Report on the EuDML external cooperation model

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Abstract. The EuDML project was explicitly envisioned as a pilot project addressing two intimately intertwined challenges: (i) setting up the technical infrastructure to create a unified access point for the digital mathematical content hosted by different organizations across various countries; (ii) defining a cooperation model with a variety of stakeholders that would allow building a reliable and durable global reference library, aiming to be eventually exhaustive. On both sides the project reached clear successes and modified the state-of-the-art. In this paper we report on the latter one.

1 Introduction

The European Digital Library (EuDML) [1, 4, 2] was a project partly funded by the European Commission in the Competitiveness and Innovation Framework Programme, Information and Communication Technology Policy Support Programme, in the period from 1 February 2010 to 31 January 2013. The EuDML project was explicitly envisioned as a pilot project addressing two challenges that prevented previous attempts towards a global digital mathematics library based on a top-down approach to succeed:

1. Setting up the technical infrastructure to create a unified access point for the digital mathematical content hosted by a number of different organizations across various countries;
2. Defining a cooperation model with a variety of stakeholders that would allow building a reliable global reference library meant to run over the long term, and to be eventually exhaustive.

The two challenges are intimately intertwined as the quality of the technical infrastructure and the array of production and interoperability services provided are the main argument to convince possible partners to join the initiative, which in turn is the best way to enlarge and enrich the content available, thus to reach a critical mass in users.

During the three years of the project, these two goals have been pursued in parallel with stubbornness. On both sides the project reached clear successes and modified the state-of-the-art. The basic infrastructure is up and running, with a critical mass in content, and a number of possible partners have declared interest in the initiative. However a lot remains to be done in order to secure these results and set the basis of a strong and inclusive infrastructure.

The technical part of the project and its outcome is described in [3]. In this paper we report on the second goal mentioned above. In the first section we describe the situation that evolved from the project. The second section is devoted to the EuDML sustainability plan.

2 EuDML at the end of project

The EuDML has been built by the motley consortium of 16 partners from 8 European countries, which comprised a variety of stakeholders and expertise: universities (Instituto Superior Técnico Lisbon, Université Joseph-Fourier Grenoble, University of Birmingham, Unyversitet Warszawski, Universidade de Santiago de Compostela, Ionian University Corfu, Masaryk University Brno), research institutes (Institute of Mathematics and Informatics BAS Sofia, Institute of Mathematics AS CR Praha, CNRS Grenoble), international scientific service institution (FIZ Karlsruhe), national research council (Consejo superior de investigaciones científicas Madrid), commercial publisher (Édition Diffusion Presse Sciences Paris) and private digital media agency (Made Media Ltd Birmigham), large library (Niedersächsische Staats- und Universitätsbibliothek Göttingen) and, last but not least international learned society (European Mathematical Society). The latter two had the status of associated partners to which another one came in the early stage of the project: Biblioteca Digitale Italiana di Matematica (bdim).

The consortium included different types of stakeholders, digital content providers, technical developers, library, a scientific database and representatives of research communities.

EuDML as the outcome of the project aims to be a long-standing, reliable and open source of trusted mathematical knowledge. This implies EuDML policies, that mostly boil down to the following:

1. The texts in EuDML must have been scientifically validated and formally published.
2. EuDML items must be open access after a finite embargo period. Once documents contributed to the library are made open access due to this policy, they cannot revert to close access later on.
3. The digital full text of each item contributed to EuDML must be archived physically at one of the EuDML member institutions.

These rules ensure that the EuDML as reference library system is on a sound base, with ingested content available for perpetuity and openly accessible eventually. For this purpose the project set up a complex of frameworks, technology, workflows, validation procedures, schemas etc. The EuDML was built as a distributed system with tasks distributed among partners each of whom assumes full responsibility for the corresponding segment.

This worked well during the project when the partners formed a formal consortium tied together by a formal contract setting responsibilities with respect to the European

Commission. The contract finished together with the project and should be replaced with a suitable arrangement.

The EuDML does not represent only the current digital content and all the technology built above it. There is also important potential of further cooperation and extendibility.

