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# Preface

Much time, effort, and money is being spent on inventing and proving new mathematical results. This effort is well spent for a discipline that forms the core of our current technology-based society. Actually, impressive progress has been made over the past decades in expanding the depth and breadth of our mathematical knowledge. However, a significant part of our time and effort is spent inefficiently because the knowledge produced is hard to retrieve. Too few resources are spent to improve the management, access and distribution of mathematical knowledge.

Of course, the advancements of computer technology, in particular the global web, promise to give us new tools of unprecedented power for making knowledge retrieval much more efficient. We already feel the practical and pleasant implications of this in our daily life as working mathematicians when, by doing a few clicks, we get access to a huge amount of relevant information whose retrieval would have taken us many hours in libraries etc. just a couple of years ago. Still, there is a great deal of work to be done before information retrieval on the web becomes reliable. A recent article in Nature mentions that even the best search engines find only less than one fifth of the relevant pages.

On a more fundamental level, we think that the urgently necessary improvement of mathematical knowledge management is not only a technological but also a deeply mathematical question and, in fact, a question of improving our abilities to do formal mathematics. The best tools of computer-technology must be combined with a new and deep understanding and mastering of the structural formal fabrics of mathematics in order to reach a higher level of accessibility and, hence, usability of mathematics. This will hopefully lead to the build-up of comprehensive web-accessible mathematical knowledge bases that, in the long run, will replace or at least supplement existing mathematical libraries. As a consequence, also the way how mathematical research, education and application can be carried out will change significantly in the future.

In a broader perspective, because of the role of mathematics as the universal "thinking technology" of science and technology, advances in mathematical knowledge management will be relevant for all of science and technology. It can be expected that techniques to be worked out for mathematical knowledge management will be applicable also for other, less structured, disciplines. I.e. by solving the management of mathematical information we are likely to solve the most difficult and relevant problems of knowledge management in general.

The first international conference explicitly devoted to the topic of mathematical knowledge management (MKM 2001) was organized in September 2001 at RISC (the Research Institute for Symbolic Computation of the Johannes Kepler University) in Ha-

genberg, Austria. Some of the papers presented at this conference formed the starting point of this special issue of Annals of Mathematics and Artificial Intelligence. Other papers were solicited by an international call for papers. The next MKM conference will take place in March 2003 in Bologna and we envisage that MKM will become a vigorous interdisciplinary research field in the coming years.

In correspondence with the fundamental problems of mathematical knowledge management, the topics of the papers contained in this special issue are quite diverse. Their scope ranges from the automated processing of printed formulae and the addition of semantic information to mathematical texts, over the build-up of knowledge libraries in certain areas of mathematics to knowledge oriented aspects of automated theorem proving.

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