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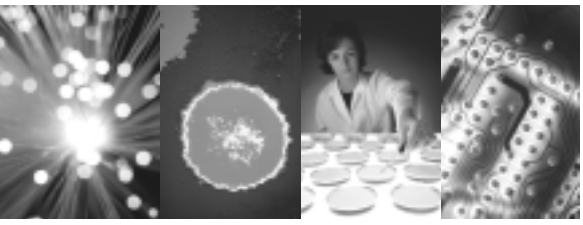
Natural Sciences and Engineering Research Council of Canada

NSERC Contact

Investing in people, discovery and innovation

Raw Material for the New Economy

Editorial by NSERC President Tom Brzustowski



There were no surprises for the NSE research community in this year's federal budget, but an excellent initiative was confirmed. The budget provided funds for the Canada Research Chairs that had been foreshadowed by the Prime Minister following the Throne Speech last October.

As this is being written, the rules governing the chairs are yet to be announced, but some things are already firm. The Chairs program will set up 2000 Chairs in five years, will have a mature cost of $300 million per year, and will be run through the granting councils. That means an average cost of $150,000 per Chair per year. The Budget plan indicates an equal split between senior and junior scholars, and that is consistent with the expectation that the senior Chairs will bring $200,000 per year to the universities and junior Chairs $100,000. The budget allocates $60 million in 2000-2001 to launch the program.

I now expect that the NSE community will be allocated 45% of the total, or 900 Chairs, and that $27 million will be provided to NSERC in 2000-2001.

When I discussed this with the Grant Selection Committees in February, they all agreed that the Chairs would provide a great boost to university research. They would fall much more on the Research Grants side of NSERC than on the Partnership side, since there was no targeting of areas and no need for matching funds. However, the GSC's could also see some potential problems with the Chairs program, and particularly that it would create a new pressure on NSERC's budget.

I think the GSC's are right. The money for the Canada Chairs will be an addition to NSERC's budget, but it will flow straight through to the universities that get the Chairs. The universities will probably have great flexibility in how they spend the funds to support the research of the Chairs, but I don't think for a moment that these funds will eliminate the need for NSERC support for the Chair holders, and I certainly expect them to apply to all our programs.

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NSERC is Canada's instrument for promoting and supporting university research in the natural sciences and engineering, other than the health sciences.

NSERC supports both basic university research through research grants and project research through partnerships of universities with industry, as well as the advanced training of highly qualified people in both areas.

Continued from cover page

The Prime Minister had identified two goals of the Chair program: to provide new opportunities for the best Canadian researchers and to attract the best scholars from abroad to work in Canada. Let's assume that 450 of the Canada Research Chairs in the NSE are new to the NSERC system. These people will be chosen for their excellence in research, and therefore they can be expected to succeed very well in our competitions. If they obtain an average grant of about $100,000 per year, that will constitute a new pressure of about $45 million on the annual Research Grants budget. This will have to be met with new funding, otherwise the investment in the Canada Chairs will not bring the desired returns.

In this aspect, the GSC's saw the Canada Research Chairs as similar to the Canada Foundation for Innovation. The CFI provides Canadian researchers with very important facilities and equipment for their work, but it offers no support for operating them. The GSC's are already seeing that researchers are looking to NSERC research grants for funds to operate their new research infrastructure.

The CFI has received $900 million of additional endowment in the 2000 budget, bringing its total federal funding to $1.9 billion. At the required 40-60 matching, and taking into account the interest earned on the endowment, *Budget Plan 2000* (p.108) predicts a total investment of about $5.5 billion in new research infrastructure. The record of CFI to date shows that close to half of its funding goes to the NSE community. That means that researchers supported by NSERC will be operating new facilities and equipment worth about $2.7 billion. They will be responsible for their operation and upkeep, paying for consumable supplies, maintenance, repairs, and in many cases the services of highly specialized dedicated staff.

Where will the money for that come from? Given the weak core funding of Canadian universities, it certainly won't all come from the universities themselves. To make a rough estimate of the pressure on the NSERC budget, I will assume that half of it will be paid by the universities and that the annual operating cost will average out at 10% of the capital cost. That means a new pressure of $135 million per year on the NSERC budget.

