The IMU and You

John Ball

International Congress of Mathematicians 2006

ICM2006 will be held in Madrid, Spain, August 22–30, 2006. The second announcement, containing names of invited speakers and information about the program, will appear in an upcoming issue of the *Notices.* For more information, visit the website `http://www.icm2006.org`.

Probably you have heard of the International Mathematical Union. You may know, for example, that it is responsible for the International Congress of Mathematicians (ICM) and awards the Fields Medals. But what else does it do? Who belongs to it? How is it run? Is it doing what it should be doing, and is it doing it well? And how can you find out?

As a first step, I invite you to visit the IMU webpages at `http://www.mathunion.org`. While you are there, please subscribe to the new IMU electronic newsletter IMU-Net (it is free), and enter your details in the Electronic World Directory of Mathematicians (EWDM). In fact IMU is soon to unveil a Web-based Federated World Directory of Mathematicians (FWDM; see `http://www.fwdm.math.ca`) that, given a name, will find entries in the EWDM and other lists such as the Combined Membership List (`http://www.ams.org/cml`). By the way, the IMU webpages are in the Math-Net format; IMU encourages all mathematics departments to have a secondary webpage in this standard format, which facilitates search by humans and computers (see `http://www.math-net.org/Math-Net_Page_Help.html`). IMU also offers a program (see `http://www.mathunion.org/MPHMaker`) to produce a high-quality structured webpage for an individual mathematician in a similar standardized format.

IMU is the scientific union for mathematics and adheres to ICSU, the International Council for Science. Of course, mathematics and mathematicians for the most part carry on their business without any thought for IMU. But it is the principal body representing mathematics on the world stage. Originally, its aims were mainly concerned with the organization of the ICMs and the awarding of the Fields Medals, but now they include other issues of importance for mathematics, for example those connected with electronic publication and with the development of mathematics in less-advantaged parts of the world.

The members of IMU are countries. There are about 192 countries in the world, of which 67 currently belong to IMU. Although this might seem a small proportion and certainly it should be increased, the number is typical of scientific unions, and the membership includes all the major scientific countries, as well as representing a large majority of the world's population. Each country is represented by an Adhering Organization—in the case of the USA this is the National Academy of Sciences—which is in turn advised by a Committee for Mathematics. Do you know who belongs to the U.S. Committee for Mathematics, what the committee does, or how its members are chosen? If not, the page `http://www7.nationalacademies.org/usnc-math/` will give you some of this information. The member countries are divided into five groups; for example, the USA is in the highest group, V. The higher the number of the group, the more votes the country has and the more dues it pays. The dues, which are low compared to other scientific unions, finance almost all the activities of IMU.

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IMU is run on a day-to day basis by an Executive Committee comprising ten mathematicians elected every four years by the IMU General Assembly in accordance with a system that is currently being reformed through the creation of nominating committees to construct the slates of candidates. The Executive Committee is responsible for all policy matters and for such tasks as choosing the members of the ICM Program Committee and various prize committees. It meets physically for two days once a year but carries out most of its business by email. There is no permanent office, and the IMU administrative base is at the institution of the secretary (currently Phillip Griffiths of the Institute for Advanced Study in Princeton).

Part of the excitement of the ICMs lies in the awarding of the Fields Medals and Nevanlinna Prize to mathematicians whose fortieth birthday does not occur before 1 January of the year of the congress. The history and requirements for these awards can be found on the IMU webpages. For example, the Fields Medal Committee is instructed "to award between two and four medals, with a strong preference for four, and to try to represent a diversity of mathematical fields." The Nevanlinna Prize is for outstanding contributions in mathematical aspects of information sciences. At the 2006 ICM in Madrid, a new IMU prize will be awarded for the first time. This is the Carl Friedrich Gauss Prize to recognize mathematics that has had a real impact in the world, and unlike the Fields Medals and Nevanlinna Prize there is no age limit. IMU also strongly supports the Abel Prize, awarded for the third time in 2005 to Peter Lax, and nominates members of the Prize Committee. It plays a similar role with respect to the new Ramanujan Prize for young mathematicians working in developing countries, to be awarded for the first time in 2005 by the International Centre for Theoretical Physics (ICTP) in Trieste.

