

Doctoral Degrees in Canada – Challenges, Opportunities and New Directions

Jeff Casello
Associate Vice-President, Graduate Studies
and Postdoctoral Affairs

UK Council on Graduate Education
**Doctoral Outcomes: Evolution, Evaluation
and Experiences**

21 March 2024



Photo credit: @bruce.digital



WHERE TO FIND US



UNIVERSITY OF WATERLOO

200 University Avenue West
Waterloo, Ontario, N2L 3G1, CANADA



THE UNIVERSITY OF WATERLOO

Founded in **1957**

DEGREES GRANTED IN 2023:

6,987 Undergraduate degrees

2,114 Master's degrees

377 PhD degrees

25K+ undergraduate co-operative education placements annually

42K+ full-time and part-time, undergraduate and graduate students cumulatively **FALL 2020**

1,378 **2023**
full-time faculty

2,811 **2023**
professional services staff



WATERLOO GRADUATE STUDIES

180 Graduate Programs

Three Study Levels

- Course-based Masters
- Research Masters
- PhD

Faculties	Students
Arts	1,000
Engineering	2,000
Environment	700
Health	880
Mathematics	1,100
Science	650

Enrollments

~6,100 Graduate Students;
~2,100 Professional;
~1,800 Research Masters;
~2,200 PhD students

40% International
47% Female

~400 Postdoctoral Scholars

WATERLOO FACULTIES, CENTRES AND INSTITUTES

\$249.1 M

2022/23

in research funding from public and private sources

CREATOR OWNED

intellectual property rights policy



CANADIAN CHALLENGES IN DOCTORAL EDUCATION



Building Identity for Graduate Programs

Attracting Strong Applicants
Managing Domestic and International Geo-Political Concerns
Articulating Value of Doctoral Degrees to Disparate Audiences



Funding Doctoral Education



Transforming Perspectives of Supervisors / University



Aligning Academic Programming to Student Outcomes

CANADIAN CHALLENGES IN DOCTORAL EDUCATION

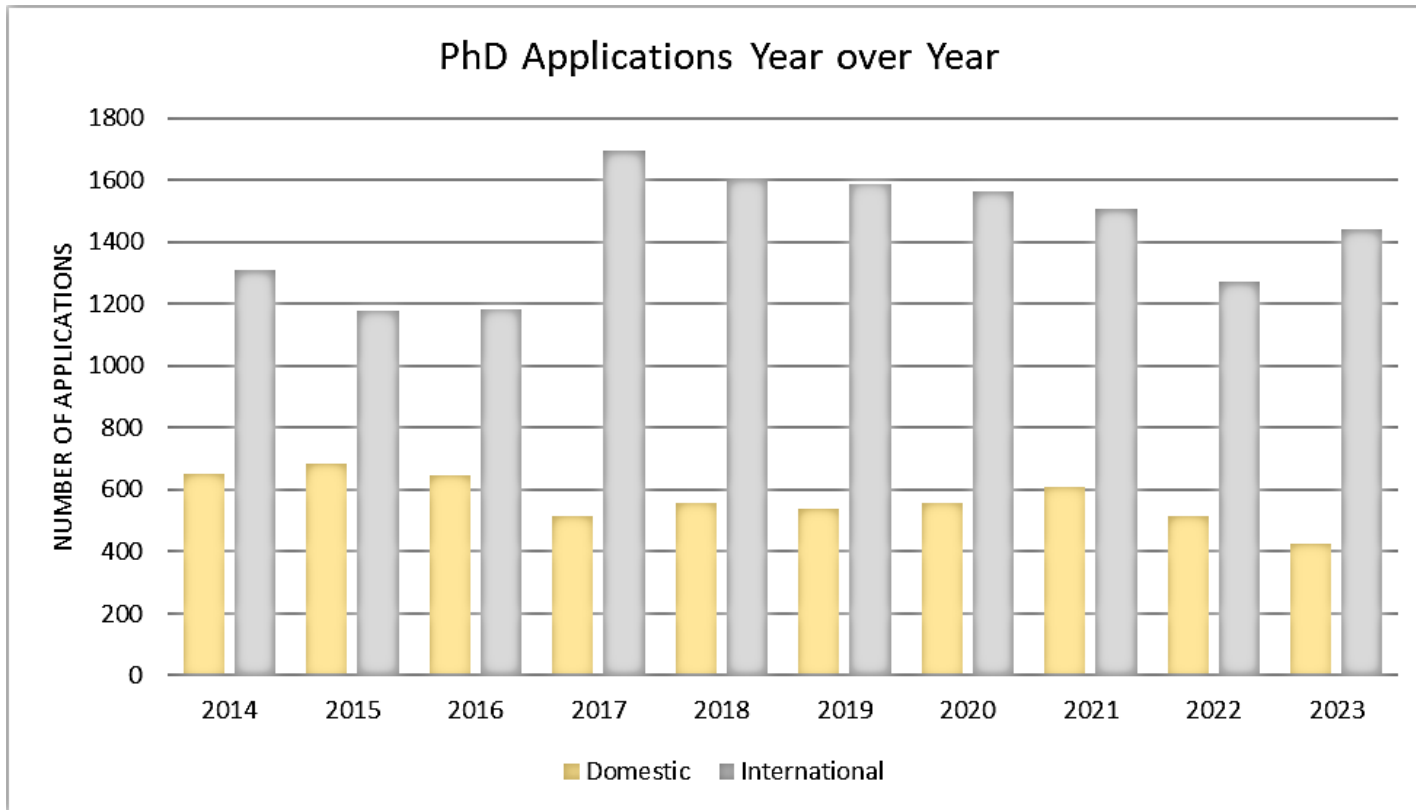
Building Identity for Graduate Programs

	Undergrad	Grad	Ratio
Alberta	30,855	7,460	4.1
UBC	52,710	10,840	4.9
Calgary	24,625	5,895	4.2
Dalhousie	14,700	3,960	3.7
Laval	29,470	13,240	2.2
Manitoba	25,135	3,755	6.7
McGill	27,600	10,145	2.7
McMaster	27,280	4,560	6.0
Montreal	49,535	18,235	2.7
Ottawa	35,515	6,740	5.3
Queens	19,665	4,985	3.9
Saskatchewan	20,010	4,335	4.6
Toronto	71,525	18,555	3.9
Waterloo	34,000	6,000	5.7
Western	24,587	5,935	4.1

Canada's Research-Intensive universities are known as the U15. Among this group, ratios of undergraduate enrollments to graduate enrollments range from 2.2:1 to 6.7:1. Waterloo ranks 13th in the U15 and 6th among Ontario Universities in this ratio.

