Open Access at the Academy of Sciences of the Czech Republic and Czech Digital Mathematical Library

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Abstract. We explain the principles the Open Access Policy of the Academy of Sciences of the Czech Republic adopted as a consequence of its accession to the Berlin Declaration on Open Access. The Policy is implemented by means of Academy's Institutional Repository. An example of a subject specialized open access repository is the Czech Digital Mathematics Library (DML-CZ) and the European Digital Mathematics Library. We discuss a special feature of the DML-CZ represented by the highly heterogeneous collections devoted to eminent personalities of the Czech mathematics.

Keywords: Academy of Sciences of the Czech Republic, Open Access, Open Access Policy, Institutional Repository, Digital Mathematical Library, DML-CZ, collected works.

1 Introduction

Open access to outcome of the research, particularly the one funded from public sources – is becoming an imperative. The Academy of Sciences of the Czech Republic (ASCR) – the main non-university research institution in the country comprising 54 public research institutions working in a wide spectrum of research fields – undertakes the responsibility for dissemination results of the research executed in its institutes.

This requires efficient arrangements from political decisions through technical facilities to solution of legal issues. The ASCR as the first among research institutions in the Czech Republic (and so far the one of the only two) accessed to the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities [4] in 2008. Soon after, the ASCR took measures for efficient practical implementation of the Open Access principles in the ASCR institutes.

To manage the yearly output of 11,000 publications of various types requires an elaborated system. To this purpose, the ASCR adopted its Open Access Policy and launched the Institutional Repository operated by the central Library of the ASCR. The Library, in cooperation with lawyers, also negotiates with publishers of journals in which articles by Czech scientists appear most frequently on reasonable conditions for open access to publications created by researcher from the ASCR institutes. For

instance, the contract concluded with the U.K. publisher Elsevier Ltd. allows systematic storing in the Institutional Repository including, e.g., titles of embargoed articles freely available to users after the temporary proscription ends.

An independent solution oriented to special needs of research in mathematics is represented by the Czech Digital Mathematics Library [6], [12] which is more then just repository – it is library which includes documents for which the eventual (possibly delayed) free access is assured. The example of the special section in the DML-CZ introduced for collected works of eminent mathematicians somehow indicates the complexity of making the wide variety of publications freely accessible.

2 Publication Activity in the ASCR

The Academy of Sciences of the Czech Republic [2] established in 1993 is the main non-university research institution in the Czech Republic. It continues the research traditions and mission not only of the former Czechoslovak Academy of Sciences but also of its predecessors. The oldest, long-lasting learned society was the Royal Czech Society of Sciences (functioning under different names from 1784 to 1952) which encompassed both the humanities and the natural sciences.

The primary mission of ASCR and its institutes is to conduct basic research within the broad spectrum of the natural, technical and social sciences and the humanities. A fundamental part of the mission is to ensure that the published work of its scientists can be read and utilized by the widest possible audience. Research conducted in the ASCR endeavours to advance scientific knowledge on an international level while at the same time respecting the current needs of the Czech society.

The Academy of Sciences currently comprises 54 public research institutes, each of them being an autonomous legal entity organized in a democratic structure. The Academy's supreme body is the Academy Assembly, the executive body of the ASCR is the Academy Council headed by the President of the Academy. There are a total of more than 7,000 employees, including around 3,500 researchers.

The institutes publish more than 70 specialized scientific journals presenting more than 3,000 articles every year. The institutes publish also conference proceedings and books. However, the major part of publications produced by researchers of the ASCR representing the annual amount of 11,000 articles, reports etc. is published elsewhere.

3 Open Access Policy

The ASCR is a signatory of the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities of 2008 [4]. Subsequently, a promotion of the Open Access among researchers begun and principles of the Open Access Policy were formulated.

The official Academy's Open Access Policy was approved and released in October 2010 [10]. It declares:

- An essential part of Academy's mission is to ensure that results of scientific work of its institutes can be used by the widest possible community of scientists, other users of research results, and the general public. The ASCR undertakes to disseminate results of this research as widely as possible.
- Institutes of the ASCR are obliged to provide the Library of the ASCR copies of publications of their employees (employee work according to Section 58 of Act No. 121/2000 Coll., on Copyright [1]) and non-exclusive licenses to their use, in particular the right to its reproduction by any means and in any form, and the right to communicate the work to the public within the framework of the legal code of the Czech Republic and with respect to any prospective licence agreements with publishers.

