The machine services (OAI, OpenSearch) not yet implemented, the project has scheduled them in Release 1.3.
- The metadata registry is due for release in July 2012, according to the project's schedule.
- No proper documentation exists yet for the system as a whole (information workflow description, schema description for new content providers, description of EuDML services relevant for the typical users).

Progress has been made in integrating various components, the result is the EuDML Release 1.2.

Overall score for this perspective: **acceptable**.

### 2.3.3 Users

The objective of this evaluation facet is to understand and follow the expectations users have from the EuDML service. There are two complementary categories of users: the typical users, persons looking to locate and discover mathematical resources, and the content-providers, who are looking to enrich/curate/increase visibility of their own collections by interacting with EuDML.

Interviews and surveys with potential users have been performed and the results are available below (3). The surveys themselves are listed in appendix A for typical users and in appendix B for content-providers.

For typical users, the project's schedule is to provide annotation capabilities in Release 1.3, due after this report, therefore no performance indicators can be measured here yet.

Overall score for this perspective: **acceptable**.

### 2.3.4 Usability (user-system interaction)

This facet focuses on the quality of user-system interaction. The general aim is to make it easy, efficient and enjoyable using the EuDML system.

A ticket-based bug-tracking system is in place, it currently is used by the developers and EuDML partners, but will be accessible to the users later on, for feedback on their interaction with the EuDML system.

Of the 10 criteria specified in D11.2, 7 are met to date, the remaining items are listed below:

- No mathematical knowledge management techniques are applied to overcome language barriers.
- No functional interfaces and widgets, making it possible to include a "EuDML Search Box" in other local systems and portals, have been developed yet.
- No widget configuration facility, to make it easy for users to create tailored search interfaces for their own websites, has been developed yet.

The usability study recommendations in [6] and [5] are being followed in the process of the EuDML system implementation.

Overall score for this perspective: **acceptable** .

### 2.3.5 Usefulness (user-content relation)

This evaluation facet is concerned with the user-content relationship, i.e. relevance of content to the user.

Of 18 criteria specified in D11.2, 14 are met to date, the remaining issues are listed here:

- The user annotation system is not available currently, but will be available in Release 1.3, according to the project's schedule.
- No documentation is available yet for the new services relevant to content-providers, such as metadata capture, augmentation and merging, document and reference matching and cross-repository document linking.
- It is not clear if a link to a document's review in one of the reviewing databases (Jahrbuch, ZentralblattMATH, Math. Reviews) is given.
- No "social network" per EuDML item is available yet, it will emerge when the user annotation system will be ready, after the EuDML Release 1.3.

Performance indicators:

- **Enhancement progress:** There are currently over 11000 items with metadata+abstracts-only indexed in the EuDML , the full-text extraction is ongoing (currently at 10000) and no MathML extraction has been performed yet (the extracting tool, INFTY, has been tested on several collections and is not ready yet for production in the EuDML system) (under expectation: over 30000 full-text items *with* MathML)
- **Internal networking:** more than 80.000 links between database objects (under expectation: at least 250.000)
- **External networking:** more than 1 million external links (above expectation: 150.000).

Overall score for this perspective: **acceptable** .

### 2.3.6 Performance (system-content relation)

Due to the very recent issue of the Release 1.2, no measurable system performance parameters can be comprehensively collected yet. The bandwidth and throughput between



the EuDML aggregator and content providers are not available yet for statistical reporting, however, the effort for gathering them is not meaningful due to the one-time character of the ingestion. All the rest of the performance parameters are similar to any search service available on the internet in the beta stage, i.e. no significant delays or long response time have been noticed yet.

Overall score for this perspective: **acceptable** .

### 3 Evaluation by typical users

The following is a list of observations ("note:" and "fix:") and recommendations ("rec:") from mathematicians who experimentally interacted with the EuDML while answering the user-survey (A), as well as their expectations ("exp:");

#### 3.1 Homepage, "landing" page impressions

**fix:**

- "search tips" on the first page are missing (the only "tip" is to use "Advanced search")
- not clear if listed titles are freely available for and accessible by the users (open-access)
- should tell the user what are the main features and why or when it is "better" to use EuDML
- many dead links
- the main page is heavily redundant: the "features" are present both in the navigation bar and on the main page, the "Advanced search" is reachable in three different ways from the main page
- "Help" section missing
- an "EuDML schema" section is missing (information about it is scattered) (not clear which fields are available to search for or how a document is structured)
- no link to the Homepage from the project page
- site was down for 30 minutes
- Language choice affects only top line
- design too bulky

**exp:** cleaner data, more content/user orientation

**rec:**

- regular link check
- the search form should be available when one reaches a page on the EuDML site

