***P**artnership Group for Science and Engineering (PAGSE)*

***P**artenariat en faveur des sciences et de la technologie (PFST)*

Report on the 10th Annual PAGSE Symposium

March 30, 2006

Cover photo: **Back row** (from left to right): Peter Frise, Surajit Sengupta, Karim S. Karim, and Joaquim R.R.A. Martins. **Middle row**: Nadia Bhuiyan, Virginia Wittrock, and Marcus Brady. **Front row**: Virginie Bernier , Catharine Farrow, and John Shaw

Introduction

The 2006 Symposium of the Partnership Group for Science and Engineering (PAGSE) was held in Ottawa, March 30, 2006. The theme of this 10th Annual PAGSE Symposium was 'Leaders in Innovation'. Ten top innovators and scientific leaders met with heads of research funding and policy agencies, federal, academic and industry decision makers and others concerned with Canada's intellectual strength and the economic and policy outcomes of its scientific and technological developments.

In its selection of delegates, the organizing committee had focused on the following key areas of the Canadian economy: aerospace, transportation engineering, pharmaceutical or chemical processing, natural resources, informatics and biotechnology. Candidates had been nominated by industry associations or leaders, university research offices or senior administrators, funding councils, science-based federal and provincial departments and agencies (via chief science advisors). Criteria had included: scientific leadership (peer recognition and honours), research productivity, communication skills, and innovation in the marketplace. Canada's geographic regions and organizational sectors were taken into account, and attention was also given to linguistic and gender balance.

The ten delegates that were selected represented a range of industries and organizations. The delegate list is appended.

A bilingual booklet summarizing the expertise and contributions of the 10 delegates was prepared and was available at the Symposium. It has also been distributed to parliamentarians, senators, sponsors and some federal departments and agencies.

Program

The program included a roundtable discussion with agency heads on science, technology and innovation policy, and a reception on Parliament Hill, at which two delegates made brief presentations describing the innovations they had implemented in their sectors, and their impacts. The program is appended.

Roundtable Discussion

The following senior executives participated in the roundtable discussion with the delegates:

- Eliot Phillipson, President, Canada Foundation for Innovation
- Suzanne Fortier, President, Natural Sciences and Engineering Research Council
- Janet Walden, Vice-president, Research Partnerships Directorate, Natural Sciences and Engineering Research Council
- Mark Bisby, Vice-president, Research Portfolio, Canadian Institutes of Health Research
- Yves Morin, Co-Chair, Canadian Health Industry Partnership
- John ApSimon, Executive Director, Canada Research Chairs
- Pierre Coulombe, President, National Research Council
- Iain Stewart, Director General, Innovation Policy, Industry Canada
- Hélène Marquis, Manager, Scientific Research & Experimental Development Directorate, Canada Revenue Agency

Dr. Jean Marion opened the roundtable discussion. Dr. Marion is the Director of Scientific Affairs, Canada's Research-Based Pharmaceutical Companies; he also chaired the Symposium Organizing Committee. Simon Hanmer, Chair, PAGSE and Interim Program Manager TGI3,

Geological Survey of Canada, chaired the discussion. Dawn Conway (member of the Symposium organizing committee and Executive Director, Canadian Foundation for Climate and Atmospheric Sciences) served as rapporteur.

Delegates had been provided with the following discussion questions in advance:

1. If you were in charge of federal investments in science and technology, what would be your top priority?
   - What would you put in a brief to the Government Finance Committee?
   - What messages would you like to convey to the granting councils and other science based departments and agencies?
2. How is the innovative environment changing or likely to change over the next 5-10 years and how is this likely to affect your efforts, or efforts in your sector, at translating research ideas into new products, technologies and services?
3. Does research have sufficient visibility and impact with policymakers, and with the private and public sectors? If not, how could this be improved?

There was vigorous, informed, high-level discussion among delegates and agency executives. The executives also commented on the afternoon's discussions at the end of the session and provided information on the priorities, vision and program initiatives of their agencies.

