

Report on the Activities of the Committee on Electronic Information and Communication (CEIC) of the International Mathematical Union in the years 2002 and 2003.

I. CEIC Report for 2003

After a very successful and hectic 2002, the Sixth Meeting of the CEIC was held at the Konrad-Zuse-Zentrum (ZIB) Berlin, May 24th and 25th, 2003. While 2003 has been a quieter year, the increasing concentration of academic publishing in very few hands and the ongoing issues related to journal costs (as illustrated by present activities within Elsevier), intellectual property and copyright, make the CEIC 's ongoing presence very important. The following remarks summarize the principal items discussed and where appropriate mention subsequent actions:

World Digital Mathematics Library

The CEIC had noted at its fifth meeting (an informal 'five-and-a-half-th' meeting was held in Beijing during the 2002 ICM), in early 2002, that some half dozen centres in various countries had projects to scan the existing mathematical literature, thus making it available in digital form (*retrodigitization*). It had determined that the development is of great importance for mathematics and warrants the attention of the IMU. Further, the CEIC had come to the view that the value of the then efforts would be much enhanced if they were truly international and if there were some overall co-ordination and facilitation (inter alia to minimize duplication and to identify best practice). Accordingly the CEIC had urged the IMU to accept a central role in the co-ordination and facilitation of the World Digital Mathematics Library project and had offered the expertise and experience of members of the CEIC to act on behalf of the IMU. Those urgings were heeded by the EC and by the GA of the IMU. The actions of the CEIC reported below are taken in the light of the IMU's decision to work to realize the vision of a comprehensive digital mathematics library by agreeing to coordinate the worldwide activities leading to a World Digital Mathematics Library. The CEIC has chosen to use the acronym WDML (World Digital Mathematics Library) rather than the previously used TLA, inter alia because the domain name www.wdml.org was available for registration (whereas that omitting the 'w' was not). The available domain name has accordingly been registered on behalf of the IMU/CEIC. A CEIC WDML site <http://www.wdml.org> has been initiated.

The CEIC recalls that the WDML is based on the DML project and on the work of the several digitization initiatives of such institutions as EMANI, Cornell University, NUMDAM, GDZ Goettingen, ERAM, ... , and notes that the digitizing institutions have indicated that they will support WDML activity under the aegis of the IMU.

The CEIC emphasizes that the WDML initiative is and will be open to all interested parties that are able to promote the goals of the WDML. {WDML Committee} On the suggestion of the Goettingen DML meeting, the IMU was to establish a WDML Committee including representatives from the digitization centres and of the publishers. The task of the Committee was to prepare and organize a scientific workshop to take

place no later than summer 2004 and to be open to all parties interested in taking part in WDMML projects. This has been achieved by the meeting to take place during the 4th European Math Society Meetings, organized by Bernd Wegner.

Accordingly, on the advice of the CEIC, the President of the IMU, John Ball issued appropriate invitations resulting in Alf van der Poorten (mailto://alf@math.mq.edu.au) agreeing to chair the WDMML Committee and

David Mumford mailto://David_Mumford@brown.edu

Pierre B'erard mailto://Pierre.Berard@ujf-grenoble.fr

Bernd Wegner mailto://wegner@math.TU-Berlin.de

Thierry Bouche [for NUMDAM] mailto://thierry.bouche@ujf-grenoble.fr

Jean Poland mailto://jp126@cornell.edu

Rolf Jeltsch mailto://jeltsch@math.ethz.ch

Gertraud Griepke mailto://Griepke@springer.de

accepting John Ball's invitation to become members of the WDMML Committee.

A WDMML Workshop will form part of the meeting on 25--27 June, 2004 at KTH Stockholm "New Developments in Electronic Publishing of Mathematics" ---a workshop integrating mathematicians, libraries, editors and publishers. See <http://eic-ecm4.sub.uni-goettingen.de> The Sunday program is dedicated essentially entirely to WDMML matters.

