

## Management Response to the International Review of the Discovery Grants Program

**Background:** In 2006, the Government of Canada carried out a review of the Natural Sciences and Engineering Research Council (NSERC) and the Social Sciences and Humanities Research Council (SSHRC)<sup>1</sup>. The review recommended, among other things, that:

*NSERC (and SSHRC) should take steps to demonstrate to themselves, to their research communities and to the government that their research funding programs are truly aimed at supporting excellence in research.*

*NSERC should commission an international review team and consult the relevant Canadian stakeholders to determine whether its current awards/applicants funding ratio of 75% in discovery research is consistent with international standards of excellence and whether this funding approach is appropriate. The results of this review should be communicated to the government and made public.*

The concern in respect of NSERC related primarily to its Discovery Grants Program (“DGP”), which has a relatively high success rate compared with programs of other research granting bodies in Canada and abroad – currently about 70% of DGP applications are funded. To address this and related issues, NSERC established an International Review Committee (the “Committee”) to consider whether the DGP, together with the other NSERC programs, were able to support the best researchers at a level sufficient to perform at a world-class standard.

### Charge to the Committee:

The charge to the Committee was as follows<sup>2</sup>:

*To what extent is NSERC successful in supporting the best researchers at a world-class level through its overall suite of programs? To what extent is the research supported through the Discovery Grants Program having an impact on the international scene?*

*What should be an appropriate balance between the following two objectives of the Discovery Grants Program: “promoting and maintaining a diversified base of high quality research capability in the natural sciences and engineering in Canadian universities” and “fostering research excellence”?*

*To what extent is the philosophy of the Discovery Grants Program suited to the Canadian context and Canada’s needs for research results and highly qualified personnel?*

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<sup>1</sup> Unpublished – December, 2006

<sup>2</sup> The Committee slightly simplified and re-ordered the questions put to it while preserving the original intent.

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To these questions, the Committee itself added a further charge:

*How should the Discovery Grants Program be improved?*

The International Review Committee submitted its report in April 2008. It is available on the NSERC web site at (English) [http://www.nserc.ca/about/consultations\\_e.asp](http://www.nserc.ca/about/consultations_e.asp), (French) [http://www.nserc.ca/about/consultations\\_f.asp](http://www.nserc.ca/about/consultations_f.asp).

In its report the Committee makes five recommendations which are listed in the following table. NSERC Management response to these recommendations as well as associated comments, responsibility centre and timelines are included in the table alongside each recommendation. The NSERC Management action plan to respond to each recommendation is detailed in the indicated Annexes. The recommendations of the Committee with respect to the Discovery Grant adjudication process and the structure of the Grant Selection Committees (GSCs) are closely aligned with the recommendations made by the GSC Structure Advisory Committee, i.e. the “Sedra” Committee (report available on the NSERC web site at (English) [http://www.nserc.ca/about/consultations\\_e.asp](http://www.nserc.ca/about/consultations_e.asp), (French) [http://www.nserc.ca/about/consultations\\_f.asp](http://www.nserc.ca/about/consultations_f.asp)) to which the Committee refers in its report. The “Sedra” Committee more specifically examined the structure and processes of the NSERC Discovery Grant Selection Committees.

General comments on the report: NSERC is very pleased with the rigor and diligence exercised by the International Review Committee in its assessment of the Discovery Grants program. The Committee took great care to familiarize itself with the Canadian research environment and to absorb and understand the extensive data provided as part of this review. NSERC also greatly appreciates the feedback received for this review from academic, industrial and government researchers, both Canadian and international, who have participated at one time or another as grantees, external reviewers or GSC members in the adjudication of Discovery Grant applications. Their insight on how the Discovery Grants program works and how it is perceived both nationally and internationally was extremely valuable. A word of appreciation also goes to the numerous scientific and engineering societies, committees of Deans of Science and Deans of Engineering and committees of Department Heads, which took the time to express their views on the value and outcomes of the program. All in all, NSERC has found the process to be extremely valuable in terms of the perspective it gives on the DG program and believe it is an exercise that should be repeated on a regular basis, perhaps every 10 years or so. NSERC Management believes the Committee report provides a strong validation of the philosophy underpinning the Discovery Grants program, which is to provide broad-based grants-in-aid for ongoing programs of research that are deemed internationally competitive through a rigorous peer review process. At the same time, Management accepts the findings of the committee that there are areas in which the Discovery Grants review process can and should be improved, and that making such improvements will strengthen the confidence that the research community, the government and the public have in the Discovery Grants program.

