May 11, 2011

To: Steering Committee for NSERC Long Range Plan for Mathematics

We would like to begin by thanking the LRP Steering Committee for its work, and for the opportunity to participate in the discussion about the future of mathematics within Canada. We would especially like to thank Nancy Reid for visiting our campus in March to discuss the goals of the LRP Steering Committee.

Before providing input on the requested areas, we would first like to provide some context for our comments. Lakehead University is a small-to-medium sized school located in Thunder Bay, Ontario, with an additional small campus in Orillia. More than half of our students come from Northern Ontario. The Department of Mathematical Sciences has 11 faculty members at the Thunder Bay campus and one new faculty member in Orillia who started in 2010.

The department offers Bachelor's degrees in both arts and science. We have about 60-70 majors, with the majority in the concurrent education program. We do a large amount of service teaching, primarily for the Faculty of Engineering. We also offer an M.Sc. in mathematics which currently has five students. The normal teaching load within the department is two courses per term. Graduate teaching is not counted as part of this load; faculty members volunteer their time to offer graduate level courses.

The research areas represented by our department are: algebra, analysis, applied mathematics, optimization, probability, and statistics. Prior to the changes made within the NSERC Discovery Grant system, all eleven faculty members at Thunder Bay held a grant. Three years after the changes, only seven members now hold a grant.

We now comment briefly on the five areas suggested by the guidelines for feedback.

Science. The research areas represented by our department are: algebra, analysis, applied mathematics, optimization, probability, and statistics. Our strongest area is analysis, with over half of the department working in some area of analysis (classical analysis, abstract harmonic analysis, C*-algebras, von Neumann algebras, Banach spaces, operator theory).

Currently, no member of the department is engaged in interdisciplinary research (by which we mean research with an area outside of mathematics). Although there is some research across various areas of mathematics, the majority of our faculty members plan to continue to do basic research in the next five to ten years. While we have noticed a greater push for more interdisciplinary research, we hope NSERC will continue to set aside funds for basic research.

Research funding. Like many mathematicians in Canada, the main (if not only) source of research funding for our faculty is the NSERC Discovery Grant. Given the

geographical location of Thunder Bay, we rely heavily on our grants either to attend conferences or bring in visitors to keep us abreast of the current research advances. The remainder of our funding is devoted to the training of HQP.

Institutes. Given our geographical isolation, the department feels that it is important that we join an institute, like the Fields, to give us access to additional resources and to increase the visibility of the work of our colleagues. Many people within the department have benefited from the resources and services provided by the institutes. Most members of the department have attended at least one conference hosted at BIRS, while some have taken part in the "Research in Teams" program at BIRS. Others have been engaged in activities at Fields, and some have received money to host local conferences.

Within the department, the institutes are seen in a very positive light. The research institutes provided a catalyst for producing research. We are very keen on developing an ongoing relationship with at least one of the main institutes in Canada. It is felt that the institutes should continue to play a major role in mathematics within Canada.

(As an aside, and more of our comment on our internal politics, our department is engaged in an ongoing debate with our Office of Research about paying for our membership. Our Office of Research refuses to pay for a complete membership, even though we demonstrated numerous times the advantages of joining such an institute. This is a huge frustration to the members of our department.)

Since we are a relatively new member of the Fields Institute, and because we have a small graduate program, we have had limited opportunity to evaluate the effectiveness of the institutes in the training of HQP. When possible, we make a point of sending our students to relevant conferences hosted by the institutes.

Training. As with many mathematicians, we are somewhat discouraged with NSERC's recent emphasis on the training of HQP. While we agree with the importance of training the next generation of Canadian mathematicians, we do not see why this component should be such an integral component of the NSERC Discovery Grant. In our opinion, an NSERC Discovery Grant for a mathematician should provide the researcher with enough funding to pursue his/her research agenda. Unlike other science disciplines, mathematicians do not necessarily need a graduate student and/or post-doc to increase their research productivity.

