

Report on the External Review of the Faculty of Applied Science & Engineering of the University of Toronto

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Nora de Leeuw

Professor & Executive Dean, Faculty of Engineering and Physical Sciences, University of Leeds

Jim A. Nicell

Professor & Former Dean, Faculty of Engineering, McGill University

Ishwar Puri

Professor & Senior Vice President of Research & Innovation, University of Southern California

INTRODUCTION

The external Review Team, whose members are listed above, was charged with conducting a review of the Faculty of Applied Science & Engineering (FASE) at the University of Toronto with the goal of identifying strengths and potential areas for improvement, and to make recommendations for potential follow-up, as appropriate. More specifically, the terms of reference for this review consisted of seeking answers to eight questions, each of which is addressed in turn in this report. It was understood by the Review Team that this report would serve to set the stage for the development of a strategic plan for FASE for the coming years.

Before the visit, the Review Team was provided with extensive documentation, including the 2023 *Faculty Self-Study for External Review* report prepared by the FASE in anticipation of the start of the second term of Professor Christopher Yip's appointment as Dean. Then, between December 4 and 6, 2023, the Review Team had the privilege of engaging with many key stakeholders in a series of meetings, as follows: undergraduate and graduate students; academic leaders including the Provost and Vice-Provost Academic Programs, Deans or representatives from cognate divisions, School of Graduate Studies leadership; academic leaders from FASE including the Dean and Vice-Deans of FASE, the Faculty Registrar, Chairs, Directors and Associate Chairs (of undergraduate studies and graduate studies) of academic units in FASE; administrative and support staff including administrative leaders from the Faculty, shared services and partnership/collaborator staff; academic staff including pre-tenure, tenure-stream and teaching-stream faculty members, cross-faculty teaching staff and collaborative research leaders; staff, students and professors leading EDI-focused initiatives; and leading alumni.

The Review Team is thankful for the confidence placed in them by the University of Toronto leadership and for the trust and openness of stakeholders in engaging in important and lively discussions about the Faculty, its current state, and opportunities for improvement and future directions. The Review Team also extends their sincere thanks to the very professional and dedicated support of staff members from the Division of the Vice-President & Provost and the FASE in arranging the visit, supporting the visitors, and keeping the consultations on track.

We sincerely hope that this document meets your expectations and serves you well as you decide on how you may wish to follow up on specific recommendations made, as appropriate.

FINDINGS & RECOMMENDATIONS

Given the long-standing and excellent reputation of the University of Toronto and, specifically, the FASE, it is not surprising that the reviewers remain convinced that this is a world-class institution that continues to excel in its education and research mission. It is very clear that the FASE is comprised of very capable, dedicated, and forward-thinking academic and support staff and attracts incredibly qualified and highly motivated students to its undergraduate and graduate programs. Very importantly, the review committee found that the members of the FASE community take great pride in their institution, are cheerful and have a shared sense of belonging, and, indeed, feel privileged to be part of such a strong community. Equally important, there is a palpable consensus, both inside and outside of the FASE, that the leadership of the Faculty is in strong and capable hands. There is considerable evidence of initiative and excellence in education, research, and outreach as outlined in the self-study report and in the excitement of key participants in many of these initiatives. The Faculty and University have much to be proud of.

Not surprisingly, however, there are important challenges to be overcome and opportunities to pursue, especially given the evolving circumstances of the province, the nation, and the world (including the ongoing transition into a very different work and learning environment following the pandemic), coupled with shrinking resources available to the institution. As will be seen below, these were the subject of many discussions with key stakeholders.

Responses to Questions Posed in the Terms of Reference

This report is structured to specifically address the eight questions posed in the terms of reference for the external review. In addition, the Review Team offers suggestions for key thrusts as potential focal points for strategic planning. The reviewers remind the reader that this report is simply a reflection of issues that were most frequently raised over the course of stakeholder meetings, all of which were naturally constrained by time and by the participation of a limited sub-set of community members, who offered reflections based on their own personal experiences. This report and our recommendations are therefore offered in the spirit of constructive feedback, while recognizing that it is inevitably an imperfect and incomplete summary of some of the main issues that were raised during discussions with stakeholders.

