



Ministério da Educação

Coordenação de Aperfeiçoamento de Pessoal de Nível Superior

Diretoria de Avaliação

02.comp@capes.gov.br

RELATÓRIO DO SEMINÁRIO DE ACOMPANHAMENTO DOS PROGRAMAS DE PÓS-GRADUAÇÃO DA ÁREA DE CIÊNCIA DA COMPUTAÇÃO

Dias: 18 a 21 de março de 2013
Local: Sede da CAPES – Brasília DF

A reunião contou com a presença de coordenadores dos cursos de pós-graduação em Ciências de Computação, os membros da comissão de Ciência de Computação da Capes e quatro convidados internacionais, Prof. Hans-Ulrich Heiss (TU-Berlin), Prof. John Hopcroft (Cornell University), Prof. Michel Robert (Université Montpellier 2), Prof. Eli Upfal (Brown University).

No dia 18 os coordenadores dos cursos com conceito 5, 6 e 7 (UFF, IME-USP, UNICAMP, UFPE, ICMC-USP, UFRGS, UFMG, COPPE-UFRJ e PUC-Rio) apresentaram um resumo dos principais indicadores de seus cursos. As apresentações foram feitas em inglês e os convidados internacionais solicitaram esclarecimentos e fizeram perguntas, bem como os membros da comissão.

No dia 19 às 14:00 os Professores Jorge Guimarães (Presidente da CAPES), Lívio Amaral (Diretor de Avaliação da CAPES), Philippe Navaux (Coordenador da Área da Ciência da Computação), Paulo Cunha (Presidente da SBC) e Renata Araújo (Presidente do Fórum de Coordenadores de Pós-Graduação em Computação) e do Professor John Hopcroft (Cornell University), representando os convidados internacionais fizeram a abertura oficial do evento.

Nos dias 19 e 20, no período da manhã, os coordenadores dos cursos com conceito 4 (PUC/RS, UFSC, UFPR, PUC-PR, UFES, UnB, UNISINOS, UFCG, UFRN, UFAM, UFBA/UNIFACS/UEFES, UFMS, UFC, UFMS/UFG, UFU, UFSCar, UFRJ, UNIFOR, UFPE (Mestrado Profissional) apresentaram os principais indicadores de seus cursos e os membros da comissão fizeram perguntas e solicitaram esclarecimentos.

Todas as apresentações foram entregues à coordenação da comissão e serão postadas na página da comissão no site da CAPES.

Na tarde do dia 19 os convidados internacionais participaram de um painel em que comentaram em termos gerais suas impressões sobre o processo de avaliação realizado pela

CAPES e sobre os processos de avaliação em seu país e suas universidades. Comentaram também sobre o relatório que estavam preparando para a CAPES e houve em seguida uma intensa e proveitosa interação com todos os presentes.

No dia 20, pela manhã, o Prof. Lívio Amaral fez uma apresentação em que comentou sobre o sistema de pós-graduação brasileiro coordenado pela CAPES e forneceu informações sobre o processo de avaliação trienal que está em curso. Nesse mesmo dia, no período da tarde houve uma reunião dos coordenadores dos cursos de pós-graduação, Fórum, para discutir o processo de avaliação em curso, compartilhar experiências e esclarecer dúvidas.

No dia 20 à tarde e no dia 21, a comissão de ciência de computação se reuniu para discutir e preparar o próximo processo de avaliação do triênio 2010-2012. Nessa reunião, a comissão discutiu ajustes relacionados ao documento de área, além de outros assuntos relacionados, como a próxima atualização do Qualis, sugestão de nomes para coordenador adjunto para os mestrados profissionais, sugestão de nomes para comporem a comissão para a avaliação trienal e a preparação e tratamento dos dados a serem fornecidos pela CAPES para a comissão.



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**ANEXO DO RELATÓRIO DO SEMINÁRIO DE ACOMPANHAMENTO DOS PROGRAMAS DE
PÓS-GRADUAÇÃO DA ÁREA DE CIÊNCIA DA COMPUTAÇÃO**

Advisory panel

Computer Science graduate programs in Brazil

Brasilia, March 19, 2013

Hans-Ulrich Heiss, John Hopcroft, Michel Robert, Eli Upfal

The quality of the educational system in Brazil is vital to the development of the economy and the standard of living in Brazil. Brazil can be proud in what it has achieved in science and education. This was the result of a careful, rigorous, and continuous assessment of universities and their departments.

We believe, however, that the leading Brazilian computer science departments have now reached a level of maturity that requires a different approach to evaluation and government funding, to allow these departments to achieve their full scientific potential and international recognition..

Countries with high quality educational systems that work well have several common features:

Competition for talent.

Mobility of faculty and students, which leads to the flow of ideas.

Subjective assessment of quality, instead of numerical data.

We strongly recommend that

- 1) Brazil considers letting individual universities set salaries and compete for the top talent; and that
- 2) CAPES replaces the quantitative based evaluation (number of papers, Ph.D. students, etc.) with a qualitative based evaluation by periodic external committees' reviews.

Quality, not quantity, is important. It is what is in publications that needs to be evaluated, not the number of publications.

We recognize that Brazil may not be willing to take this important step at this time, so we comment below on how to improve the ranking process, although we sense that the ranking may have become counterproductive. Faculty are spending time on increasing the number of publications in high ranked journals, rather than focusing on quality research and excellence in teaching.