The Canada Research Chairs and the CFI together will produce a new pressure of $180 million per year on the NSERC budget, roughly a third of our total budget for 1999-2000. That pressure won't come all at once. It will build up gradually over five years, and the CFI part of it has already started to be felt in the competition just held. And the new pressure can't be met out of the present budget that, with a funding rate of 40%, is clearly insufficient to meet even the existing needs of NSE researchers. New money must begin to flow to NSERC for that purpose next year.

The Canada Research Chairs and the CFI are wonderful initiatives, much needed by Canada's research community in the natural sciences and engineering. The government investments in both programs are timely and substantial. But to receive the expected return on those investments, the government must complete the job and provide the money to support the people and facilities that it is putting in place. The government's next goal in research and innovation must be completeness of the initiatives already launched.

In his budget speech, Minister Martin listed four factors needed to equip Canadians to succeed in the new economy. The second one was: "Basic research – the raw material of the new economy." That's a wonderful metaphor, and it too invites a call for completeness. Raw materials constitute a resource that requires investment to be discovered. After that it needs adequate investment to be developed. Even then, raw materials on their own are not nearly as valuable to a nation as finished products. That all means that if Canada is to derive maximum benefit from its university research capacity, the means must be found to invest adequately in the complete innovation system, for all the reasons so eloquently stated in the February Budget Speech.

NSERC Prize Winners

The NSERC E.W.R. Steacie Memorial Fellowships and Doctoral Prizes are two of Canada's most important research prizes.

The prestigious Steacie Fellowships are awarded to enhance the career development of outstanding and highly promising scientists and engineers who are staff members of Canadian universities. Successful fellows are relieved of any teaching and administrative duties for two years.

The NSERC Doctoral Prizes are awarded in recognition of high-quality research conducted by students completing their doctoral degrees. Two awards are available in the natural sciences and two in engineering.

The winners will be presented with their awards at a ceremony in late November.

At the same time, NSERC will honour the first winner of the new $1 million Gerhard Herzberg Canada Gold Medal for Science and Engineering.

Eight Canadians have been named winners of the 2000 NSERC Steacie Fellowships and Doctoral Prizes. The announcement was made in early February by the Hon. Dr. Gilbert Normand, Secretary of State (Science, Research and Development), and Dr. Tom Brzustowski, President of NSERC.

2000 NSERC Steacie Fellows

Dr. Bruce Balcom
University of New Brunswick

Joy Cummings, UNB Audio Visual

Dr. Bruce Balcom

Dr. Bruce Balcom has earned a worldwide reputation for developing a technique that allows a device called a magnetic resonance imager to peer deep inside rigid materials and display subtle detail and changes within them. The stunning, non-invasive 3-D scans are giving scientists and engineers whole new worlds of physical, biological and chemical phenomena to explore. Researchers can now detect structural changes in materials as diverse as human bone and rigid plastics, watch the process of water freezing inside concrete, observe glue penetrate within wood and detect previously invisible clues to climate change in sediment deposits. The tool has allowed Dr. Balcom to make fundamental advances in materials science, as well as contribute practical insight to food and industrial processes.

Dr. André Charette
Université de Montréal

Bernard Lambert, Université de Montréal

Dr. André Charette

Dr. André Charette is known internationally for blazing new trails and finding shortcuts in the synthesis of complex, biologically active molecules. He has invented powerful techniques for constructing molecules of very precise shapes and characteristics – traits that determine the molecules' desired effects. Besides being of fundamental importance in chemistry, his advances are attracting strong interest from chemical and pharmaceutical manufacturers. Beginning with the successful, complete synthesis of the antibiotics Calcimycin and Indanomycin during his graduate studies, he has rapidly emerged as one of the most creative and productive researchers in his field.

Dr. Chris Le
University of Alberta

University of Alberta

Dr. Chris Le

Dr. Chris Le is an analytical chemist known internationally for his work investigating chemical contaminants in drinking water and food. The analysis techniques that he has developed to detect and characterize arsenic compounds have been enthusiastically welcomed by health researchers worldwide. Another remarkable new technique developed by his team can detect one impaired DNA base among a sample of one billion healthy ones. It promises, amongst other things, better measurement of the impact of radiation doses in cancer therapy.

Dr. Wayne Grover
University of Alberta

University of Alberta

Dr. Wayne Grover

Dr. Wayne Grover is an international leader in the theory, design and operation of "self-healing" networks – communications networks that survive physical failures through fast, highly efficient means of self-organized reconfiguration. His theoretical and practical advances constitute a foundation technology that will allow networks to keep up with the explosive growth in broadband communications. A landmark paper that he wrote on this topic in 1997 earned him the top research paper award last year from the Institute of Electrical and Electronics Engineers, the largest engineering and research professional organization in the world.