1. The consistency of the Faculty's academic plan with the University's long-range plan, in particular, the Faculty's commitment to excellence in teaching and research.

The external review committee reviewed a number of documents made available to them regarding the University's priorities including the [Statement of Institutional Purpose](#) and the [President's Three Priorities](#), among others. As demonstrated in the self-study document and in our discussions with community members, FASE has advanced its research and teaching programs in numerous ways and in direct alignment with the institutional mission and the priorities of its senior leadership. Nevertheless, the review team heard a deep desire from many stakeholders, especially following the disruptive years of the pandemic, for strategic directions (and choices about priorities) to advance its research and teaching missions.

Notably, over the course of our meetings, and as will be seen in the text that follows, numerous participants asked that there be a focus in the near future on diverse subjects such as (1) academic

planning for students, particularly to deal with recently admitted undergraduate students who are not well prepared both academically and socially and are struggling; (2) how to use the limited or shrinking resources (i.e., funds, personnel, space) strategically and fairly; (3) recruitment, retention and support of graduate students and enhancement of their experience; (4) meeting the work and life needs of pre-tenure faculty members; (6) connecting University Advancement activities to priority opportunities and needs across the Faculty; (7) vulnerability of the Faculty due to perceived reliance on a large and growing population of international MEng (professional) students; and (8) deciding which activities should be reduced or stopped entirely in order to release resources to support priority areas.

Many in the Faculty referred to the management style of the previous Dean, who took the initiative to direct programs and initiatives. Dean Yip is viewed as having a very holistic and collaborative approach, entertaining a large reservoir of ideas. For many, this change in style is welcome but has also led to confusion on the part of some when it comes to execution or implementation of initiatives, with some unsure about their specific roles and responsibilities. The community appears to believe that Dean Yip should focus on working with the Faculty to decide what not to do as much as what to do by setting clear priorities. In many instances, participants in meetings specifically asked that strategies be developed to address priority issues.

Recommendation: *The Review Team recommends that priority should be placed in the near term on conducting a multi-dimensional strategic planning exercise – involving stakeholders from across FASE and its partners – that is directly connected to resource allocation and focuses on key areas, challenges and opportunities, many of which will be described below. See the section “Strategic Planning” below.*

2. Progress towards the Faculty’s academic priorities, including the capacity to meet opportunities and challenges ahead successfully.

The self-study report convincingly demonstrates significant progress across all dimensions of the mission of the Faculty and the University, and in direct alignment with the action plan arising from the 2016-17 external review of the FASE. There has been exceptional advancement on improving the teaching and learning activities in the Faculty, growth in students enrolled in graduate programs (with corresponding increases in revenue), and a growing emphasis on the launch of interdisciplinary research initiatives in areas of strategic importance to the Faculty and University. However, circumstances continue to evolve, and important challenges lie ahead, especially with respect to the continuation or sustainability of key initiatives. For example, concerns were raised about the fate of the Institutional Strategic Initiatives (ISIs), many of which implicate units within FASE, and which are currently funded through seed funding of limited duration. Challenges to FASE also arise from resource constraints including revenues (i.e., the ongoing tuition freeze), limited quantity and quality and functionality of space, and personnel in key areas. There is also a perception that the level of growth achieved in recent years in professional course-based master’s programs may be reaching an upper limit, which when coupled with already-high tuition costs, limits prospects for future revenue growth.