Best Current Practices

The document 'Best Current Practices', hereafter BCP, addresses fourteen topics of relevance to electronic publishing in mathematics. The CEIC plans to enhance the BCP statements by adding external documents including remarks, comments, references, and examples; for instance, comment on and definition of technical language, clarification of the underlying principles, guidelines instructions, an explanation of alternative views.

BCP should provide clear and understandable advice on the diffusion of mathematical information and on communication via the Web. BCP will be linked to related documents thus providing references, links to related material, and relevant examples.

Responsibility for the various BCP topics (Structure and Format, Linking and Enrichment, Versioning, Personal Homepages, Personal Collected Works, Preprints and Archives, Copyright, Journal Price Policy, Validation and Refereeing, Statistics, Partial Access/Free Access, Archiving Format, Archiving Responsibility, Licensing and Bundling, Development Countries) was distributed among the CEIC members, and an action timeline was nominated. While this project is still incomplete, it is reasonable to expect to see the fruits during 2004.. Experts from outside CEIC (say from the reorganized TAB discussed below) will be more actively involved in the enhancement of the BCP.

For example, during the last year Dr Jofre has been involved testing a web-site with an updated list of links of open access math journals and related subjects. This experience

has been successful and his goal is to incorporate more people to this initiative as an easy way to be proactive with mathematicians in many developing countries

Intellectual Property Rights/Copyright

It is plain that Intellectual Property Rights/Copyright plays a key role in obstructing access to mathematical information. One might well ask whether its generally held principles are at all appropriate in the Mathematical Sciences. Whatever, John Ewing is at present writing on the relevant principles. In brief, he discusses proposals that amount to copyright, as we know it, persisting on learned papers only for a limited period, with the material then going into the public domain.

World Directory of Mathematicians

Financial considerations have led the IMU to cease publication of a printed version of the World Directory of Mathematicians. The CEIC remains charged with the duty to develop feasible models for an electronic WDM. However, "Privacy Laws" provide a fundamental obstruction to that endeavour. Nonetheless, a first practical step towards such an electronic WDM might be a federated search ("federated search" is a popular term for search over diverse databases) of electronically available membership lists of mathematical societies. The Committee noted a plethora of problems that will have to be dealt with. A prototype search solution is to be discussed at the 2004 CEIC meeting.

Persona Mathematica

If only because not all mathematicians are members of learned societies, it will remain relevant to continue the Math-Net approach: (a) to develop a standard for a personal professional homepage; and (b) to harvest those professional homepages by the Math-Net service 'Persona Mathematica'. Martin Groetschel's professional homepage appears to provide a fine model.

Math-Net Activities. Web sites of the IMU, CEIC, Math-Net, and WDML

Under the guidance of the CEIC the various websites have been provided with uniform interfaces. See <http://www.mathunion.org> and linked sites. Note that the Math-Net Page <http://www.math-net.org/services> serves as base for the structure of the web sites providing them with a common 'look and feel'.

ICIAM 2003 The CEIC presented a special session at ICIAM with presentations by Jon Borwein, John Ewing, Martin Groetschel (given by Alf van der Poorten), and ---by invitation ---Bernd Wegner. This session's presentations are lodged at <http://www.colab.sfu.ca/ICIAM03/eic.html>. In addition, Jonathan Borwein represented the IMU at the ICIAM's Council Meeting and made a presentation on behalf of the CEIC. The ICIAM warmly responded to an invitation to be more closely involved with the CEIC. Similar presentations are planned for ICME11 in Copenhagen in July 2004.

II. Report by M. Groetschel on CEIC related activities at ZIB during 2003

IMU Server. The design of the new structure of the IMU server and the redesign of the IMU website were finished in summer 2003. The IMU website is permanently maintained and updated at the Konrad-Zuse-Zentrum (ZIB). New activities, especially EWDM and IMU-Net, were integrated into the IMU website, see below for details.