(continued on page 4)

Continued from page 3

2000 NSERC Doctoral Prize Recipients

Dr. Annamalai Annamalai Jr. has developed novel mathematical theory and tools that will have a profound impact on the design of high-speed digital wireless communications systems in the future. The benefits of his design tools include more reliable, faster and more accurate predictions of the wireless systems' performance at a fraction of computer simulations' run time and cost. Dr. Annamalai Jr. obtained his doctorate in the Department of Electrical and Computer Engineering, **University of Victoria**.

Dr. Ramachandra Achar's computer-aided design tools allow accurate modelling of the blisteringly fast signal operations of advanced circuit boards and computer chips. His techniques, which are being considered for adoption by some of the world's leading manufacturers, lead to shorter design times and more reliable products. Dr. Achar obtained his doctorate in the Department of Electronics, **Carleton University**.

Dr. Mark John MacLachlan has made spectacular contributions to the chemistry of inorganic polymers and materials. His talent for developing entirely new areas of materials research was revealed in a recent series of major papers published in the world's leading international science jounals. He obtained his doctorate in the Department of Chemistry, **University of Toronto**.

Dr. Carole Lyn Yauk's research has been instrumental in showing that gulls living in contaminated environments near steel mills inherit significantly more mutations than gulls from rural locations. Her work – an important advance in the assessment of environmental genotoxins – has attracted international attention. She obtained her doctorate in the Department of Biology, **McMaster University**.

Council Membership News

Amit Chakma

University of Regina

Martin Godbout

Photo Luc Bergeron, Québec

In November 1999, John Manley, Minister of Industry, and Gilbert Normand, Secretary of State (Science, Research & Development) announced astronaut Julie Payette's reappointment to NSERC Council for a second term and the appointment of two new members, Martin Godbout and Amit Chakma.

Dr. Godbout, who holds a B.Sc. in biochemistry and a Ph.D. in physiology and molecular endocrinology from Laval University, heads Genome Canada. He has authored or co-authored more than 60 publications and is a member of the board of directors of several biopharmaceutical companies, foundations and scientific organizations, including the Biotechnology Human Resources Council (BHRC), Quebec Bio-Industry Association, the Medical Research Council's (MRC) Standing Committee on Business and the Conseil de la science et de la technologie du Québec. In 1999, he served as chair of the Selection Committee of the Canada Foundation for Innovation and currently serves in the same capacity for the Networks of Centres of Excellence.

Dr. Chakma is Vice-President (Research) and professor of environmental engineering at the University of Regina. He holds an M.A.Sc. and a Ph.D. in chemical engineering from the University of British Columbia. Dr. Chakma is a member of the board of directors for the Saskatchewan Population Health and Evaluation Research Unit, the Saskatchewan Research Council and TRLabs. In 1998, Dr. Chakma received Canada's "Top 40 Under 40 Award" in recognition of his outstanding achievements in leadership.

E-business Means E-nabling, E-xtending, and E-nriching

SSHRC and NSERC are jointly planning to expand their use of web-based technologies to improve service to clients.

Project director Christiane Villemure says their goals are:

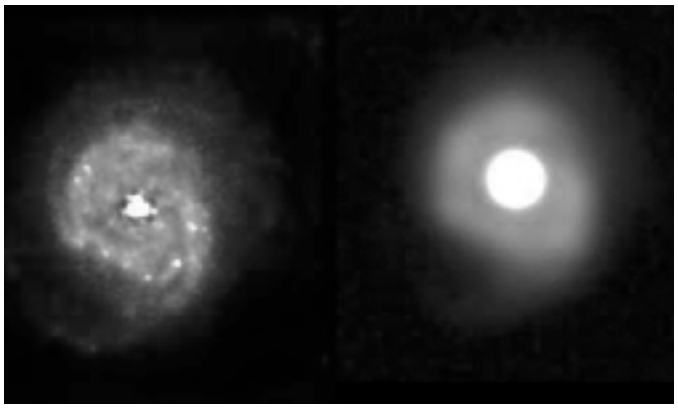
- improving the application process for grants and scholarships;
- streamlining the administration of awards; and
- facilitating communications with universities and other groups.