CANADIAN CHALLENGES IN DOCTORAL EDUCATION

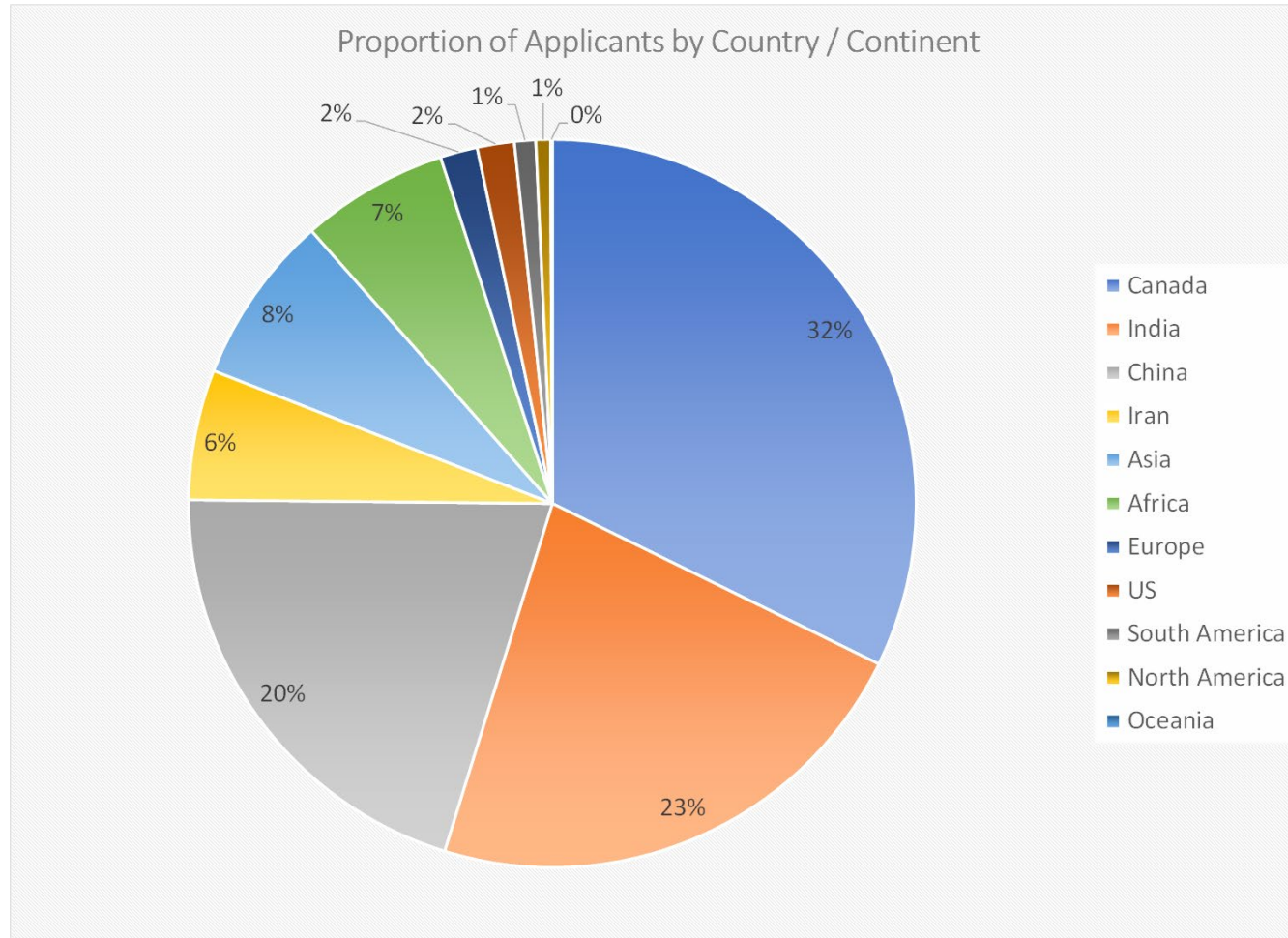
Building Identity for Graduate Programs



	Engineering PhD	Environment PhD
Domestic Applications	65.0	59.5
Domestic Offers	36.3	43.5
Applications / Offer	1.79	1.37
Domestic Acceptances	29.3	36.5
Acceptance Rate	81%	84%
International Applications	496.5	76.0
International Offers	96.3	14.0
Int'l Applications / Offer	5.16	5.43
International Acceptances	63.0	10.3
Int'l Acceptance rate	65%	74%

CANADIAN CHALLENGES IN DOCTORAL EDUCATION

Building Identity for Graduate Programs



In the past three years, 81% of graduate applications came from four countries.

For fall 2024 admissions, Indian applications were down ~60%

Most recently friction is increasing among Canadian / Chinese Govts on issues of Research Security.