This situation is further complicated by the fact that the pandemic was not only disruptive to many activities and priorities of FASE in the past few years, but its repercussions are ongoing. The latter include very significant perceived impacts on, for example, the well-being of community members, the preparation of new students who have been recently admitted to undergraduate and graduate programs, the adaptation to new models of work for staff members and professors (i.e., remote or

hybrid work) and perceptions that this leads to a distancing between staff and the students they serve, and the implications of new models of teaching and learning which have arisen from the pandemic experience (e.g., remote teaching, a shift to virtual labs and demonstrations). Despite these complications, the post-pandemic period also presents an opportunity for improvement. That is, capabilities that were developed and implemented during the pandemic provide a new set of tools that can be mobilized to better use the limited resources that constrain the Faculty and University. For instance, the move to remote/hybrid teaching can lead to new markets for programs and students (and revenue), new and efficient modes of delivery, and new approaches to shared learning experiences between programs distributed across campuses. Similarly, the move to remote or hybrid work by staff may create significant space efficiencies that may make it possible to release some space that can be reallocated to support other priorities. In addition, the ability to connect and meet remotely could be used to increase the efficiency of use of staff time (e.g., communications, alumni engagement, student advising, connecting with partners). Of course, such adjustments must be made in a careful and balanced way to ensure high quality teaching and learning experiences and the attraction, development, and retention of employees.

Recommendation: *The Review Team recommends that FASE work, through its strategic planning exercise, to identify current constraints that threaten the sustainability of its priority initiatives and to identify how new models of work and teaching and learning may be used to free up resources not only to preserve the gains made in recent years with respect to research and teaching, but also to create a path forward for the development of new initiatives.*

3. The appropriateness of the approach to undergraduate and graduate education, and its enhancements to support students' academic experience.

The FASE rightly prides itself on attracting students of exceptionally high calibre into its programs at the undergraduate and graduate levels. Programs at the undergraduate level remain fully accredited by the Canadian Engineering Accreditation Board and the graduate programs appear to be flourishing with an ability to attract students both domestically and internationally.

Undergraduate Education

With respect to the undergraduate program, the Review Team heard concerns expressed by academic and administrative staff about the poor preparation and mindset of newly admitted students, with impacts that are not only noticeable in their first year but as they advance through their programs. Concerns were expressed that FASE currently has an inadequate understanding of students' mindsets and their capabilities when they arrived and, as such, were not prepared to adapt curricula and advising to the levels required of incoming students. Participants expressed that this was not uniformly the case for all students who have been recently admitted; that is, when students were coming, for instance, from IB programs, there was a lesser concern about their preparation compared to those coming from various areas across Canada where the level of academic preparation was seen to be more varied. It was suggested that steps should be taken to make connections with feeder schools, particularly from regions across Canada, to better help the Faculty prepare for the arrival of students from these areas and ensure their success.

Another key area of concern that was expressed, not only by students from across the Faculty but also academic staff, was the shortage and, in fact, apparent diminution of hands-on laboratory experiences

in their programs. Some students observed that some of the methods that were implemented during the pandemic (e.g., virtual labs or lab demonstrations by teaching assistants) have been maintained despite the return to in-person teaching, with a corresponding decrease in the quality of the student experience. While students were very appreciative of the opportunities for learning gained through extracurricular activities such as design teams and which are supported by FASE, they expressed concerns that there is a perceived overreliance on such activities to provide hands-on experiential learning, especially given that the availability of such activities are unevenly distributed across disciplines and, moreover, because they are disconnected from program requirements. Suggestions were made that a concerted effort is needed across the Faculty to address this, especially considering constraints (e.g., laboratory space, technical support) that limit access to hands-on learning opportunities. Some suggested that it would be opportune to find ways to connect design team activities to courses (e.g., project-based or capstone design courses). Others suggested that the departments/programs would benefit from the placement of educational developers throughout the Faculty to develop and share best practices and to develop a teaching and learning community of practice. Finally, it was made very explicit by some that a key constraint on hands-on learning is the availability of appropriate laboratory facilities, suggesting that this should be an important capital priority across units.