"The first stage of the project will be to develop an overall e-business strategy and implementation plan for the coming years," says Ms. Villemure. "We want the community to be involved throughout the project. We're currently setting up an advisory group composed of members of the community and key organizations."

Both Councils have given this initiative a high priority. For more information, send an e-mail to: christiane.villemure@nserc.ca.

Unscrambling Research – Egghead Style

The fall series of these very popular lectures, which are co-sponsored by NSERC and PAGSE (The Partnership Group for Science and Engineering), moved into high gear with a presentation by NSERC University Faculty Award holder and York University professor Dr. Diane Michelangeli. Dr. Michelangeli reviewed the major Canadian atmospheric research issues and the impact of the atmosphere on the quality of life in the country. In early December, Sydney Pugh of Millenium Biologix Inc., Kingston, talked about his company's involvement in forefront research on osteoporosis, a debilitating condition shared by older persons...and astronauts. Members of Parliament got a firsthand look at an experimental apparatus built by his company for the John Glenn space shuttle mission.



The new year dawned with an inspiring tour of the universe and a history of astronomical advances from Stonehenge to GEMINI, the brand new international telescope project, in which Canada is playing a major part. The speaker, Laval professor, author and Canadian Gemini project scientist Jean-René Roy, was interviewed by Tom Spears of the Ottawa Citizen. The "before and after" photograph demonstrates how new "adaptive optics" technology permits ground-based telescopes to produce fine infra red detail in deep space images.

NSERC Upgrading Its Environmental Assessment Procedure

NSERC is revising its procedures to enable it to better identify projects that might have an environmental impact, and to determine how the environmental assessment (EA) of such projects should be conducted under the *Canadian Environmental Assessment Act*.

To ensure such projects are properly identified, NSERC will require more information on applicants' proposed research. To that end, the 2000 *Researcher's Guide* will include a section on environmental assessment and Form 101 (Application for a Grant) will be modified as well.

The information researchers provide on the revised application form will assist staff in determining whether the proposed research requires an environmental assessment under the Act. When an environmental assessment is deemed necessary, NSERC will contact the researchers involved and provide them with information on the Council's EA process.

Under the Act, NSERC cannot release funds until an acceptable environmental assessment is received and it has been clearly demonstrated that the project is not likely to cause significant adverse environmental effects. If the project is likely to have a significant environmental impact, it may still be approved if it has been shown that appropriate mitigation measures will be put in place.

Check NSERC's Web site regularly this summer and read the fall edition of *Contact* for more information about EA and NSERC's EA process. If you have any questions in the meantime, please contact Robert Roy, Environmental Assessment Coordinator, by e-mail at robert.roy@nserc.ca, or by phone at (613) 995-8079.

Wanted: Committee Member

Renewal of NSERC's peer review committees depends on finding experts who are not only interested in serving on our committees but willing to do so. Although we are quite familiar with the pool of potential members from universities, we have more difficulty identifying potential members from the private or government sectors. Also, while it is our intention to include graduate students and postdoctoral fellows on our Scholarships and Fellowships committees, we only know about a fraction of this talent pool.

The principles governing membership on our committees and the nomination form are posted on our Web site at www.nserc.ca/comme.htm.

If you know someone who would be a good committee member, please let us know.

NCE News

Three New NCEs to Support Aquaculture, Develop New Vaccines, and Fight Strokes

On February 11, Minister of Industry John Manley and Minister of Health Allan Rock announced that the Government of Canada will invest $13 million per year in three new Networks of Centres of Excellence (NCEs):

AquaNet (Network in Aquaculture)

Over the last 20 years, aquaculture has been a growth industry in Canada, generating significant revenue and jobs in rural communities, with nearly half of the industry's workers, in 1996, aged less than 30.

Nonetheless, the sector operates in a very challenging environment. The global marketplace is very competitive. Research is key to growth, competitiveness and exploitation of new biological and technological developments to enhance production.

To be sustainable, though, the industry's growth must also incorporate sound environmental practices, as the viability of aquaculture is directly dependent on the maintenance of a healthy and productive aquatic environment.

AquaNet's goal is to help secure the future of the Canadian aquaculture industry by increasing the efficiency of production through species diversification, biotechnology, environmental sustainability and training of highly qualified personnel.