CANADIAN CHALLENGES IN DOCTORAL EDUCATION

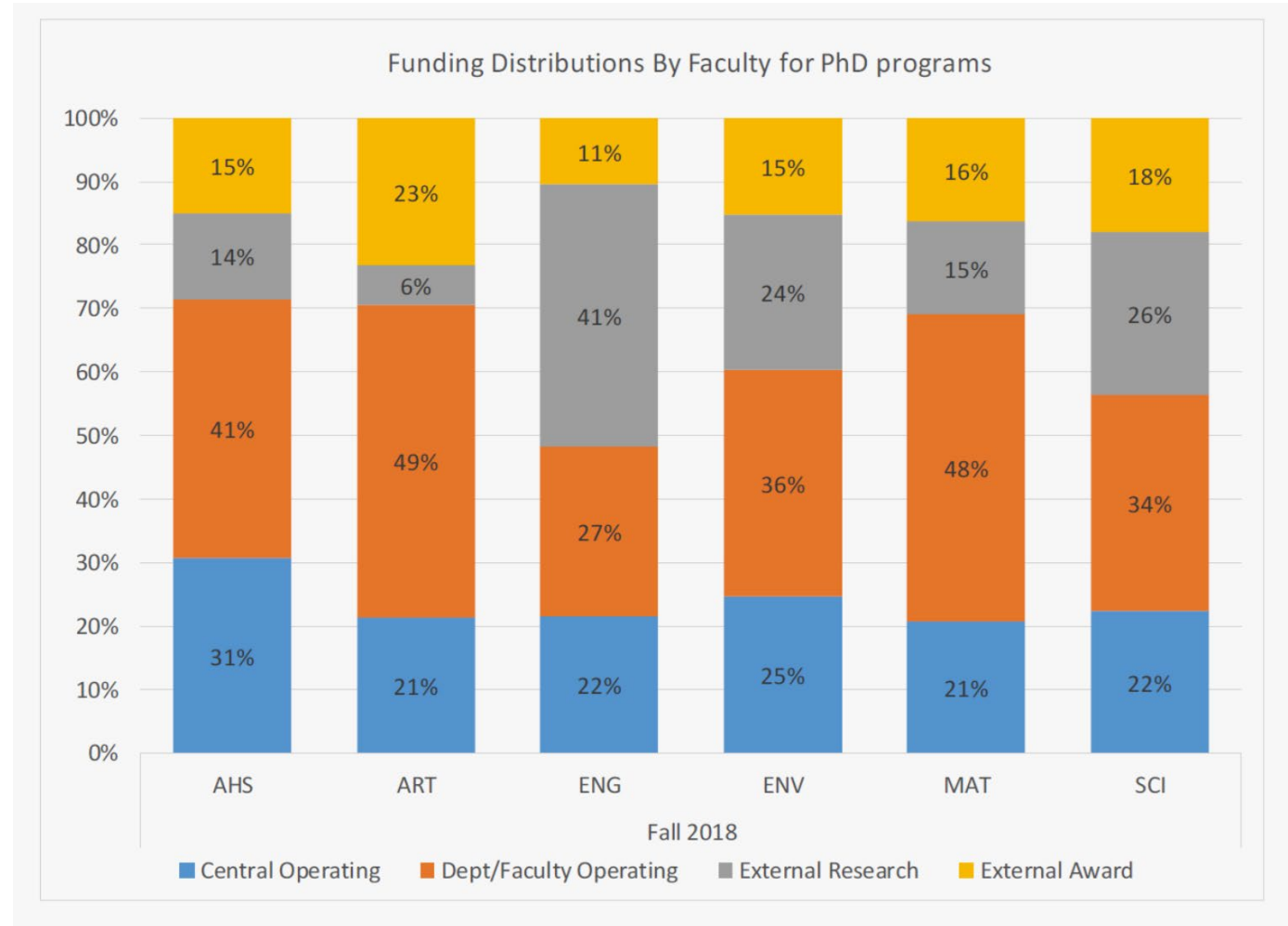
Funding Graduate Education

- ❖ In Ontario, revenue generated by doctoral students includes:
 - Tuition and fees for domestic students ~\$8400/yr
 - Provincial “grant” for domestic PhDs ~\$24,000/yr
 - Tuition and fees for international students ~\$24,600/yr with \$0 Grant.
 - At Waterloo, all international doctoral students receive an award that offsets int’l tuition to domestic levels (IDSA), so net revenue is \$8400.
- ❖ The financial support for doctoral students includes:
 - Minimum annual support of ~\$27k.
 - Total value achieved by internal (operating) and external funding.

CANADIAN CHALLENGES IN DOCTORAL EDUCATION

Funding Graduate Education

- ❖ In Ontario:
 - Tuition rates were reduced in 2018 by 10% for all domestic students;
 - Tuition frozen through 2026.
 - Government grant has not changed for more than a decade.
- ❖ Federally, student scholarships funded by the research councils has not changed since 2003.