Recommendation: *The Review Team recommends that the Faculty see it as a strategic priority to work to ensure that (1) programs and support services are adapted to the realities of its admitted student population and (2) students are provided with an appropriate level of experiential hands-on learning within their programs. It is also suggested that the Faculty would benefit from creating a teaching and learning community of practice to share best practices, not confined to experiential learning, across the FASE.*

Graduate Education

In discussions with the Review Team, graduate students shared their pride in coming to the University of Toronto and in working with incredibly capable and internationally renowned professors. Likewise, professors noted that they were privileged to have access to excellent graduate students, who were instrumental in driving their research programs. Nevertheless, of all conversations that the Review Team held with students and staff during its visit, the subject around which there was most lively and, indeed, passionate discussions was the issue of graduate education.

Consistent with the report arising from the 2016-17 external review, the time to graduation, particularly for PhD students continues to be raised as a major source of concern – both by students and academics. For instance, the median time to graduation, quoted as 5.5+ years by some, was seen as particularly problematic. Students described the extraordinary financial pressures that they were experiencing considering the high tuition and cost of living in Toronto, coupled with a time-to-completion that was significantly longer than the “*advertised four-year duration of PhD programs*” and which extended well beyond the extent of the funding package granted to PhD students. Students pointed to the low probability of securing a TA appointment in their first or even second year of studies, which exacerbates the financial situation for some during the first few years of studies. They also reported that many students are left without funding after the first four years, making it not only challenging for them and their families but also delaying and even threatening the completion of their studies.

The approach to financial support of graduate students was portrayed as “*wild west and decentralized*” across and within units, as was the approach for managing graduate student progress and relationships with supervisors. The lack of uniform policies and approaches and accountability of professors, the variable quality of supervision and mentoring of graduate students, the perceived poor quality of some MEng professional courses and programs, and less-than clear expectations for graduate students at the outset of their studies were brought up repeatedly. The consequences of these are considerable, especially given that many students felt that they must seek additional sources of income (e.g., work on a separate project or second job), which delays graduation even further. Some students reflected that, even with their precarious financial situations, many were asked to bear the temporary but significant cost of travel arrangements for many months before they were reimbursed; in fact, some claimed that travel advances “*are not allowed.*” Others complained that they were being asked to expend their own funds to purchase supplies and minor equipment, with long delays before they were reimbursed. For students who are concerned about next month’s rent, this puts them in a precarious position. The Review Team understands that these situations likely reflect poor practices on the part of certain laboratories, rather than policies or even typical practices of the University; however, it would be expedient for the FASE to clarify to professors and students how travel or other reimbursements should be dealt with in a fair and equitable manner without creating undue financial burden on graduate students.

Students also reported lack of controls in place and *ad hoc* inconsistent arrangements for course work. They felt that many of the improvements in teaching and learning practices and curriculum design that have been implemented at the undergraduate level have not made their way into graduate courses. Similarly, they report a lack of professional support for the graduate student experience. They also reported that some laboratory groups are so large that students feel little connection to their supervisors and lack proper mentoring – some going as far to say that they have had to introduce themselves to their supervisors several times and others stating that they have seen instances where co-supervisors only discover that they are co-supervising a student at the defense stage. Many reported a mismatch in expectations between graduate students and professors at the start of their projects. Some were concerned that they were left alone to negotiate access to spaces or equipment even in their own units, sometimes hampered by poor relationships between professors and forcing them to seek access to equipment at other institutions. Others stated that they were not clear about what resources (e.g., funds, equipment, space) were available to them to undertake their planned research. Still others described being charged with duties that are more suitable for a lab technician or manager and not within the expected scope of a graduate student’s work. In certain cases, such practices create considerable delays in student progress. A constant refrain heard by the Review Team was that individual professors set their own standards of what is required, at minimum, to finish a PhD (e.g., three papers published in top tier journals to quote a specific example), creating inequities in expectations between students and programs.