Key issues emerging from roundtable discussion:

<u>Funding of new researchers/younger faculty members</u>

Several delegates stressed the need for adequate starter grants for new faculty members and a longer duration for this early support. New faculty have heavy teaching responsibilities and are under tremendous pressure to obtain research grants, initiate research programs, produce and publish - often within the timeframe of a single first grant.

Administrative issues arising from the range of funding sources and their procedures could be addressed, with a view to streamlining procedures and requirements and to harmonizing funding agency policies.

Funding councils have faced declining success rates despite rising budgets, and have been unable to keep up with the need for research support. (This situation is sometimes related to the need to respond to an influx of new, and sometimes highly experienced, applicants). The duration of council support is also subject to the limitations of annual appropriations; partnerships with the industrial sector are affected by a perceived lack of reliability in federal programs.

<u>Graduate student support</u>

Delegates commented on the inadequacy of graduate student stipends, on the opportunity cost of pursuing a higher degree, and the view of higher education as a transition to employment. Students generally earn 25-30% what they would in industry or the private sector. This has implications for their quality of life and financial stability. As a result, fewer Canadian students are opting for advanced degrees and applications are predominantly from foreign students. The current situation will not allow Canada to generate enough skilled Canadians to succeed senior research personnel who will be retiring, or to meet private or public sector needs.

Delegates provided examples of the approaches taken by other countries such as Sweden, where the cost differential between graduate study and employment is minimal. In France and Denmark, stipends are double or triple what they are in Canada. Graduate students are heavily relied on for

university research and often drive intellectual property development in a university, yet are often in transition to a future workplace or career. In contrast, Germany has a high level of technical expertise and stability in its university research personnel which allows rapid, effective response to (or action on) research priorities.

Intellectual property and industrial issues

Delegates agreed that Canada's intellectual property policy was confusing and sometimes counterproductive, and that companies (which may be transnational) were often reluctant to enter into partnerships with universities. Entrepreneurs need to 'get into' the university system. One delegate suggested that intellectual property generated in Canada may end up commercialized by the United States or another country; he also noted that Canadian technology is being increasingly outsourced to Asian manufacturers. This gives foreign companies the added value, increases our dependence on Asian manufacturers, and enables our competitors to evolve. He cited examples of technology sectors where Canada had lagged and where it would be difficult to catch up; he also recommended training centres to keep Canada at the forefront of key sectors.

Access to venture capital within Canada is also problematic. One funding council offers support for 'proof of principle'; universities vary in the efficiency and effectiveness of their technology transfer and commercialization activities and expectations can exceed benefits. Universities could share their best practices for commercialization. Universities also frequently lack links with entrepreneurs. In some cases entrepreneurial acumen leaves the university when a faculty member establishes a spin-off company. One Council executive noted a need to harmonize the expectations of university innovators with benefits.

It was generally agreed that the best means of technology transfer was knowledge transfer through training and partnerships.

Balance of support

The considerable federal investment in academic research over the last nine years was acknowledged. At the same time, delegates considered the balance among funding sectors and needs to be sub-optimal. Federal laboratories can be very important for experimental research in areas which are not appropriate to industry or universities, but which underpin applied research in the other sectors.

The balance of funding must also take much better account of needs among: research, skilled people, facilities and indirect costs. One agency executive presented the United Kingdom system, which provides major initiatives with funding through three-year rolling budgets, with a 10 % carryover.

National priorities

The pros and cons of setting national science and technology priorities were considered in the context of Canada's size and research capacity/resources. Agency heads suggested a need for a broad base of expertise with concentration in key areas, resulting in an enhanced international profile. It was also suggested that Canada has strong partnerships, but is not good at integrating efforts on a large scale. Partnerships are important for research and researchers, but also for expanding students' skill and knowledge sets.

Priorities discussed included:

- Strengthening the S&T innovation system
- A better balance of S&T investment among universities, federal laboratories and industry
- Support for research clusters
- Ensuring S&T investment addresses priorities, e.g. Environment, Energy, Health, etc.