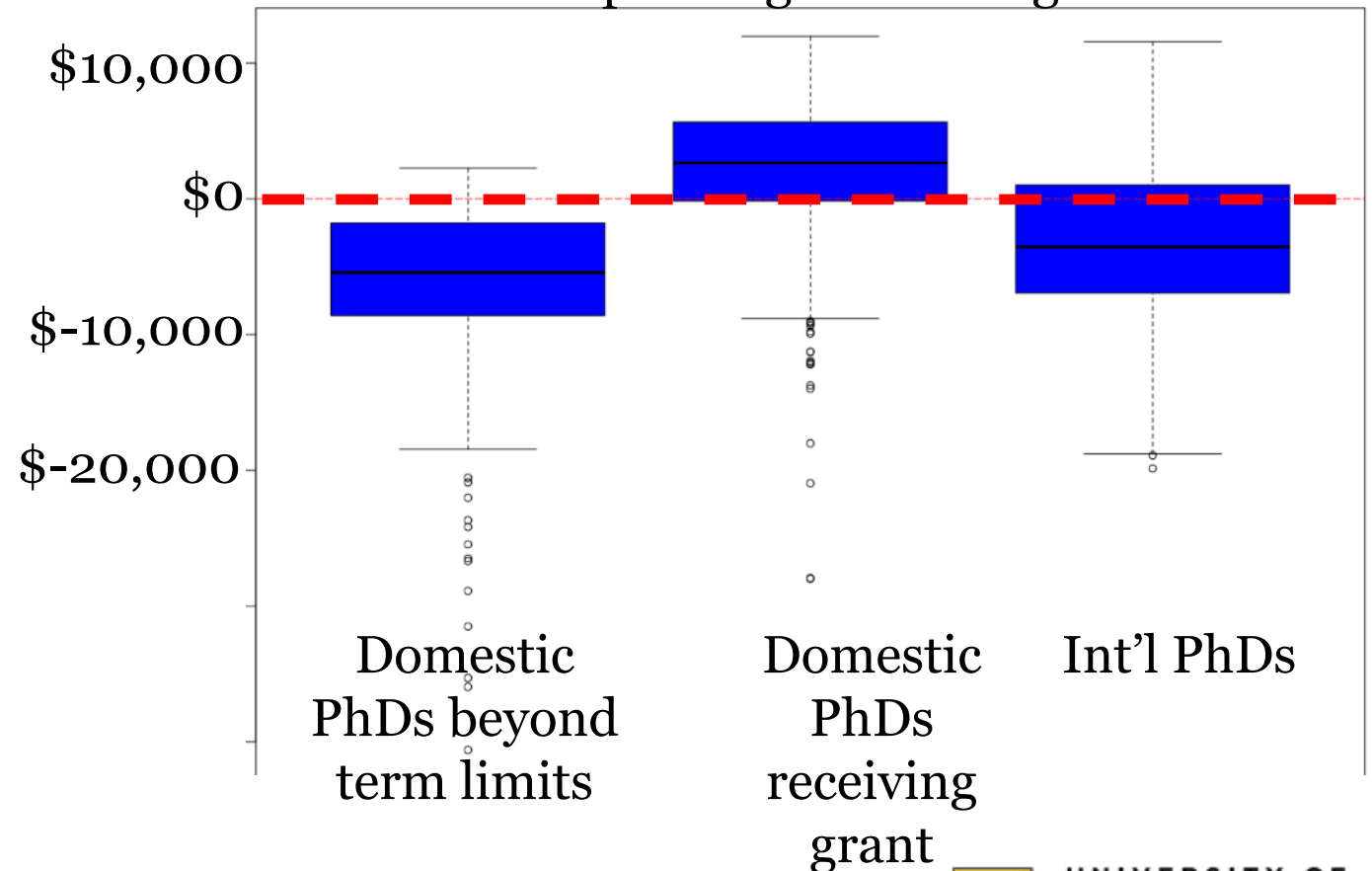


CANADIAN CHALLENGES IN DOCTORAL EDUCATION

Funding Graduate Education

- ❖ International and time extended domestic doctoral students represent substantive costs to the university.
- ❖ Horizontal line in the diagram is the median value.

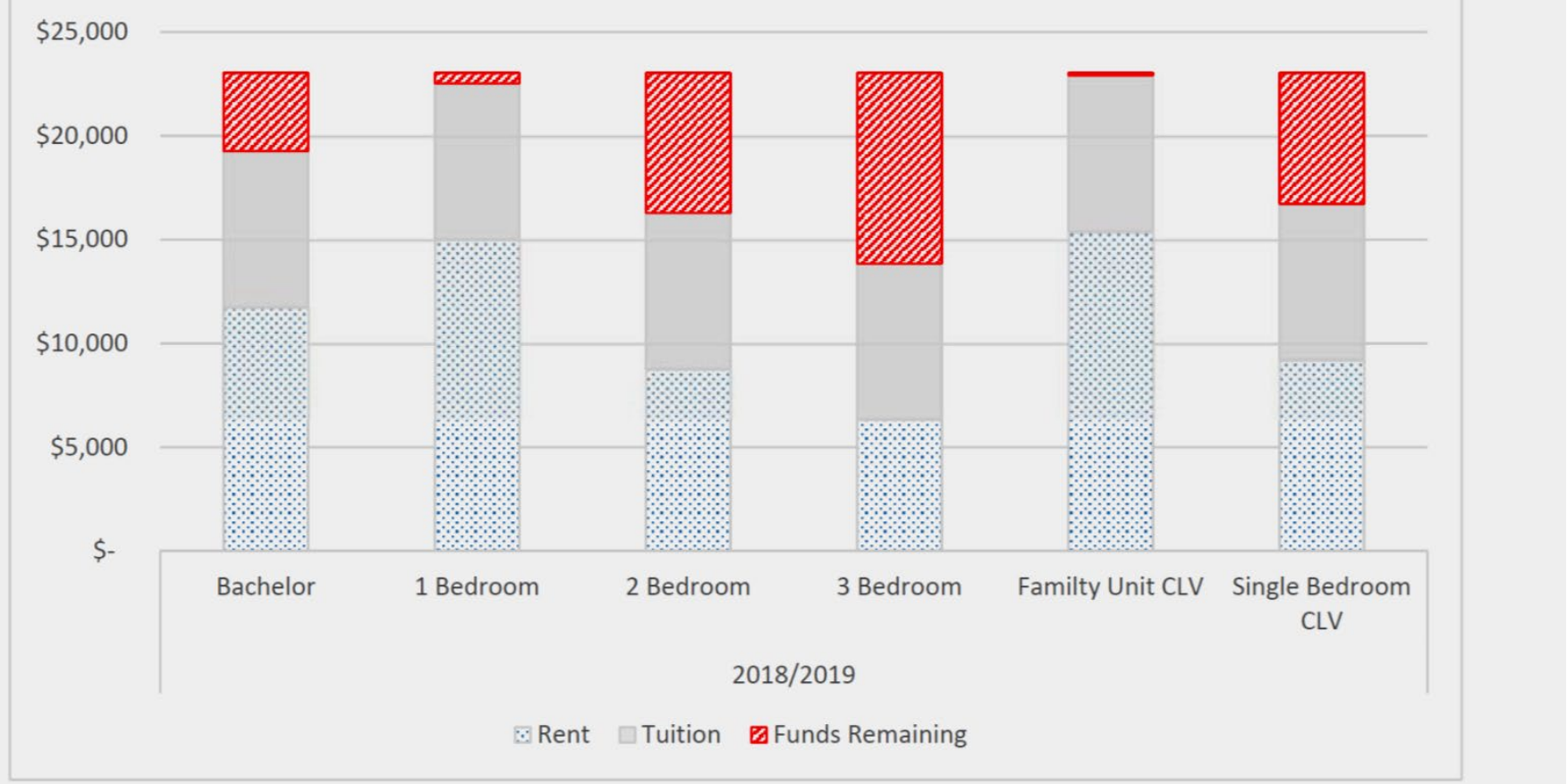
Distribution of total net revenues / costs for PhD students depending on funding sources



CANADIAN CHALLENGES IN DOCTORAL EDUCATION

Funding Graduate Education

❖ Net of tuition, our PhD students have very little revenue remaining.



