

PROVOST SELF-STUDY: RESEARCH FUTURE
THOUGHT PAPER March 2020

I. EXECUTIVE SUMMARY

The importance of research at Dalhousie University is demonstrated in our [Vision and Mission](#) to be a “*leading innovative, **research-intensive university**, inspiring our diverse scholarly community to serve Nova Scotia, our region, our nation and our world*”, and to “*create a hub of **world-leading research and innovation** adding to the intellectual, social and economic capital of our communities.*” Dalhousie is currently recognized as a U-15 University in Canada and the only member in the Atlantic region. To honour our commitment as a research-intensive University, Dalhousie has the responsibility to maintain a level of research intensity and inclusive research excellence that keeps pace with peers across the nation and around the world.

Through consultations over the course of this self study, we heard from senior leaders that Dalhousie needs “*to take a bold and transformational approach, not incremental, if we are to be successful in growing our research enterprise*”, and that “*we need an institutional culture change to prioritize research in decision making at all levels across the institution.*” Researchers have broadly stated the lack of time they are able to dedicate to research and the need for improved research support. Indeed, some of our leading researchers noted that Dalhousie “*is very far behind*” with respect to its research support infrastructure compared to other research-intensive Universities and that we are “*at a decision point – either support research at a competitive level or let researchers know it is not going to happen.*”

We noticed significant variability across faculties in how research is being prioritized (e.g., workload allocations and Faculty strategic plans), and how research and research impact is being evaluated (e.g., in tenure and promotion criteria and policies). Finally, there seem to be polarized views across our research community on how research is defined, valued, and supported, including: prioritizing research in signature clusters versus supporting research across all areas; the emphasis on innovation, commercialization and industry partnership (commodification) versus the generation of new knowledge; priority-driven versus discovery-based research; and interdisciplinary team-led versus single investigator led-research. The future of research at Dal depends on thoughtful consideration of how we choose to value, define and prioritize research and how we strategically invest in growth.

To effectively grow our research enterprise over the next five years and beyond, our self study team presents five major recommendations:

- 1) Reallocate resources over the next 5 to 10 years to attain an institutional investment in research that is comparable to other U-15 Universities,**
- 2) Build effective research support over time in a strategic way,**
- 3) Foster an institutional shift in expectations around research excellence,**
- 4) Support equity, diversity, and inclusivity in research in a meaningful way,**
- 5) Recognize, support, and promote the intersection of research and teaching.**

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In five years, success would be measured by: (i) a significant increase in grant funding per tenure track faculty member and U-15 ranking, (ii) the role and structure of the PhD has been defined, and potentially reconfigured, so that increased PhD enrollment is thoughtful, strategic and effectively addresses student experience and priorities, career prospects, and faculty needs, (iii) critical Faculty and institutional barriers to research have been identified and resolved (or a plan in place to resolve them), clear strategies will have been actioned that address the priority needs of the research community (i.e., support for cross-faculty collaboration, graduate student support, and enhanced research support), and key performance indicators have been identified and tracked to ensure impact and efficacy of the changes/interventions (or refinement of the approach if needed), and (iv) strategic planning priority activities are undertaken through an approach that is considerate of equity, diversity and inclusivity (EDI).

II. SELF STUDY PURPOSE AND RECOMMENDATIONS

The **purpose** of the Research Future Self Study is to (i) establish a collective definition of what it means to be a research-intensive institution, and (ii) identify the opportunities and challenges we face at Dalhousie in improving our performance as an inclusive research-intensive University.

This self-study initiative involved consultation with a number of senior leaders (VPs, AVPs, Deans, ADRs), researchers, staff and students from across the University. We reviewed and analyzed data from the U-15 Data Book (2018-2019) and collated key findings gathered through surveys, workshops and extensive consultations as part of the recent Research Strategic Planning process (2018). Internationally recognized reports were examined to identify key considerations on the future of research from a global perspective. Through this process, the Research Future Self Study Team has identified four goals and five major recommendations. Within each recommendation, we also indicate rapid actions that will be critical in advancing the recommendations as well as the impact we believe these actions will yield. We believe that progress within these recommendations will yield an increase in Dalhousie's research intensity and impact, teaching excellence, inclusivity, and our reputation as a top-performing research-intensive university.

The Future of Research: Challenges and Distruptors

Academic research institutions are facing ongoing challenges, and Dalhousie University is no exception. These include changing funding levels and shifting institutional, societal, and governmental priorities, increasing tuition and research costs, as well as growing compliance and reporting requirements. Cost cutting within academic environments continues to reduce the level of research support and shifts administrative responsibility to researchers, thereby significantly reducing capacity. ([Research Future Report](#)) In order to remain competitive, excel within the U-15, and honour our commitment to be a research-intensive university, it is essential that Dalhousie establishes a research system that is nimble, efficient, responsive, and able to support informed decisions and strategic investments in research supports and processes that maximize productivity and impact. (researchuniversitiesfutures.org).

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We reviewed several studies on what the future of research might look like, the drivers that will influence change as well as technologies and practices that may disrupt current standard practices. ([RAND](#), [Elsevier](#)) The **Research Universities Futures Consortium** explored the combined pressures facing the academy, including declining federal funding, soaring tuition costs, intensifying internal and global competition, increasing compliance and reporting requirements, and continued expectations of university-based research to produce creative solutions to a growing list of complex problems. **Elsevier and Ipsos MORI** explored drivers and scenarios for research in the next decade, including funding, open science, how researcher work, technology, research information systems, and the academy. The **RAND Europe** report presents a landscaping study to understand the changing research landscape and the possible application of technology within the process of national research assessment, including how output will change, types of social impact, how the research environment will change, research assessment and adaptation. They identified the top drivers of change to be: 1) collaboration with other academic researchers; 2) collaboration globally; 3) focus on multidisciplinary research; 4) focus on research integrity; and 5) drive toward open science.