We believe Brazil should focus on changes that will encourage:

- 1) Competition between universities for intellectual talent.
- 2) Subjective review of research quality rather than numerical rankings.
- 3) Excellence in teaching.
- 4) Professional development of junior faculty.
- 5) Use of external reviewers for evaluation.
- 6) Mobility between institutions.
- 7) Interdisciplinary computer science research

Vision:

Computer science, with its applications to almost all fields of science and business, has become one of the most dominant scientific disciplines. Research and education in computer science is a major factor in the development of modern economies.

Computer science is an evolving field. Both academic research and business development in computer science today focuses on areas and problems that didn't exist 10-15 years ago, and we can expect a similar pace of change in the future. Students' careers will last 30-40 years. Therefore, strategic planning and evaluation of departments, in particular their graduate programs, should place large emphasis on the way research and education is adapted to new developments in the field, and on education that prepares students for an evolving field.

Computer science is in the process of shifting from an inward looking discipline, focused on developing the basic concepts and tools of computation, to a collaborative discipline with large emphasis on developing advanced computational tools for other sciences. In that respect, computer science is becoming the "new mathematics", a central tool of science research. State of the art research in biology, physics, economics, and almost any other research field is modeled as computational problems. To remain relevant, computer science departments need to adapt their structures and goals to these developments.

Quality of teaching

The main purpose of a university is to educate people for fuller lives, highly qualified jobs, and to advance science. Education and research could be done in different institutions but it has proven to be far better to follow the idea of Humboldt who espoused unity of study and research. Challenging research questions are stimuli for acquiring the necessary knowledge and skills to tackle problems. Teaching helps professors clarify and conceptualize scientific fields. Interaction with bright young students has always been a source of new ideas.

Since universities produce the next generation of researchers, quality teaching is vital for the future quality of research. Teaching excellence should play a major role in the evaluation of Computer Science Departments, and in the evaluation of professors considered for hire or promotion.

Academic education should lay the foundation for lifelong learning. Departments should formulate the learning outcomes of their degree programs having in mind not only future

careers in research but also the needs of the society and the particular needs of a local region. Derived from these learning outcomes, they should devise the curriculum and the teaching and learning methodology they employ to achieve these learning outcomes. They should implement a quality management system that monitors the educational process from freshmen to alumni, with feedback cycles to lead to a continuous improvement of the efficiency and effectiveness of teaching and learning. Reviewers should determine to what degree departments have established effective mechanisms to assure high quality teaching.

Mobility

Moving from one locale to another is very important to the flow of ideas. New and varied experiences and environments can open the mind to new ideas. An open mind is a prerequisite for research and for change. Students and professors should be encouraged to move at least once to another university. Students should be encouraged to do their graduate work at an institution other than the one at which they received their undergraduate degrees. No university should hire their own Ph.D. onto their faculty without the individual first serving some time at another institution. This brings new ideas into departments and prevents them from getting stuck in old behaviors. Incentives for mobility should be implemented, e.g., the opportunity for promotion, for a higher salary and better research infrastructure when accepting a new post at another university. Universities should compete for the best talent and should have the means to attract that talent.

RANKING

The evaluation of activities conducted by higher education and research institutions aim to be constructive and help improve graduate programs in computer science. The methodology chosen to evaluate graduate courses in institutions in computer science needs to be based on a few fundamental principles:

- 1) An evaluation which uses explicit criteria and takes into account the plurality of missions, the diversity of research and, when applicable, the complexity of its interdisciplinary dimension.
- 2) An evaluation which, for each criterion used is based on observable facts and the assessment of their value.
- 3) The limitation of the quantitative model that can become a mechanism that overvalues raw numbers to the detriment of a proper analysis of their contextual significance and value. For example, the presentation of graduate programs should focus on key results and their importance, not the mere number of papers or where they are published.
- 4) The specificities of the individual fields, such as computer science, where conference proceedings are an important part of the international scientific production.
- 5) Characterization of the scientific production: the lists of journals and conference proceedings, drawn up (QUALIS) and regularly updated are a good reference and

allow comparison between institutions. This, however, is not a substitute for the assessment of the quality of scientific outputs carried out by experts.

To take better account of the diversity of research, their missions and production, we suggest introducing a multi-dimensional approach based on criteria that can be evaluated. Examples of proposed criteria are as follows:

- 1) PRODUCTION: Scientific production and quality.
- 2) TRAINING: Involvement in training through research.
- 3) IMPACT: Interactions with the social, economic, and cultural environment.
- 4) VISION: Strategy and research perspectives.

The result of the evaluation could be a ranking for each criterion. This multi-ranking approach could be adapted to the CAPES standards (classification of graduate courses from 1 to 7).



Hans-Ulrich Heiss

TU-Berlin

Vice-President

Hans is a Professor in Computer Science with research areas Operating Systems, Distributed Systems, Parallel Computing, Security, Performance Analysis. Chairman of the German Council of Informatics Department. Vice-president of the Informatics Europe.



John Hopcroft

Cornell University

Turing Award in 1986

In 1992, he was appointed by President Bush to the National Science Board (NSB). Member of the National Academy of Science and National Academy of Engineering.



Michel Robert

Université Montpellier 2

President

he is full Professor at the University of Sciences of Montpellier (France), where he's teaching microelectronics in the engineering program. He was Director of the Laboratory of Informatics, Robotics and Microelectronics from 2005 to 2010. He published more than 250 publications.



Eli Upfal

Brown University

Eli is a professor of computer science at Brown University, during 2002-2007, he was also the department chair. Before coming to Brown in 1998, he was a researcher and project manager at the IBM Almaden Research Center in California, and a professor at the Weizmann Institute in Israel.