

Submission to Long Range Planning Committee  
for NSERC Mathematics and Statistics Evaluation Group.

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The Department of Statistics and Actuarial Science attended a presentation by Char-maine Dean on February 4, 2011. The discussion which follows is partly based on this discussion, partly based on comments I received by email from my faculty members and partly a reflection of my own views. I have partitioned what follows in four pieces: comments on the current NSERC discovery grant process – first evaluations of grants and then allocation of funds between evaluation groups; comments on the mathematics institutes; comments on the future; and finally comments from others in my department.

**The current NSERC evaluation process:** For statisticians, Discovery Grant funding is more important than other funding. The current model, in which one set of people score grants and another set determine the financial consequences of the scoring, is working badly. The advantages touted, of “funding excellence” and the loss of the influence of the previous grant level on the current funding level are not, in fact advantages:

- Some research excellence is going unfunded because of the emphasis on highly qualified personnel.
- Stable research funding was, until the adoption of the current model, the main advantage of a system in which the funding levels are actually quite low by US standards. That advantage is being eliminated; faculty with solid research careers and excellent training records are unable to plan properly for the period of transition between two grants. The move from 3 year to 5 year grants was sensible in a stable funding model; now it locks in random fluctuations in the decision making process for long periods of time.
- Low success rates are not desirable. They do not encourage more and better research. Worse, as discouraged faculty exit the system it will be necessary to cut funding to better and better researchers in order to hold success rates down to 50 to 60%.
- In the United States low success rates are sustained by the fact that there is a very strong personal financial incentive to seek funding. Since there is no salary component to NSERC funding the personal financial incentives are much weaker in Canada.
- Research excellence is not as volatile as the new funding levels. People do not bounce in and out of the excellent researcher category.

- One stray thought: Why do we need people to bother filling out budgets in the current evaluation framework? The funding decisions are far too far removed from the budget for the activity to be useful. That is a bad sign for the current system.

**Current NSERC funding allocations:** I don't like the current allocation model. The creation of 6 broad evaluation groups has not improved the treatment of interdisciplinary research in my experience. My understanding is that the process of comparing statisticians to mathematicians was demonstrably not improved this year and that bin funding levels were adjusted to reflect this failure. At the same time the creation of the 6 groups has created incentives for each group to marginalize those researchers who lie on the boundary between that group and others. A statistician working in ecology and population biology was cut off funding this year on the strength of a cv for which zero funding from the math stat evaluation group would be inconceivable. I am persuaded that this reflects a bias built into the new, larger silos.

Summary: I do not accept that 6 large silos are a lot better than 15 to 20 smaller ones.

**Comments on the institutes:** The institutes now act as funding agencies like NSERC. There are advantages and disadvantages in having them play that role.

- The institutes fund activities like conferences and workshops which are not funded by NSERC. This is particularly useful in mathematics but those conferences and workshops are rather less useful to statisticians – not at all useless (I have attended some very useful conferences funded by the institutes), but dramatically less useful. (The institutes should not fund any large conferences except perhaps to make it possible for graduate students to attend.)
- The institutes also serve as organizations which can use funding opportunities from one level of government to generate funding from another level of government and this is useful.
- Based on my experience I would say that institute directors have considerable budgetary control. This makes the institutes flexible and weakens the control of conflicts of interest. The long range planning committee can certainly reflect on the extent to which it is desirable that institute decision making processes are controlled by individuals or small groups of individuals.
- Until recently postdoctoral appointments in statistics at Canadian schools went largely to weaker PhD graduates; the strongest students went straight on to employment. The focus of the institutes on funding postdoctoral fellows is not very useful when that is the case; it keeps weaker graduates in the university system hoping for permanent work when they should be moving on to other activities.
- Recently, however, I perceive an increase in the number of good statistics graduates doing a postdoc as a way of strengthening their training before getting regular academic jobs.

- Overall, on balance, the postdoctoral funding activities of the math institutes are still not very useful to the statistics community.
- I ask if we are moving to a system in which a PhD is not sufficient qualification for academic employment. I think stretching the length of graduate programs in this way, in a country where they are already very long because of our insistence on the MSc, PhD route, is a bad idea.

**Comments on the future:** Statistics is moving away from mathematics. As a discipline it is doing best on campuses where it is no longer inside mathematics departments and where the statisticians are collaborating not so much with other statisticians but more with other scientists.