In the current thought paper, our stated goals align with recommendations from these leading international reports on the future of research, emphasizing assessment and adaptability to position Dalhousie University to maintain a strong and successful research enterprise as we head into the future.

We propose to define a research-intensive university as:

One where the value of research permeates the entire institution and that research is prominent at all levels of education from undergraduate to postdoctoral fellowship; where the administration and all units see themselves as key to driving a successful institutional research mission; and where research is prioritized in all levels of decision making. Our commitment to the pursuit of research excellence is recognized in Article 2 of the [Collective Agreement](#) between the Board of Governors and the Faculty Association, as well as the [Guiding Principles of the U-15](#). Importantly, these values need to be established from a perspective of EDI.

To excel as a research-intensive university and member of the U-15, our goals must include:

- 1. BE AGILE:** able to respond rapidly to the changing landscape of research including funding agency priorities, trainee and employer expectations, and community priorities. Through strong links with stakeholders and robust **assessment** metrics, we need to be nimble, strategic and effective.
- 2. BE INTROSPECTIVE:** continually **assess** to enable analysis, advocacy, allocation, accountability, acclaim and adaptation. ([RAND](#)) Commit to **assess AND adapt** in order to grow the efficiency and effectiveness of our research programs.
- 3. BE STRATEGIC:** make strategic investments informed by **assessment** and capitalizing on **agility** to grow quality and impact of research programs while allowing room for innovation in new directions.

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4. BE A LEADER: remain at the forefront nationally and internationally through engagement with stakeholders to learn and educate. Lead the conversation and develop priorities through collective knowledge, insight and collaboration.

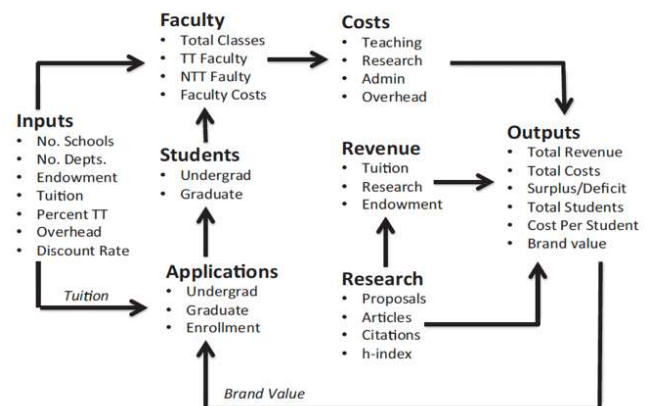
In order to successfully achieve these goals, our recommendations are:

RECOMMENDATION 1: Reallocation of resources over the next 5 to 10 years to attain an institutional research investment that is comparable to other U-15 Universities.

If we are committed to research excellence as a competitive U-15 institution, we need to ensure that our investment in research is comparable to the other U-15 Universities (i.e., percentage of total operating cost invested in research). Over the next 5 to 10 years, we can gradually shift our investment to attain a level that is competitive. A clear understanding of the research system, and the connectivity and efficacy of all its components, will support informed and strategic decision making in allocation of resources (see also Recommendation 2).

1.1 Develop a model of the University research system. ([Rouse et al. 2018](#))

Research universities are complex systems subject to a range of pressures and demands. At the same time, they are expected to compete for external funding, graduate students, publish and innovate. The impact of changing needs and the implementation of strategic plans need to be understood across the university down to the unit level. It is therefore recommended that we organize the institutional research system (components, input and output data) into a model that can identify and track key enablers and barriers to research, to inform strategic decision making in planning, and resource allocation. This will allow us to be agile, adaptable and strategic.



1.2 Track research using the right data. ([RAND](#))

Tracking and assessing the impact of research is essential for acclaim and advocacy as well as accountability and allocation. International standardized research metrics are growing in importance and sophistication (e.g., [snowballmetrics.com](#)) and are important for understanding the impact of research (publications, citations, collaboration, social impact, and economic development). It will be important to prioritize and track indicators of research intensity and impact relative to our peers (U-15 and others), and to expand research impact data to include engagement and socio-economic impact. It is recognized that metrics and impacts will be discipline specific, therefore it will be essential for Faculties to help define metrics that measure research excellence in their respective fields (see also Recommendation 3.2). Research impact case studies to illustrate the importance of

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university research to government and the public are becoming more important (e.g., [UKRI](#) and [ARC](#)) and provide a mechanism to contextualize underpinning research, collaborations, training, and beneficiaries, further demonstrating socio-economic impact of our research.

Rapid-Actions

- Identify key components and map connectivity to construct the institutional research system.
- Determine optimal Snowball Metrics for tracking performance within the University with peers. Tie strategic goals and investments to expected metric outcomes.

Impact

- Informed planning and decision making.
- Projected outcome and impact for accountability.
- Clear value-add to funders and key stakeholders.

RECOMMENDATION 2: Build effective research support over time in a strategic way.

Growing the research enterprise at Dalhousie will require clearly defined and broadly communicated expectations related to research excellence across all units, as well as the implementation of enhanced, targeted, decentralized research supports to enable the research community to achieve this vision. Many of our faculty are growing increasingly demotivated by the time-consuming systemic barriers, non-streamlined institutional processes, and lack of effective research support they face daily, and they feel that we are at a point where a decision must be made: is Dal going to be a research-intensive University or not? Institutional investment in resolving some of the key systemic barriers and implementing targeted supports and enablers *prior to* upping the institutional expectations on performance will help to improve buy in and engagement of the research community as we shift our culture toward prioritizing research excellence. Our team members have identified a number of potential barriers as well as ideas for improved support that could provide a strong starting point for the next phase of the strategic planning process (implementation). Overall, our team felt very strongly that faculty level investigation of barriers and research support needs will be critical for achieving our institutional research aspirations, since this will allow us to identify and address faculty-specific priorities (i.e., solutions may not be “one-size-fits-all”).