Remarks concerning the EWDM. Following the suggestion of the IMU Committee on Electronic Information and Communication (CEIC) to set up an electronic version of the WORLD DIRECTORY OF MATHEMATICIANS (EWDM), ZIB has established the necessary infrastructure so that every mathematician can offer his personal homepage via a central registration mechanism, see <http://www.mathunion.org/ewdm/> The software guarantees that the e-mail addresses of the EWDM members can't be extracted by robots without very significant effort. IMU has called all mathematicians to enroll in the EWDM. By the end of February 2004, more than 600 mathematicians from nearly 50 countries joined this new IMU/CEIC service. The number of subscribers rises daily (but slowly).

EWDM provides a link to a Math-Net Page offering links to the member lists of mathematical societies and groups, see <http://www.math-net.org/more/people>. A future challenge is to provide a service allowing a metasearch of the EWDM and all available electronic member lists of mathematical societies.

Remarks concerning the Mathematician's Professional Homepages (MPH). CEIC has developed a proposal for a standardized mathematician's homepage. However, the amount and size of topics interesting a mathematician may highly differ. Therefore each mathematician can choose between two types of such a homepage

- the "full" version with a large number of groups and subgroups
- the "light" version with a reduced number of groups and subgroups.

Intuitive tools are necessary for generating the MPH. The MPHMaker is a tool for generating easily and efficiently a standardized Mathematician's Professional Homepage (full version): <http://www.mathunion.org/MPHMaker> A tool for the light MPH version is under construction.

Remarks concerning IMU-Net. Since fall 2003, ZIB has been establishing the technical infrastructure to run the bimonthly IMU-Net newsletter <http://www.mathunion.org/Publications/Newsletter/>. In the first issue John Ball introduced IMU-Net as follows: *"The newsletter aims to improve communication between IMU and the worldwide mathematical community, by reporting decisions and recommendations of IMU, and highlighting issues that are under discussion. In addition, IMU-Net will report on major international mathematical events and developments, and on other topics of general mathematical interest."*

The call to subscribe to the IMU-Net mailing list was sent out to nearly 41.000 mathematicians. As of now there are about 3800 IMU-Net subscribers. Three issues have been published and archived.

<http://www.mathunion.org/Publications/Newsletter/archive/index.html>

Remarks concerning Math-Net

a. State of the art. Math-Net refers to and makes accessible the information of more than 1,000 mathematical departments <http://www.math-net.org/navigator> Two hundred departments have generated and installed Math-Net Pages as a standardized portal to their electronic information. Moreover, the Math-Net Navigator covers country lists of Web servers of mathematical departments. Lists are served for the continents as follows:

Africa: 8 country lists

Botswana, Kenya, Mauritius, Namibia, Nigeria, South Africa, Swaziland, Zimbabwe

America: 12 country lists

Argentina, Barbados, Brazil (2), Canada (23), Chile, Colombia, Jamaica, Mexico, Puerto Rico, Trinidad and Tobago, United States (29), Venezuela

Asia: 26 country lists

Armenia, Azerbaijan, Bangladesh, Brunei, China (1), Georgia, India, Indonesia, Iran, Israel, Japan, Kazakhstan, Kuwait, Lebanon, Malaysia, Oman, Philippines, Republic of Korea, Russia (3), Saudi Arabia, Sri Lanka, Taiwan, Thailand, Turkey (1), Vietnam (1)

Australia: 3 country lists

Australia (2), Fiji, New Zealand (2)

Europe: 37 country lists

Austria (8), Belarus, Belgium (2), Bulgaria, Croatia, Cyprus, Czech Republic, Denmark (4), Estonia, Finland, France (3), Germany (85), Greece, Hungary (3), Iceland, Israel, Italy (6), Latvia, Lithuania, Malta, Moldova, Netherlands, Norway, Poland (1), Portugal (1), Romania, Russia (3), Serbia and Montenegro, Slovakia(1), Slovenia, Spain (3), Sweden (3), Switzerland, Turkey (1), Ukraine, United Kingdom (17)

The number in brackets denotes the number of departments with a Math-Net Page.

