

# Summary of CAP/NSERC Survey Results [and Observations]

## Introduction

In May 2012, the CAP launched a survey of its members regarding recent changes to NSERC programs. This survey was initiated in order to enable CAP to respond on behalf of members to an anticipated review of the changes made to the Discovery Grant (DG) program since 2008. Following cancellation of the Research Tools and Instrumentation (RTI) and Major Research Support (MRS) programs in April 2012, feedback on these programs was also requested in the survey.

The survey was available to CAP members for a total of 6 weeks. A total of 366 members responded to either the French or English version of the survey.

This document attempts to summarize the responses; details are provided in two spreadsheets of responses to the multiple choice (6 pages) and short answer questions (36 pages), respectively. Note that the actual questions are summarized very briefly; please refer to the spreadsheets or the original survey for the exact wording.

In summarizing the statistics, comparisons were made only between respondents who voiced an opinion on an issue - i.e. respondents who selected "no opinion" were not included in the percentages. This option was offered on most questions to allow those who did not have direct involvement in particular aspects; for example, theorists would not normally apply for RTI grants, etc.

This summary was compiled by Barbara Frisken (Director of Academic Affairs for CAP) in consultation with Gabor Kunstatter (President, CAP), Mike Roney (Past President, CAP), and John Dutcher (Chair, CAP NSERC Liaison Committee).

## List of abbreviations:

CAP - Canadian Association of Physicists  
CFI - Canadian Foundation for Innovation  
DAS - Discovery Accelerator Supplements  
DG - Discovery Grants  
E - Excellence of Researcher  
H - HQP (Highly Qualified Personnel) Record  
MRS - Major Resources Support  
NSERC - Natural Sciences and Engineering Research Council of Canada  
P - Excellence of Proposal  
RTI - Research Tools and Instruments  
SAP - Sub Atomic Physics

## General Information

The majority of respondents are from universities and colleges, with only 10% from government and industry. 80% are eligible to hold an NSERC grant, and 69% of those hold either a DG or SAP-DG grant. As a comparison, in 2012, 72% of eligible applicants to physics NSERC DG programs were successful, while success rate was 70% in 2011 and 62% in 2010. [Note the NSERC statistics for physics includes SAP-DG grants, both individual and group, but not SAP-projects.]

Q1. 90.3% are associated with a university or college (36% large, 36% medium, 18% small university and 1.4% college).

Q2. 291 respondents, or 80%, are eligible to hold an NSERC grant.

Q3. Of those eligible, grants currently held:

Program	Current	Current (as a percent of those eligible)
DG	182	62.5%
RTI	29	10.0%
MRS	18	6.2%
SAP-DG	20	6.9%
SAP-Project	37	12.7%
SAP-RTI	16	5.5%
SAP-MRS	14	4.8%
Discovery Accelerator Supplement	13	4.5%
Research Partnerships Program	19	6.5%

## Discovery Grant Program

In summary, respondents expressed dissatisfaction with several aspects of recent changes to the DG system. Of the respondents who stated an opinion, 51% felt the changes to the DG program have had a negative impact, while only 19% have found the changes to be positive.

Q6. Only 5% felt that the expert panels should have minimal input with regard to grant size associated with each bin (the current situation). The leading alternatives were:

- 37% - Individual grant amounts should be decided by the expert panel on a case-by-case basis using the ranking in the binned system as the primary input.
- 33% - There should be significant input from the expert panels with regard to grant size associated with each bin.
- 5% - Expert panels should have minimal input [This is the current system].

Q7. Only 28% felt that the three criteria should be equally weighted (the current situation). Leading preference for weightings of the three components of the funding formula:

- 39% - E=P>H
- 28% - E=P=H [This is the current system]
- 24% - other alternatives

Q8. 89% agreed that the weighting of the HQP record of early career applicants should be less.

Q9. 91% agreed that there should be some flexibility in the weightings.

Q10. Opinion on how the cost of research should be factored into funding is somewhat mixed, with slight more in favour of change:

- 49% - cost of research should have significantly more weight
- 42% - current approach is about right

Q11. Should researchers be able to elect to apply for a shorter funding period, if justified?

