CONCORDIA UNIVERSITY

January 15, 2016

DOUBLE OUR RESEARCH
THE BOLD DIRECTION

New Thinking, New Culture

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Mandate: Recommend how best to position Concordia to *Double our Research*

Aspire

Context: The aspiration to *Double our Research* reflects the reality that research and creative production are primary drivers of university reputation. A reputation for high performing research speaks to the tangible benefits that flow to society from discovery, creativity, innovation, knowledge and training. It is equally vital to competing globally for talented faculty, students, postdocs and staff. The objectives of this strategic direction are measurably to increase, intensify and expand the scope, performance and significance of Concordia's research enterprise according to the following three baseline criteria.

External Funding: Concordia ranks 8/10 in terms of research dollars per full-time faculty member when measured against Canada's other comprehensive universities. Given that total research income in Canada dropped in 2014 for the first time in fourteen years, the challenge to increase research funding, necessitates that we simultaneously: a) increase individual grant success; b) mobilize and lead more large, institutional and inter-institutional grants; c) increase and diversify funding sources; and d) increase donor support.

Productivity: One commonly agreed metric among research grade universities is the number of journal publications per full-time faculty member. By this measure, Concordia significantly lags behind other Canadian comprehensive universities. Other valid indicators include juried exhibitions, artistic productions, published monographs, journal impact factors, matriculation and career placement of graduate students and postdocs. To nurture increased productivity, we need to place greater institutional value on research and HQP training; recalibrate current faculty incentive/reward structures; do better at linking research to curriculum; and introduce more flexibility in course delivery and service expectations to maximize time for research and creative activity.

Impact: A key to enhancing recognition for Concordia research is to increase its impact by: prioritizing output that is transformative to scholarship and knowledge in and across academic disciplines; better integrating research activities into the needs and priorities of the external communities with whom we engage; engaging more in co-production/co-creation of knowledge with collaborators from all sectors of society; improving knowledge translation to industry, public policy and stakeholders.

Four strategies to create a next-generation research grade university

Integrate

Institute thinking: Concordia can most effectively make step-function gains to *Double our Research* by fostering transdisciplinary institutes that catalyze novel, convergent approaches to research and training that foster new ways of organizing knowledge and engaging with society. These institutes, which are at different stages of development, will support high-risk/high-reward research in fields that are truly cutting-edge; capitalizing on our diversity and regrouping our expertise to develop transformative perspectives on key topics where we can legitimately aspire to achieve national and international-level leadership that will measurably grow our output, impact and income in the short-to-medium terms.

Launched:
Digital Arts, New Media and Technology: Ever since the creation of Hexagram in 2002, Concordia has been an international leader in digital culture and research creation in a city that is a capital of design innovation and the arts. The university has invested heavily to build critical mass in this field. We are currently poised to launch a new, world-class Institute that will facilitate convergent research and creative practices in cognate fields such as games, interactive design, digital poetics, digital cinema, textile, photography and mobile media.

Aerospace: Montreal is one of three global hubs for aerospace R&D. This is a leading sector of Concordia research and training, and a major focus for industry and inter-institutional partnerships. In fall 2015 a new research arm was created within the Concordia Institute for Aerospace Design and Innovation (CIADI) to catalyze expertise across the Faculties of Engineering and Computer Science and the John Molson School of Business, with the potential to expand horizons to other fields of inquiry such as human determinants in flight.

In progress:
Life Sciences and Technology: From lab-on-chip engineering to nanoscience and mass spectrometry, Concordia is known for life-science-based technology and engineering, internationally renowned for non-human genomics (which is the single largest source of our external research funding), and recognized as Canada's leader in the disruptive new field of synthetic biology. These research areas are evolving and morphing across disciplines at staggering pace, creating a unique opportunity to aggregate our expertise for next generation discovery and application across the life sciences. (Launch 2016)

Preventive Health and Wellness: In Canada, more than 50% of public funding to support research is targeted to health and medicine, which is also a leading sector of industry R&D and object of private philanthropy. Concordia has cross-faculty expertise, community networks, spectacular physical and professional staffing assets (PERFORM), and axes within several existing research centers

that could be mobilized in a truly unique, innovative configuration around preventive health. (Launch 2016)

Indigenous Culture and Communities: Concordia has the largest critical mass of researchers and artists working in indigenous studies in central and eastern Canada. Unlike programs elsewhere that focus on land, legal status, and governmentality, our strengths address socio-cultural topics from youth to new media, art, and the dynamics of north-south relocation. At a pivotal moment of national reconciliation when Canadian governments and foundations are also investing meaningfully in indigenous studies research, Concordia has a golden opportunity to give new shape and visibility to indigenous studies in Quebec and Canada. (Launch 2017 to coincide with Canada 150)