2.1 Identify and resolve critical institutional barriers to research progress.

There are critical systemic issues that continue to be major impediments for our researchers in advancing their research programs, including a Financial Management System that is cumbersome, convoluted and very time consuming to navigate. For example, the Faculties of Health and Medicine are encouraged to work with partners in the health authorities, and many researchers in these Faculties have cross-appointments with the health authorities. However, these researchers find it extremely difficult and very time consuming to operate across administrative systems that are incompatible (e.g., financial management, ethics, data, and even email and calendars). We need to work with our researchers, across all

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Faculties, to **identify and resolve** high priority cross-cutting and Faculty-specific barriers and streamline administrative processes, that are currently posing critical impediments to research activities.

2.2 Enhance research support mechanisms.

Through extensive consultations with researchers and administrators from across Dalhousie as part of the Research Strategic Planning process (2018), three priority areas were identified to grow the research enterprise: (i) interdisciplinary and collaboration support, (ii) graduate student support, and (iii) administrative support (see Section III. Strategic Context for additional details).

Under the [Research Strategic Priority \(2.0\)](#) of the last Dalhousie Strategic Plan, five sub-priorities were identified, each with specific goals, including Sub-Priority 2.5: *“Enhance research with state-of-the-art facilities and resources in accordance with the Institutional Framework for the Support of Research (IFSR).”* A similar strategy was identified under Goal 1 of the Strategic Implementation Goals in the Strategic Research Direction (Research & Innovation): *“Ensure that the university environment supports the conduct of research to the highest standard at all career levels by providing access to quality research infrastructure and high standards of research support.”* (see Section III. Strategic Context for additional details).

Although the connection between these separate goals, and the status/progress in addressing them, was not clear to our team, successful growth of our research enterprise will depend on our ability to **follow through on these priority actions** and effectively address the three priority needs identified by the research community. Progress on these actions would not only address priority needs but also align with the findings from the RAND report where collaboration and interdisciplinary research were identified as critical factors for research over the next 5 to 10 years.

We have the opportunity to maximize and coordinate our current research support infrastructure, including Centers and Institutes, ORS, ILI, Core Facilities, as we implement complementary, targeted, decentralized research supports. For example, decentralized support with strategic planning and building new collaborations, knowledge mobilization, and stakeholder engagement would compliment the pre- and post-award support currently offered through ORS and could be services offered through our Centers and Institutes (which are currently positioned as “Enabling Impact”). Goals and priorities for how we grow the research enterprise must be informed by external drivers (ranking systems, government priorities, etc.) while at the same time addressing the needs and priorities of our research community. There is an opportunity to learn through case studies of other successful research-intensive Universities in order to guide our approach to enhancing research support (see McGill/Laval/Dal comparison in “What the U-15 Data Tell Us” under Section III. Strategic Context). Assessment of the efficacy of approaches that are implemented, including feedback from the research community, will be crucial to enable adaption/refinement if needed.

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Grow start-up and bridge-funding programs, seed grants to build momentum, encourage collaboration, support new emerging areas, as well as graduate (thesis MS and PhD) studentships and postdoctoral fellow support.

2.4 Increase PhD enrolment thoughtfully and strategically.

Dalhousie recently set a target to double the number of PhD students by 2023. Although U-15 data indicates a strong correlation between PhD-to-Faculty ratios and total grant capture, many of our team members questioned whether it was ethical to double the number of PhDs when we know that there are limited career opportunities in some fields for which these PhDs are designed (i.e., academic careers). The role and structure of the PhD at Dalhousie, and the discipline-specific variations in demand for PhDs, should be carefully examined. Further, we can adjust the program structure to reduce time to completion and ensure that students are effectively prepared for a wider range of careers. There is currently a PhD Capacity initiative underway at Dalhousie to examine the implications of doubling the number of PhD students (lead by Susan Spence), and at a recent senior leaders retreat, there was collective agreement for the need to proceed carefully and thoughtfully so that the process is informed by student experience and needs, future job opportunities, and addresses faculty and institutional challenges/barriers to effectively support more PhDs.

It is interesting to note that despite Dalhousie's above average number of faculty relative to students, our faculty members largely feel that they do not have enough time to dedicate to research. Faculty level consultations as well as investigation into other U-15 Universities would help to reveal critical gaps and barriers in our research system (beyond PhD numbers) that prevent us from performing at the level of our competitors (see What the U-15 Data Tell Us, under Section III. Strategic Context). The critical role that thesis MSc and postdoctoral fellows play in supporting the research enterprise should also be considered.

Rapid-Actions

- Faculty consultations to identify critical barriers to research and optimal strategies to improve decentralized research support.
- Assess progress and impact/efficacy of recent and/or on-going institutional initiatives that target the three priority areas identified by the research community: What has been implemented to drive improvement in these areas? Is it working?
- Increase institutional support for and coordination of existing research support assets, including Centers and Institutes, ORS, ILI, Core Facilities, faculty/department level research facilitators.
- Subsidize PhD students to eliminate disincentives and facilitate MSc to PhD transition.
- Grow institutional seed and bridge-funding programs.
- Continue PhD Capacity initiative to explore implications and identify a thoughtful and strategic plan for increased enrolment. Assess PhD enrollment to detect underperforming units and identify barriers.

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Impact

- Improve trust and engagement of our faculty members with administration by working together to address key issues (this will be especially important prior to implementing a shift in expectations around research excellence; Recommendation 3).
- Improved efficiency and productivity by optimizing existing and strategically investing in complimentary research support infrastructure.
- Increased number of graduate student numbers through an approach that addresses student and Faculty needs and barriers.