The number of Math-Net Pages is increasing slowly.

b. Technical Aspects: Math-Net uses the Harvest system. Harvest covers the typical components for handling distributed information in the Internet:

- Gatherer component (gathering the distributed information)
- Broker component (indexing of the gathered information)
- User Interface (to search the distributed information)

The Harvest based search would be more efficient if the page rank approach of Google was used (as developed by Stanford University): "*the analysis of hyperlinks is a suitable mean to advertise the relevance of a Web page for a search*". The page rank is defined by the citation (link) graph of the web. It is a sparse system of linear equations which can be solved by iteration. A test implementation is installed to calculate the page rankings within the Web servers of ZIB. ZIB will also try to use this method for Math-Net.

Further activities

a. Open Access. There are a lot of activities to establish open access to the knowledge in the sciences and humanities. CEIC has partaken in the activities and supports these initiatives, Berlin, October 20-22, 2003, see <http://www.zim.mpg.de/openaccess-berlin/> .

b. Web Presentation of Projects in Mathematics. A proposal for a standardized Web presentation of mathematical projects was developed, see <http://www.mathematik-21.de/statussem/poster/groetschel/index.htm>. The Math&Industry Web Site Maker http://soft-pc3.zib.de/create_website allows one to create such a Web presentation for a project. For an example of a such a Web presentation see <http://soft-pc3.zib.de/MathInd/fkz03GR7ZIB-7/>. German is currently used as the base language, but it would be not expensive to create an English version.

III CEIC Report for 2002

Fifth Meeting of the CEIC -- The Fifth Meeting of the CEIC was held at the Morris J. Wosk Centre for Dialogue, Simon Fraser University, Vancouver, February 15--17, 2002. A report on the meeting is included in the report on the four-year term of the CEIC in the IMU-Bulletin 48 (June 2002), pages 70--80.

Presentation to the General Assembly -- The General Assembly of the IMU (Shanghai, August 17 and 18, 2002) received a report by Martin Groetschel, IMU EC representative, Peter Michor, Chair of the CEIC, and Alf van der Poorten, on the activities of the CEIC during the past four years.

The presentation included a brief review of mathematics on the Web, an introduction to Math-Net and the importance of Math-Net Pages for mathematical institutes and departments, a preview of standardized personal pages for mathematical researchers, an outline of the "Best Current Practices Recommendations" on electronic publishing including a review of mathematical preprint servers, a call to all mathematicians to make their publications electronically available, an explanation of CEIC's copyright recommendations, and an outline of plans for a Digital Mathematics Library.

CEIC Recommendations -- The Committee prepared a booklet collecting CEIC's current recommendations on various aspects of electronic information and communication. Those recommendations had been drafted by CEIC members and were finalized in open discussions during CEIC's 1998--2002 term. They were variously endorsed by the IMU Executive Committee and by the Shanghai General Assembly.

The booklet was distributed at the GA in printed form. It is electronically available at CEIC's web site http://www.ceic.math.ca/filegmt_data/files/recommendations.pdf

Future of the CEIC -- The CEIC was reviewed by the IMU EC at its meeting preceding the GA. The EC determined to re-establish the CEIC for a second term with revised terms of reference (included below).

The following resolution (Resolution 6) summarizing the work of CEIC was adopted by the General Assembly:

The General Assembly of the IMU endorses the "Best Practices" document of its Committee on Electronic Information and Communication (CEIC), also endorsed by the IMU Executive Committee at its April 13, 2002, meeting. In particular the Assembly endorses the provisions designed to ensure access by mathematicians of the developing world to current mathematical literature: the posting of the articles on personal homepages and servers and the practice now beginning with several publishers of making journal articles in electronic form freely accessible five years after they have been published, or even sooner. An important part of making mathematical literature available is coming to agreement on common standards for digitization. The Assembly commends the CEIC for its work on this matter and urges further efforts in this direction.

CEIC Activity at the ICM, Beijing -- Members of the CEIC held an informal lunch-time meeting to discuss further plans of the committee.