The institutes must ensure that their employees' performance of patrimonial rights to such works is not violated.

- Works included in this policy comprise published scientific articles, books or chapters of books, presentations, reports or pedagogical materials, etc.
- Publication outputs will be provided in electronic form. The Library of the ASCR will assure that they are deposited in the Institutional Repository and made available to the public as soon as possible, with respect to the fact that certain publishers may place time limited embargos on these works, i.e., a period when an article is unavailable to the public (often called moving wall).

The Library of the ASCR is responsible for dissemination and interpretation of this publication policy and for creation and maintenance of the information infrastructure.

4   Institutional Repository

Construction of the repository started immediately after adoption of the OA Policy. The Academy Library set down rules and prepared a manual. The condition for storing full-texts to the repository is an agreement between Academy Library and the Institutions of the AS CR. Collecting data began in 2012. The repository itself is an extension of the ASEP database system (Automatic System of Publication Data Recording, [3]) which has been used by the Academy Library since 1993 for collecting and archiving data on publication outputs from ASCR institutions.

The Repository facilitates adding full texts to all bibliographic records in the database complying with publishers' policies and copyright conditions. Lawyers in cooperation with librarians analyze licensing agreements concluded between authors and publishers and compare them with data in the database SHERPA/RoMEO. The system is distributed in the sense that in each ASCR institute there is a data administrator (usually a local librarian) who takes care for fulfilling the OA Policy principles, submission of metadata and full-texts and respective access modes.

In general, there are four modes of access to full-texts in the Repository: "Open access" means that the full-text is freely available. In the "Request a copy" mode the full-text cannot be downloaded but the reader can click a button to send a request of

the full-text to the administrator. The "Private" mode means that only metadata are published while the full-text is not seen and cannot be provided from the Repository. It can be obtained from the author only. Which of these modes is applicable depends primarily on the analysis of author's contract with the publisher, alternatively on data contained in the SHERPA/RoMEO database. However, before the decision is made all authors are asked by e-mail to agree. Each of them may request removing the full text from the repository.

Full-texts in the "Open access" and "Request a copy" modes are available to directors and researchers in the author's institute, based on the IP addresses.
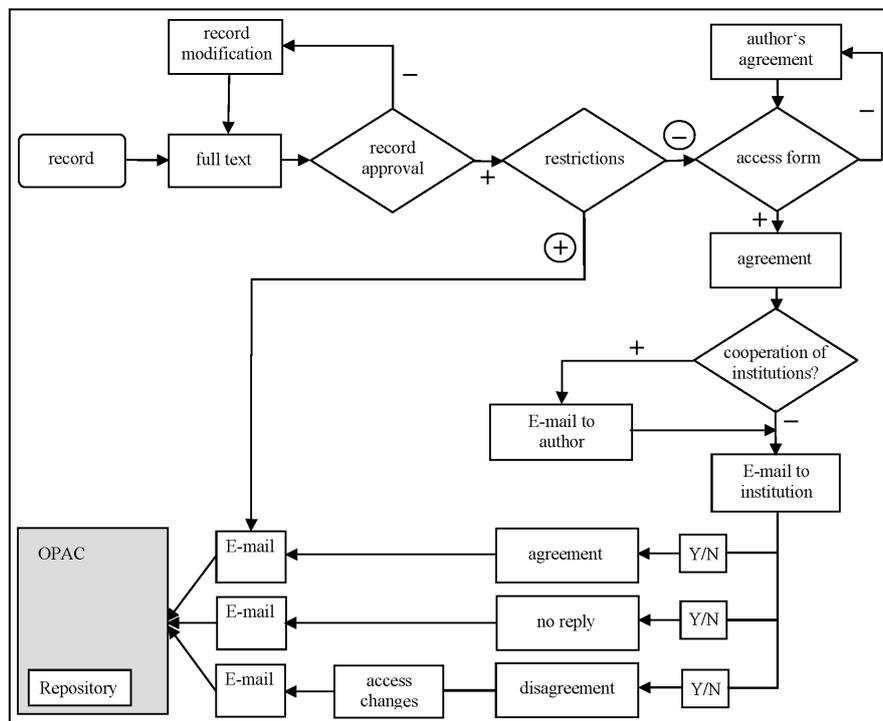
Fig. 1. Institutional Repository workflow

While primarily scientific articles are stored, all kinds of research documents in any of their versions can be stored, namely in the formats pdf, jpg or htm. Forbidden formats are zip, arj, dll, com, bat. The size of the files is not limited.