RECOMMENDATION 3: Foster an institutional shift in expectations around research excellence.

Dalhousie University has set research excellence as part of its mandate and vision. If we are to reach this vision we need to ensure there is continuity across all Faculties and Units to drive a collective approach, and we need to set targets that are considerate of how we choose to define, value and prioritize research: priority-driven versus discovery-based; signature clusters versus service-based approach to prioritization (e.g., central and decentralized research support services available for all); interdisciplinary team-led versus single investigator-led; commercialization-focused (commodification) versus the discovery of new knowledge. Recent stories in [The Conversation](#) and [The Scientist](#) discuss a report in the journal [Nature](#), which stated that “Solo scientists like Einstein, or small teams, appear to come up with novel ideas that change the course of a field,” and that “The most disruptive papers, patents, and software products tend to be produced by small groups, and as team size grows, disruptiveness declines.” Several of our team members commented on the importance of not losing sight of single investigator-led research in the shift toward focusing on collaborative interdisciplinary teams, since these individuals are typically responsible for disruptive change in their field, and since it takes strong individual scientists to build a robust team.

3.1 Promote workload balance.

A number of researchers have expressed that they do not have enough time to do research, and that research is often relegated to “whatever is leftover” in their workload assignment. We need to quantify the teaching and research expectations across all Faculties at Dal and implement equitable strategies across all Faculties and Units for assigning and managing workload to enable effective research.

3.2 Create a culture that prioritizes research.

Our commitment to be a “leading innovative, research-intensive university” and to “create a hub of world-leading research and innovation adding to the intellectual, social and economic capital of our communities” is captured in Dalhousie’s Mission and Vision and described in Article 2 of the Collective Agreement. It is essential that this commitment to research excellence be described in Faculty and Unit missions, strategic plans, promotion guidelines, and currently there is a high degree of variability across faculties and units in how research excellence is defined, prioritized and assessed.

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Rapid-Actions

- Revision of workload assignment and Tenure & Promotion policies with clearer expectations in support of research excellence.
- Development of faculty strategic plans and unit missions that demonstrate their commitment and contributions to the successful research mission of the University and reflect continuity in our priorities and goals at all levels.

Impact

- A clear understanding and collective vision for our research mandate, and the role of all faculty and staff in supporting research either directly or indirectly.
- Promotion of an institutional culture that prioritizes research excellence.

RECOMMENDATION 4: Supporting equity, diversity, inclusivity in research in a meaningful way.

Viewing the research enterprise through a lens of equity, diversity and inclusivity (EDI) has rightfully become a major priority at the institutional, provincial and federal levels. Considerations around sex and gender, underserved groups, and appropriate engagement with Black Nova Scotians and Indigenous Communities are critical not only in decisions around faculty, staff and student compliments, but also in the participants and data used for research studies and to inform decision making.

Although EDI has been presented as a stand-alone recommendation, we wish to emphasize the importance of approaching the other four recommendations, and any ensuing activities related to them, through this lens. For example, access to childcare was identified as a potential enabler to research, for faculty, staff and graduate students. Enhanced research support could include expert consultation services in EDI for research programs and grant proposals (see below), and increased financial support for research (Recommendation 2.3) could include studentships designated for underserved groups and/or funding for graduate student parental leaves (which is currently lacking). Faculty-level consultations to identify critical barriers and opportunities, and potential solutions for enhanced research support (Recommendation 2) should be considerate of these sometimes less obvious issues in order to ensure that priority strategies and allocation of resources support the research community as broadly and inclusively as possible.

A strong understanding of the growing body of knowledge and appropriate language is required in order to have the capacity to truly address EDI thoughtfully and comprehensively (as opposed to having it be just another box to check) and contribute meaningfully to a shift in perspective and culture across the institution to one that truly values inclusion and diversity. EDI has become a major priority of most (if not all) major grant agencies, with high expectations around the thoughtfulness and appropriateness with which these issues are addressed. Our funding success will be contingent on robust competency in EDI issues across all of our research endeavors.

Despite the importance of EDI, there is a high degree of variability in expertise across the researcher community, and many feel ill equipped to address these issues in a comprehensive

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way. In addition to leadership and institutional policies, evidence-informed resources, toolkits, access to expert consultants, and capacity development initiatives would greatly benefit our research community and would help to instill these values across all levels of the University. Our team has begun to compile resources available to the research community, but there is a clear need for coordination and improved accessibility of this information for our researchers and graduate students. Further, we are currently in a transitional period to becoming a more representative faculty, and the same individuals are being asked to represent diversity on an overwhelming number of initiatives. The pressure on these individuals needs to be mitigated to avoid burn-out.

Rapid-Actions

- Compile institutional, local, provincial, federal resources available on EDI issues with researchers, trainees, project design and interpretation, and communication. Establish and communicate a central resource for researchers to access this information (perhaps expert consultation services could also be offered through ORS).
- Run workshops led by local and provincial leaders in EDI for researchers and graduate students (could be mandatory training) to enhance capacity and knowledge.
- Find and train allies to reduce the burden on EDI champions. Work with Deans and Department Heads to curate administrative responsibilities and ensure that these allies and champions participate in all critical decision-making meetings and committees to represent the EDI perspective.
- Ensure EDI champions inform the approach and focus of faculty level consultations as part of Recommendation 2.

Impact

- A deeper understanding of, and appreciation for, EDI and its impact on research.
- Capacity to address EDI in an appropriate and meaningful way.
- An institutional culture that values equity, diversity and inclusivity across all levels.
- Inclusive research excellence.