CANADIAN CHALLENGES IN DOCTORAL EDUCATION

Transforming Supervisors' Perspectives

- ❖ Graduate supervisors often assume that PhD candidates will join the academy;
- ❖ The “currency” for supervisors is publications in academic fora;
- ❖ In some disciplines, the norm is for PhDs to (exclusively) support and advance the supervisor’s research program;
- ❖ In other disciplines, the norm is for supervisors to research (exclusively) independently of their students;
- ❖ Students are clustered and largely interact based on discipline, not thematic areas of study.

CANADIAN OPPORTUNITIES IN DOCTORAL EDUCATION

What Should (Will?) the Future Hold

- ❖ A data-driven, well-articulated message on the value of PhD studies;
- ❖ A purposeful, perhaps aspirational enrollment mix that:
 - Is aligned with the research goals of the university;
 - Is cognizant of market demands (across sectors);
 - Creates diversity of perspectives and lived experiences.
- ❖ A funding model that diminishes the opportunity cost of PhD studies.
- ❖ Supervisory perspectives and structures that promote students' agency in their pursuits.
- ❖ Revised academic and extra-curricular constructs that are linked to students' personal and professional goals.
- ❖ Greater support for and connections with graduates.

CANADIAN OPPORTUNITIES IN DOCTORAL EDUCATION

How can we demonstrate the value of PhDs?

- ❖ Rethink the way we present ourselves as academics;
- ❖ Gather data on our graduands, across sectors;
- ❖ Tell their stories of impacts on society, innovation, and on their own goals;
- ❖ Communicate appropriately for disparate internal and external audiences.

Laura Healey

Footwear Innovation Manager, PUMA

The path to footwear design

As manager of footwear innovation at PUMA's North American office in Boston, Massachusetts, Laura Healey uses her biomechanics expertise to create enhanced performance footwear. Along with a team of designers and engineers, Laura helps develop the innovation and concepts that will be used in Puma's athletic footwear in the future. By talking to and working with top athletes, Laura and the innovation team can obtain feedback and input on their needs and wants from footwear. "I get to talk to top athletes, get their feedback and it's really important stuff. It's also really cool, I love it. It really is 'dream job' material." Often working in collaboration with researchers from other universities, Laura and her team also ensure that the new ideas they develop are based on new and detailed research.

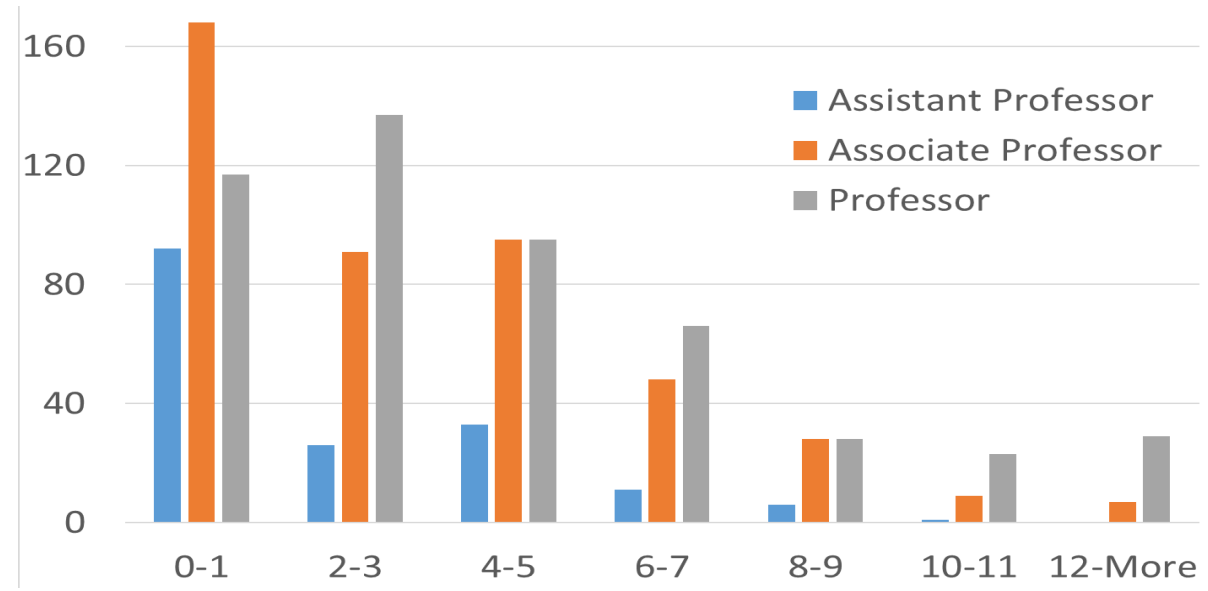
“ I get to talk to top athletes and get their feedback on footwear design. It really is 'dream job' material.” ”



CANADIAN OPPORTUNITIES IN DOCTORAL EDUCATION

How do we set and achieve enrollment targets?

- ❖ Integrate graduate enrollments with strategic research goals;
- ❖ Establish expectations among supervisors in quantity and diversity;
- ❖ Elevate the decision-making on enrollments;
- ❖ Create partnerships and pathways with (international) peers;
- ❖ Catalyze and support the creation of communities that celebrate diversity.



