NSERC Discovery Grants Workshop
Jim Cotton

• Professor in Mechanical Engineering – 12 years

Industry: Dana Corporation – 7 years

• Applied Research in Integrated Energy Systems, waste heat recovery (Pizza Ovens), thermal storage and (automotive) thermal management

• Discovery Research:
  • “Electrohydrodynamically Controlled Phase Change Heat Transfer and Thermal Storage Systems”

• NSERC Discovery Evaluation Group 1512 -Mechanical

• Evaluation Committee Member 2017 – 2019

• Committee Co-Chair 2018 & 2019
# Discovery Grants Program Specificities

<table>
<thead>
<tr>
<th>Discovery Grants Program</th>
<th>Other ‘Typical’ Research Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funds <em>programs</em> of research</td>
<td>Funds research <em>projects</em></td>
</tr>
<tr>
<td>Freedom to pursue most promising avenues</td>
<td>Constrained by objectives set in proposal</td>
</tr>
<tr>
<td>Covers direct costs of research; not faculty salary or overhead</td>
<td>Covers direct and possibly indirect costs and some salary</td>
</tr>
<tr>
<td>Typically 5 years duration</td>
<td>Project-based timeframe</td>
</tr>
<tr>
<td>Limited to one DG at a time</td>
<td>Multiple grants can be held at one time</td>
</tr>
</tbody>
</table>

Source: NSERC Orientation Session
# Discovery Grants Statistics

## Table 1  Overall Comparative Statistics Discovery Grants Competitions, 2015-19

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2016*</th>
<th>2017</th>
<th>2018*</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Success Rate</td>
<td>Average Grant ($)</td>
<td>Success Rate</td>
<td>Average Grant ($)</td>
<td>Success Rate</td>
</tr>
<tr>
<td>Early Career Researchers (ECR)</td>
<td>65%</td>
<td>$26,120</td>
<td>75%</td>
<td>$28,771</td>
<td>69%</td>
</tr>
<tr>
<td>Established Researchers (ER)</td>
<td>65%</td>
<td>$32,903</td>
<td>65%</td>
<td>$37,138</td>
<td>66%</td>
</tr>
</tbody>
</table>

*Includes additional funding received resulting from Federal Budgets 2016 and 2018

Source: NSERC 2019 Competition Statistics
Evaluation Materials

• Application
• Canadian Common CV (CCV)
• Samples of Research Contributions
• Reports from external reviewers
What reviewers look for:

• Evidence of researcher accomplishments and quality of work
• Evidence of the specific application of knowledge and improvements to current practices (e.g. revisions to codes)
• Evidence of the creation of novel products, processes and services that are or may become useful to society (e.g. software development, technology transfer, patents)
• Evidence of degree of innovative content of the research program and the potential to make a significant contribution to the field
• Evidence that HQP will receive high quality research training and that past students have highly desired skills and are needed/wanted in the Canadian workforce
Application Sections

Application - Part 1
• Identification
• Summary of Proposal
• Proposed Expenditures
• Relationship to Other Research Support
• HQP Training Plan
• Past Contributions to HQP
• Most Significant Contributions
• Additional Info on Contributions

Application - Part 2
• Proposal
• List of References
• Budget Justification
Canadian Common CV Sections

• Personal Information
• Education
• Recognitions (Honors, Prizes, Awards)
• User Profile (Research Expertise)
• Employment (Academic, Non-Academic)
• Research Funding History
• Supervisory Activities
• Administrative Activities (Editorial, Event Administration, Collaboration, Technology Transfer)
• Memberships
• Contributions (Journal Articles, Conferences, Presentations/Invited Talks, Books, Patents)
Evaluation of a Discovery Grant Application

• Each Committee member reviews 40 to 50 applications each year. Each application takes about 3 hours to review and then another 15-30 minutes at the competition.

• Each application will be assessed by 5 members, the assignment of applications is typically:
  • First Internal Reviewer (10-15 applications each)
  • Second Internal Reviewer (10-15 applications each)
  • +Three Readers (20-25 applications each)
External Reviewers Reports

• External reviewer reports start to arrive in January and can arrive up to the week of competition.