- NSERC needs to be looking at funding models which increase the connections between statistics and computing science. This is true for mathematics and computing science too. Having funding levels differ by factors of two, with negligible differences in research costs, is not justified.
- I want to tell an old story which reflects the relationship between mathematics and statistics and which I think continues to this day. As a graduate student working on a thesis in set theory, really, I was asked by John W Addison III: “Tell me the three most important open problems in statistics.” I failed to do so. But of course it is the question which is the failure – it reflects a complete lack of understanding of statistics as a discipline.
- We need a plan which removes the incentives for evaluators to look at research and say things like: “her/his work is not very *deep*’.” That is not really a relevant adjective in statistics and the supposition that you don’t deserve to be in the top evaluation categories without qualifying for that adjective is wrong.
- In discussing the future and research priorities there are a number of issues of importance:
  - It would be quite unsuitable for the long range planning committee to discuss priorities in the sense of research areas which deserve more or less funding. Mathematics and Statistics are not disciplines which benefit from a lengthy planning period.
  - The priorities then need to be attached to the kinds of uses of funds.
  - Currently NSERC does not get to choose how discovery grant money will be spent; there is no connection between a proposal’s budget and how the money is spent nor between how the money is spent and the evaluation of the next proposal.
  - So absent a complete change in this structure the long range planning committee has little to say here.

- Perhaps the long range planning committee could say to the institutes that they need to direct money in specific ways but I don't feel competent to discuss the institutes' budgets at the depth that would be necessary to be sure they were spending too much on thing and too little on another.
- That said, the institutes should consider setting aside funding specifically for statistics, allowing statisticians to formulate priorities for statistics spending separate from those set for mathematics.
- Statisticians must then be prepared to step up to take on the responsibility for setting these priorities and for helping the institutes in their fund raising efforts.
- I think the long range planning committee is in a position both to suggest this targeted institute funding and to throw down the gauntlet in front of the statistical community.

**Specific comments raised by my colleagues – paraphrased by me:**

- Collaboration with industry is not recognized by NSERC as a positive indicator in the process of evaluating discovery grant applications. One colleague describes much of his work as “technology transfer” and cites, as examples, workshops he gives showing environmental researchers in government how to analyze environmental impact studies and how to design and analyze other ecological and environmental experiments.
- In a very similar vein one colleague, discussing areas of research falling between the cracks in terms of NSERC funding says “I think collaborative research that leads to new enabling methods (as opposed to gadgets) for other research communities tends to be under-valued. Biostatistics is one example.”
- Is the long range planning committee in a position to recommend that this sort of technology transfer work be recognized positively when a grant proposal is evaluated? Is it in a position to recommend that contributions to good science are as important as good theorems?
- My colleague suggests direct funding for technology transfer: support of small training workshops possibly by providing funding to pay for teaching relief.
- I would suggest that NSERC should return to providing infrastructure funding directly to statistical consulting services. Funding high quality services will allow them to provide good quality advice on small scale projects without burdening university's financial systems with many, many small transactions. It would encourage consultation at preliminary stages in projects and increase the utilization of good methods. Perhaps there is room for similar concepts on the applied mathematics side.
- Consulting services also provide excellent training for HQP; I think funding students to participate in such training would be a useful way to direct NSERC funding directly to

HQP rather than trying to coerce researchers into spending more of their tiny discovery grants on HQP. How many students can you support on \$12K per year?

- “The Institutes and BIRS have played an important role in funding conferences and workshops. However, for funding of HQP, there is a perception that some Institutes may favour certain research groups, that the process is not open, and that more effort could be made to reach out to all constituents.”
- One colleague answered the question “How can the institutes best support research in mathematical and statistical sciences?” by writing: “By making sincere efforts to reach out to all members of the mathematical sciences community for the support of HQP, not just a select few. By supporting HQP through a open and inclusive mechanism and casting a much wider net with respect to research areas.” Again we see concern about the transparency of processes at the institutes and about the breadth of vision of the institutes.
- In response to specific questions raised in Charmaine’s presentation one colleague provided a number of very useful answers:

- *How does existing infrastructure support research and training in mathematics and statistics?*

It is becoming increasingly difficult to fund HQP doing collaborative research. In the current funding climate, grant review panels at both NSERC and CIHR appear to be retreating to their base.

- *Are there opportunities for different mechanisms that would strengthen the support of research, for example, to facilitate greater collaboration?*

I believe there are great opportunities to more proactively support the intertwining of research programmes between the mathematical sciences and potential areas of application outside mathematics and statistics. One example would be to support graduate students to develop new enabling methods for end-users in these non-quantitative fields, similar to a MITACS Accelerate internship but at a deeper methodological level and on a longer-term basis.

- *Are there important areas of research that are falling between the cracks, in terms of NSERC funding?*

I think collaborative research that leads to new enabling methods (as opposed to gadgets) for other research communities tends to be under-valued. Biostatistics is one example.

- *Recognizing that adequate funding continues to be a struggle, is the current mix of resources suitable for research goals in mathematics and statistics?*

I would like to see more resources directed towards funding HQP working in cross-disciplinary research areas and a wider net cast so that all members of the community have a chance to participate.

– *Would it be helpful to researchers if NSERCs Team Grants and/or USRA programs were less restrictive?*

It would be helpful if the USRA programs included foreign students.

– *How will end of NCE funding to MITACS impact researchers?*

I will lose a critical source of funding for HQP.

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