We would like to propose two ideas that could provide better funding opportunities for the mathematical community (for both large and small universities).

(1) We suggest that the training of HQP somehow be divorced from the NSERC Discovery Grant. Perhaps, instead, two pots of money should be set up; one pot of money would be for research expenses and the second pot of money would be for the training of HQP. As part of this idea, we would also suggest that the NSERC USRA

be de-coupled from the NSERC Discovery Grant program, i.e., a mathematician can supervise an NSERC USRA without holding an NSERC Discovery Grant.

As many on the committee are well aware, the current ranking of NSERC proposals places such a strong emphasis on the training of HQP, it makes it very difficult for small schools, such as Lakehead, to ever receive a high ranking in the HQP category. The primary factor for our colleagues who did not have their grant renewed was their HQP evaluation indicators. With two pots of money available, we can continue to apply for grants (even small grants) to continue our research. In addition, a "two pot" system would allow people to take breaks from supervising HQP, and only apply for funds when students and/or post-docs are available. This system would also allow people who are not able to supervise students (e.g., emeritus professors) to apply for some form of research funding.

(2) In the case that the HQP evaluation indicator is deemed unavoidable by NSERC for its Discovery Grant Competition, we would like to suggest a more fair way of discussing each individual application in this category, based on the terminal graduate degree of their respective institutions and the size of the graduate program.

The difference in terms of HQP between universities offering only M.Sc. degrees and the ones also offering Ph.D. degrees is significant, both quantitatively and qualitatively. Not only does the graduate enrollment (relative to the size of the faculty) give the latter universities an advantage, but also, more importantly, the quality of the students gives these universities a much better chance to succeed in the current model of evaluating HQP. There is no doubt that a Ph.D. candidate would be more able to "contribute to quality, original research" (as the evaluation indicator "Very Strong" requires) than an M.Sc. candidate.

While there is nothing wrong with giving people credit for their hard work in supervising Ph.D. students, in the current model for the HQP evaluation indicators a researcher from Lakehead University (or any other university that only offers M.Sc. degrees) will never be able to obtain a better indicator than "Strong".

Similarly, researchers at a university with a graduate program with a small enrollment are also at a disadvantage. When the number of graduate student applicants is less than than the number of faculty members (as in the case of Lakehead), not every faculty member will have the opportunity to supervise a graduate student. As an example, during the five year period 2006 to 2010, our department graduated only 11 M.Sc. students. So, on average, our faculty members only have the opportunity to supervise at most one student every five years. A school with a larger enrollment has a significant advantage in that researchers can easily increase their HQP numbers.

Therefore, ONLY for the HQP component of the evaluation, it would be better to set up two categories of applicants according to the the terminal graduate degree of their respective institutions, with slightly different indicators of quality to reflect the uneven playing field. In additional, the size of the graduate program should be taken into account when allocating funds. As a counterpart, once the evaluation is completed,

the successful applicants from the same bin (in terms of quality) should receive different funding, with larger amounts offered to the researchers from universities offering Ph.D. degrees.

International. One member of the department has benefited from funding from Italy. The system in Italy is slightly different in that a research area (say, for example, algebra) is given a pool of money. Mathematicians from outside of Italy are than able to apply in conjunction with an Italian host for money to visit Italy for an extended stay (e.g. one or two months). In addition, another member of our department had the opportunity to use the London Mathematical Society Scheme 2 funding, which works in a similar way and provides the visitor with the opportunity to showcase his/her research at several universities in the UK (during one visit)

While we do not suggest that we emulate this model of dividing up money among research areas, we suggest that perhaps some money can be set aside to help international visitors stay for longer periods of a time. Perhaps NSERC (or possibly through the Institutes) money can be set aside that international researchers can apply to visit Canada for an extended period of time.

Again, we would like to thank the Steering Committee for its time. We hope the above comments will be useful as you go forward. If you have any further questions, please feel free to contact either of us below.

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