FORMATION RECHERCHE INTERNATIONAL VIE DES CAMPUS UNIVERSITÉ VOUS ÊTES

Accueil * International * Partenariats internationaux * Laboratoires de recherche internationaux

Laboratoires de recherche internationaux

Avec ses activités de recherche tournées vers l'innovation et l'internationalisation, Sorbonne Université est une composante essentielle de plusieurs laboratoires de recherche internationaux.

Découvrez comment nos chercheuses et chercheurs collaborent aux quatre coins du globe.



CANADIAN OPPORTUNITIES IN DOCTORAL EDUCATION

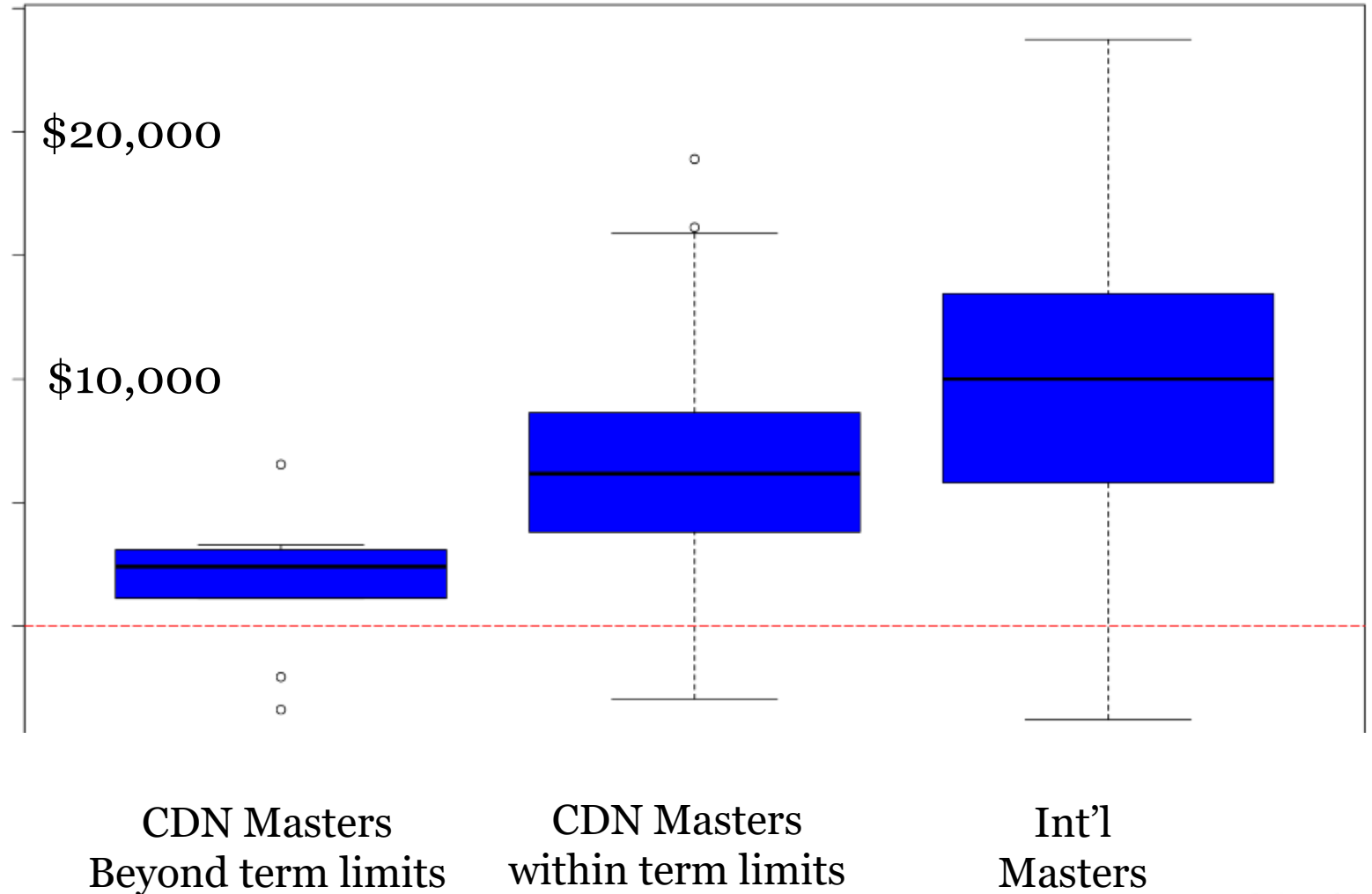
How do we make the case for more internal support?

- Pilot Project with our Faculty of Environment to scrape faculty members' annual performance report (APR) submissions;
- Cross-reference those results with current and past graduate students;
- ~20 faculty members reports generated:
 - 7 book chapters
 - 9 community research reports
 - 69 journal publications
 - 3 keynote presentations
 - 5 posters
 - 1 presentation for non-academic audience
 - 38 academic presentations
 - 2 workshops
- ✓ 54 current and/or former graduate students collaborated on at least one output with their supervisor
- ✓ A total of 135 outputs were counted for current and/or former graduate students

CANADIAN OPPORTUNITIES IN DOCTORAL EDUCATION

How do we leverage other graduate programming to support our research?

Pair research programs with revenue generating course-based master's programs.



Int'l
Masters



UNIVERSITY OF
WATERLOO

CANADIAN OPPORTUNITIES IN DOCTORAL EDUCATION

With whom do we advocate for greater support?

How do we tell our story?

The image displays three screenshots of Canadian government research council websites, each featuring a red maple leaf logo and a search bar. The first screenshot is for the Social Sciences and Humanities Research Council, the second for the Natural Sciences and Engineering Research Council of Canada, and the third for the Canadian Institutes of Health Research. Each page includes the Government of Canada logo and navigation links for Canada.ca, Services, Departments, and Français.