RECOMMENDATION 5: Recognize, support, and promote the intersection of research and teaching

The research and teaching nexus (RTN) is the subject of a long-standing debate within higher education, and focuses on understanding their reciprocal and deeply nuanced relationship at individual, departmental, Faculty and institutional levels ([Wuetherick, 2009](#)). At Dalhousie, the RTN can be examined through three key contexts: (1) how is disciplinary research informing course content and curriculum development; (2) what opportunities are we providing our students (both undergraduate and graduate) in courses, program requirements, and extracurricular opportunities to engage in and develop independent research skills; and (3) how can Dalhousie support, integrate, and value the engagement of pedagogical research/the scholarship of teaching and learning in our teaching practice. The ability of an institution to demonstrate and market the synthesis of research into learning and teaching is now seen as a

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crucial tool to “increase prestige, ‘brand power’ and resource accumulation” ([Clark & Hordosy, 2019](#)); but more importantly, each of the above contexts are effective institutional strategies to increase research capacity, improve teaching quality, and ultimately enhance the student experience ([Zhang & Shin, 2015](#)).

Research and teaching are largely viewed as competing and dichotomous activities in higher education ([Toni, Maphosa & Wadesango, 2014](#)), and Dalhousie’s culture as a research-intensive institution often intensifies this divide. Dalhousie has a unique opportunity to be a leader in teaching, research, and the RTN in Atlantic Canada; but in order to capitalize on this, there needs to be strategic directives to support and nurture the relationship between teaching and research, and combat the often time systematic separation of the two.

Rapid-Actions

- Assess the current engagement in, and support of, the RTN at Dalhousie.
- Develop an institutional taskforce that is responsible for creating a Dalhousie vision on the interconnection between teaching and learning and how we conceive and define research (both disciplinary and pedagogical) across courses, departments, disciplines and institutional systems.
- Consult with students, faculty, staff and administration on the facilitators and barriers currently experienced at Dalhousie when engaging in or experiencing the RTN.
- Examine institutional structures associated with incentivising (e.g., T&P) and supporting (e.g., internal funding and development opportunities through the Centre for Learning and Teaching) engagement in the RTN.

Impacts

- Promoting and valuing the RTN can begin important culture shifts around research and teaching at Dalhousie, and help our institution meet the growing demand for us to strengthen our research and teaching efforts while not marginalizing either.
- Increasing the practice of pedagogical research will directly enhance the teaching practice of our instructors and curriculum delivery of programs which will have lasting impacts on the effectiveness of student learning and the quality of learner and programmatic outcomes.
- Engaging in research-led teaching at course and program-levels will promote the development of critical skills in learners and enrich the student experience at Dalhousie.

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III. STRATEGIC CONTEXT

Dalhousie University Research Strategic Planning Process (2018)

In 2018, the University initiated a Research & Innovation Strategic Planning Process that included 7 impact sessions (involving 143 faculty, 44 staff and 9 graduate students), a summit (with 150 participants) and a survey (with 280 respondents).

The key goals identified for advancing research and innovation were:

- Better communication and collaboration amongst Faculties
- More infrastructure for research equipment
- Collaboration incentives and research recognition
- Dissemination of research findings and knowledge mobilization
- More administrative support

The top three recommended changes were:

1. Interdisciplinary and Collaboration Support
 - University level support for working across faculties
 - Creating a collaborative space for researchers to collaborate and discuss research
 - Breaking down silos between Faculties and departments for funding and collaboration
 - More collaboration with other institutions and health care facilities (IWK, NSHA)
2. Graduate Student Support
 - More funding for grad student research
 - Waive international/differential fees to attract top researchers from around the world
 - Creation of a research funding package to give grad students to get research started
3. Administrative Support
 - Better support for researchers at all levels, from grad student support to applying for and managing grants
 - Dal must increase its matching of research funds (such as Tri-council funded research)
 - More time for teaching and research and less time on funding and grant applications by increasing application support
 - More funding to maintain research equipment in labs and across campus

These consultations led to the identification of our Signature Research Clusters as well as 10 Strategic Implementation goals, which were also informed by external ranking systems (see table below). Some but not all of these goals align with the Research Strategic Priority (2.0) from the last Institutional Strategic Plan (Dal Forward).

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| Research & Innovation Strategic Direction | Dalhousie Strategic Research Plan (DalForward) |
|---|--|
| <p><u>Signature Research Clusters:</u></p> <ol style="list-style-type: none"> 1. Sustainable Ocean 2. Healthy People, Healthy Communities, Healthy Populations 3. Clean Tech, Energy, the Environment 4. Culture, Society, Community Development 5. Food Security <p><u>Cross-Cutting Themes:</u></p> <ol style="list-style-type: none"> 1. Big Data 2. Innovation & Entrepreneurship | <p><u>Priority Research Areas:</u></p> <ol style="list-style-type: none"> 1. Ocean Studies 2. Advanced Materials and Clean Technology 3. Health and Wellness 4. Governance, Society and Culture <p><u>Emerging Research Areas:</u></p> <ol style="list-style-type: none"> 1. Information Science and Communication 2. Agriculture and Food Technologies 3. Energy and Environment |
| <p><u>Strategic Implementation Goals:</u></p> <ol style="list-style-type: none"> 1. Attract and retain the best researchers 2. Attract and launch the best graduate students 3. Promote and support solution-based, cross-disciplinary research teams 4. Foster a culture of mentorship and peer review 5. Enhance research collaborations with international partners 6. Engage more industry partners 7. Foster and grow government relationships 8. Increase and leverage research to drive social, cultural and environmental development 9. Increase and leverage research to drive economic development 10. Inform policy creation through research | <p><u>Sub-Priorities:</u></p> <ol style="list-style-type: none"> 2.1 Resourcing Priority Research 2.2 Faculty Excellence 2.3 Graduate Student Excellence 2.4 Undergraduate Research 2.5 Research Facilities and Resources |

Through consultations as part of the Self Study initiative, similar priorities were raised by the research community: the need for better support of cross-Faculty collaboration, increased graduate student support, and enhanced research support (administration, grant writing, knowledge mobilization, etc).