On the technical front, the EuDML got expression of interest, but rather in the form of attracting new partners in some follow-up to the current project. On the political front, the EuDML got quite some awareness and support from mathematical societies (The International Mathematical Union, the European Mathematical Society and some national mathematical societies. On the content front, there has been large number of discussions with potential further partners (eLibrary of the Mathematical Institute of the Serbian Academy of Sciences and Arts in Belgrade, digitized proceedings of the International Congress of Mathematics and European Congress of Mathematics, project Euclid in the Cornell University and Steklov Mathematical Institute/Russian Academy of Sciences' project Math-Net.Ru).

An important decision that has been taken after the 6ECM round table is that the EMS publishing house will contribute the *Journal of the EMS* after a 5 years moving wall. Work to achieve this has started, partly handled by our IMAS partner acting here as a sponsor for EMS-ph.

A contact has been also made with JSTOR in the hope to acquire their public domain content and make it visible in EuDML. This is currently going through various steps in JSTOR's bureaucracy.

The effort of the EuDML consortium does not end with the creation a functional prototype of the Digital Mathematics Library and providing its content and services to the public. The true success of the project depends very much on sustainability and further development of the EuDML. The principal aims of sustainable EuDML services comprise

- working toward comprehensiveness, service integration, and cost efficiency of the EuDML services,
- assisting in exploiting the benefits of networking for integration of digital library services such as sharing and enhancing data,
- advancing cooperation between information and service providers,
- creating and maintaining a non-profit service in the interests of the mathematics user community.

  In order to create such sustainable service from the EuDML project, important issues have been assessed, namely
- an organizational and legal framework, which will take its roots in the EuDML consortium and further partners associated during its lifetime,
- balancing costs and potential sources of revenue of running the EuDML services,
- a common framework for dealing with IPR and copyright issues.

3 Principles of the EuDML Initiative

Eleven partners of the consortium declared their will to continue in efforts to maintain and develop the EuDML after project's end, representing the general mathematical community and the core content and technology providers.

1. European Mathematical Society
2. Fachinformationszentrum Karlsruhe, Zentralblatt MATH
3. Interdisciplinary Centre for Mathematical and Computational Modelling, University of Warsaw
4. Cellule Mathdoc, Centre national de la recherche scientifique & Université Joseph-Fourier, Grenoble
5. University of Birmingham
6. Institute of Mathematics and Informatics BAS, Sofia
7. Institute of Mathematics ASCR, Praha
8. Masaryk University, Brno
9. Ionian University, Corfu
10. Società Italiana per la Matematica Applicata e Industriale, Unione Matematica Italiana
11. Niedersächsische Staats- und Universitätsbibliothek Göttingen

They will form an association named EuDML Initiative where the first three of them will assume particular roles. The EMS will provide an umbrella using its institutional authority to secure association's internal functioning and its external representation with respect to partners, other institutions and public and, in particular, to ensure that the DML services shall remain under control of organizations representing the public interest. For the first period of at least three years, FIZ/Zentralblatt MATH and ICM will provide human resources and machine capacities for hosting, system and service maintenance, and basic technical operations.

The EuDML Initiative (Initiative) will be an association without legal personality. The status of an association without legal personality and financial budget will be perfectly functional for the first period, during which the possibility/necessity of transforming the Initiative to another model involving legal personality and financial issues will be investigated.

The purpose of the Initiative is to provide a Digital Mathematics Library ("DML") for the worldwide scientific community as a public service in order to

– help scientists locate the information that is distributed in various digital repositories and discover information related to their work in an optimal way;
– encourage the public in using it as a public knowledge repository;
– be exhaustive and comprehensive in the field of mathematics.

The basis for such DML is provided by the EuDML. The Initiative will

– encourage content providers to join and integrate their content to the DML,
– adapt to using new information technologies and invite subjects interested in contributing to research and development for the continuous evolution of DML to join,
– search for projects of research and development aiming at improving its services to the user community and will encourage its members to get involved in such projects.

Membership in the Initiative will be open to any legally and contractually competent natural or legal person willing to support the objectives of the Initiative by providing

- digital content, i.e. integrating (at least partially) their digital collections of high-quality mathematical publications in the DML according to the DML guidelines and standards, which are based on internationally accepted standards and trends, adapted to the special needs of mathematical publications, and maintaining and expanding access to these publications through the DML service,
- technological equipment and services for maintaining the DML central services and/or developing other technical services and tools to be used in the DML,
- scientific, financial, strategic or political support to the Initiative and its activities.