CANADIAN OPPORTUNITIES IN DOCTORAL EDUCATION

How do we transform the academic and co-curricular structures to “modernize” our PhD Programs?

1. Support students and give them agency as they map their education to career goals;
2. Integrate academics with external, applied partners;
3. Evolve academics from discipline specific to thematic exploration;
4. Revise the structure of PhD programs – comprehensive exams, proposals, defenses.

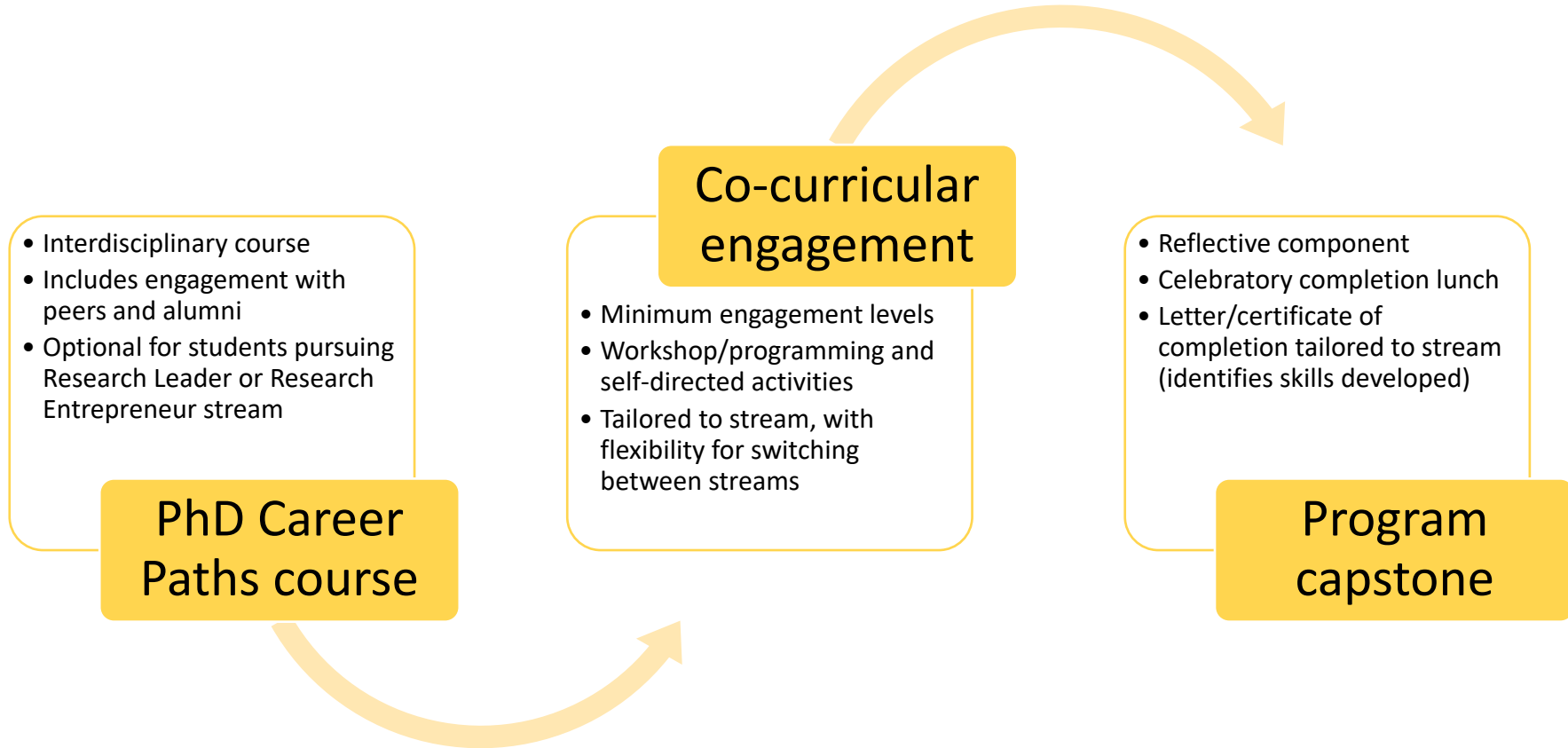
CANADIAN OPPORTUNITIES IN DOCTORAL EDUCATION

Waterloo has introduced a PhD Pathways Program

- ❖ Academic and Teaching Leaders stream (academic)
 - Skills to succeed in an academic environment and be competitive in the academic job market (teaching, research, grant writing, supervising, etc.)
- ❖ Research Leaders stream (industry, government or non-profit)
 - Skills essential to industry, government and/or non-profit employers; align employer needs and research outputs (project management, leadership and management, communicating to non-academics, etc.)
- ❖ Research Entrepreneurs stream (entrepreneurship)
 - Skills and knowledge to commercialize research, and identifying the commercialization potential of research outputs (business grant applications, commercializing research, IP and copyright, creating a business plan, market research, etc.)
- Academic and Research Leader (parallel career planning)
 - Intentional focus on preparing for both an academic and non-academic career paths simultaneously

CANADIAN OPPORTUNITIES IN DOCTORAL EDUCATION

To complete the PhD Pathways program, students will engage in:



CANADIAN OPPORTUNITIES IN DOCTORAL EDUCATION

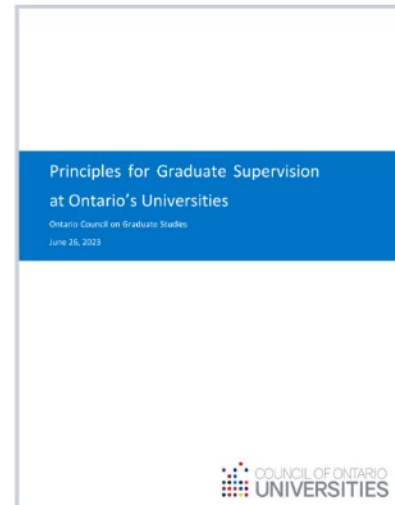
How do we bring supervisors along?