- 62% agreed that researchers should be able to elect for a shorter funding period when applying, if justified.
- 13% disagreed

Q12. Impact of changes to DG program

- 51% felt that the changes have had a negative affect
- 30% were neutral
- 19% felt the impact has been positive.

## RTI and MRS programs

The major point of interest here is that 73% would be interested in exploring a funding envelope. When asked to compare the RTI, MRS and DAS programs, researchers felt that the RTI program has the most impact on their research and the DAS the least. Most felt it will be difficult to maintain/grow infrastructure with only the CFI program, with the major impediment being that participation in CFI projects requires development of large scale multidisciplinary projects that go beyond the primary research focus.

Q13 and Q14. Of RTI, MRS and DAS, RTI is the program with the most impact on respondents' research programs and DAS is the program with the least impact.

Q15. 73% felt that the loss of the RTI program would have a negative impact.

Q16. 61% felt that the loss of the MRS program would have a negative impact.

Q17. 73% of respondents would be interested in exploring the possibility of a funding envelope.

Q18 and Q19. 59% of respondents have participated in CFI projects, most of them in 1 or 2 projects at most.

Q20. Major impediment to participation in CFI projects is the need to develop large scale multidisciplinary projects that go beyond primary research focus. All of the other factors that were suggested in the survey are also important:

- Requirement to align the research with the strategic priorities of the institution.
- Infrequent CFI competitions and delays in these competitions
- 20% funding matching requirement
- 40% provincial funding matching requirement

Q21. 78% agree that it will be difficult to maintain and/or grow their research infrastructure with only the CFI program.

## PART II - Short Answer Questions

### Q 22. What information/factors does NSERC need to examine during its review of the effectiveness of the Discovery Grants Program?

People answered this question several different ways. In the spreadsheet, the answers have been grouped into two main sections: specific things that could be addressed in the review and other items that are more related to revising procedures. Also there were several comments that NSERC should clarify the mandate of the DG program as part of this review.

The summary below focuses on suggestions of information/factors to be included in the review of the effectiveness of the program because this was the intent of the question.

Several noted that the impact of these changes on science research in Canada will be hard to detect after only 5 years of the new system - it will really take several cycles for the changes to be felt and impact to be realized. So many of the metrics suggested below will need to be monitored over the long term.

General areas of concern:

- Funding for the DG program is too low
- It is important to emphasize quality and impact, not only output
- Are small to medium universities being hit disproportionately?
- Are regions of the country being hit disproportionately?
- What is the impact of concentrating funding on a few large groups? Does more funding for these groups mean higher impact?
- What is the impact of the DAS and is it worthwhile?
- What is the impact on early career researchers?
- What is the impact of 5 years between grants - is this too long i.e. are people able to respond fast enough to opportunities/ideas?
- Does the lack of continuity affect risk-taking of researchers or the number of students researchers will take on?

Specific suggestions:

- Impact on HQP
  - Can the number funded by DG's alone be quantified? (People may fund students out of a variety of programs)
  - Number of PhDs supported (compare changes at small and large universities)
  - Number of summer students (compare changes at small and large universities)
  - Number of scholarships won by students
  - Has the number of BSc students decreased due to perceived lack of support for science? (long term impact)
  - Is the pool of Canadian applicants to graduate school decreasing? (long term impact)
- Impact on research output
  - Number of publications, citations etc.
  - Awards, prizes
- Impact on our position in the global research community
  - Attendance at foreign conferences
  - Number of foreign awards
  - Invitations to speak at foreign conferences
- Impact on faculty
  - Number of researchers supported (compare changes at small and large universities)
  - Number of researchers cut (compare results at small and large universities)
  - Do changes impact our ability to attract and retain faculty?
  - Are new researchers being adequately funded? Compare funding request for new researchers to established researchers
  - What is the distribution of career stages of researchers being funded? Or not funded?
- Changes to distribution of research funding