Further, we noted that there were polarized views related to fundamental aspects of how the University defines, values and prioritizes research. A number of researchers felt that the “Signature Research Cluster” approach to prioritizing research was exclusive for some, and that new and emerging areas may be missed. A service-based approach was discussed as one way to prioritize activities that would support the research of all faculty members (e.g., central and decentralized research support services available for all faculty). The current emphasis on

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innovation, commercialization and industry partnership was also polarizing, as it aligns well with the research activities/outcomes of some faculty but by no means all. There was also concern that this approach values the commodification of research over the generation of new knowledge, and whether, as an institution, that was a direction we should be pursuing. How to strike an appropriate balance between priority-driven and discovery-based/investigator-led research, as well as interdisciplinary team-led and single investigator-led research were also key issues that arose in our consultations. There was concern expressed over the need to protect and value strong investigator-led, discovery-based research as a critical enabler of comprehensive and robust interdisciplinary teams.

Moving forward, it will be critical to consider these important issues, and to establish a collective vision for how Dalhousie University defines, values, and prioritizes its research endeavors, through a lens that is inclusive of EDI. Continuity in our goals and strategies, reaching across all Faculties and Units, will also be critical to effectively drive our research agenda forward. Ensuring follow through in addressing priority issues that are identified by the research community, and evaluation of the efficacy of the interventions/changes that are implemented will also be critical to the successful growth of our research enterprise.

PhD Capacity Initiative (2019/2020)

An outcome of the 2018 Strategic Research Planning Process was the consensus that Dalhousie needs to increase its number of PhD students. The rationale for an increase included: i) benefits to research, ii) better alignment with other U-15 institutions, and iii) as a consequence of increased research productivity and training opportunities for PhD students, an improvement in international rankings. While a goal of doubling the number of PhD students by 2023 was proposed, it was agreed that a capacity study was required (executive sponsors Provost Teri Balser and Vice-President Research and Innovation, Alice Aiken, led by Vice-Provost Planning and Analytics, Susan Spence). Studies on the career trajectories and employment of PhD students have been undertaken by several U-15 institutions including the [University of Toronto](#), the [University of British Columbia](#) and [McGill](#), indicating a growing demand for PhD graduates, especially in the STEM fields, driven industry and government needs.

Dalhousie's PhD Capacity Initiative has the following objectives:

- i) Identify, through consultations and data, the current capacity for growth in PhD programs;
- ii) Identify specific barriers to recruitment where capacity exists;
- iii) Identify requisites for growth in the number of PhD students; and,
- iv) Make recommendations on how to achieve (or modify) a growth target and timelines

Work to date has identified the following themes to address for PhD growth:

- Funding
- Student Experience and Student Success
- Faculty Renewal / Support / Professional Development
- Space

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- Systems and Processes (i.e. an online application system, more robust financial services systems to be able to reliably pay graduate students)
- Culture
- Communications and Coordination

The priority issues to address are:

- Funding
- Systems and Processes, including Communications and Coordination
- Culture

Consultations continue as well as workplans to identify how best to address these initial three priority issues. A follow-up workshop with Deans and other Senior Leaders is planned for April 2020.

Tenure and Promotion Review

The commitment to research excellence is set forth in [Dalhousie's Vision and Mission](#) and is recognized in the [Collective Agreement](#) (Article 2) where it is agreed that excellence is to be pursued in research and scholarly contributions. Article 15 further indicates that the University “expects and endeavors to improve its standard of academic performance” (including research) and that tenure is granted in support of this (15.02). As in the case with other institutions, the award of tenure represents a firm and confident prediction that the member will spend their entire career advancing academic excellence including research and scholarly activity. However, language in Article 15 focuses on “commitment to activity” and maintaining “proficiency,” which does not capture collective concepts of excellence.

According to the Collective Agreement, standards in considering tenure (and promotion) are the responsibility of each Faculty (15.07) and are to be communicated at the time of appointment. Article 17.17 discusses “review and assessment of scholarship should recognize non-traditional forms of scholarship and traditional ways of knowing.” It is expected that this will be varied across the faculties. How these forms of scholarship are assessed in terms of excellence should also be addressed in Faculty tenure guidelines and letters of appointment.

A review of Faculty tenure guidelines revealed a great deal of variability in expectations and in some cases these guidelines simply refer back to the Collective Agreement. It is important to strengthen language in the collective agreement as well as in Faculty guidelines, so as to highlight the importance of national and international excellence in research and scholarly activity with competitive metrics of performance (funding, HQP, and publications) and impact (citations, policy impact, and engagement).

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What the U-15 Data Tell Us

- We are punching above our weight so investment and growth in research should have real impact. Although we are by far the smallest U-15 institution, we are in the middle of the pack in terms of Field-Weighted Citation Impact. Key global contributors and internationally recognized leaders in Medicine (geriatrics), Science (batteries) and Engineering (underwater acoustics) (SciVal).

