OECD Global Science Forum

Proposal for a
Follow-on Activity on Mathematics in Industry

Submitted to the Nineteenth Meeting of the OECD Global Science Forum
By the Delegation of the United States

Background and Rationale

At the Eighteenth Meeting of the Global Science Forum in March 2008, Professor Willi Jäger of the University of Heidelberg presented a proposed final "Report on Mathematics in Industry". The report, which was the outcome of two workshops held in Heidelberg, Germany, in the spring of 2007, was subsequently modified as a result of the discussion at the GSF meeting, then reviewed by the GSF Bureau, and officially released to the public in July, 2008 (see www.oecd.org/sti/gsf). It gives an overview of the opportunities for the application of mathematics to industrial problems. It also lists various mechanisms that were in place in the member countries as of 2008 to enable or enhance partnerships between academic mathematicians and their industrial counterparts. The report, however, does not go into the practical aspects how to implement these mechanisms.

Several of the participants in the Heidelberg workshops attended the recent meeting of the European Consortium for Mathematics in Industry in London (ECMI 2008), where the GSF findings were presented in a special session, attended by approximately 50 persons. At that meeting, there was general agreement that the impact and utility of the report would be considerably enhanced if a supplement could be produced that would describe, in sufficient detail, the mechanisms that have proven to be particularly useful for the application of mathematics in industry. A scoping group, consisting of Dr. Jean-Pierre Bourguigon (France), Dr. Hans G. Kaper (USA, acting chair), Dr. John Ockendon (England), Dr. W.H.A. Schilders (Netherlands), Dr. Andreas Schuppert (Germany), and Dr. Nils Svanstedt (Sweden, acting secretary), was formed to get such an effort started. This group, which has extensive contacts in academic and industrial circles, is confident that the proposed work will receive widespread support in those communities. In consultation with the GSF secretariat, the group prepared material that was then used by the Delegation of the United States as a basis for the current proposal.

As explained in the "Report on Mathematics in Industry", industrial innovation is increasingly based on the results and techniques of scientific research. That research, in turn, is both underpinned and driven by mathematics. The report provides a broad overview of the opportunities for applying mathematics to important industrial problems, with examples from the chemical industry, oil exploration, medical imaging, micro- and nano-electronics, logistics and transportation, finance, information security, communications, and the entertainment industry. The report also lists a variety of mechanisms that have been successfully implemented to enhance the mathematics/industry interface, but it does not – by design – go into the implementation and operational details in such a way that interested governments, companies or institutions (e.g., universities, research institutes, foundations) could emulate or adapt the mechanisms for their purposes. The U.S. proposes to fill this gap by bringing together a group of experts appointed by national delegations, who would, in a relatively short time (one year or less) and probably without the necessity of holding a physical meeting, produce a report containing essential supplemental information to make it more likely the original GSF report would have a tangible impact in the form of new industry/academia partnerships. These partnerships would, in turn, benefit society via innovative products, services and jobs.

Proposed Activity, Schedule & Outcomes

It is proposed that the Global Science Forum establish an Experts Group that will select a set of proven successful mechanisms for detailed consideration, for example, interdisciplinary research centers, research internships, study groups, student activities, or technology translation networks . For each mechanism, an analysis will be made of the most relevant characteristics that relate to implementation and operation. These could include: an overall characterization of the mechanism, the type of problems addressed, the scope of the effort (including special challenges and constraints), the organisation and management structure, the funding requirements and procedures, the handling of intellectual property rights, the number of people involved, the problems that were overcome, the pitfalls to avoid, and the possibilities for further evolution or enhancement. The Experts Group will collect the information from the relevant institutions and organizations directly. Success stories and other concrete examples would be compiled as needed for illustrative purposes, without implying that the associated projects are superior to any others. Most of the discussions and correspondence will be conducted electronically. A small editorial workshop might be organised if necessary to finalise the policy-level report, and the project would be completed in one year. A minimum of support would be needed from the GSF secretariat. The work would begin as soon as it was authorised by the Global Science Forum

Experts Group Membership

The current members of the scoping group (listed in the background section above) have indicated their willingness to serve on the OECD Experts Group if the Global Science Forum approves this proposal and if they continue to have the support of their national delegations. Interested member and observer delegations could appoint additional members. The Experts Group would invite the participants in the Heidelberg workshops to join the effort; however, participation would be voluntary. In addition, contributions could be solicited from representatives of the organised scientific community.