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Recommendations	Management Response	Comments	Action Plan	Responsibility	Timeline
<p><b>1. An applicant’s previous Discovery Grant should not be the starting point for a new grant.</b> There is evidence that Grant Selection Committees (GSCs) may sometimes rely too much on the amount of an applicant’s previous grant and are conservative in making changes to an award from one funding cycle to the next. To ensure that grants are entirely merit-based, and thus to increase the funds available for strong proposals, the Committee recommends that:</p> <ul style="list-style-type: none"> <li>• Each GSC should first rate the proposals under consideration according to merit criteria and <i>without reference</i> to the proposer’s prior grant amounts, requested budget, or a “need for funds” criterion.</li> <li>• The merit rating would assign proposals to a number of “bins” – e.g., “Must fund”, “Fund if resources are available”, “Possibly fund”, and “Do not fund” – perhaps using some measure of forced distribution to prevent rating inflation.</li> <li>• Only after all proposals have been merit-rated in bins, should the GSCs consider the allocation of funding (based on the requirements set out in the proposal budget).</li> <li>• A separate merit-rating process and funds allocation should continue to be set aside to support <i>early-career</i> researchers. The current NSERC target guideline of 50% success for this group is reasonable, subject to assurance of high quality.</li> <li>• NSERC should review its current selection criteria to include elements such as the potential for the research to be “transformative” and to better define the intent of the “need for funds” criterion.</li> </ul>	<p>Agree</p> <p>Agree</p> <p>Agree</p> <p>Agree</p> <p>Agree</p> <p>Agree</p>	<p>This recommendation addresses the issue of historical grant level having a disproportionate influence on future funding level. Concern has been expressed that the DG program uses existing grant levels as the starting points for moving slowly up or down in funding rather than focusing on overall merit as the main driver for establishing grant levels. Because of this, it was felt that rising stars were not able to get sufficient support for their research programs quickly enough. Also, the perception in the community is that if a grantee had the misfortune of applying for an initial grant or a renewal in competition years with particularly severe budgetary constraints, the grantee would remain disadvantaged throughout his or her career because of the influence of this grant level on subsequent funding recommendations. It is important to mention that the implementation of this recommendation will not affect the principle of stability inherent to the program as the applicant’s research record will remain an important factor in determining the value of the grant applied for.</p> <p>Implementation of this recommendation will profoundly change the current adjudication process, since it will separate merit assessment from funding recommendation.</p>	<p>See Annex 1</p>	<p>Research Grants program staff</p>	<p>Partially implement in 2009, full implementation by 2010 or 2011.</p>
<p><b>2. Increase the number of Discovery Accelerator Supplements*.</b> The Accelerators are a particularly effective way to encourage excellence by helping researchers with unusually promising and timely ideas to “seize the moment”. The</p>	<p>Agree</p>	<p>The Accelerator Supplements are a useful mechanism to quickly ramp up the research programs of promising researchers. NSERC agrees that, with the current process of Discovery Grant</p>	<p>See Annex 2</p>	<p>Council</p>	<p>As permitted by funding increases to Council’s budget</p>

\* NSERC has recently established this new category of award, within the DGP, to support a select group of grantees whose research shows exceptional promise of rapid and significant progress. Currently, NSERC makes available each year 100 three-year “Accelerator” awards (\$40,000 per year).