- Has the distribution of funding between small and large universities changed?
- Sub-disciplines - are we losing expertise in various areas, do we have a good distribution of expertise?
- If we fund a small number of experts, does this mean we lose our broad base of knowledge?
- Geographical distribution - some regions have more non-NSERC funding than others
- What happens after somebody is cut to zero - do they manage to reenter the system?
- Are people with larger grants more productive?
  - Compare # publications/dollar
  - Compare # students/dollar
- Funding
  - Is the amount of funding available sufficient to fund the programs that are selected for funding?
  - Is the minimum level of funding appropriate?
  - What is the impact on individual research careers of receiving substandard funding? What happens to experimentalists who receive \$0 for one year or \$15k for five years?
  - Is the funding representative of cost of research?
  - Is the cutoff in the bin system (strong-strong-strong) really where we want to be?
  - Is the distribution of funds by bin appropriate? [It is currently highly non-linear.]
  - How do DG's leverage other funding?
- Compare the impact of the DG program to others
  - Examine the DAS program. Are DAS winners more productive than their peers?
  - Examine impact of RPP programs, or the impact of concentrating resources on a few individuals (CERC, Banting, Vanier)

Q23. Do you have suggestions for improvements to the DG evaluation process (please keep them brief and constructive)?

- Offer a transition year to applicants whose grants are cut to zero
  - This allows researcher to support existing students while he/she reapplies
  - Researchers are delaying hiring graduate students in case they lose their grant
- Return to the old method
- Funding
  - The committee should have more impact on the funding decisions
  - Reduce size of funding for highest bins to provide more funding in lower bins
  - Make the amount of funding per bin more linear
  - Minimum grant size should support a “living wage” = 1 student + 1 conference
  - Funding should not be based on a bin but rather based on the need for funds to accomplish the research program.
- Stress quality over quantity
  - Suggestion that researchers include comments from manuscript review process as an indication of quality since not all papers are cited immediately
- Make sure procedures for establishing the expert panel are sound
  - Make sure the expert panel has good representation from Canadian institutions, large and small, from a variety of geographic areas, subdisciplines of physics.
  - Respondents feel that the lack of experience or expertise on the committee biases the outcomes, particularly in cases where opinions of expert reviewers are not taken into account.
  - There is concern that the Evaluation Group does not have sufficient expertise to evaluate all proposals fairly.
  - Some questioned the conflict of interest guidelines as being too mechanical. In particular, if all members of groups such as CIFAR are banned from participating, this reduces the possible pool of experts in the country substantially.
  - Detailed suggestion: “External referee reports would be more valuable to the panel committee if referees were given 3 to 5 grants and asked to RANK them in order of quality, in addition to the other comments given. This would make sure that the referee reports are not “uniformly positive”.
  - Limit the number of international experts on the panel
- Give new researchers more time to launch their career (10 years more appropriate than 5?)
- Increase impact of expert reviewers
  - One person suggested letting the applicants see the reviews and respond to them before the committee decision. Apparently this system is used by EPSRC in the UK
  - Another suggested that the external reviewers’ opinions on ranking of EPH also be included in the averaging
- Provide more detailed feedback to applicants
- Consider extending the time over which the research history of the applicant is evaluated (perhaps 10 years rather than 6?)
  - This might allow more flexibility re: delays in research activity
- HQP evaluation
  - Considered flexibility based on university size
  - What about the researcher who works on his/her own? Is this not a valid way of doing research? If not, then NSERC should be clear on this as many respondents seem to feel that this research mode is not being addressed. One respondent pointed out this is called a Discovery grant rather than a Training grant.
  - Clear guidelines are required as to how this component is evaluated
  - Deemphasize HQP
- Process needs a little more inertia as people cannot always change the way they do research to suit new application processes every 5 years
- A finer gradation of scores might help as the binning system seems a little crude

- Detailed suggestion: "Assessment of researcher, proposal, and HQP should be done as a simple percentage, and the final bin assignment based on a weighted average. The number of bins should be increased by a factor of at least two. The equal weighting of researcher, proposal, and HQP is too rigid; there should be more flexibility. There should be expert oversight in the assignment of grant levels; the final outcome should be validated by the evaluators."
- A system to fund projects as well as programs might be worth looking at
- Evaluate Plan on Training rather than Training Record for early career researchers, or de-weight HQP score
- Application process
  - Why not abandon the requirement to state the amount of time to be spent on a research program?
  - Require all applicants to use a flat rate for student and post-doc stipends
  - Separate researchers into 3 groups depending on research size
  - Consider including a way to take the opportunity to do research into account. For example, people at smaller universities teach more, but might be very effective in guiding a number of undergraduates. Alternatively, people with CRC or CERC chairs, or working in government in positions where little teaching is required have more opportunity to do research. Is their success proportional to their opportunity?