CANVAC (Canadian Network for Vaccines and Immunotherapeutics of Cancer and Chronic Viral Diseases)

Chronic viral diseases and cancer exert a heavy burden on society in terms of lives and economic factors. Cancer is the second leading cause of death in Canada and around the world. It is estimated that as many as 200 million people worldwide, including approximately 275,000 in Canada, harbour the hepatitis C virus. Every day, some 16,000 people around the world are infected with HIV (human immuno-deficiency virus), the virus that causes AIDS (acquired immuno-deficiency syndrome).

Vaccine development and production in Canada have been highly successful areas of research and business for the past 25 years. The discovery of the T-cell receptor by Canadian investigators has allowed better understanding of the fundamental immune processes involved in controlling chronic diseases. It is now possible to envision the development of immunotherapeutic strategies for the prevention or treatment of chronic diseases such as some forms of cancer, AIDS and hepatitis C, through the triggering of a protective immune response.

CANVAC is a network of renowned Canadian scientists specializing in the fields of immunology, virology and molecular biology. In partnership with Canadian biopharmaceutical companies, it is jointly aimed at developing safe and effective vaccines to protect people from cancer and life-threatening viral infections, such as hepatitis C and AIDS.

CSN (Canadian Stroke Network)

A person is afflicted by a stroke every 10 minutes in Canada. Strokes commonly result in death or in enormous disability to victims. For every 10 Canadians suffering a stroke, two will die, six will have varying degrees of disability, and two will achieve some neurological recovery but will have a diminished quality of life.

But there is hope. Studies indicate that many strokes are preventable and that controlling risk factors, such as high blood pressure, cholesterol and heart disease, decreases the incidence of strokes.

The CSN aims to develop innovative prevention and recovery strategies through multidisciplinary and multisectoral research. The network proposes a broad approach that would link education, prevention strategies for recovery and rehabilitation, and research to further our understanding of brain injury, repair and functional recovery after a stroke.

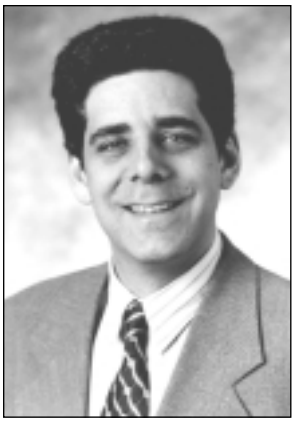
2000-02 NCE Targeted Competition

The Government of Canada recently launched a $13-million targeted NCE competition. Letters of Intent are invited for potential new NCEs in the following areas: The Automobile of the 21st Century; Genomics Technologies and Society; Meeting Environmental Challenges for Clean Water; Early Child Development and Its Impact on Society. The deadline for the receipt of the Letters of Intent is May 1, 2000, and selected groups will be invited to submit full proposals by October 2, 2000.

For more information on the current networks or the upcoming competition, consult the NCE Web site at www.nce.gc.ca.

NSERC and the NCEs Are Each Gaining a Full-Time Director!

Since March 1998, André Isabelle has been heading NSERC's Strategic Projects and Research Networks Division, while at the same time managing the Networks of Centres of Excellence program. Following the NCE program's 63% budget increase last year, however, the NCE Steering Committee decided that the program should have its own full-time director.



Stephen Fenn Photography

André Isabelle

As a result, André decided to return to full-time NSERC service, not only to run the Council's Strategic Projects and Research Networks programs, but also to take on the challenging task of being NSERC's representative in the process of designing the administration of the 2,000 Canada Research Chairs. The chairs are to be established by 2005, thanks to a $900-million investment to be channelled through the granting councils' budgets. A biology science graduate from the University of Ottawa, André held various program officer positions in NSERC's Research Grants and Scholarships Divisions prior to assuming his position as director two years ago.

Jean-Claude Gavrel recently became the NCE program's first full-time director. He is a computer science graduate of the University of Ottawa with over twenty years' experience in the delivery and management of high-tech product development and research programs. Jean-Claude has also worked for CATA*Alliance* (the Canadian Advanced Technology Alliance) and the Scientific Research and Experimental Development Tax Credit Program of the Canadian Customs and Revenue Agency. He also served as Vice-President of PRECARN, the industry-led consortium that manages one of the NCEs, the Institute for Robotics and Intelligent Systems.