Top Key Topics at Dalhousie University

| Topic | Scholarly Output | FWCI | Prominence percentile |
|----------------------|------------------|------|-----------------------|
| Geriatrics | 144 | 3.46 | 99.7 |
| Batteries | 128 | 2.31 | 99.9 |
| Underwater acoustics | 52 | 1.95 | 98.3 |

2014-2018

Field Weighted Citation Impact Overall

| | |
|--------------------------------|-------------|
| McMaster University | 2.15 |
| University of Toronto | 2.07 |
| University of Montreal | 2.04 |
| University of British Columbia | 2.01 |
| McGill University | 1.88 |
| University of Calgary | 1.87 |
| University of Ottawa | 1.86 |
| Dalhousie University | 1.74 |
| Western University | 1.71 |
| University of Alberta | 1.69 |
| University of Manitoba | 1.65 |
| Université Laval | 1.59 |
| University of Waterloo | 1.56 |
| Queen's University Kingston | 1.53 |
| University of Saskatchewan | 1.38 |

2014-2018

- We are well supported; however, the low overall FTE student numbers reduces resources in absolute terms (critical mass). Our operating revenue per FTE student (all levels and fields) is above the U-15 average (second highest).
- We have significant capacity for growth of doctoral programs. Our number of PhDs per tenure track faculty member is half the U-15 average and the lowest. However, there is significant variability across disciplines. For example, our 5-year PhD graduation rate in the Sciences Discipline Cluster (as defined by the U-15) produces 46.3% of all Dal PhDs, approximately twice the percentage of PhDs in that cluster in other U-15 members (24.8%).
- Compared to other institutions it appears that growth in faculty numbers has occurred over other critical mechanisms for research support including staff (technical and support) and core facilities. Our number of FTE students per full time faculty is last among U-15 institutions; 30% below the average.
- It is critical to explore the factors that impact the strongly correlated relationship between number of PhDs and research income. There is a strong correlation between number of PhDs and research income, so it is not surprising that our research revenue per full time professorial faculty is half the U-15 average and the lowest.
- We should explore other research-intensive universities to identify effective strategies to grow our research enterprise. U-15 ranking is based on total grant capture, however grant capture per full-time faculty and research revenue as a percentage of total operating cost (i.e., Research Intensity) are also informative indicators. McGill and Laval offer two interesting case studies, as comparators for Dal. These two Universities rank highest with respect to Research Intensity and have competitive grant capture per Faculty across the U-15. Beyond the obvious difference in PhD-to-Faculty ratios at these Universities compared to Dalhousie, examination of their research support strategies may help inform priority areas for investment at our institution (Recommendation #3).

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| Indicator | McGill | Laval | Dalhousie |
|--------------------------------------|-----------|-----------|-----------|
| Under:Faculty | 12.3 | 16.4 | 13.5 |
| MSc:Faculty | 2.2 | 2.9 | 2.2 |
| PhD:Faculty | 1.7 | 1.8 | 0.7 |
| (PDF+RA):Faculty | 0.7 | 0.3 | 0.6 |
| Space:Faculty (GSM) | 463 | 545 | 561 |
| Total Op Rev (\$000) | \$781,948 | \$573,047 | \$513,814 |
| Grant\$/Faculty (\$000) | \$291 | \$284 | \$143 |
| Research intensity (Grant\$/Op\$) | 72% | 70% | 28% |

Building Research Culture

Research culture can be understood as “a system of widely shared and strongly held values” ([Marchant, 2009](#)), which provides “a supportive context in which research is uniformly expected, discussed, produced, and valued” ([Cheetham, 2007](#)). A culture of research requires the following elements: identification and communication of clear research goals at the institutional and unit levels; allocation of significant resources for faculty training and support; open and collaborative personal relationships among faculty members and staff; resource allocation based on faculty members’ current motivations and abilities; consideration of student involvement ([Hanover Research, 2014](#)).

Evidence indicates that academic units with successful research productivity share important characteristics at institutional, leadership, and individual faculty member levels, and that success at any one level is insufficient for success ([Bland et al, 2005](#); Hanover Research, 2014).

At the institutional level, recruitment and selection of faculty and staff, positive group climate, brokered opportunities, and decentralized organization are common characteristics with clear coordinating goals, research emphasis, culture, mentoring, communication with professional network, resources, sufficient work time, size/experience/expertise of faculty and staff, communication, and rewards being the strongest predictors of research productivity ([Bland, 2005](#)). Institutions successful in research productivity provide significant support to faculty research efforts including: effective leadership and clear goals, faculty training and support programs, research centres, recognition of research production, encouragement of faculty collaboration, balanced teaching and research responsibilities, and pay that is commensurate with expectations ([Hanover Research, 2014](#)).

Characteristics of productive individuals include socialization on norms, values, and expectations, content knowledge, basic and advanced research skills, simultaneous projects, orientation, autonomy and commitment, and work habits, with motivation being the strongest predictor of research productivity ([Bland, 2005](#)). [Hammond](#) et al (2004) noted that a ‘one size fits all’ approach to resource and workload allocation is not appropriate and suggests customized allocation based on the motivation and abilities of individuals.

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Characteristics important for leadership of motivated faculty include having leaders who are highly regarded scholars, are research oriented, and who capably fulfill all critical leadership roles, with being a participative leader being the **strongest predictor in facilitating research productivity** ([Bland, 2005](#)).

Graduate students naturally hold an important place in a culture of research. Research indicates that faculty mentoring facilitates dissertation completion and that “graduate students have fewer difficulties completing dissertations when they have been introduced to research practices early on in their studies” ([Grasso et al, p.30](#)).

A strong research culture requires clear communication of expectations, processes, and supports from the top down as well as high standards that are well defined and strongly held from the bottom up. This requires clear Faculty tenure & promotion guidelines and strategic plans as well as mentorship at all levels. Encouragement, recognition, and support should be provided in support of expectations of continuous growth in research excellence and impact throughout a career. Academic environments are naturally competitive due to finite resources (funding, students, etc.) and demanding due to the need to defend ideas and interpretation of results (proposals, publications and presentations). At the same time, academic environments are expected to be nurturing in order to develop strong faculty, staff and trainees. This tension is balanced by cohesion and a common sense of purpose tied to a goal of research excellence. Pride in accomplishments and successes of the University as well as shared sense of values and drive for advancing research are essential elements to focus on and build as we move forward.