The future of our subject depends on its continuous regeneration by the young. In turn, this depends on a positive image for mathematics in the media so as to attract students to the subject and influence politicians and opinion-formers, and on effective and inspiring teaching of the subject in schools and universities. Although most of the readers of these words will be involved in one way or another with mathematics education, there can sometimes be an uneasy relationship between research mathematicians and those specializing in how the subject should be taught. It is thus particularly valuable that IMU has a close relationship to mathematics education through its International Commission on Mathematical Instruction (ICMI). Currently we are exploring with ICMI a joint project to provide some international perspective on the "pipeline" issue of the number of students studying mathematics.

Mathematical talent is not determined by geographical boundaries, and a key responsibility of IMU is to take what action it can to assist the development of mathematics in regions of the world that lack the necessary resources, infrastructure, or expertise. IMU has for many years awarded small grants to mathematicians from developing countries under schemes administered by its Commission on Development and Exchanges (CDE) (see `http://www.ictp.trieste.it/~cde/`). However, the funds available are small and come from member country dues, and there has been apparently no attempt to attract funds from charitable foundations and international agencies. The current Executive Committee moved rapidly to convene an ad hoc committee to advise IMU on how it could improve its strategy towards developing countries. This committee reported in September 2003, and most of its recommendations (which can be found at `http://users.ictp.trieste.it/~dcsg/Report_Recommendations`) are being implemented. In particular, IMU has appointed a half-time administrator for developing countries based at the International Centre for Theoretical Physics in Trieste (ICTP), has set up a new Developing Countries Strategy Group (see `http://www.ictp.trieste.it/~dcsg/`), has increased the CDE budget by transferring to it the majority of IMU conference support, is proposing a new class of associate membership of IMU appropriate for less mathematically developed countries, and has initiated a project to construct a database of mathematics in developing countries.

IMU is delighted to be receiving a substantial grant, expected to be annual, from the Abel Fund, a generous action by our Norwegian colleagues stimulated by IMU's involvement with the Abel Prize. In the first year much of this grant will go towards the African Mathematics Millennium Science Initiative, which IMU supports, while some will also form the prize money for the Ramanujan Prize. At the same time, IMU is beginning to make some proposals to foundations for support for specific projects, especially in Africa. I am encouraged by specific donations from the American Mathematical Society and London Mathematical Society towards these efforts. These are in addition to contributions from these societies and from the Mathematical Society of Japan to the IMU Special Development Fund, which enables young mathematicians to attend the ICM. We hope to persuade other mathematical societies to adopt the AMS method of having a check box for contributions for developing countries on the annual dues renewal form.

IMU is advised on all electronic and publishing matters by its Committee for Electronic Information and Communication (CEIC), whose best practices documents for mathematicians, librarians,

and publishers (see `http://www.ceic.math.ca/Publications`) have been influential and are endorsed by IMU. The rapid development of the Internet and electronic publishing provides many opportunities and challenges, some shared by science in general, others specific to mathematics. Excessive journal prices and proposed new models for journals such as "author pays" open access pose questions that should concern both individual mathematicians in their potentially influential roles as referees and members of editorial boards, and all organizations that represent mathematics.

Mathematics differs from other sciences in the generally much longer period over which research papers retain their value. This is a key reason behind the idea of the World Digital Mathematics Library (WDML), an ambitious proposal to make the entire mathematical literature digitally available in fully searchable form, in particular via retro-digitization of older journals and books. IMU strongly supports this vision and in particular the idea of a "moving wall", a negotiated period, say 5 years, after which all journals are made electronically available free of charge by publishers. There is already a considerable amount of retrodigitized material available, due to the splendid and continuing efforts of various projects (see `http://www.ceic.math.ca/WDML/projects/index.shtml`) and some optimism that substantial new projects will soon emerge to increase this material. In this endeavor, the adoption of appropriate common standards and protocols is essential, and IMU is involved in this process (see the vision statement and retrodigitization best practices document at `http://www.ceic.math.ca/Publications`). The WDML has the potential to become a tremendous resource for mathematical research, a global memory intelligently interlinking centuries of mathematics at the click of a mouse. However, substantial obstacles, especially related to copyright, need to be overcome before the dream can be realized.

Finally, let me invite you warmly to attend the 2006 Madrid ICM. It promises to be a remarkable International Congress, a celebration of all that is best in world mathematics.