CANADIAN ASSOCIATION OF PHYSICISTS

ASSOCIATION CANADIENNE DES PHYSICIENS ET PHYSICIENNES

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Isabelle Blain, VP
NSERC
350 Albert St.
Ottawa, Ont K1A 1H5

Dear Isabelle,

The NSERC review of the Discovery Grants Program (DGP) in 2013-2014 is a very important exercise given the major changes to the DGP that have been implemented over the past five years. The CAP is very grateful for the invitation from NSERC to provide feedback.

The following response is based in part on the CAP/NSERC survey that was completed by members in May 2012. It was available to CAP members for a total of 6 weeks last spring and a total of 366 members responded to either the French or English version of the survey. The survey included seven multiple choice and two short answer question related to changes of the DGP. Please see http://www.cap.ca/en/news/2012-08-27/summary-capnserc-survey-results-and-observations for more information. The response is also based on discussions amongst the members of the executive and council of the CAP.

The CAP has identified three areas of concern that are particularly important to the physics community:

1. The DGP is the only program that funds basic research. It is crucial that the importance of this aspect of the DGP be clearly articulated and supported through design and implementation of the program.
2. We feel the new system is hard on new researchers and hope that this aspect of the program can be refined and improved.
    - The current system only makes adjustment for first time applicants. We do not feel this is sufficient. We suggest that the time period for early career and emerging researchers be extended, perhaps to 10 years past PhD.
    - We suggest that NSERC consider a three-stage system that mirrors the research expectations for professors at different stages: assistant, associate, and full.
    - Alternately, NSERC could maintain the current system, but add a supplement to each young researcher, perhaps from the DAS budget.
3. In general, the new system is overly rigid and algorithmic. Many of our members' concerns can be addressed by introducing a little more flexibility into the system. We recommend that
    - the EG be given more flexibility in deciding the weighting of the criteria, using the current algorithm as a guideline,

- the EG be given more flexibility in deciding the funding level of individual grants, using the current algorithm as a guideline, and
- the EG members be encouraged to make recommendations on grant length in exceptional circumstances.

Q.1 – *What role does or should the Discovery Grants program play in funding NSE research, including basic or fundamental research, high-risk research and multidisciplinary research?*

We note that basic research, by its very definition, includes both interdisciplinary research as well as investigations that are "high-risk" in the sense that the time-frame for technological/economic returns, if any, are unknown at the outset. Thus we do not comment on these separately in the present context. The CAP feels that the most crucial role of the Discovery Grant Program is to provide funding for research that addresses fundamental or basic questions (henceforth called "basic research"). While there is a spectrum of research funding possibilities for Canadian researchers, the spectrum narrows as a research program becomes more focused on basic research. Current funding of the DG program is only 32% of NSERC's total budget, down from 40% in 2001/2002. Since the DG program is one of the only sources of funding for basic research in Canada, this part of NSERC's mandate needs to be clear and the program needs to be available to as many researchers as possible.

This is particularly important in light of another important role of the DGP, namely the use of DG funds to leverage other support. Some researchers use their DG funding to explore novel ideas that may form the basis of other more applied research proposals; DG funding enables these researchers to leverage funding from other sources such as the Partnerships Programs and the CFI and a loss of DG funding reduces their access to other research support. However, there are also researchers who have limited or no access to other types of funding – perhaps they work on fundamental problems or in areas that do not (currently) have industrial applications in Canada. The DG program needs to be flexible enough to adequately support both researchers who have other funding opportunities and those who do not in order to ensure the long term health of Canadian science and technology.

A third aspect of the DGP that is very important to physicists and one of its key strengths is that it provides long-term funding for high-quality research programs rather than research projects. Some degree of stability is very important to encourage creative and innovative research programs. Of course, being able to secure this funding should be contingent on the researcher being able to demonstrate productivity and excellence, but consistency of funding of DG research is very important to the success of the program in achieving its objectives.

Q.2 – *Do you believe that the current focus and objective of the Discovery Accelerator Supplements are appropriate?*

CAP objects to the current focus and objective of the DAS:

- Most CAP members feel that the DAS program has a very low impact on their research area. Our members commented that the money should be redistributed to the general DG program, as it represents an appreciable amount (approximately $14M per year).
- The CAP feels that all research programs funded by the Discovery Grants program should incorporate the DAS principles and should ultimately "explore high-risk, novel or potentially transformative concepts and lines of inquiry, (that) are likely to have impact by contributing to

groundbreaking advances in their area of research", and in this sense a special program with these principles should not be necessary. We also feel that intent of the new peer-review system is that people with particularly good proposals, "high risk" or otherwise, should get adequate funding.

- Given this description of the DAS principles, and the recent high ranking of Canadian Physics on an international scale [IOP Study], the relatively low fraction of DAS awards that go to members of the Physics Evaluation Group (EG) is surprising. In 2011/2012, Physics researchers received 6.3% of the DAS funding as compared to a total of 9.3% of the total DG funding. We fear that this is because of the emphasis of the final selection criteria on relevance to a number of strategic sectors. Since the DG program only receives 32% of NSERC funding, and as argued above its primary mandate should be funding for basic research, we suggest that, if the DAS program is continued in the current format, funding for projects in NSERC's core strategic areas should be funded from the strategic side of the budget line.