Documents posted in the Institutional Repository are protected by Czech Copyright Act No. 121/2000 Coll. In general, users (natural persons) are entitled to use the work for personal needs, in teaching for illustration purposes or during scientific research, in all cases without seeking to achieve direct or indirect economic benefit and – needless to say with a proper citation of the source.
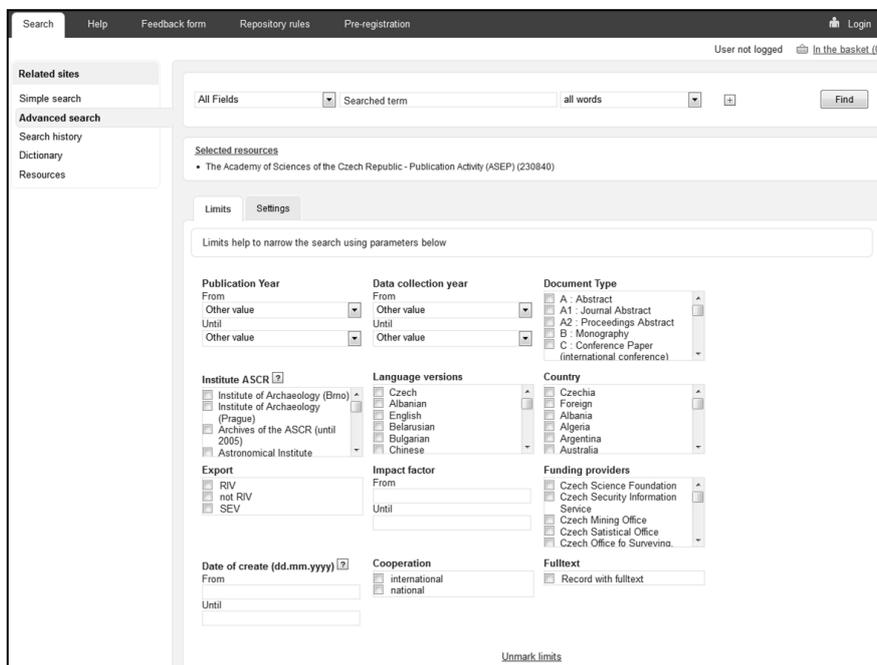
Fig. 2.
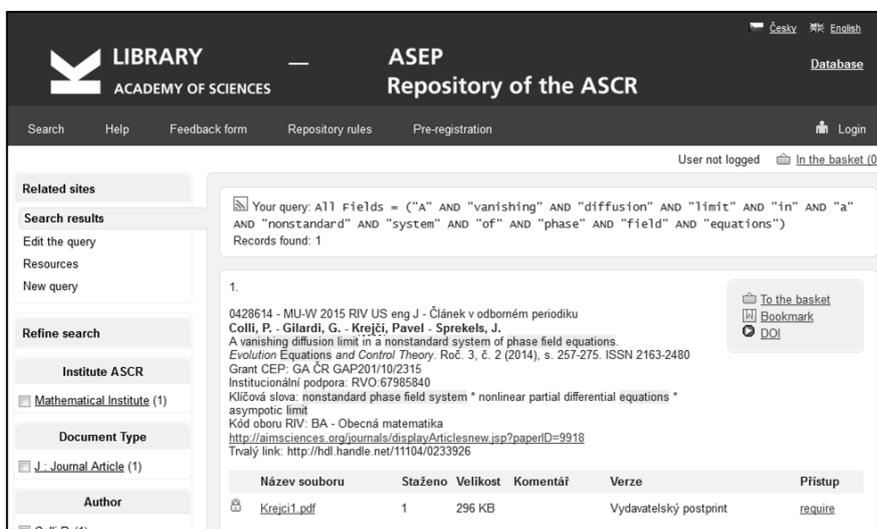
Fig. 3.

