

**Joint ICIAM/IMS/IMU-Committee on
"Quantitative Assessment of Research"
Terms of Reference
21 May 2007**

The drive towards more transparency and accountability in the academic world has created a "culture of numbers" in which institutions and individuals believe that fair decisions can be reached by algorithmic evaluation of some statistical data; unable to measure quality (the ultimate goal), decision-makers replace quality by numbers that they can measure. This trend calls for comment from those who professionally "deal with numbers"-- mathematicians and statisticians.

Throughout the world, assessment of research has become increasingly important, and at the same time, of great concern. No doubt, academic achievement, research, and teaching all need to be evaluated in order to guarantee and maintain quality. Comparisons are necessary to define best practices and to set standards. Scholars judge other scholars when they referee articles, write letters of reference, or participate in regular evaluations. Administrators rate scholars when they decide about salaries or promotion. Librarians rank journals or books when they decide on which to spend their budgets. And politicians assess institutions based on many factors, including research output.

Making judgment is hard work. Everybody making judgments would like to be supported by measures that objectively describe "performance" and help to compare and rank whatever is being judged.

There is growing concern about various measures of research performance, especially those using citation data (for example, the "ISI impact factor"). Many of these measures are used in ways for which they were not designed and to make judgments that are unjustified by the data. Many of those defending the use of such measures argue that they are based on sound statistical data and employ transparent mathematical formulas, and hence they are objective. The precision of the formulas and the pretended exactness of the data, though, may only disguise the inappropriateness of the decision-making process.

The International Council of Industrial and Applied Mathematics (ICIAM), the Institute of Mathematical Statistics (IMS), and the International Mathematical Union (IMU), institutions representing the world wide communities of mathematicians and statisticians, are troubled by the possible misuse of mathematical concepts or statistical indicators. As societies representing mathematicians and statisticians, they feel a responsibility to provide a clearer understanding about the proper use of statistical data in assessing research -- especially research in the mathematical sciences.

ICIAM, IMS, and IMU therefore have established the joint committee "Quantitative Assessment of Research" and charged it with the following tasks:

1. To evaluate to what extent the ISI impact factor is a significant indicator for the quality of a researcher, a department, or similar institution in statistics or mathematics.
2. To determine to what extent the ISI impact factor can be used to compare the quality of research in mathematics with that in other disciplines.
3. To determine whether or not the ISI impact factor has any bias with respect to language, region, or length, source or field of publication, interdisciplinary work.

4. To examine these questions for a selection of other recently proposed measures based on citation data.
5. To propose suitable substitutes for these measures based on citations.
6. To list the possible dangers or advantages that the widespread use of impact factors and similar simple measures may have on publication behaviour, recruitment, balance between scientific disciplines, etc.

The committee is asked to create a summary of its finding to be endorsed and publicly distributed by the Executive Committees of ICIAM, IMS, and IMU. It is requested to support its conclusions by examples and statistical data to be provided in additional documents meant to provide evidence and a solid basis for the findings.

Academic achievement is a complicated mix of contributions to research, teaching, and supervision of students, as well as contributions to academic self organization/administration and to the scientific community. ICIAM, IMS, and IMU acknowledge that the evaluation of scientific quality is notoriously difficult, simplistic answers to complicated questions of judgment are unlikely. However, the committee is also asked to investigate whether it sees possible alternatives to measures based solely on citations that may help to evaluate research and academic achievement and indicate quality in a sensible way.