From the perspective of academics, Associate Chairs for graduate education confirmed that they also saw very different levels of quality of supervision of students, mismatches in expectations between supervisors and students, and many instances of poor-quality supervision and mentoring. Even with the backing and support of their Chairs, they felt that they have little, if any, authority or tools to address “*bad behavior*” by supervisors. Some academics, citing the ongoing effects of the pandemic, suggested that many students may be taking longer to complete their graduate studies because they are tending to spend too much time away from their labs, presumably working remotely and without interacting with other students and colleagues. However, while the pandemic may be a contributing source to this problem, the issue of the lengthy time to completion of PhD programs pre-dates the pandemic. Some

faculty members and graduate students also reported that the recent growth in the admission of course-based Masters students (particularly international and as a much-needed source of revenue) has led to very large graduate classes (i.e., reportedly even larger than those experienced in undergraduate classes) and that this has resulted in a dilution of material in courses, particularly those that are designed to equip research-focused graduate students to advance their research. This may also result in a mismatch between the expectations of different students enrolled in some courses; i.e., research-oriented versus practice-oriented subject matter. Some MEng course-based programs were viewed by students as being of poor quality in terms of teaching practice and out-of-date or irrelevant (to them) content, not providing cutting-edge preparation for the workplace, and thus poor value for money. Both constituencies pointed to the need for a concerted campaign by the University and Faculty to attract graduate students, but to also to improve processes and practices related to graduate education and administrative support for graduate programs.

Based on our discussions, it is apparent that many of the concerns highlighted above are not new. As reported in the self-study, one accomplishment implemented in recent years was the creation of the Graduate Engineering Council of Students (GECoS) to enhance pathways for graduate students to engage directly with the Faculty and work with the leadership to improve the overall graduate experience. However, at present, graduate students claim that this Council is serving as more of a “social club” (i.e., akin to the undergraduate Engineering Society), rather than a conduit for addressing core issues related to the graduate student experience. There is an opportunity to empower this group to become a permanent focal point for communications – in both directions – and collaboration between the Faculty leadership and students to deal with issues surrounding the graduate student experience.

Recommendation: *The Review Team recommends that the Faculty focus on enhancing the graduate student educational experience as an urgent priority. It is recommended that the Faculty/departments consider allocating resources to provide professional support for graduate students and to ensure coordination with the expertise and resources available through the School for Graduate Studies. The goal of this effort would be to develop consistency and uniformity in the quality of the student experience across units and professors. In support of this, the Faculty should work with the Graduate Engineering Council of Students to create a standing group that would be empowered to become a trusted conduit between faculty and students to help them jointly address concerns about the graduate experience. Beyond this, it is suggested that a coordinated approach is needed in the short term to address acute issues related to graduate student funding, time-to-completion, and quality supervision, particularly of PhD students. Given the current financial pressures on graduate students, it is suggested that a concerted effort in the context of the ongoing “Defy Gravity” campaign be focused on raising funds for fellowships for graduate students, especially in recognition of the fact that graduate students are the lifeblood of research programs and a major source of the institution’s international reputation. It is suggested that financial models for fellowships should be considered in which the supervisor matches the funding provided through fellowships to ensure that the professor has “skin in the game” and an incentive to have the student complete their PhD program within the nominal 4-year period. It is also recommended that the Faculty take active steps to measure, track, and comply with milestones related to the academic progress of students. Finally, it is recommended that units in the Faculty share best practices and report on their efforts and accomplishments with respect to decreasing the time to completion of PhD studies.*

4. The effectiveness of the Faculty's efforts to foster a strong culture of excellence and achievement in research and scholarly activity, including the effectiveness of support structures.

There is no doubt that the FASE attracts an enviable quality of professors and students who are responsible for achievements that reflect the highest standards of research and scholarly activities. Their work, both theoretical and applied, is clearly impactful and benefits from a remarkable array of effective partnerships across the University, with institutions nationally and internationally, and with industry. No concerns are apparent about the level of output from FASE in terms of their ability to attract funding through competitive grants and contracts, to develop partnership in academia and industry, to educate HQP, and to produce original scholarly work. All indications of inputs and outputs are positive. As such, it is evident that “a culture of excellence” is something that already defines the Faculty and the University but, as with any complex organization that suffers from resource constraints, there are always opportunities to improve.