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in all cases without seeking to achieve direct or indirect economic benefit and – needless to say with a proper citation of the source.
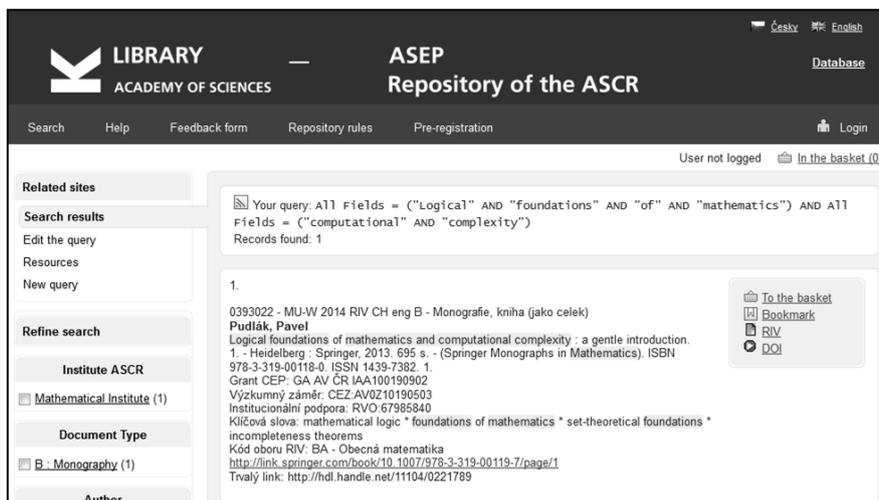
Fig. 4.
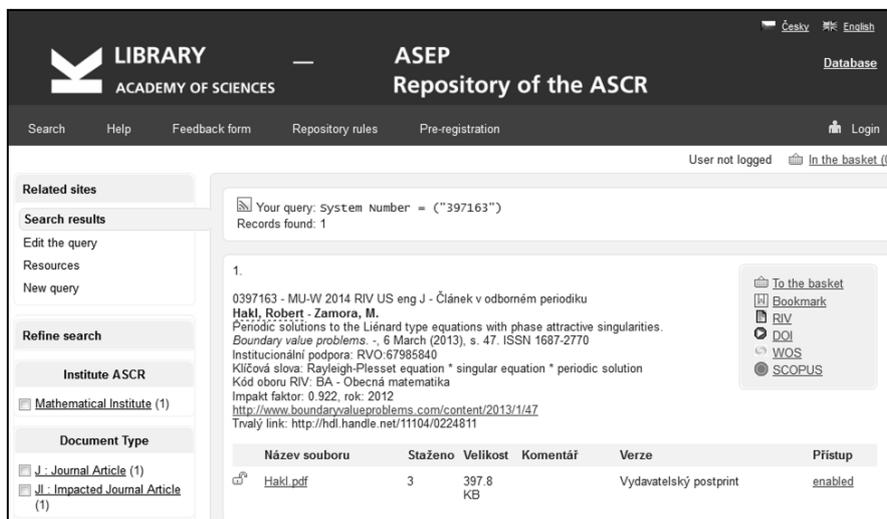
Fig. 5.

5   Negotiating with Publishers

The Library of the ASCR has identified journals in which authors from the ASCR publish most frequently and started to negotiate with the publishers. For instance, the contract concluded with Elsevier Ltd. allows systematic storage of the documents in

the Institutional Repository, including a list of titles embargoed with the information when the article can be made freely available to users.

Table 1. The top 15 publishers according to the number of articles
published by ASCR´s authors

Publisher	Number of articles
Elsevier	543
Springer Verlag	262
Wiley-Blackwell	125
American Chemical Society	90
Wiley-VCH Verlag Berlin	57
Taylor & Francis	40
Institute of Physics	39
Oxford University Press	37
Blackwell Publishing	35
John Wiley and Sons	29
BioMed Central	27
Royal Society of Chemistry	26
American Institute of Physics	22
American Nuclear Society	21
Institute of Electrical and Electronics Engineers	20

6   The Czech Digital Mathematical Library

Besides the Library of the ASCR which provides central services, there are numerous smaller specialized libraries in individual institutes. Among them, the library in the Institute of Mathematics ASCR is unique in the sense that it also maintains a full-featured digital library – the Czech Digital Mathematics Library (DML-CZ). It has been developed during 2005–2009 by several academic partners in the Czech Republic with the aim to preserve in digital form the content of major part of mathematical literature that has ever been published in the Czech lands, and to provide a free access to the digital content and bibliographical data. In this sense it can be considered a prototype of a specialized open access repository which is not limited to a production of a single institution but rather to production of selected publishers.