Sustainability and Urbanization: Concordia hosts multiple university and national centers in sustainability research with complementary expertise in smart building design, water remediation, environmental impact assessment, climate modeling, sustainable enterprise, environmental policy, geochemistry, and transportation. In the fall 2015 we successfully showcased this expertise at the Montreal Summit on Innovation, *Climate of Change: Cities, Citizens, and Prosperity*, creating momentum to federate a unique institute on urban resilience and sustainability. (Launch 2017 to coincide with Montréal 375)

Potential:
Chemical and Materials Science and Engineering: Because materials development is typically one of the major limitations in technology advancement, expertise in materials science and engineering is in almost limitless demand. Furthermore, chemistry and chemical engineering are rapidly crossing new frontiers of knowledge, going beyond the study of atoms and molecules to explore their manipulation as complex systems with the potential to affect all forms of life. Concordia has research expertise in domains of materials science, chemical engineering, chemistry and biochemistry, but should seize this strategic moment to build new research capacity, particularly to align with our strategic priorities.

Innovate

We should invest in ourselves by creating an institutional *Knowledge Hub* that will mobilize research and professional expertise with polyvalent applications across the spectrum of 21st century research and creative activity. Such knowledge is currently pocketed and hidden in discreet sectors of the university. The coherent and more visible organization and mobilization of such knowledge would stimulate and reinforce creativity and innovation in diverse fields.

Methodological toolkit: Led by faculty researchers and staffed by research associates, autonomous postdocs and 4th year PhD students, Concordia should incubate a *methodological toolkit* that reassembles and repositions the

university's technically-oriented and human science knowhow in key, transferable 21st century knowledge domains. We have remarkable existing and emerging strengths in areas such as statistics, big data analytics, computer arts, modeling and design thinking, high performance computing, research data management, oral history, public opinion and survey research, ethics, quality systems and lean engineering. Conceptually and methodologically, these zones of expertise are increasingly in demand across all disciplines, informing and enriching inquiry into all manner of research challenges. Built in-house, the *toolkit* would be a powerful leveraging resource in *Doubling our Research*. It will equip researchers to push their thinking in new directions through access to highly specialized expertise. Reciprocally, such collaborations could also open research pathways for colleagues who provide the methodological expertise in the first place.

Research entrepreneurship incubator: In parallel with the *Toolkit*, the *Knowledge Hub* would also nurture *research entrepreneurship and innovation* by capitalizing on academic expertise in the John Molson School of Business to develop entrepreneurial and scientific management and leadership training for researchers, including PI's overseeing large teams and labs. Building, too, on the experience of *District* 3 and the Loyola *Wetlab Makerspace*, and paired with the university's business development and technology transfer professionals, Concordia could become a national leader in mentoring innovation and incubating entrepreneurship, including social entrepreneurship, within and across the research community, with a view to significantly boosting research commercialization and spinoff activity.

Influence

Like many other universities, Concordia has a very good track record in terms of mobilizing knowledge with community and industry partners on a project-by-project basis. We have an opportunity to take such engagement to another level by creating a *Network of Think Tanks* that foreground Concordia as a convener of evidence-based, multi-stakeholder research and exchange.

Network of Think Tanks: These topic-specific entities are designed to address community or industry-specific challenges and related matters of public policy. Funded externally for the most part, *Think Tanks* require far fewer operational resources than a standard research center. Drawing intelligently on the advisory input of stakeholders, *Think Tanks* typically commission research projects that can be undertaken by Concordia faculty, postdocs or graduate students. *Think Tanks* can play a valuable role in raising Concordia's profile as a convener, social citizen and influencer of public policy, including in priority research areas. An *Aviation Think Tank* has just been created and preliminary discussions are underway regarding a *Think Tank on Global Trade*. It is feasible to imagine *Think Tanks on Disruptive Technologies*, *Preventive Health*, *Sustainable Cities*, or *Information Security and Privacy*, all of which relate to leading areas of our research.

Enable

Talent: Integral to achieving growth and intensification of research and creative activity is the recruitment and effective support of highly qualified graduate students and postdoctoral fellows. Concordia has traditionally taken a very passive approach to HQP recruitment and a largely ad hoc approach to their support. In the super-charged competition for talent, we need to target growth in our postdoc and thesis-based graduate student population in areas of strategic excellence and priority. And we need to couple this by proudly extolling our *Top 100 Under 50* global ranking, world-class facilities, and Montreal's cosmopolitanism as a university city.