**praise:**

- the general website design and style are friendly and pleasant
- focused on searching and browsing functions

### 3.2 Types of searches

**note:**

- looking for a paper knowing its reference only partially
- looking for *some* paper relevant to a specific subject
- looking for a definition or theorem
- looking for what's new
- looking for an item available in full-text

### 3.3 The "Advanced Search" page

**fix:**

- the tree representation with rules and sub-clauses is clumsy and confusing
- the text color in the drop-down lists/menus is grey, suggesting that they are "disabled"
- the items "does not contain" or "is not" do not work (e.g. "any field contains" "a" gives the same results as "No field contains" "a")
- not clear if search is made only on titles or on other items as well
- not clear how "Math Formula search" works
- not enough fields are indexed (e.g. keywords, page numbers of an article, URL of fulltext)
- publication date options are unclear (including/excluding the input year)
- formula search seems to work incorrectly, e.g. looking for "dynamics" AND  $\epsilon$  gives <http://eudml.org/doc/54958>

**exp:** the possibility to restrict search to some subjects or some part of the mathematical classification

**rec:** connection with other projects (e.g. DeliverMath@ZentralblattMath)

### 3.4 The "Search results" page

**note:**

- full-text is the most relevant for searching
- the presence of the abstract is a useful feature

**fix:**

- listing publication year is important
- the design should not resemble that from the provider's page (in the NUM-DAM case it seems like one gets twice the same thing)
- Searching for the TeX formula  $y^n + x^\alpha y + x^\beta a(x) = 0$  ( $\$y^n+x^\alpha y+x^\beta a(x)=0\$$ ) did not yield a result although it is in the title of <http://eudml.org/doc/117035>
- Searching in the "math" field for " $(2,n)$  varieties" seems to disregard the "varieties". Also, it yields 388 results, of which most do not seem to contain the formula  $(2,n)$  ( $\$(2,n)\$$ ), while one that matches - namely, <http://eudml.org/doc/117039> - is not even listed.
- there are no sorting capabilities in the results set
- number of total hits is never shown

- wrong links, e.g. when searching at [http://eudml.org/search/page.action?q=sc.general\\*op\\*1\\_0\\*c\\_0a11\\_0eq%253A1.a&qt=SEARCH](http://eudml.org/search/page.action?q=sc.general*op*1_0*c_0a11_0eq%253A1.a&qt=SEARCH) the item pointing to <http://eudml.org/doc/30568> brings a completely different article

**exp:**

- links to the journal.
- subject comprehensiveness.

**rec:**

- there should be a way to save the references in either BibTeX or PDF.
- a "full-text" button should be present (where available) near the found item.
- show first one-two pages to help users decide if it is relevant.

**praise:** useful to have journals, authors and years listed along with the results

### 3.5 The similarity service

**note:** term-based similarity may be more relevant when using a controlled vocabulary

**fix:**

- generally useful, but too tolerant, e.g. ("Sur les polyèdres étoilés, D'après M. Cauchy" has nothing to do with papers on "Cauchy's problem");
- the current similarity service cannot be evaluated if it is based only on titles;

**rec:** user-controlled combination of similarity services

### 3.6 "Browse by subject" section

**note:** may skip the "xx" bits, also the XX-0X classes reflect only the format of the publications not the mathematical content so they can be skipped too

**fix:**

- using MSC is good, but it is only used at the highest subject level
- it should be made explicit in a footnote that the MSC 2010 classification is used;
- the number of articles available in EuDML on a particular subject should be listed also (when there is no article, displaying "0" would help the user avoid wasting time visiting that page)
- not knowing the sorting rule used is awful

**exp:**

- browsing by topics based on keyword lists
- clarify the browsing status of the items not yet unclassified
- MSC browsing, also, the finer MSC levels should also be explicit

**rec:** it would be interesting to join/disjoin MSC codes in a search, e.g. "35Axx AND 17Bxx", this is relevant for "Advanced search" page too

### 3.7 The "Journals" page

**note:** are all the journals really European? (e.g. Bulletin of the New York Mathematical Society)

**fix:**

- the list should be browsable alphabetically
- the total number of journals available should be clearly displayed
- not clear if the metadata offered by the content-providers is actually made available by the interface (e.g. abstract in more than one language are only available in one language, volume numbers missing although initially present etc.)
- not all the journals have an ISSN listed
- no sorting is in place, e.g. <http://eudml.org/journal/2948c0f58d3a1c7ec55beed95cca713f>

**rec:**

- volumes of journals are ordered by number. In fact they should be ordered by series/number or year/number
- the time period covered should be shown