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<p>Committee recommends doubling the annual limit on new Accelerators supplements to 200. This increase should not be at the expense of existing programs but rather continue to be from new funds received by NSERC.</p>		<p>adjudication, these supplements are an effective tool to quickly elevate funding levels of meritorious individuals and accelerate the progress of their research. They help mitigate the concerns raised over undue conservatism and grant inertia. NSERC also believes that the Accelerator Supplements also address, at least in part, the recommendation to the effect that the criteria should include the potential for the research to be transformative. It remains to be seen whether Accelerator Supplements will still be needed once we establish the separate merit rating and funding allocation mechanism, and we will monitor their continued need on a regular basis.</p>			
<p><b>3. Revise the Grant Selection Committee structure.</b> The Committee would endorse proposals to:</p> <ul style="list-style-type: none"> <li>• Cut the number of GSCs from the current 28 roughly in half (with the details to be advised by the ‘Sedra’ committee). This would facilitate assessment of transdisciplinary proposals and, by virtue of substantial structural rearrangement, reduce any “inertial” tendencies implicit in the long-standing existing GSC set-up;</li> <li>• Increase the number of GSC members who are based outside Canada. Roughly doubling the current proportion to about 15% would be an appropriate target. NSERC should streamline GSC procedures to make membership more attractive for non-Canadians;</li> <li>• Ensure that every DGP proposal has at least one reviewer from abroad providing a written report.</li> </ul>	<p>Agree</p> <p>Agree</p> <p>Agree</p>	<p>NSERC agrees that creating broad groupings of research areas, which would be primarily disciplinary but possibly thematic where appropriate (e.g., environment), would improve the peer assessment of proposals. This structure would allow more of a customized approach to membership of the smaller sections within the broad groups, and would even allow “borrowing” members from other groups as needed. There would be fewer boundaries and more fluidity of membership to assess better a particular set of proposals. In making these changes we will ensure that we retain the strengths of the current process while improving those aspects, such as review of proposals in emerging research areas or at the boundaries of current GSC expertise, that would benefit from the new approach. NSERC realizes that organizing this kind of structure presents important logistical and scheduling challenges but believes that these can be overcome.</p> <p>With respect to increasing the percentage of international members and to “ensuring” that each application had at least one reviewer from abroad providing a written report, NSERC agrees that these</p>	<p>See Annex 3</p>	<p>Research Grants program staff</p> <p>Research Grants program staff</p> <p>Research Grants program staff</p>	<p>2010 or 2011 competition</p> <p>Start moving towards this objective with the 2009 competition</p> <p>Start moving towards this objective with the 2009 competition</p>

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		are desirable objectives, but is not able to “guarantee” that this will be achieved. We will strive to double the international membership and to obtain at least one written review from abroad. We will also document our efforts to do so.			
<p><b>4. Increase support for training of highly-qualified personnel.</b> This is especially needed for postdoctoral fellows (PDFs) coming from abroad, who are not currently eligible for <i>direct</i> NSERC program support. (DGP grant holders can, at their discretion, use their funds to support foreign-based graduate students and PDFs). The Committee recommends that:</p> <ul style="list-style-type: none"> <li>• Canada strengthen its ability to attract international PDFs and specifically endorses NSERC’s proposed new CREATE program;</li> <li>• New mechanisms be developed to encourage Canadian PDFs who study abroad to return to Canada. This could perhaps be modeled after the NSF CAREER awards or the “Future Fellowship” of the Australian Research Council.</li> </ul>	<p>Agree</p> <p>Agree</p> <p>Requires further study</p>	<p>A critically important aspect of the Discovery Grants program is the support of highly qualified personnel. More than half of all grant expenditures are for training. Additionally, the Accelerator Supplements will enable the hiring of more PDFs.</p> <p>The CREATE program is seen as a key mechanism for attracting PDFs from abroad and retaining Canadian PDFs in Canadian labs. Any successful strategy for repatriating Canadian PDFs must be linked with career opportunities at home.</p>	<p>See Annex 4</p>	<p>Research Grants and Scholarships Directorate</p> <p>Scholarships program staff</p> <p>Research Grants and Scholarships program staff</p>	<p>CREATE program will award its first grants in 2009</p>
<p><b>5. At a minimum, the DGP should be funded at a level sufficient to keep the average grant-size from decreasing in real (constant dollar) terms.</b></p> <p>The Committee considered proposals that have been put forward from time to time to place upper and/or lower bounds on the size of Discovery Grants. It concluded that <b>there should not be a uniform NSERC-mandated lower limit on the size of a Discovery Grant.</b> It may nevertheless be appropriate to establish minimum grant-sizes based on discipline-specific factors and thus varying across Grant Selection Committees. The Committee also concluded that <b>there should not be an upper limit – either absolute or varying by discipline – on the size of grants.</b> This would limit a GSC’s discretion to support outstanding proposals.</p>	<p>Agree</p> <p>Agree</p> <p>Agree</p>	<p>The current pressure on the DG budget is a serious, fundamental problem. With respect to Canada’s ability to attract excellent researchers, members of the RGS advisory committee (COGS) have emphasized to NSERC that many individuals have been attracted by various Chair programs, but some of these are leaving when they find they are unable to secure sufficient funds through the DGP to set up a research program. NSERC recently introduced guidelines to GSCs promoting minimum grant levels that reflect the practical lower limit required to accomplish useful research and training within a given discipline. This usually is the amount required to support at least one student with some funding for materials. GSCs can still recommend amounts lower than this minimum where a compelling case has been made.</p>	<p>See Annex 5</p>	<p>Council</p> <p>Research Grants Program Staff</p> <p>Research Grants Program Staff</p>	<p>Already in effect</p> <p>Implementation beginning with the 2009 competition</p>