## Q24. Please provide general comments about the impact of the elimination of the RTI program.

The most common word to describe the elimination of the RTI program is “disaster”.

Some typical comments:

Elimination of this program will

- Make it difficult to repair equipment
- Make it difficult to replace equipment
- Make it difficult to buy new equipment
- Make it difficult to explore new ideas
- Make it difficult for Canadian groups to compete with international groups
- Be especially hard on new researchers
- “Seriously compromise my ability to run my program in ultrafast spectroscopy”
- “might make me consider moving away from Canada”
- “hobbles the scientific community”
- “will prevent me from doing high-risk research”
- “have a huge negative impact on Canada attracting high quality researchers to its universities over the next decade.”
- Effectively cuts the DG program

Replacements

- CFI is not a possible replacement
  - There are too many constraints placed on CFI funding to make this a valid alternative
  - CFI is designed for big projects and has a very low success rate
  - CFI applications are onerous, and much of the paperwork wasteful.
  - CFI does not appear to fund research based on intellectual merit alone.
  - The CFI evaluation process contains a political element, both at University and CFI levels.
  - Funds are not open to free competition
  - Not amenable to custom built equipment from purchased components - partly because it is necessary to keep track of every single item in great detail
  - No program for small equipment from individual researchers
- DG funds are not sufficient - “Either the students who are funded will no longer have the appropriate tools and infrastructure or there will be no students to use the upgraded or newly purchased” equipment
- “Currently there is very little difference between granting levels to theorists and experimentalist, even though the costs are very different. This philosophy is valid only when there is a robust RTI program. As the DG program comes under increasing pressure, it is impossible to use these funds for anything other than supporting students.”
- “I think they would have done better to cut a similar amount from CFI”
- “The RTI should be reinstated by eliminating the DAS Program.”
- Other NSERC programs require an industrial partner
- Smaller provinces, in particular, do not have other sources of funds for equipment

General Comments

- RTI is critical for funding relatively small pieces of equipment
- This is a setback for research in Canada
- Inability to maintain equipment means loss of previous investments
- RTI funding should be part of an increased base-budget.
- RTI was a convenient, effective and simple program.
- “Un charpentier qui ne peut ni reparer ou acheter un marteau sans faire parti d'une manufacture de 100 ouvriers est un charpentier au chomage”