Universities need to have a coherent approach to priorities, appropriate to their particular circumstances.

Several delegates cited the need for convergence between natural and social sciences. Academic researchers must also get their results to those who can benefit from them.

Finally, delegates recognized that research provides benefits in economic, social, political and cultural areas, all of which are important to Canada. The identification of federal research priorities needs to take into account both short and long term investment needs, emerging areas, realistic resource requirements and the need to go beyond federal agendas.

Roundtable wrap-up

In his summary the Chair cited the following key issues: priorization; national strategies for research and development; incentives for advanced degrees and to retain skilled human resources; balance in support mechanisms and sectors, including regular review of this balance; and the vital role of science and technology in economic development and for Canadians' quality of life.

Reception

Over 100 participants attended the Symposium Reception in Room 200 of the West Block, Parliament Buildings. These included five members of Parliament, parliamentary assistants representing two other M.P.s, a number of journalists and science writers, and executives of several science-related agencies and departments. The Parliamentarians were pleased to meet researchers from their ridings.

Simon Hanmer, Chair of PAGSE, formally opened the proceedings; Dr. Yves Morin, Co-Chair, Canadian Health Industry Partnership, introduced the 10 delegates, who were also identified on screen via a projection 'loop' and by glowing star badges. Jean Marion invited questions from those attending and there was a lively question and answer session. Issues addressed included Canada's global competitiveness, particularly in the face of Asian competition; the identification of areas of Canada's international economic leadership, particularly in the natural resources sector; and the role of innovation in moving products from conception to the marketplace. Mr. Brad Trost, M.P. (Saskatoon—Humboldt) formally thanked the speakers and all of the PAGSE delegates.

The following delegates gave short presentations on their work and responded to questions:

- Catharine E.G. Farrow, Chief Geologist, FNX Mining Company, Inc.
- Marcus Brady, Vice President, Business Development, PainCeptor Inc.

Sponsorships

The Symposium was self supporting. Delegate travel, administrative and other hard costs were supported through sponsorships from the following:

- Canada Foundation for Innovation
- Canada's Research-Based Pharmaceutical Companies
- Canadian Foundation for Climate and Atmospheric Sciences
- Canadian Institutes of Health Research
- Canadian Chemical Producers' Association
- Chemical Institute of Canada
- Geological Survey of Canada
- Industry Canada
- Merck Frosst Canada
- Canada Research Chairs
- Natural Sciences and Engineering Research Council
- Gowling Lafleur Henderson LLP

The sponsors were recognized at the public reception, in the booklet profiling delegates, and on a poster for the event. PAGSE is grateful for their support.

Conclusion

The Symposium was a successful event that highlighted and celebrated Canada's innovators and stimulated a keen exchange of information. It provided agency heads and government officials with informed feedback and opinions on science policy, programs, intellectual property and industrial innovation from highly productive scientists who have succeeded in moving research from the laboratory to applications. The Partnership Group for Science and Engineering thanks the delegates, agency representatives, participants and sponsors for their contributions to the success of the 10th PAGSE Symposium.

April 2006

The Partnership Group for Science and Engineering (PAGSE) is a cooperative association of more than 20 national organizations in science and engineering, representing some 50,000 individuals from industry, academia and government sectors. It was formed in June 1995 at the invitation of the Academy of Science of the Royal Society of Canada. On behalf of its members, PAGSE addresses issues concerning the nature, importance and benefits of science and engineering to Canadians, and promotes greater understanding by decision-makers of the role of Science and Technology (S&T) in Canada's prosperity.

Delegates - PAGSE Symposium 2006

Virginie Bernier
NSERC Pharmacology Research Fellow
Merck Frosst Centre for Therapeutic Research

Field: biomedical sciences: role of G protein-coupled receptor for asthma susceptibility; doctoral thesis on folding of V2 vasopressin receptor in nephrogenic diabetes insipidus

Nadia Bhuiyan
Department of Mechanical and Industrial Engineering
Associate Director of the Concordia Institute for Aerospace and Design Innovation
Concordia University

Field: operations management, new product development, product design & development

Marcus Brady
Vice President, Business Development
PainCeptor Inc.