• NSERC Evaluation Committee Member will integrate external reviewer reports into their evaluation. However, given the amount of work, most start reviewing in December before they have the external examiner reports and then integrate the reviews later.
# Rating Form

**Applicant:**

**Title of proposal:**

**Selection criteria (See instructions for complete details):**

<table>
<thead>
<tr>
<th>Excellence of the researcher</th>
<th>Exceptional</th>
<th>Strong</th>
<th>Moderate</th>
<th>Insufficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge, expertise, and experience of the researcher in the NSE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality and impact of contributions to the proposed research and/or other areas of research in the NSE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importance of contributions to, and use by, other research and end-users</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Merit of the proposal</th>
<th>Exceptional</th>
<th>Strong</th>
<th>Moderate</th>
<th>Very Strong</th>
</tr>
</thead>
<tbody>
<tr>
<td>Originality and innovation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significance and expected contributions to NSE research, potential for policy and/or technology-related impact</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clarity and scope of objectives</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clarity and appropriateness of methodology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feasibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extent to which the scope of the proposal addresses all relevant issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriateness of and justification for, the budget</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstration that the Discovery Grant proposal is distinct conceptually from research supported (or submitted for support) through CHFR and/or SSHRC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear explanation why Discovery Grant funding is essential to carry out the research proposed in the DGO application (for applicants who hold or have applied for a CHFR Foundation Grant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Contributions to the training of highly qualified personnel:**

<table>
<thead>
<tr>
<th>Contributions to the training of HQP</th>
<th>Exceptional</th>
<th>Strong</th>
<th>Moderate</th>
<th>Insufficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past contributions to the training of HQP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HQP awards and research contributions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcomes and skills gained by HQP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training philosophy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HQP research training plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Rationale for rating:**

**Other comments (e.g., duration should be less than norm, special circumstances, quality of samples of contributions provided, environmental impact, ethical concerns. Your Program Officer should be notified accordingly):**

**Message to the applicant:**

**Discovery Accelerator Supplement (DAS):**

- Regular DAS: Yes, No
- DAS in Targeted Areas: Yes, No

**Rationale for DAS Recommendation:**

---

Source: NSERC Orientation Session
Discovery Grants Evaluation Criteria

Merit assessment uses six-point scale to evaluate:
• Excellence of Researcher
• Merit of Proposal
• Training of Highly Qualified Personnel (HQP)
+Cost of research (High, Normal, Low where applicable)

Equally weighted
## Discovery Grant Merit Indicators (2018)

<table>
<thead>
<tr>
<th>Exceptional</th>
<th>Outstanding</th>
<th>Very Strong</th>
<th>Strong</th>
<th>Moderate</th>
<th>Inefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>The accomplishments presented in the application were deemed to be far superior in quality, impact and/or importance to a broad community.</td>
<td>The accomplishments presented in the application were deemed to be of superior quality, impact and/or importance.</td>
<td>The accomplishments presented in the application were deemed to be of very superior quality, impact and/or importance.</td>
<td>The accomplishments presented in the application were deemed to be superior in quality, impact and/or importance.</td>
<td>The accomplishments presented in the application were deemed to be of acceptable quality, impact and/or importance.</td>
<td>The accomplishments presented in the application were deemed to be below an acceptable level of quality, impact and/or importance.</td>
</tr>
</tbody>
</table>

### Merit Indicators

- **Excellence of the Researcher**
  - Proposed research program is clearly presented, is extremely original and innovative and is likely to have impact by leading to groundbreaking advances in the area and/or leading to a technology or policy that addresses socio-economic or environmental needs. Long-term vision and short-term objectives are clearly defined. The methodology is clearly defined and appropriate. The budget clearly demonstrates how the research activities to be supported are distinct from and complement those funded by other sources.

- **Merit of the Proposal**
  - Training record is at the highest level, with HQP contributing to high-quality research. Most HQP move on to positions that require highly desired skills, obtained through training received. Research plans for trainees are appropriate and clearly defined. HQP success highly likely.

- **Training of HQP**
  - Training record is superior to other applicants, with HQP contributing to high-quality research. Many HQP move on to appropriate positions that require desired skills, obtained through training received. Research plans for trainees are appropriate and clearly defined. HQP success likely.

- **Cost of Research* (2019-2020)**
  - Majority of justified expenses represent costs higher than the norms for the research area.

### Criteria

1. The Discovery Grants Merit Indicators should be used in conjunction with the Peer Review Manual (Chapter 6) which outlines how reviewers arrive at a rating.
2. Possible examples include: Cost of training of HQP, Equipment-intensive research and/or high-user fees, particularly expensive or frequent consumables; Travel (for collaboration, field work, access to facilities, conferences, etc.)