- “This is a classical example of funding system break down, when fundamentally important decisions are made solely by people who are not from the research community”
- “Equipment does not last forever”
- “many experimental science programs will stay in 20th century”
- “So in a nutshell: Loss of RTI = concentration of money for equipment in the hands of a smaller number of researchers chosen by university administrators rather than scientific peer-reviews + waste of time and of talent.”
- “In my opinion, the dropping of the RTI program is a major disaster, and very ill thought out. In Canada, where one is expected to do "world class" research on relatively modest Operating Grants (now Discovery Grants), I have needed to rely on two small, but critical, trump cards - the first is that we haven't had to pay overhead to the university, AND machine shop work and other technical help tends to be subsidized by the provincial governments. The second was the existence of the RTI grants. Whereas the main grants had a cycle time of 3 or 4 years, one could apply for an RTI grant anytime during the cycle. This allowed one to react very quickly to a research opportunity - in my own case this was often the key to keeping the research going.”
- “Someone at NSERC apparently said that it only affects a few chemists and physicists) but even that's not true -- a search of the RTIs for competition years 2009 to 2011 (most recent three years on NSERC search engine) showed that only 22% of the RTIs went to PIs in Chemistry or Physics Departments (15% Chemistry, 7% Physics). 27% went to Engineering. The rest were spread over many different departments (12% Biology, etc.). And many researchers cannot make full use of their other support without equipment grants.”
- “The RTI/Equipment Grant program is a long-standing NSERC program that funds small infrastructure items that are worth up to \$150,000. Funding of RTI proposals is based primarily on the excellence of the researcher, need and urgency, and the excellence of the proposed research. As a result, successful RTI proposals have provided key infrastructure for a broad range of excellent research, including work whose impact has yet to be widely recognized. This is one of the key advantages of this program: success is not tied to strategic directions or industrial partnerships, but rather is based on excellence, need and urgency. Another key advantage of the RTI program is that a competition is held every year, so that urgent needs can be addressed in a timely fashion. Even though the success rates for the RTI competition were typically low, very high need or very high novelty ideas could be funded. Infrastructure funded through the RTI program has repeatedly provided key pieces of equipment that have been essential in training the next generation of Canadian scientists and engineers.”
- “The RTI program was a program that allowed me to built custom scanning probes for studying material properties at the atomic-scale. ... The RTI supported the development of innovative research tools and custom instruments in Canada and in the process supported the development of technical expertise in Canadian companies.”
- RTI better suited to building custom equipment, which gives more opportunity to train students on detailed fabrication of scientific instruments
- “you can't do cutting edge research with old equipment”
- “If we don't do the fundamental research, someone else will, and Canada will become a nation of followers rather than one of leaders”

Q25. Please provide general comments about the impact of the elimination of the MRS program.

There are specific comments about the following facilities:

- Advanced Laser Light Source at INRS-EMT
- Brockhouse Institute of Materials Research at McMaster
- High Performance Computing at Sherbrooke
- Canadian Neutron Beam Centre at Chalk River
- SHARCNET
- Canadian Light Source in Saskatoon
- Polar Environment Atmospheric Research Laboratory

A collection of general comments:

- Universities have gotten away from funding technical support staff. Their resources go to undergraduate education. The MRS program allows researchers to make progress that they would never be able to do if they had to rely on individual institutions.
- It is an extremely efficient way to provide support across multiple institutions.
- Furthermore, it maintains highly qualified technical personnel available for many researchers, despite the natural cycles of progress through lengthy experiments - development, prototyping, construction, running, analysis.
- MRS forces the research communities to share resources in an efficient and cost effective manner
- MRS encourages collaborative research and enables research groups to operate large equipment-intensive programs at an internationally competitive level

Suggestions:

- “Obviously every user facility needs to have a financial plan and I understand this program was under funded. But cutting the program completely is not the solution and I am sure better ways to deal with this could be imagined. For example funding could come partly from user fees and partly from government/institution matching fees. This ensures that the user facility operates in a truly regional and/or national (depending on size) way and that it really becomes a resource for many researchers. See for example the European Soft Matter Infrastructure program (<http://www.esmi-fp7.net>). But if you cut the DG grants, there is no more money for user fees, and if you cut the MRS program there is no money for matching funds. These facilities will just cease to exist.”
- There needs to be rationalization of CFI and the tricouncils.

## Q26. Other comments

Here are a random sample of other comments, organized into several more focused categories:

Things that all physicists applying to NSERC need to be aware of:

- “Having served on the Evaluation group for physics, I think it has to be understood that the current DG program is primarily designed to fund students, so it is essential that the H component continue to be an important evaluation criterion. This also means that the cost of research is not too critical. This was based on the assumption that RTI and MRS programs were available to fund the hardware side of research. With these gone, there may have to be a total redesign of the DG program. This is unfortunate.”

Particular comments for CAP:

- CAP has not been very effective in lobbying government at all. Many colleagues feel that the CAP has sat idle for too long and will not renew their memberships.
- CAP could play a much more visible role in communicating the concerns of the scientific community to government. This survey is a good start, but there could be a lot more going on, as evidenced by the reception that Ted Hsu has received from the scientific community.
- “I was astonished at the positive press release that the CAP distributed within a few days of the reading of the budget. The conclusion that this so-called R&D budget will be good for research in Canada was shocking to me. Was this a political strategy?”