On Monday, August 26, CEIC organized an afternoon special session: New Aspects of Electronic Publishing.

The following talks were given:

Jonathan Borwein: What is the CEIC?

Roland Schwaenzl: Where should you put your papers?

Wilfrid Hodges: Should we give away our research?

Martin Groetschel: Can we make information more accessible?

John Ewing: How long should publishers own scholarship?

Alf van der Poorten: Is refereeing necessary?

Panel discussion: What are best practices and why should you care?

Satellite Meeting -- Members of the CEIC participated in the satellite conference "Electronic Information and Communication in Mathematics" at Tsinghua University in Beijing (August 29--31, 2002), and gave the following talks:

Peter Michor (keynote): Doing Mathematics in the years 1949, 1973, 2003, 2039

Jonathan Borwein: The next four years

Wilfrid Hodges: Copyright in mathematical work

Alf van der Poorten: The costs and benefits of refereeing

Alexei B. Zhizhchenko: Electronic information system in mathematics in Russia and participation of Russia in the MathNet project

John Ewing: Predicting the future

Appendix:

At its 70th session on August 16, 2002, in Shanghai the IMU Executive Committee has reviewed the activities of its "Committee on Electronic Information and Communication" (CEIC) and decided to re-establish CEIC for a second term with the following revised terms of reference:

- a) The CEIC is a standing committee of the Executive Committee (EC) of the IMU, reviewed every four years by the EC at its meeting preceding that of the GA. Members are appointed for four-year terms by procedures similar to those for IMU Commissions. The EC appoints one of its members to serve on the CEIC.
- b) The CEIC may meet as necessary in each four year period to review the development of electronic Information and Communication as it impacts the international mathematical community, and is asked to submit an annual report to the EC.
- c) The CEIC may organize or sponsor international meetings or forums to bring together representatives of all interested parties, including societies, publishers, libraries, researchers, and sister disciplines. It may publish, electronically or on paper, and otherwise disseminate proceedings, reviews of recent developments, and technical surveys for the use of the mathematical community.
- d) The CEIC may suggest international standards (‘best practice recommendations’) on issues related to electronic communication. Such recommendations should be reviewed by the EC and, if approved, may be published and promoted in the name of the IMU.
- e) The CEIC is expected to continue its previous efforts such as the promotion and organization of Math-Net and related activities that make mathematics related material electronically available. In carrying out its activities, CEIC is asked to continue soliciting the views of the mathematical community through the CEIC and the Math-Net homepages.

The CEIC is asked to address, in its second 4-year term, the following issues with special emphasis.

- f) The CEIC is requested to enhance its advisory role with the aim - to make the issues involved generally understood, - to define the relevant needs of our discipline clearly, - to shape the role the mathematical community needs to play, and - to guide the practice of scholarly communication and publication.

- g) The CEIC is asked to take an active part in any development of a Digital Mathematics Library, to further address copyright and archiving issues, journal licensing models, and cost models for journal production and acquisition.
- h) The CEIC is requested to draft a proposal, to be decided upon by the EC in 2006, concerning its future status. The proposal should include issues such as CEIC's institutionalization, membership, long term financing, and sustainability of the various current CEIC efforts and activities.

The composition of CEIC for the next period is as follows:

Pierre Berard <Pierre.Berard@ujf-grenoble.fr>
Jonathan Borwein, chair <jborwein@cecm.sfu.ca>
John Ewing <jhe@ams.org>
Martin Gr\"otschel, IMU-EC representative <groetschel@zib.de>
Alejandro Joffre, <ajofre@dim.uchile.cl>
Peter Michor <Peter.Michor@esi.ac.at>
David Morrison, <drm@math.duke.edu>
Alf van der Poorten, <alf@math.mq.edu.au>

The following two persons are attached to CEIC with special emphasis on the further development of the World Digital Mathematical Library:

Rolf Jeltsch <jeltsch@math.ethz.ch>
David Mumford <David_Mumford@brown.edu>

Peter Michor, Jon Borwein, Alf van der Poorten.