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### Additional issues raised in the International Review Committee report:

Support for broad-based research:

Data presented to the Committee indicates that decreasing the success rate in the DGP in order to provide larger grants to top researchers would have a disproportionate effect on smaller universities. NSERC supports the finding that small grants should not be cut and, by extension, the success rate in the DGP is not too high because:

- small grants produce quality work,
- less populous provinces and smaller universities hold a larger proportion of the smallest grants; therefore, cutting the smaller grants from the DGP would have a negative effect on these universities (including specific geographical regions) selectively,
- the % of each DG spent on training was quite even across grant levels, but smaller grants tended to support a greater proportion of undergraduate and Master's students, whereas larger grants supported a greater proportion of PhDs and PDFs. By extension, it can be concluded that holders of small grants engage students in research at an earlier stage and thus play an important role in feeding the HQP pipeline.

A recent Statistics Canada report <http://www.statcan.ca/bsolc/english/bsolc?catno=11-622-MIE2008019> presents supporting data on the importance of maintaining the broad base of Discovery Grant support across all parts of Canada. The report found that “university degree holders in large cities are more prevalent and are growing at a more rapid pace than in smaller cities and rural areas.” The higher rate of growth was from both migration to and degree attainment in the larger centres, with degree attainment playing a greater role. The report concludes that “it is less the ability of cities to attract human capital than their ability to generate it that underlies the high rates of degree attainment we observe across city populations.” Without a strong research base in smaller rural and urban universities, usually underpinned by the DGP, their ability to produce and retain highly qualified personnel would be lessened, and the trend would be for degree holders to be produced in or gravitate to the large urban centres. This would decrease the proportion of knowledge-based employment generation in the smaller centres.

Annex 1:

Recommendation: **An applicant's previous Discovery Grant should not be the starting point for a new grant.** There is evidence that Grant Selection Committees (GSCs) may sometimes rely too much on the amount of an applicant's previous grant and are conservative in making changes to an award from one funding cycle to the next. To ensure that grants are entirely merit-based, and thus to increase the funds available for strong proposals, the Committee recommends that:

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- Each GSC should first rate the proposals under consideration according to merit criteria and *without reference* to the proposer’s prior grant amounts, requested budget, or a “need for funds” criterion.
- The merit rating would assign proposals to a number of “bins” – e.g., “Must fund”, “Fund if resources are available”, “Possibly fund”, and “Do not fund” – perhaps using some measure of forced distribution to prevent rating inflation.
- Only after all proposals have been merit-rated in bins, should the GSCs consider the allocation of funding (based on the requirements set out in the proposal budget).
- A separate merit-rating process and funds allocation should continue to be set aside to support *early-career* researchers. The current NSERC target guideline of 50% success for this group is reasonable, subject to assurance of high quality.
- NSERC should review its current selection criteria to include elements such as the potential for the research to be “transformative” and to better define the intent of the “need for funds” criterion.

Action: Beginning with the 2009 Discovery Grants competition Research Grants program staff will start to move away from setting competition budgets for individual GSCs based on a historical proportion of the DG envelop. Competition budgets will instead begin to be based on population dynamics and cost of research. This will be a phased in approach over two competition cycles (10 years) to avoid drastic swings in budget levels. We will also begin to separate the assessment of merit from the recommendation of a grant amount. We will establish a “bin” rating system in 2009, with descriptors associated with each rating level to facilitate placement of applicants. By decoupling merit assessment from grant level recommendation GSCs will be free to place applicants in the appropriate rating bin, regardless of previous funding levels. We will continue to ask GSCs to assess early career applicants separately from established researchers. We will review our literature and focus on selection criteria based on excellence of the applicant, merit of the research (including potential to be transformative) and training of HQP. In addition, GSCs will be asked to factor in the relative cost of the research proposed in each application and they will assess the budget justification presented by each applicant. The “need for funds” criterion will no longer be considered.

Annex 2:

Recommendation: **2. Increase the number of Discovery Accelerator Supplements.** The Accelerators are a particularly effective way to encourage excellence by helping researchers with unusually promising and timely ideas to “seize the moment”. The Committee recommends doubling the annual limit on new Accelerators supplements to 200. This increase should not be at the expense of existing programs but rather continue to be from new funds received by NSERC.