Photographic Illustrations

Jean-Claude Gavrel

Duration of Support for Postdoctoral Fellows

Up till now, the maximum period that a postdoctoral fellow (PDF) can be paid from NSERC grant funds has been two years. Recently, members of the physics community have pointed out that this restriction can limit the ability of Canadian researchers to attract top foreign PDF candidates, since their foreign colleagues are able to make three-year offers to PDFs. Furthermore, while PDFs who are Canadians or landed immigrants can be paid from grant funds for a longer period by changing their status, to research associate for example, immigration rules make this difficult for foreign PDFs.

This matter was discussed by the Committee on Research Grants (CORG) last November. The Committee was not in favour of extending the maximum period of support for PDFs and **recommended that it remain unchanged**. CORG was concerned that extending the maximum period of support could contribute to fellows spending increased time in PDF positions. The Committee wishes to encourage instead the transition of PDFs to more permanent positions (with employment benefits) within or outside academia.

However, to address the concerns raised, CORG agreed to give researchers the authority to decide, **on an exceptional basis**, when a longer period of support is warranted. The decision to offer support for up to three years must be made up front to attract foreign candidates; it cannot be made once the PDF has started his/her position. This requirement, of course, would not preclude a periodic review of the PDF's performance and a shortening of the period of support, if warranted (and permitted by university policy).

Grantees who use this exception are required to inform NSERC in writing, within one month of an offer being accepted, and explain their reasons. This will enable CORG to monitor the number of cases where the duration of support is beyond two years and the circumstances surrounding such cases. The policy will be revisited after one year.

Researchers who make a three-year offer to a foreign PDF candidate must send a short justification to Dr. Lalita Acharya, Program Officer, Research Grants (lalita.acharya@nserc.ca) explaining the circumstances.

Review of the Research Grants Program Under Way

The review of the Research Grants Program is now officially under way. NSERC is required to periodically evaluate all its programs in order to demonstrate to its major stakeholders – Parliament and Treasury Board – their effectiveness and impacts.

A number of issues were identified following extensive consultations with chairs of grant selection committees, vice presidents, research, at Canadian universities, and NSERC senior management. A strong focus of the study will be on the results and impacts of the program and the extent to which it meets its objectives. Other issues that were raised include the role of NSERC within the university research community; the extent to which the program funds high risk research and interdisciplinary research; and a number of design and delivery questions.

Following a competitive bidding process, the ARA Consulting Group, a division of KPMG Consulting, has been awarded a contract for the design phase of the study. Different methodologies will be used including case studies, bibliometrics, surveys of the research community and other stakeholders, benchmarking, and file reviews. We expect to carry out the survey of grantees during April and May. The final report should be available early next year.

The collaboration of the research community will be essential to the success of this study, so we encourage you to take the time to provide input if you are contacted.

Fund Opens International Doors

Thinking about international collaboration? Hoping to join an international research program or project? The International Opportunity Fund (IOF) can provide funds to help you open those international doors. The program provides support to groups of Canadian researchers planning new international research collaborations, and assists in joining existing groups abroad. It also provides funding for Canadian reseachers to participate in specific international activities such as workshops and symposia at which new international collaborations are planned, and other pre-research stages of international collaborative research projects and programs. For more information about the IOF program, contact Madeleine Bastien, IOF officer, in NSERC's Research Grants division at (613) 996-7041, or visit our Web site at www.nserc.ca/intern/iof.htm.

Call for Nominations for Third Reallocations Exercise

Every four years, up to 10% of the Research Grants Program budget is redistributed according to the changing needs and priorities of the Canadian science and engineering research community.

Researchers are encouraged to organize their discipline now to begin the process of preparing reallocation submissions due January 2002.

As in the past, Steering Committees that represent the discipline communities within the current Grant Selection Committee (GSC) structure will make the submissions to NSERC. Disciplines will also be encouraged to get together to propose interdisciplinary or multidisciplinary initiatives.

At this time, NSERC solicits nominations of suitable individuals (people with vision, breadth and judgement) who are willing to serve on the Steering Committees.

The deadline for receipt of all nominations is May 15, 2000.

Individuals, groups or organizations may make one or more nominations to one or more Steering Committees.

GSCs will review the nominations and finalize the memberships.

The NSERC Web site will be the source for complete information and all the latest news on the new Reallocations exercise. Check the Web site now for the full description of the process, including procedures for nominating Steering Committee members.

www.nserc.ca/programs/rea/2000-e.htm