In terms of support structures, concerns were expressed by some professors about either the inefficiency or lack of transparency in certain administrative processes. For instance, faculty members identified the research collaboration and partnership office as a barrier to research, being slow to respond to approvals of contracts and partnership agreements, with poor or unseen tracking of processes, and little communication about where the pinch points are. Some faculty members described instances where once they had submitted their requests for approval, they encountered significant delays, not understanding what the status of their request was, or whether the approval was delayed or at a standstill inside or outside the Faculty, and/or whether they had done something wrong that was the source of the delay. In some cases, faculty members said that delays in approvals threatened their initiatives or was the single most significant risk to embarking on new contracts or agreements with partners. Some others also cited delays in key processes in the Faculty, such as the launch of search processes for new departmental chairs and subsequent decisions on the appointment of successors. Many pointed to the need to plan for succession of leadership well in advance of appointment end dates to ensure smooth transitions between academic leaders.

In terms of risk to long-term excellence, it is essential that the Faculty be not only able to attract and hire the very best of scholarly talent, but to develop and retain them. At a personal level, new professors reported very acute concerns about housing costs, daycare access, and access to family physicians, which may threaten their retention over time. They stated that while they have every intention to remain at the University of Toronto, personal pressures like these are inevitably important factors in their decision to stay. Tenured professors echoed this concern on behalf of their more junior colleagues. Equally important, it was apparent that many recently hired professors felt that their ability to perform was hampered or impeded by the limited availability of key resources that are required to advance their research programs. Some new professors reported that they felt that it was left to them, upon arrival or at the stage of preparing CFI applications, to negotiate with more established colleagues for access to essential space and equipment. Some said that they would have benefited from more direct interventions and guidance by senior colleagues and academic leaders to help them establish their research programs. A particularly acute issue, reported both by junior and mid-career professors, was the problem of “*legacy space*” occupied by more established professors where the perception is that some of these spaces are no longer being used productively (i.e., cluttered with unused or underused equipment, not housing many graduate students) or there is a mismatch between the function and use of some spaces within and between departments. While perceptions may inevitably be skewed about this issue (i.e., the “grass is always greener...”), the Review Team heard frequent suggestions that

underutilized spaces should be released and reallocated so that they can be used effectively. In other cases, it was stated that unfettered growth in some laboratory groups resulted in space constraints that are limiting the growth of the research programs of newer professors, an instance of the “tragedy of the commons” in an academic setting.

Excellence also implies that professors develop and advance over the course of their careers, ensuring that they can achieve their full potential. Based on many discussions, it became clear that while many professors feel at home and supported in their local units, many have an incomplete or poor understanding of the Faculty and the University, including its governance, policies, and practices. Suggestions were made that professors might benefit from a deeper knowledge of hiring processes (including intersections with EDI approaches), support and orientation for early-career professors, training to help them navigate and understand the Faculty and University (e.g., governance, processes for approval of courses and programs, the University and Faculty budget model), training on how University Advancement can support their activities and vice versa, leadership development to support succession planning, and establishment of communities of practice around teaching (including but not limited to teaching-stream faculty).