Concerns:

- “De plus en plus, être chercheurs au Canada et décourageant. Le système actuel décourage des jeunes chercheurs prometteurs de continuer dans leur domaine d'expertise respective. CRNSG: Attention! vous mettez en jeu l'avenir de la science au Canada, qui fut pourtant glorieuse”
- “NSERC tried to improve an already very good funding system, which was what attracted a large number of international researchers to Canada in the first place. Now we have something that resembles the US system in its competitiveness for funds, but without the possibility to apply to different granting agencies, or more that only once in five years (for DGs). The result is a disaster. My advice: go back to the old system as soon as possible!!”
- “My personal experience on applying to NSERC grants is the existence of networks of self proclaimed “experts” who overrule the opinions of international experts to deny support for proposals. There is a real cancer eating up the original purposes of NSERC that is totally deleterious to real scientific progress in Canada.”
- “I think the new model is making NSERC less relevant to many Canadian researchers, and decreasing it's effectiveness.”
- “There is too much emphasis on research that has direct industry ties in the current funding model. I understand the need to translate breakthroughs in University research into the commercialization of new products. However, if the funding of such ultra-applied research is done at the expense of fundamental research, there will be no fundamental breakthroughs to exploit ten years from now. This current trend of making Universities (and NRC) act at subcontractors for industry is misguided and short-sighted. It needs to be reversed.”
- “I feel that the one evaluation committee for physics is too large - astronomy, general, and cond matt all in one group sharing one pot of money - if one community “knows how to play the game” and overranks their own people then they get a disproportionate amount of the money. It should be the same people who see all the same grants who decide on the monetary allocations, otherwise it is not really fair.”
- “Unfortunately, I strongly believe that the level and recognition of Canadian science will drop dramatically in the next few years - In turn, this will strongly affect the capacity of producing IP, training HQP, retaining HQP and finally, will affect High Tech industry severely.”
- “The Discovery Grant program should not be lumped under the same funding envelope as RTI and MRS, unless accompanied by an increase in funding that preserves (or increases) the DG grant size. In the past ten years the average DG has increase by a few percent at most, which amounts to a decrease in real dollars after inflation. The amount is already pitifully small, especially for an experimental group. And even though the recent changes have resulted in

dropping success rate for applicants, the average grant amount has not changed. I caution CAP against "rolling with the punches" to accept lumping RTI, MRS, and DG together -- this would also be signing off on a smaller DG program."

- "Stability of funding and rationality of the funding agency used to be one of the greatest things about being a researcher in Canada. We need to get it back, or risk having the research community in Canada damaged - and such damage could take decades to repair!"
- "It is pivotal that smaller universities also get grants. Small schools DO MORE to provide HQP. We have intimate knowledge of the student needs, can involve them in a personal way in our research, and provide them with guidance, and perspective that a bigger institution simply cannot."

Specific suggestions:

- "Scrap NCE, CFI and CERC and put the funds into some more general programs without the multiple restrictions that make research more an act of creative proposal writing than actually doing anything of lasting value"
- "End the special treatment of SAP - there are plenty of other fields with the same issues that do not get the same deference."
- "If reallocation needs to be done, I think that the Canada Excellence Research Chairs program money could be much more productive if spread over a large number of people. This whole superstar approach to funding is misguided and stupid."

General comments:

- "I insist on complimenting NSERC with the way they manage to do their best to distribute, with a minimum of resources, fairly and equitably the inadequate amount research money allotted by the government. Our comments are meant to improve, not to criticise."
- "Generally, I'm satisfied by the overall approach to funding by NSERC in Canada, as compared to other places (US, some European countries). The focus is not -- and should NOT be -- to fund some "superstars" at the expense of a broad funding to university researchers who maintain a strong level of activity and good publication records. The DG program should maintain that approach, to fund good research everywhere in Canada, and not be confined to the "big 5" (or whatever the number is)."
- "NSERC needs to consult more with the scientific community. Perhaps a separate council at NSERC that provides scientific input that is different from the administrative organization. More scientists in key positions at NSERC and in government would also be useful."
- "The general issue is one of underfunding."