* Source: NSERC Orientation Session 2019-09-12
Excellence of Researcher

- Knowledge, expertise and experience
- Importance of contributions to research
  - Focus on NSE impact
- The entire community is used as a reference to help interpret the qualifiers in the grid
- Focus on past six years (anything outside of this is not considered)
- Only material in the application can be discussed at competition
<table>
<thead>
<tr>
<th>Criterion</th>
<th>Application Grant Proposal</th>
<th>CCV Researcher Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellence of the Researcher (EoR)</td>
<td><strong>Sections</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Most Significant Contributions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Additional Information on Contributions (choices of venues, order of authors)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Samples of Research Contributions (max of 4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Sections</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Contributions (publications, books, patents, etc.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Recognitions (honours, prizes and awards)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Administrative Activities (editorial, collaborations, event organization, tech. transfer)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Membership (service on committees)</td>
<td></td>
</tr>
</tbody>
</table>

Source: NSERC Orientation Session
Merit of the Proposal

• Originality and innovation
• Significance and expected contributions to NSE
• Clarity and scope of objectives
  – Must describe a program of research, NOT A PROJECT, that will advance knowledge in the NSE
• Clarity and appropriateness of methodology
• Feasibility of program
• Appropriateness of budget
  – Relationship to other sources of funds clearly explained
# Criterion

## Merit of the Proposal (MoP)

<table>
<thead>
<tr>
<th>Application Grant Proposal</th>
<th>CCV Researcher Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sections</strong></td>
<td><strong>Section</strong></td>
</tr>
<tr>
<td>- Proposed Expenditures</td>
<td>- Research Funding</td>
</tr>
<tr>
<td>- Relationship to Other</td>
<td>History (to assess</td>
</tr>
<tr>
<td>Research Support</td>
<td>possible conceptual</td>
</tr>
<tr>
<td>- Proposal</td>
<td>or budgetary overlap)</td>
</tr>
<tr>
<td>- List of References</td>
<td></td>
</tr>
<tr>
<td>- Budget Justification</td>
<td></td>
</tr>
</tbody>
</table>

**Standalone attachment (when applicable)**

- Other Support Sources
  - (mainly for CIHR & SSHRC grants)
Contributions to the Training of HQP

• The assessment of contributions to training of HQP is based on both the record of training (in the past) and the plans for training (in the future)

• Quality, extent and impact of contributions during the last six years

• Appropriateness and quality of training plan in the Natural Sciences and Engineering

• Enhancement of training arising from a collaborative or an interdisciplinary environment, where applicable

• NSERC values all levels of HQP (undergraduates conducting research to PhD and postdoctoral) although the committee focus on thesis is based on MASc and PhD

• Remember to include “Consideration of equity, diversity and inclusion in past and planned training of HQP.”
<table>
<thead>
<tr>
<th>Criterion</th>
<th>Application Grant Proposal</th>
<th>CCV Researcher Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contributions to the Training of Highly Qualified Personnel (HQP)</td>
<td><strong>Sections</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- HQP Training Plan (students’ role, knowledge and skills acquired)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Past Contributions to HQP Training</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Sections</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Supervisory Activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Contributions (co-authors who are trained HQP are to be identified by an asterisk *)</td>
<td></td>
</tr>
</tbody>
</table>

Source: NSERC Orientation Session
Implementation of the Conference Model and Use of the Rating Indicators

Reader

2nd Internal

Conflicts

Excellence
Outstanding
Outstanding
Outstanding
Outstanding
Outstanding

Merit
Outstanding
Very Strong

HQP
Outstanding
Outstanding
Outstanding

Very Strong

Very Strong

Very Strong

CoR Factor:

N

N

N

1st Internal

Reader

Different EG

Source: NSERC Orientation Session
### Step 1 - Merit assessment

<table>
<thead>
<tr>
<th></th>
<th>Exceptional</th>
<th>Outstanding</th>
<th>Very Strong</th>
<th>Strong</th>
<th>Moderate</th>
<th>Insufficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellence of the researcher</td>
<td>X X</td>
<td>X X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Merit of the proposal</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contribution to the training</td>
<td>X X</td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>of HQP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Outstanding – Very Strong – Very Strong*

### Step 2 – Funding Recommendation

<table>
<thead>
<tr>
<th>Funding Bin</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>...</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>...$</td>
<td>...$</td>
<td>...$</td>
<td>...$</td>
<td>...$</td>
<td>...$</td>
<td>...$</td>
<td>...$</td>
<td>...$</td>
<td>...$</td>
<td>...$</td>
<td>...$</td>
<td>...$</td>
</tr>
</tbody>
</table>
Application Purpose

Make the reviewers (possibly 10) believe:

• this research is novel and important
• there is benefit to Canada
• you are qualified to carry it out

These reviewers may be:

• experts in your area
• a researcher in a similar department/stream you are in but not an expert in your area
• someone from industry in your field
• or someone you would not expect or believe has the qualifications to review your proposal
Proposed Research

• You are presenting a PROGRAM (not a project) so provide 2-3 aspects of research, paths you will explore

• Indicate alternate paths if research involves risk and explain what happens if there are issues or the results negative: what are your fall-back positions, your Plan B

• Link together through common theme

• Indicate who will participate in what piece of research (PhD, MASc) making sure the level is appropriate for task

• Name graduate students that you know will work on proposed research or provide numbered labels for future students (PhD2)
Objectives