Support: To enable a step function growth in research and graduate studies, Concordia must complete a cultural change in the institution that began with creation of the position of Vice-President, Research and Graduate Studies a decade ago. This means fully internalizing the mantra that research and creative work, postdocs, graduate students, and graduate studies are core to Concordia's mission, and moving to reflexively integrate this priority into all operations and marketing of the university. This is a collective responsibility to be shared across the organization. It demands a collaboration ethos, new thinking, fresh attitudes and new skills. How can the academic and non-academic sectors work together to streamline procedures (e.g: purchasing, finance, HR, IT, ethics) and more efficiently support or administer research? What are the new competencies in grant writing, project management, business development, foresight mapping that we need to bolster the research enterprise? How do we best position research and graduate studies at the heart of institutional branding, marketing and fund-raising? What is required, and from which units, to provide the best possible *encadrement* and mentoring for new faculty? Can we fast-track curriculum approval of new graduate programs in novel areas, and devise more supple forms of course delivery and workload management? How can we become uniformly pro-active, responsive and welcoming in our recruitment, admissions and mentoring of graduate students and postdocs? What is required to maximize internal and external mobility opportunities for faculty and students across programs, faculties and institutions?

Internationalize: The globalization of research and HQP mobility is happening at breathtaking speed, changing how research is done, and shifting perceptions about locations of excellence. The paradigm shift toward challenge-driven research necessitates transnational thinking and large-scale project funding increasingly demands multinational support. Although roughly half our postdoc cohort and 40% of our graduate students are international, our research enterprise can accomplish much more by ramping up research collaborations and two-way training mobility with targeted institutions in areas that match our strategic priorities.

Inspire: We should make a strong commitment to expand research and innovation experiences for undergraduates, and to showcase achievements of competitive teams such as iGEM and Space Concordia. Not only will this better prepare more students to work in the 21st century knowledge economy, it will also cultivate an appetite to pursue graduate education and expand our pool of qualified talent.

Targets

Double the number of postdocs in two years; funding for graduate students in five years; and undergraduate research apprenticeships (CUSRAs) in three years.

Double major institutional grant applications in two years and success rates within five, while increasing individual grant applications annually.

Double research output in five years as measured by number and/or impact of publications, or prestigious awards linked to cultural/artistic production whether by full-time or part-time faculty, postdocs or graduate students.

Double, in five years, the number of partnering institutions and organizations on research grants, and joint international, or pan-Canadian graduate programs, including *co-tutelles,* linked to research strengths.

Develop, annually from 2017-18 onward, one new transdisciplinary, Institute-based graduate program in and one Course-based undergraduate Research Experience (CRE),[1] and setting a three-year horizon to assess the cost/benefit of cross-listed undergraduate/graduate and thesis/non-thesis courses

Recommendations

1. Incubate and promote transdisciplinary research Institutes and graduate programs in *Digital Arts, New Media and Technology*, *Aerospace*, *Life Sciences and Technology, Preventive Health and Wellness, Indigenous Culture and Communities, Sustainability and Urbanization*, *Chemical and Materials Science and Engineering*

2. Create a *Knowledge Hub* that advances research and creative activity by giving PI's and HQP access to in-house methodological, entrepreneurial and innovation expertise

3. Foster a *Network of Think Tanks* to position Concordia as a convener of multi-stakeholder expertise and co-creator of knowledge

[1] National Academies report on *Integrating Discovery-Based Research into the Undergraduate Curriculum*, 2015

4. Require that all tenure-track hires meaningfully connect to *Double our Research,* allocate 20% of positions to transdisciplinary cluster hiring in priority fields, and develop customized professional development roadmaps for all new hires including research chairs

5. Fund forty-five new postdoc positions in each of the next two years in areas of strategic priority

6. Model best practices in graduate recruitment and admissions, and pro-actively bundle graduate funding from all internal sources to maximize capture rates for top students in targeted programs and fields

7. Position research and graduate studies at the heart of institutional marketing and fund-raising, and develop greater institutional capacity to support research and graduate studies by: mobilizing non-academic staff to advance research projects in a dedicated way; training teams of qualified graduate students and postdocs as grant and curriculum writers; onboarding new professional expertise to support key areas of the research enterprise; and providing research management and leadership training for PIs

8. Create an internal peer-review process for major institutional grants and mandate that individual researchers who receive seed or bridge funding submit their next external grant application for internal peer review

9. Pilot flexible, multi-year teaching schedules (6 or 9 semester horizons) for high performing researchers, including options to teach short courses at the graduate level, do more team-teaching, link undergraduate teaching to research, and align internal and external service obligations to the research, international and graduate training missions

10. Ensure that the threshold for research and supervision-based course release truly rewards highly productive research and graduate supervision outcomes, and that other incentives—e.g. merit bonuses or accelerator funding--are implemented to incite and reward outstanding, research-related performance

All forward-looking universities face challenges to organize and do 21st century research and graduate studies within risk-averse academic structures rooted in the past. The successful *next generation university* will demonstrate nimbleness, imagination and boldness to advance its research enterprise. There will be an early adopter advantage to doing it now.