Without prejudice to other rights set out in the statute or in applicable laws, members will have the right to:

- take part in the activities of the Initiative,
- examine the documents recording the activities of the Initiative, as well as request and obtain information on the development of such activities,
- resign from the Initiative.

Members will have the duty to:

- take part in the activities necessary for the satisfaction of the objectives of the Initiative,
- contribute to the needs of the Initiative,
- comply with the decisions of the bodies of the Initiative, with the statute and the applicable legislation.

The body of the Initiative with decision-making powers will be the General Assembly. The executive body will be the Executive Board. It will be advised by the Scientific Advisory Board and supported by the Technical Committee. It is assumed that all bodies of the Initiative will meet via telecommunication if appropriate. Videoconferencing has proved a very efficient management tool during the EuDML project and will reduce the running costs of the Initiative.

The General Assembly will be formed by one representative of each member and shall meet regularly, at least once a year. The tasks assigned to the General Assembly include the following:

- decision on applications for membership to the Initiative,
- decision on expulsion of a member,
- election and dismissal of the members of the Executive Board from persons suggested by members of the Initiative, except for the member representing the EMS,
- election of the Chair of the Initiative from members of the Executive Board,
- election and dismissal of the members of the Technical Committee from persons suggested by members of the Initiative,
- issuing instructions to the Executive Board,
- decision on modification of the statutes and the dissolution of the Initiative.

Decisions by the General Assembly shall be taken by way of a simple majority of the votes. Decisions of the General Assembly with regard to the modification of the statutes and the dissolution of the Initiative shall be of no effect unless passed by a majority of three quarters of the votes cast.

Extraordinary General Assembly will be convened if it is deemed in the interest of the Initiative.

The Executive Board will be composed of the Chair of the Initiative, the Chair of the Technical Committee and three other persons representing members of the Initiative.

The members of the Executive Board shall be elected by the General Assembly except for the member representing the EMS who will be nominated by the Executive Committee of the EMS. This rule corresponds to the EMS particular role and responsibility in the Initiative. The term of office for the members of the Executive Committee would be two years with the possibility of re-election.

In conducting legal or other affairs the Initiative shall be represented by the Chair of the Initiative.

The Executive Board shall have general charge of all matters concerning the Initiative. The tasks assigned to the Executive Board include in particular:

- management of the current affairs including copyright and ownership management according to advices of the Scientific Advisory Board,
- execution of the decisions of the General Assembly,
- appointment of the subordinate committees entrusted with the special tasks within general framework of the Initiative,
- preparation and convention of the General Assembly.

The Scientific Advisory Board will be appointed by the European Mathematical Society of their representatives and other suitably qualified and recognized persons. It's responsibility will be ensuring the scientific quality of the DML service, and advising the Executive Board on scientific matters, strategic orientations and priorities for development of the service, taking part in the evaluation, and bringing in the feedback of the mathematical community. The Scientific Advisory Board works out recommendations for the development of EuDML with regard to the content and the organization of the Initiative. The rules for the Scientific Advisory Board doing will be set up by the EMS.

The Technical Committee will be composed of the Chair of the Technical Committee and four other members representing technological equipment and service providers or other members of the Initiative. The Technical Committee will ensure the continuous technical operations of EuDML services being responsible for the technical development, technical standards and workflows, and the technical operations of the system. The Chair of the Technical Committee will be automatically member of the Executive Board.

The Technical Committee will especially take care that the following issues are handled: system-level maintenance (hosting), application-level administration (operations), technical support for information providers, content ingest and aggregation, general workflow management, including enhancers, continuous dissemination, first level end-user support, content level quality control and feedback, service level quality control and feedback, uptime monitoring, generating and reviewing statistics, software maintenance, software development.

It is very important that the potential external partners understand who the EuDML Initiative is and what is to be expected of a possible cooperation. Hence, the following principles should be adopted and published.

The content providers retain all rights pertaining to their collections. They grant to the EuDML Initiative the right to keep and use copies of their provided data for the purposes of search and retrieval display in DML public services.

Each content provider may decide, whether full text will be provided to the EuDML Initiative and to which extent the full text might be used or distributed. Agreements between the Initiative and the content providers specify these and further usage and exploitation rights for each collection contributed to the DML.