In light of the answers in Section 3 above, one may observe that the culture of excellence may not be as strong in the sphere of teaching and graduate education as it is with research. Steps taken in recent years to hire numerous teaching-stream faculty have clearly resulted in an important benefit, reported by many, of their tendency to lift the quality of education at the undergraduate level in the academic units. This is something that should be carefully nurtured and supported and perhaps extended to encompass the improvement of graduate education, both in terms of the courses taught, but also in enhancing the entire graduate student experience. One unintended consequence, however, of creating teaching-stream faculty appointments (a consequence that has been discussed in research-intensive universities everywhere) is whether this might result in two “classes” of professors. In fact, in discussions with the Review Team, two colloquial labels were used widely, namely “*teaching professors*” and “*research professors*” which led to the impression that the teaching activities of so-called research professors (who are formally known at the University of Toronto as “tenure-stream professors”) might be seen to be of secondary importance. In fact, it was observed by some that “*research professors are rewarded*” for high levels of graduate supervision with reductions in course responsibilities, leading in some cases to the growth of immense research groups supervised by professors with virtually no classroom responsibilities. Some expressed concerns that this undermines the quality of the undergraduate experience (i.e., an overreliance on contract staff for teaching, which also has budgetary implications) and may be leading to the proliferation of large groups of graduate students in certain laboratories who, due to the limited bandwidth of their supervisors, have less than satisfactory access to regular supervision and mentorship. In a nutshell, it is implied that the emphasis on excellence in research may come at the expense of the excellence of educational programs. While the Review Team is hesitant to pronounce on what the best balance between research and teaching activities and excellence should be, it is recommended that the Faculty examine this issue and explore the trade-offs inherent in the perceived valuing of research over teaching. Ultimately, it should address the important but unanswered question raised during our discussions: “Should all professors teach?” Also arising from these discussions was the impression that policies on course release was inconsistent between units. This may lead to inequities in workload and unequal opportunities for career advancement across FASE.

Finally, in the interest of maintaining excellence, the development of the newly hired teaching-stream faculty should be seen as a priority. Some academics (not just teaching-stream faculty) raised the question “Are teaching-stream colleagues properly respected?” Some teaching-stream faculty reported

a lack of an induction process or training upon appointment, although others claimed that they didn't want or need mandatory training. Some also noted difficulties in finding suitable opportunities for professional development and guidance on how best to approach their scholarship as teaching-stream faculty. The Review Team also heard about apparent differences in job expectations, responsibilities, and workload of teaching-stream faculty between units, and perceptions of a potential glass ceiling on career progression. Moreover, teaching-stream faculty reported inconsistent or unclear levels of support available to them for attending and presenting at professional conferences, including a lack of external grant opportunities. In addition, it seems that some opportunities for academic leadership in the departments, the Faculty and the University are not open to teaching-stream faculty. The Review Team is of the view that these faculty members should be treated as key contributors to the mission of departments and faculties. More than simply expecting them to teach more courses than tenure-stream faculty, they should be able to advance in their careers, contributing not only to the teaching of a wider variety of courses, but with the expectation that they will translate evidence-based approaches to teaching and learning into practice in their own courses, and provide service and leadership within the scholarly community to elevate the quality of teaching more broadly. This means that there should be clear opportunities for them to advance over the course of their career in academic leadership positions within the unit, the Faculty, and the broader University.

Recommendation: *In support of maintaining and strengthening the culture of excellence in the FASE, the Review Team offers several recommendations. First, to ensure the quality of its educational programs and equitable workloads, policies should be developed either at the Faculty level or the University level to ensure equitable course relief/release for professors involved in, for example, high levels of graduate supervision, administrative or leadership duties, or responsibilities for coordinating major research initiatives. Secondly, given that space appears to be the single most important limiting factor on graduate education and research productivity, especially in furthering the careers of new faculty members, the development of a space inventory, management, and reallocation plan in the Faculty, perhaps mirrored at the unit level, should be seen as a priority. The goal would be to provide fair and equitable access to space to support the development and growth in research programs for professors at all levels across the Faculty. Thirdly, recognizing that career progression and succession planning is essential to the future of the Faculty, it recommended that a concerted effort be made to provide development opportunities for professors. Finally, the Review Team feels that with the growth in the number and importance of teaching-stream faculty in the Faculty, some attention should be paid to clarifying expectations for these faculty members, to mapping out long-term career paths for them, and to ensure that they are fully integrated as equal and respected partners in the life and activities of their academic units. Considering these recommendations, the Review Team suggests that it might be prudent for FASE to create an academic leadership role in the Faculty, i.e., a Vice-Dean (Faculty Affairs) for instance, who would be focused on the hiring, retention, and development of faculty members.*

5. The effectiveness of the Faculty's internal organizational and financial structure including the appropriateness of resource allocation with respect to budget, faculty complement, infrastructure and advancement.