- ❖ Training, particularly for new faculty;
- ❖ Financial incentives;
- ❖ Equating outcomes to performance evaluations.

Reports

Principles for Graduate Supervision at Ontario's Universities

Published: June 26, 2023



These resolutions form a set of guiding principles for the supervision of students in graduate research-based programs, and were agreed to unanimously by the Ontario Council of Graduate Studies in May 2023.

 [DOWNLOAD REPORT \(PDF\)](#)

CANADIAN OPPORTUNITIES IN DOCTORAL EDUCATION

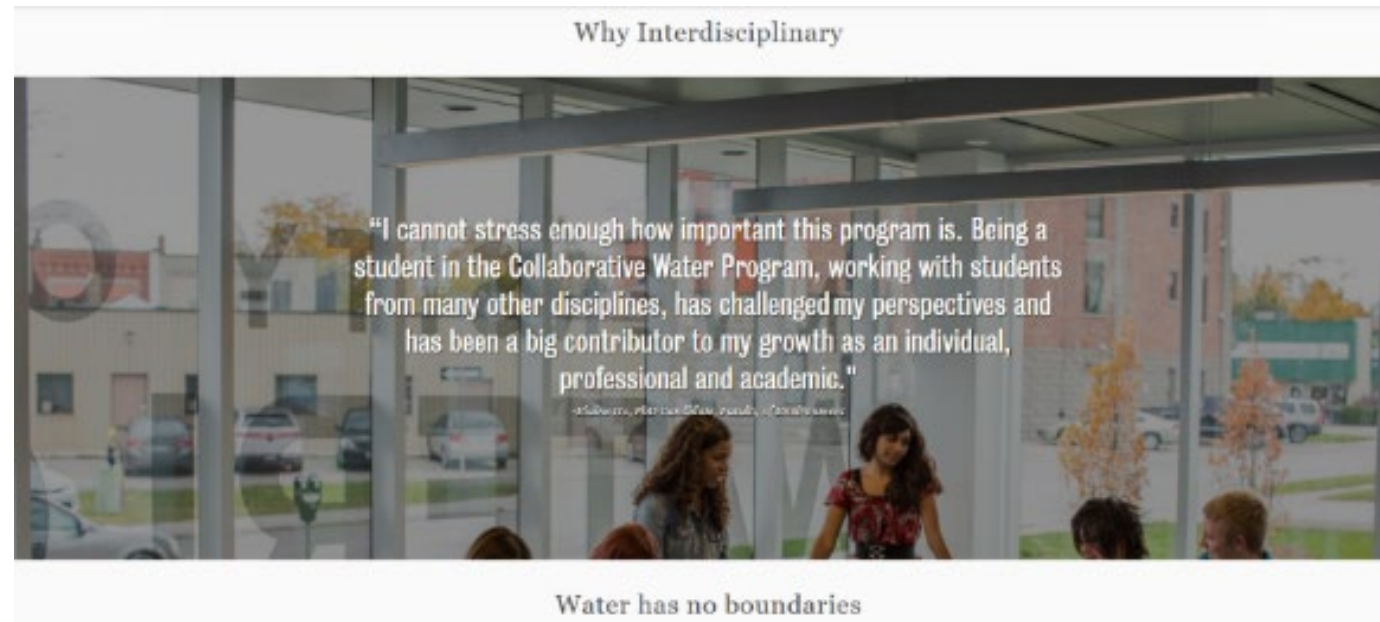
How do we integrate doctoral studies with external, research challenges?

❖ Graduate Work Integrated Learning (WIL)

- PhD in Applied Philosophy
- PhD with a co-op stream in Political Science
- Industry PhDs?

❖ Thematic, interdisciplinary doctoral programs

- + Water;
- + Aviation;
- + Nanotechnology



CANADIAN OPPORTUNITIES IN DOCTORAL EDUCATION

- ❖ Futures framework: consolidated academic attention to global challenges
- ❖ Wicked problems course

The Wicked Problem of Precarity: Living in an Uncertain World

Wicked Problem of Precarity:
**LIVING IN AN
UNCERTAIN WORLD**



Economic Futures



Health Futures



Societal Futures



Sustainable Futures



Technological Futures

CANADIAN OPPORTUNITIES IN DOCTORAL EDUCATION

A final integrated look at the future of the PhD from the student life cycle perspective:

1. Attract, recruit, and confirm **exceptional students and scholars**, domestically and globally, with purposeful **equity, diversity and inclusivity**.
2. Facilitate **student-centered academic pathways** including **experiential opportunities** that offer uniquely impactful academic, personal, and professional outcomes for our students.
3. Conduct and disseminate **fundamental and applied research** that advances scholarship, transforms societies and economies, while strengthening the University identity as a global leader.
4. Create **exceptional experiences for graduate students** that promotes the well-being of our students and serves as a positive differentiator for Waterloo's graduate studies.
5. Engage and support students in their **transition to diverse and transformative** future pathways.
6. **Energize the alumni community** to whom the relationship with the University will continue to **add value** and who will be motivated to **continue their support for the University**.

CANADIAN OPPORTUNITIES IN DOCTORAL EDUCATION

Would you like more information?

- ❖ Contact me at jcasello@uwaterloo.ca
- ❖ Learn more about [Graduate Studies at Waterloo](#)
- ❖ Learn more about our students' work at [GradImpact](#)
- ❖ Learn more about our [Applied Philosophy Program](#)
- ❖ Learn more about our [Futures Framework](#)
- ❖ Learn more about our [Collaborative Graduate Program in Water](#)
- ❖ Learn more about the [Graduate Supervision Workshops](#)
- ❖ Learn more about the [Ontario Council of Graduate Studies Supervisory Principles](#)
- ❖ Learn more about [CIHR](#), [SSHRC](#), [NSERC](#)

UNIVERSITY OF WATERLOO



YOU+WATERLOO

Our greatest impact happens together.