The indexing and other metadata information generated by the central services of DML ("DML-enhanced metadata") is owned by the Initiative. Content providers are entitled to use and exploit copies of DML-enhanced metadata of those items for which they have provided metadata.

Copies of metadata provided by content providers and the DML-enhanced metadata shall be kept at the sites maintained by service providers. If a service provider withdraws from this role, the data and respective rights and obligations stay with the remaining service providers. Members of the Initiative active in the research domain of Digital (Mathematics) Libraries are entitled to use (copies of) the DML-enhanced metadata for their research purposes. However, usage of a particular subset of the metadata for this purpose may be restricted by the respective information provider. Results of such research activities will be made available to the Initiative and its members. Exploitation rights for software and tools developed by the Initiative stay with the originator. However, Initiative advocates an open-source policy for software, and encourages developers to put their developments for DML in the public domain. In case of dissolution of the Initiative, all (meta)data and related rights are to be transferred to the European Mathematical Society.

4 Conclusions

The EuDML project reached clear successes in addressing the two main challenges: (i) the technical infrastructure for a unified access point for the digital mathematical content hosted by different organizations across various countries is set up and running with a critical mass in content, and (ii) a cooperation model with a variety of stakeholders has been defined for building a reliable and durable global reference library and a number of possible partners have declared interest in the initiative.

A number of tools have been developed and deployed to ease contributing new content to the EuDML system and to offer many useful ways of exploiting the EuDML content, or creating specific views for different communities.

For external interoperability a number of specific tools have been developed to allow third parties to enrich their services thanks to the availability of collections in the EuDML system. This provides more visibility to and more usage of the EuDML collections.

The EuDML policy was developed stating three main principles: (i) the digital content must be scientifically validated, (ii) eventual open access, (iii) physical archiving of the content at one of the EuDML member institutions.

Contacts were made with several possible external partners (eLibrary of the Mathematical Institute of the Serbian Academy of Sciences and Arts, Springer Heidelberg, Swiss Electronic Library project, Cornell University's project Euclid and project Math-Net.Ru of the Steklov Mathematical Institute RAS, JSTOR, digitized proceedings of the International Congress of Mathematics and the European Congress of Mathematics) to ingest their digital content in EuDML. In some of these cases, the technical work has already started.

Based on the above policies, a model of sustainable EuDML operation has been drawn on the basis of an association without legal personality formed by EuDML core members being scientifically and organizationally strong not-for-profit institutions that take care of the system's activity, maintenance, and of the collections both in terms of preservation and eventual open access provision. Three partners, EMS, FIZ/Zentralblatt MATH and ICM will assume particular roles providing an umbrella securing association's internal functioning and its external representation, ensuring that the DML services shall remain under control of organizations representing the public interest, and providing human resources and machine capacities for hosting, system and service maintenance, and basic technical operations during the first mid-term period after the project end. The possibility/necessity of transforming the Initiative to another model involving legal personality and financial issues will be investigated during this period.

The EuDML Initiative will be an open, democratic association with well defined structure, distributed roles and responsibilities which will allow the long-term sustainability, form the solid basis for partnership with external entities and provide condition for further development.

References

1. EuDML: The European Digital Mathematics Library.
2. José Borbinha, Thierry Bouche, Aleksander Nowiński, and Petr Sojka. Project EuDML—A First Year Demonstration. In James H. Davenport, William M. Farmer, Josef Urban, and Florian Rabe, editors, *Intelligent Computer Mathematics. Proceedings of 18th Symposium, Calculemus 2011, and 10th International Conference, MKM 2011*, volume 6824 of *Lecture Notes in Artificial Intelligence, LNAI*, pages 281–284, Berlin, Germany, July 2011. `http://dx.doi.org/10.1007/978-3-642-22673-1_21`.
3. Thierry Bouche. Reviving the Free Public Scientific Library in the Digital Age? The EuDML project. In Klaus Kaiser, Steven Krantz, and Bernd Wegner, editors, *Contemporary Issues in Mathematical Publishing*, page 20, 2013. To appear.
4. Wojtek Sylwestrzak, José Borbinha, Thierry Bouche, Aleksander Nowiński, and Petr Sojka. EuDML—Towards the European Digital Mathematics Library. In Petr Sojka, editor, *Proceedings of DML 2010*, pages 11–24, Paris, France, July 2010. `http://dml.cz/dmlcz/702569`.