Program Design and Delivery

Q. 3 – *Do you believe that equal weighting of the three selection criteria is appropriate, based on the three program objectives, or should certain criteria be weighted higher or lower relative to the other criteria, and why?*

CAP believes that a purely algorithmic weighting of the criteria is not in the best long term interests of the program:

- On the CAP/NSERC survey, only 28% of CAP members responded that these criteria should be equally weighted. They were asked to comment on a variety of alternatives; most popular (39%) was a formula where HQP had a somewhat lower, but non-zero rating.
- The current system seems to be biased towards large groups, where multiple sources of funding are available. To assuage this, we suggest that NSERC ask people to identify HQP training that is directly related to their NSERC DG so that the total HQP record is put in the proper context.
- The CAP feels that all three criteria are important and are consistent with the program objectives. We applaud the EG for their work on evaluating quality, and not just quantity, as they assess programs based on these three criteria. However, we do not feel that the current rigid approach is consistent with the program objectives of supporting a diversified base of high-quality research capability. The EG needs to be allowed more flexibility in deciding the weighting of the criteria. They should be able to use the current algorithm of equal weighting as a guideline, adjusting it as they consider different circumstances, such as career stage, and research focus, such as theory versus experiment. They should be encouraged to review results that will lead to either substantially higher or lower funding amounts to make sure that the algorithm is adequately capturing the circumstance of the researcher involved.
- In particular, the CAP is concerned that the new system does not adequately support researchers at early stages of their careers. The only concession seems to be that first time applicants (ECR) can be graded for the HQP score on a training plan rather than actual training. For first renewals, there are no concessions. Then, because they are compared with researchers with significant experience who have had many years to build up their research programs and funding base, they end up in the lower bins and, subsequently, with less funding. This in turn decreases the odds of a positive outcome in subsequent competitions. In 2012, Physics early career researchers had a success rate of 67% with an average funding of $26K/year, 2/3 of the funding received by established researchers. In contrast, in the past effort

was made to fund new faculty members at a higher success rate and at a higher grant level in order to help them get their research program going.

Q. 4 – ***Does the new peer-review system enable NSERC to ensure consistency and fairness in the assessment process, across applications?***

While the concept has merit, CAP is concerned that in the current implementation the system is too algorithmic and rigid. We feel some flexibility is required to accommodate a breadth of excellence in research programs. Variety and diversity are both good things – and we believe that this is a case where one size does not fit all.

In particular, the strict relationship between bin assignment and funding level does not sufficiently accommodate variations in research programs and in research needs. As well, the coarse-grained nature of the initial quality assessments, binning and funding assignments allows for small differences in assessment to lead to significant differences in research funding for researchers near the boundaries of the bins. The EG should be allowed more flexibility in deciding the funding levels and the need for funds. They should be able to use the current algorithm as a guideline, adjusting it as they consider different circumstances, such as need for funds.

Other more detailed points of concern are:

- Members request that the conflict of interest guidelines be reviewed. In particular, if all members of groups such as CIFAR are banned from participating in the evaluation, as happened in a recent competition, this reduces the possible pool of experts in the country substantially.
- In evaluating HQP, researchers should be compared to their peers and that context should be taken into consideration. This means that cosmologists should be compared to cosmologists and not to materials physicists, and that in smaller, primarily undergraduate institutions the focus should be on undergraduate HQP training.
- The survey revealed a general interest in more feedback**.** At this stage, successful applicants, even if they receive minimal funding, receive no feedback. Sending a list of specific suggestions that would help them improve their program and plan for their next application would be very helpful.
- The new peer-review system makes it very difficult for people to recover from a couple of non-productive research years. One way to make the system somewhat more accommodating would be to extend the review period covered on the Form 100 from 6 to 10 years, or two grant lifetimes.
- It is important that the Evaluation Group be carefully selected to represent different areas of physics, different size institutions, and different geographic areas, and that it include strong Canadian representation. This is necessary to make sure that the DGP continue to support a diversified base of high-quality research across Canada.

Q. 5 – ***Does the new peer-review system enable meritorious applicants, regardless of their career stage, to increase their funding more quickly?***

While the removal of inertia in the system and resultant large fluctuations in granting levels appears to

support this statement, it is not clear that this is true in all cases:

- First of all, as argued above, we feel that early career researchers (possibly including first renewals) should be evaluated separately, since being binned with more established researchers with previous long term funding does not necessarily enable them to increase their funds to the level that might be required to embark on a new research program.
- In addition, although large increases are more likely, so are large decreases. Large fluctuations do not provide the stability required for creative and innovative long-term research programs.
- Some of these difficulties could be alleviated if EG members were encouraged to make recommendations on grant length in certain circumstances. We understand the administrative problems associated with shorter granting periods, but in most cases assigning low funding to a researcher for 5 years is not likely to lead to improvement. EG members should consider recommending a shorter grant period to researchers of either a) exceptional promise (presumably with larger funding) or b) concern (presumably with smaller funding) as long as some average was maintained.

Sincerely,

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