U-15 Principles

The U-15 institutions: “undertake 80 percent of all competitive university research in Canada, rank among the world’s premier institutions, and conduct about \$8.5 billion worth of research annually. Together, we contribute upwards of \$36 billion to the Canadian economy every year. Collectively, we produce more than 75 percent of all doctorates awarded in Canada. We not only help the Canadian economy to grow, the students and faculty in our institutions generate the ideas and life-changing policies and innovation that improve lives in Canada and around the world.” (<http://u15.ca/who-we-are>)

Our Principles

- We pursue excellence.
- We challenge Canadians to think deeply about what constitutes and contributes to the public good.
- We contribute thought-provoking ideas and solutions in the global arena.
- We stress the importance of international cooperation and collaboration.
- We value the entire educational continuum, from primary and secondary schools to undergraduate and post-graduate studies.
- We embrace the contributions of all fields, from the arts and humanities to science and technology, and the value of basic and applied research.
- We endorse the peer-review process to challenge and strengthen discovery.
- We promote the translation of our knowledge so it informs all aspects of daily life.
- We advocate an open, honest approach to tackling complex issues, engaging all points of view and making difficult decisions.

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IV. THE SELF STUDY PROCESS

This new strategic planning process has enabled the Dalhousie community to come together to build a plan that is informed not only by evidence and vision of the senior leaders, but importantly also by the perspectives and lived experiences of the members of our University. This process created the opportunity for a grass roots approach, garnering buy-in and commitment from people across Dalhousie; we believe in the purpose, vision and priorities that we are helping to lay out.

Over the course of the Self Study process, there were a number of conversations where it was noted that Dalhousie seemed to be very strong at gathering information and surveying the community, but that we need to improve our capacity to implement and evaluate change as a result of what we learn. Further, it is important to engage the broader community in these processes. The Self Study process, and implementation phase to follow, offer an ideal opportunity to improve our track record in these areas.

V. THE RESEARCH FUTURE SELF STUDY TEAM

Co-Leads

Michael Freund, Chemistry

Jaymi Cormier, Health & Medicine

Team Members

Kate Sherren, Management, Resource & Environmental Studies

Karen Foster, FASS, Sociology and Social Anthropology

Crystal Dieleman, Health

Erin Aubrey, SKIP, KT specialist, Health/Medicine

Emily Marshall, Medicine

John Archibald, Medicine

Sophia He, Agriculture

Mae Seto, Engineering and Oceans

Joanna Mills Flemming, Science

Derek Reilly, Computer Science

Jill McSweeney-Flaherty, Centre for Learning and Teaching

Rob Jamieson, Civil and Resource Engineering

Sherry Stewart, Psychiatry

Lucie Guibault, Schulich School of Law

Estelle Joubert, Fountain School of Performing Arts

Conor Falvey, Research Facilitator

Sara Seck, Schulich School of Law

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Graduate Student Financial Support at U-15 Universities 2016-17
[GSFS_2016-17_Report (2).pdf]

The Changing Research Landscape and Reflections on National Research Assessment in the Future [[RAND RR3200.pdf](#)]

Research England asked RAND Europe to conduct a landscaping study to understand the changing research landscape over the next 5 to 10 years, and the possible application of technology within the process of national research assessment. The aim of this study is to help Research England understand the direction of change within the research system in order to consider how national research assessments may need to adapt going forwards. It considers factors such as the international environment, technological advances and public policy developments.

The Current Health and Future Well-being of the American Research University
[[RIM Report Research-Futures-Consortium-.pdf](#)]

The Research Universities Futures Consortium explore the combined pressures of declining federal funding, record reductions in state funding, erosion of endowments, soaring tuition costs, intensifying internal and global competition, increasing compliance and reporting requirements as well as loss of political and public confidence in the value of university-based research. While at the same time the expectations of university-based research to produce creative solutions to a growing list of complex problems.

Research Futures: Drivers and Scenarios for the Next Decade
[[Research Futures full report Feb2019.pdf](#)]

A large report by Elsevier (major publisher) in collaboration with Ipsos Mori (market and opinion research firm). They identify 19 key drivers produced six essays on Funding, open science, how researchers work, technology, the future research information system, and the academy and beyond. They also explore three scenarios for the research future including open world, tech titans and eastern ascendance.

The Scientist: Bigger is not Always Better for Team Science
www.the-scientist.com/news-opinion/bigger-is-not-always-better-for-team-science-65463

Feb 2019

The most disruptive papers, patents, and software products tend to be produced by small groups, and as team size grows, disruptiveness declines.

The Conversation: Want Disruptive Research? Go Small Instead of Big
<https://theconversation.com/want-disruptive-research-go-small-instead-of-big-111737>

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Feb 2019

Solo scientists like Einstein, or small teams, appear to come up with novel ideas that change the course of a field. Authorship lists on scientific papers have grown in the last century, from about one author per paper in 1913 to an average of 5.4 authors per paper in 2013.

Professional Skills Development for Graduate Students

[\[Prof Skills Dev for Grad Stud Final 08 11 05 \(1\).pdf\]](#)

The objective of this document is to provide a springboard for the CAGS community to engage actively in this discussion, to develop a consensus on need for the further development of these programs, and potentially to propose a plan for action to explore how to provide a core set of skills across all institutions.

Make PhD Courses More Relevant

[\[Nature careers.pdf\]](#)

Column from a graduate student perspective on the need for courses to prepare PhD graduates for non-academic careers.

The Slow Professor: Challenging the Culture of Speed in the Academy

Written by Drs. Maggie Berg and Barbara K. Seeber (2016), this book explores the idea of “time management versus timelessness” in teaching and research in the University setting. They challenge the current culture of urgency and quantity in the academy and propose the “Slow Professor Manifesto” as a reminder of the importance of thoughtful, deliberate, *quality* work.

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