### 3.8 The article-description page

**note:**

- generally OK, clear and friendly outlook
- "From the journal" works incorrectly (e.g. <http://eudml.org/doc/44644> points to the journal entry <http://eudml.org/journal/12903841>, which is missing
- links in references are missing (e.g. <http://eudml.org/doc/90879>)
- ZBMATH / MR IDs are just numbers at the beginning, not yet linked
- links in abstracts are omitted (e.g. <http://eudml.org/doc/50922>)
- Broken links to Journal Browsing (e.g. <http://eudml.org/doc/193851>)

**fix:**

- the broken vertical line on the left looks discomfoting
- too many links from there are confusing, especially if some of them point to the journal and not to the article itself.
- the title of the menu "table of contents" is misleading, i.e., it does not refer to the publication item's table of contents
- some links to the article full version are broken (e.g. <http://www.emis.de/journals/DDNS/Vol1>)
- abstracts are missing for at least some EMIS resources even though they are present in the EMIS pages.
- For several (title-only) articles one finds more in the search results than on the article page
- There are no links to authors in the ZBMATH author database, despite the fact that it is free (including author profiles!)

**exp:**

- MSC classification
- reference/bibliography enriched with links
- visible links to full-text
- full-text availability
- author profiles
- links to free content of arXiv, Zentralblatt MATH (free features like author profile, single reviews)

**rec:**

- proper author disambiguation/identification
- provide links to a ZBMath or MathSciNet review (where available)

### 3.9 Categories of users

**note:**

- would NOT use EuDML for complete information concerning publications or author profiles
- historians of science might be interested in more sophisticated services

**exp:** specialists are typically looking for a specific paper with an incomplete reference

**rec:** non-specialists should have a browse by topics related to primary/secondary studies, possibly search by mathematical formula

### 3.10 User environment and social network

**exp:**

- sharing a set of search results with colleagues would be useful
- as well as sharing annotations
- search history
- tagging some papers

### 3.11 The query

**rec:**

- transliteration
- misspelled forms
- stemming

### 3.12 Mathematical formulas display

**note:** less important when full-text available

**fix:**

- needs improving (strange mixtures of LaTeX and MathJax)
- garbled TeX representation of formulas:  
e.g " $2D$ -\$-gons, " $S L_n / B$  "\$ $SL_n/B$ "

**rec:** use homogeneous solution, preferably MathML

### 3.13 Multilinguality

**note:**

- good in menus/online help
- not important to have a translated version of the article, a feature not worth having, given the effort and the error-proneness associated with it
- moderately useful to have the abstract translated

**fix:** the title/abstract should be presented in the same language as the paper itself

**exp:**

- translation service or a link to translation services
- multilingual features in search are important

**rec:**

- important to have an english-translated version of the abstract
- important to have search-keywords translated in all the EuDML languages

### 3.14 User-based scoring of the EUDML

The scoring scale is 0 to 10.

- general functionality: 7
- task accomplishment speed: 8
- information provided: 4
- ease of use: 7
- documentation: 1

## 4 Evaluation by content-providers

Here follows a list of comments, expectations and recommendations made by the content-providers while answering to the content-providers survey (B):

**note:**

- interested in keeping the collaboration with EuDML beyond the end of the project
- have plans to increase the amount of full-text indexed in the EuDML

**fix:**

- a clear policy on what should/can be included in EuDML and how these objects should be described.
- to be regularly informed on the development of the project (e.g. schema evolution)
- a clear and simple description of the tools used and functionalities available in the EuDML
- project page disfunctional (authentication required for "Become a partner" information page)
- currently no benefit is obvious for the content-providers, the typical expectation is that EuDML is an alternative access point providing a view of the texts, enhanced with reference linking and formula recognition.
- cannot say in the current schema version that EuDML has both the original metadata string and a partially structured one produced by EuDML itself
- useful data (such as ZentralblattMath links) is ignored or badly exploited
- minimal validation of the provider data should be mandatory (e.g. publication year)
- a true workflow for the continuous collection of metadata

**exp:** better visibility for the provided collection

**rec:**

- agreeing on a moving walls policy with large publishers would help tremendously with enlarging the EuDML content collection
- keep track of the origin of metadata and its nature (automated or edited)

- keep several metadata representations on store for different purposes
  - reach critical mass content, clearly describe the content, ease of search/access
- praise:**
- Fast and easy access from centralized user interface, web services and functionality that are not present in current software used by content-providers.
  - provider metadata introspection process due to migration to the EuDML schema proved useful
  - current methodology of processing content collections is OK

## 5 Next evaluation steps

Two surveys will be run again between the EuDML Release 1.4 and the end of the project: one for typical users and one for content-providers, evaluating EuDML as a digital mathematics library. Their results will be integrated in the final evaluation report.