- State explicitly your short-term (1 to 4) and long-term objectives
- Long-term objectives should be far-reaching research
- Discovery Grants support fundamental research
HQP 2 Parts

Past contributions to the training of HQP
1. Training environment
2. HQP awards and research contributions
3. Outcomes and skills gained by HQP

**Focus on quality and impact of training**

Future plans for training
1. Training Philosophy
2. Research Training Plan

**Focus on quality, suitability and clarity of plan**
HQP

• Explicitly state the number of HQP you will train over the course of 5 years—even if you have mentioned them already in budget justification or throughout description of proposed research

• “Through my proposed research I will train five Ph.D. students, three M.Sc. students and a postdoctoral fellow. HQP trained by me will …”

• State what skills the HQP you train will acquire

• State exactly what each HQP will do

• Make sure you tell the reviewers about the success of your past students...Best Paper Awards, Great jobs, Start up companies, Scholarships, Academics
HQP - Consider equity, diversity and inclusion (EDI) in your application.

- “Applicants are encouraged to promote approaches that increase the inclusion and advancement of women and other under-represented groups in NSE.
- Applicants should describe their planned approach to promoting participation from a diverse group of HQP, taking into account equity in recruitment practices, mentorship and initiatives aimed at ensuring an inclusive research and work environment.”
References

• Make sure references are not just your past papers
• Make sure your references are not just ones that use the specific approach you plan to use
• Provide references from a broader area to compare against
Cost of Research

• Relative cost of research of the proposed research program as compared to the norms for a given discipline / field of research
  – High, Normal, Low
  – The majority of applications are deemed to have normal costs of research relative to the EG
  – Availability of other sources of funding does not affect the assessment of the relative cost of research
Budget Justification

• Justify your numbers and do your homework
• Budget should be realistic - Numbers that are too high look dishonest or suggest you are clueless or unprepared
• NSERC Discovery is “grant in aid” - but is not meant to support the full costs of a research program
• If others in your department are applying be consistent, if possible, in HQP salaries. Discuss with your colleagues.
• Don’t expect NSERC committee to read in detail “unless not normal”. If you didn’t have room in your proposal or HQP Sections to give the required amount of detail **do not use this space to add new important stuff here**! However you can emphasize content from your other sections.
Early Career Researcher

• Early Career Researchers (ECR) are applicants who have held an independent academic position for 5 years or less. For example, to be classified as an ECR, a researcher submitting an NOI in August 2019 would have been hired on or after July 1, 2014.

An independent academic position is a position that:
• is a university faculty appointment (tenured or non-tenured);
• requires that the researcher engages in research that is not under the direction of another individual;
• authorizes the researcher to supervise or co-supervise the research of students registered in an undergraduate or graduate degree program, or postdoctoral fellows.
Discovery Accelerator Supplements

• $120,000 - over three years
• EG Members are asked to identify applicants who best meet the revised objectives of the DAS program
  – Highly original and innovative research programs,
  – Show strong potential to become international leaders within their field, and
  – Able to capitalize on an opportunity with additional resources
• Up to ~125 Supplements per year
• Each EG will receive a quota of DAS nominations to recommend
Advice
Proposal should stand on its own
- Emphasize originality & innovative aspects of your work and potential impact – incremental work is not viewed highly by EG
– Reader should not have to read your papers to understand proposal
– Reader will not use internet to understand proposal or find acronyms - it is prohibited by EG members
Have your draft read by others
– By experts in your research area – your students/pdfs
– By people in your department who know very little about your area
– By lay people who are good writers or editors
Advice

• Avoid acronyms
• Checked for spelling, grammar
• Leave spaces between sections
• Make sure your program does not sound like a series of projects
• Bold names of HQP that you have supervised or will supervise anytime you mention them
• Indicate HQP in Journal papers and when they present at conferences
• Be very clear about methodology – be specific
• Do not pad your CCV – do not include your H-factor or citations
• Do not ask for a DAS
Advice

• Your 4 Journal papers submitted are extremely important. Primary method to assess quality. Make sure they are within the past 6 years.

• Your training philosophy and plan and past training outcomes are as important as the Proposal – spend as much time on it!

• Use all of the space provided

• Do not use Administrative Appointments as a reason for delays in your research – it is considered a career choice

• Do not list Capstone Undergrads as HQP – USRAs are good

• Masters (non-thesis is generally not considered research)

• Include EDI - Considering equity, diversity and inclusion throughout your application.
Advice

Follow *all* instructions given by NSERC

- Ordering, bolding, margins, page limits, years of contribution (6)

*Do not include the role of Academic Advisor in your NSERC CCV.* Typically Academic Advisor is not considered an official supervisor role in the evaluation of the contributions to HQP.
Good Luck!