Action: NSERC Management continues to support this mechanism as one way of disbursing increases to the NSERC budget and will increase the number of Accelerator Supplements as new funding becomes available in order to approach the target of 200 awards. Management will monitor the effectiveness of the Accelerator Supplement mechanism in the context of the changes that will take place to the Discovery Grants review process.

Annex 3:

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Recommendation: **Revise the Grant Selection Committee structure.** The Committee would endorse proposals to:

- Cut the number of GSCs from the current 28 roughly in half (with the details to be advised by the ‘Sedra’ committee). This would facilitate assessment of transdisciplinary proposals and, by virtue of substantial structural rearrangement, reduce any “inertial” tendencies implicit in the long-standing existing GSC set-up;
- Increase the number of GSC members who are based outside Canada. Roughly doubling the current proportion to about 15% would be an appropriate target. NSERC should streamline GSC procedures to make membership more attractive for non-Canadians;
- Ensure that every DGP proposal has at least one reviewer from abroad providing a written report.

Action: Research Grants staff is working towards implementing these recommendations over the course of the next two years. With respect to the first recommendation, staff has proposed a draft structure which is being validated through consultation with the research community. The target implementation date is for the 2010 competition. Our emphasis is on doing it right rather than on doing it quickly, because we do not want to lose the high level of community confidence that the review process currently has. With respect to the second and third recommendations, staff will begin implementation in the 2009 competition, recognizing that complete achievement of the goals may take some time. We will put in place mechanisms to more easily identify international reviewers who may have had at one time a Canadian connection, as these reviewers might be more inclined to participate. Staff will also consider options aimed at easing the workload of international reviewers so as to encourage greater participation. Also, staff will consider the feasibility of increasing the use of videoconferencing to ease the burden on members unable to travel or travelling long distances.

Annex 4:

Recommendation: **Increase support for training of highly-qualified personnel.** This is especially needed for postdoctoral fellows (PDFs) coming from abroad, who are not currently eligible for *direct* NSERC program support. (DGP grant holders can, at their discretion, use their funds to support foreign-based graduate students and PDFs). The Committee recommends that:

- Canada strengthen its ability to attract international PDFs and specifically endorses NSERC’s proposed new CREATE program;
- New mechanisms be developed to encourage Canadian PDFs who study abroad to return to Canada. This could perhaps be modeled after the NSF CAREER awards or the “Future Fellowship” of the Australian Research Council.

Action: The CREATE program is being implemented in the 2009 fiscal year, with up to 20 awards in the first competition and an additional 20 awards each year until 2014. This program will allow researchers flexibility in hiring both Canadian and foreign students and postdoctoral fellows as required by the research program. In addition, the Accelerator Supplements will provide \$40,000 per year over three years to 300 grantees (when steady state is reached), which will



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allow increased hiring of Canadian and foreign PDFs. Our objective is to increase this to 600 grantees per year (steady state). In addition, we are revising the eligibility criteria of the Industrial Research and Development Fellowships program (IRDF) to allow tenure of these fellowships by foreign PDFs. With respect to encouraging Canadian PDFs who study abroad to return to Canada we do not have specific actions yet determined, but will consider options that will link their return to career prospects in Canada. Research Grants staff will also consider other programs that exist to see whether they are worthwhile adapting.

Annex 5:

Recommendation: **At a minimum, the DGP should be funded at a level sufficient to keep the average grant-size from decreasing in real (constant dollar) terms.**

The Committee considered proposals that have been put forward from time to time to place upper and/or lower bounds on the size of Discovery Grants. It concluded that **there should *not* be a uniform NSERC-mandated lower limit on the size of a Discovery Grant.** It may nevertheless be appropriate to establish minimum grant-sizes based on discipline-specific factors and thus varying across Grant Selection Committees. The Committee also concluded that **there should *not* be an upper limit – either absolute or varying by discipline – on the size of grants.** This would limit a GSC's discretion to support outstanding proposals.

Action: With respect to funding the Discovery Grants program at a sufficient level, NSERC Management will communicate the results and recommendations of the International Committee report to the appropriate departments of the federal government and will refer to the report in presenting our budgetary requirements as part of the annual federal budget planning exercise. Within the parameters of the structural changes that will take place in the Discovery Grants program adjudication process, staff will continue to encourage the use of minimum grant sizes that are discipline specific. While no *a priori* upper limits will be established on the size of grants it must be recognized that there will be practical limitations based on the available budget and the move to the binning approach.