DML-CZ presents full-texts of journal papers, conference proceedings articles and book chapters in PDF format, equipped with enhanced metadata and with bibliographical references linked to the databases of mathematical literature zbMATH [13] and MathSciNet [11]. Further services provided by the DML-CZ include interlinking and search for contextually similar items. The content of DML-CZ has been incorporated in the European Digital Mathematics Library (EuDML) [7] and observing principles of EuDML policies [8], namely: The texts in EuDML must have been scientifically validated and formally published. They 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.

Journal and proceedings articles are displayed according to the terms of a contract with the publisher which is keeping ownership of the digital data. The contract sets up, in particular, the moving wall. Monographs are included in the DML-CZ only if the agreement with the author and/or the publisher allows displaying them immediately. In this case the digital data remain property of the Institute of Mathematics ASCR.

The database itself, in particular the bibliographic data, is property of the Institute of Mathematics ASCR.

Each digital document in the DML-CZ is authorized with electronic stamps and provided with a flyleaf containing the basic metadata and terms of use including indication of the copyright owner.

Originally, the DML-CZ was built to include and display only complete series of periodicals which also complies with the principles of the EuDML. Recently, an exception from this rule has been made when, at the public request, a section devoted to collected works of eminent personalities of Czech mathematics has been established. These collections naturally contain single papers scattered in a variety of journal and conference proceedings titles, most of which are not included in the DML-CZ, and even variety of other documents like lecture notes, newspaper articles and other people's works on the corresponding person. This brings a lot of brand new questions concerning the metadata scheme and classification of the documents. It was necessary to switch to the FRBR (Functional Requirements for Bibliographic Records) model [9] and to work with "creations" rather than with "publications" only. The variety of sources naturally generates additional copyright issues.

The very first collection of this type was devoted to the private archive of Otakar Borůvka (1899–1995), one of the most important Czech mathematicians in the 20th century who coincidentally was affiliated to two DML-CZ partners: the Masaryk University in Brno and the Institute of Mathematics ASCR in Prague. The collection consists of three main types of Borůvka's works: original research works (9 monographs and 81 papers), other works (2 university textbooks and 51 journal and newspaper articles) and works about him (1 monograph, 1 thesis, 64 articles).

The second collection is devoted to Vojtěch Jarník (1897–1970), an excellent scientist and teacher who essentially influenced several generations of Czech and Slovak mathematicians representing a link between the classical and the modern mathematics. He was a real expert in traditional fields of mathematical analysis and simultaneously one of the first Czechoslovak mathematicians to master the set theory, topology, theory of measure and integral. The collection consists of four main types of works: research works (99 papers), books (8 monographs), other works (44 journal and newspaper articles) and works about him (2 monographs, 19 articles). The 8 monographs include high level university textbooks which have been published repeatedly in different editions. In this case only the most representative editions have been digitized and displayed while the rest is considered just other demonstration of the item and only metadata without full-text are provided.

The third collection under preparation will be devoted to Eduard Čech (1893–1960), the greatest Czechoslovak mathematician and one of the leading world specialists in the fields of differential geometry and topology. He also paid special attention to the organization of research work in mathematics and to education of mathematics.

The collection includes a large number of high-school textbooks, many of them being just repeated and slightly changed editions of the same item.

Fig. 6. Presentation of different editions of the same title. Each edition is presented with full metadata but only the latest one has a full-text.

Analogous collected works appear in the Biblioteca Digitale Italiana di Matematica [5]. Since the EuDML policy is to include only articles from complete journal series these personal collections do not appear there and can be found only in the original sources, the DML-CZ and bdim.

7   Conclusion

Institutional repositories play a very important role in scholarly intercommunication and collaboration and there are many sources of information within the research arena where the user can search for information. However, discovery and retrieval of information is not always easy nor targeted and relevant.

The ASCR, its Library and research institutes seek to solve key research issues. Open access and knowledge management allows the end-users, researchers and schol-

ars to optimise or even shorten the research cycle in innovative response to new global challenges.

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