A scientific advisory board (SAB) survey will be performed after Release 1.4.

In the final evaluation of EuDML, the issues on the checklist designed in [4] will be parsed again, expecting the tasks to be implemented on schedule and partially functional (**acceptable**), fully functional (**good**) and documented (**excellent**).

## 6 Concluding recommendations

During the surveys, the users encountered more than normal technical disfunctionalities, fixing them should be considered a high-priority task, as their prolonged presence erodes user trust in the capabilities of EuDML and, therefore, the EuDML potential user base.

The current EuDML partners should decide at the next general meeting (June 2012) which of the issues above are still meaningful or relevant for the EuDML as a service and prioritize the work accordingly; in particular, the usefulness-related performance indicators in 2.3.5 should be addressed in a concrete plan of action before Release 1.4.

An EuDML short presentation document should be issued to SAB with the aim of using the SAB effectively in the EuDML project for further guidance.

Emphasis should also be put on clearly and concisely documenting EuDML's functionalities for (potential) content providers, SAB, and different categories of users (mathematicians, researchers, redactors, editors, reviewers, laymen) so that, at the next evaluation, all the functionalities available in EuDML are described in appropriate terms and accessible either in a "Help" or "FAQ" section of the EuDML site, or context-based, or, ideally, in both forms.

Finally, more concrete steps should be taken by the partners to ensure the continuity and sustainability of the EuDML service after the end of this project.

# Appendices

## A Typical users survey

The EuDML entry page is <http://eudml.org>

### EuDML as a tool.

Please offer short comments (dis/like, missing, suggestions/expectations) on your experience with the EuDML as a tool for mathematical resources discovery:

- homepage
- search
- browse by subject
- journal
- article-description page
- links

### Satisfaction.

What would be your satisfaction factors of choice (score 0-10)? How does EuDML fare at them (score 0-10)?

- general functionality
- task accomplishment speed
- information provided
- ease of use
- documentation

### Information handling strategies.

Accomplishing tasks using EuDML :

- how do you proceed when you're looking for something in EuDML ?
- What "feature" bothers you the most? what is there which should NOT be changed?
- for what general kind of tasks would you use EuDML (looking for full-text, bibliography, citations, abstracts, formulas)?
- for what general kind of info-retrieval tasks would you NOT use EuDML ?
- what kind of EuML-provided links would you consider useful, very useful, not useful?

### Recommendations.

What recommendations would you have for EuDML as a public service for different kinds of users (researchers, redactors, students, layman)?

### Multilinguality.

Language issues

- is it important to have the full article translated (score 0-10)?
- is it important to have the abstract translated (score 0-10)?
- is it important to search keywords translated in all the EuDML languages (score 0-10)?

### Formula display.

Your comments on EuDML's mathematical formulas display: suggestions/preferences?



**Similarity.**

How important do you consider the following two types of similarity services (score 0-10)?

- based on common search-keywords found in the documents (dependent on the user-query)
- based on semantic distance (independent of the user-query)

**Missing features.**

Is there anything missing from EuDML that you would badly need in your specific activities?

## **B Content-providers survey**

**The EuDML schema:**

- any further recommendations on tuning the EuDML schema towards an effortless content export to the EuDML collection?
- is there anything important missing or not yet addressed in the current schema?

**Collaboration process:**

- any recommendations on improving the collaboration process with the EuDML team?
- technically
- organizationally

**Benefits:**

- are there currently any benefits for you from participating as a content-provider in EuDML ?
- what benefits would you expect in the future from continuing your participation as a content-provider in EuDML ?
- do you have plans for collaborating as a content-provider with the EuDML , after the end of the EuDML \*project\*?

**The content collection:**

- do you plan to enlarge the content offered to EuDML ?
- any plans to increase the amount of full-text in your collection to be indexed by the EuDML ?
- any suggestions for EuDML on the ways to further enlarge its content collection?
- any suggestions about how the content collections should be processed or served by EuDML ?

**The end result:**

- what would be, in your opinion, the main drawbacks/obstacles in your interaction with EuDML
- any suggestions for improving the current situation?

**Missing features?** Is there anything else we missed or you have a strong opinion about, relative to EuDML ?

## References

- [1] Deliverable D3.2b of Project DL.org (Coordination Action on Digital Library Interoperability, Best Practices & Modelling Foundations), ICT Programme “Cultural Heritage and Technology Enhanced Learning”, Project Number: 231551; L. Candela, A. Nardi, G. Athanasopoulos, D. Castelli, K. El Raheb, P. Innocenti, Y. Ioannidis, A. Katifori, A. Nika, G. Vullo, and S. Ross. The Digital Library Reference Model, 2011
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