Field: biopharmaceuticals; corporate alliance initiatives with drug firms and academia, patent protection and commercialization of PainCeptor's technologies

Catharine E. G. Farrow
Chief Geologist
FNX Mining Company Inc.

Field: the formation of magmatic ore deposits; implications for new exploration methodologies

Peter R. Frise
Scientific Director and CEO, AUTO 21
University of Windsor

Field: the automobile of the future – fuels, electronic systems, materials and manufacturing, and health and safety of occupants and auto industry workers

Karim S. Karim
Silicon Thin-film Applied Research Group (STAR)
School of Engineering Science
Simon Fraser University

Field: Semiconductor circuit, device and process development for biomedical diagnostic and preventive care equipment including medical imaging applications

Joaquim R.R.A. Martins
Institute for Aerospace Studies
University of Toronto

Field: employing state-of-the-art technology in computing hardware & software to optimize aircraft configurations

Surajit Sengupta
NSERC Industrial Research Fellow
Electrovaya Corporation

Field: production processes in chemical and petrochemical plants; development of new cathode material for use in lithium ion batteries

John M. Shaw
Department of Chemical and Materials Engineering
University of Alberta

Field: petroleum thermodynamics; thermophysical properties of coal liquids, heavy oils and condensate-rich reservoir fluids

Virginia Wittrock
Research Scientist
Saskatchewan Research Council

Field: climate change impacts and adaptation research; drought research; teleconnection patterns research; climate trends analysis

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PAGSE Symposium 2006
Leaders in Innovation

Ottawa, March 30, 2006

Rx&D Boardroom, 12th Floor, Suite 1220, 55 Metcalfe Street, Ottawa

13:30	**Arrival** (Refreshments available)
14:00	**Welcome** *Jean Marion and Dawn Conway, PAGSE Symposium*
14:15	**Introductions**
14:30	**Roundtable discussion on Research and Innovation Policy** Moderated by: *Simon Hanmer, PAGSE Chair* *Jean Marion, PAGSE Symposium*
16:15-17:00	**Walk to Parliament Hill** Group photo in front of Parliament Buildings

Room 200, West Block, Parliament Hill, Ottawa

17:00	**Reception**
17: 45	**Welcome** *Simon Hanmer, PAGSE Chair*
17:55	**Introduction of PAGSE 'Leaders in Innovation' and Speakers** *Yves Morin, Co-Chair, Canadian Health Industry Partnership*
18:10	**Presentations** o *Catharine E.G. Farrow, Chief Geologist, FNX Mining Company, Inc.* o *Marcus Brady, Vice President Business Development, PainCeptor Inc.*
18: 25	**Question and Answer Period**
18:40	**Thanks to 'Leaders in Innovation'** *Brad Trost, M.P.*
19:00	**Reception ends**

Photos

Back row: Janet Walden, Mark Bisby, **Karim S. Karim, Joachim Martins**. *Second row*: **Peter Frise, Surajit Sengupta**, John ApSimon, Simon Hanmer, Yves Morin, Jean Marion, Dawn Conway. *Front row:* **Nadia Bhuiyan, Virginia Wittrock, Catharine Farrow, John Shaw and Marcus Brady.**

Brad Trost, MP, and Virginia Wittrock

Joachim Martins (centre) with Peter Boag, Aerospace Industries Association of Canada (right) and reception guest

Marcus Brady, presenting

Robert Livingston (*Merck Frosst Canada*), Virginia Bernier, and Brad Trost (MP, Saskatoon—Humboldt)

Reception guest and Peter Frise

Catharine E.G. Farrow, presenting

Reception guest, John Shaw (centre) and Graham Taylor