The Review Team saw many benefits arising from the Resource Centered Management model for the budget in the University, which appears to be mirrored at the level of the FASE, where departments directly benefit from the revenues that they create through their research and teaching activities. At present, it appears that, given the number of students and faculty members in the Faculty, there are

significant resources available to them in terms of funds and personnel. Not surprisingly, when excellent and ambitious people are brought together, they ultimately utilize all available resources to their maximum extent, which is likely the reason why space (i.e., quantity, quality, and functionality) has become the main limiting factor of common concern across the Faculty and its units. Given this, and especially considering the changes that have come about from the pandemic in terms of work and learning activities, there is an opportunity to rethink how the resources available to the Faculty - especially space but also allocations of personnel - might be freed up and reallocated for priority purposes. Notably, many individuals in different meetings pointed to the need for post-pandemic strategic planning. Comments made included how the Faculty should evaluate where it is now and where it wants to go, decide what it should say 'no' to, and not regret what cannot be done.

In these sessions, the Review Team learned of the desire from many to work on a budget model that would encourage and/or reward more cross-disciplinary approaches (both within and outside of the Faculty) including the ability to meet the special needs of cross-disciplinary programs, which are an important opportunity for the Faculty to play a leadership role in the country and internationally. Linked to this, the Review Team learned about the need for business planning expertise in the Faculty, including training academic leaders to see the creation of new and novel programs as revenue-generating opportunities. Beyond this, as alluded to earlier in this report, many asked for an approach for streamlining operations, reducing delays in initiating, processing and decisions and unnecessary steps in processes, increased transparency to clientele, and return-on-investment for staff in key areas, such as University Advancement and communications.

Participants emphasized the importance of community building around key roles (i.e., communities of practice); e.g., graduate education, space management (fair distribution of space based on need and level of activity), curriculum design and development, teaching practices, improvement in collaboration with central units to achieve smooth processes for handling, for example, agreements, contracts, partnerships, and IP. Notably, faculty and staff members and students pointed to a lack of community and belonging outside of their home units and expressed support for more efforts to get them to know each other. A common refrain heard by the Review Committee was *"we should meet more often like this."* People genuinely seemed excited to be introduced to each other, often for the first time or for the first time in person, and to have the opportunity to share their experiences and thoughts with colleagues. Considering that the shift to more remote work results in less frequent in-person interactions, the FASE should be quite deliberate in creating opportunities to build a strong sense of community across the Faculty and with counterparts from elsewhere in the University.

Meeting participants also reflected on common issues shared across units and asked that the Faculty establish a process for capital investment based on shared strategic priorities, and to focus on increasing the sharing of facilities including space and equipment among units, and more operational care for graduate students to avoid delays in their research and education. Participants also asked for a common approach to essential services, including sharing of best practices and data between departments and units. The desirability of a shared service *"hub and spoke model"* was referred to. Here, easy wins might include mature services, such as HR, where professional development opportunities are available for administrative staff at the Faculty or University level, creating thematic training, bringing faculty and staff leaders together to build communities of practice, share experiences, choose common priorities, and spin-off working groups. The Review Team also learned about the need to create structure for University Advancement across the Faculty and University where, for example, the terms of reference for a broader spectrum of academic leadership positions could include this responsibility explicitly, and where responsibility for coordination on advancement priorities across units would be emphasized.

Recommendations: *The Review Team recommends that, given the resource limitations apparent throughout the Faculty and its units and given the ongoing post-pandemic transition and adaptation, that the FASE consider reevaluating how its limited resources are distributed across the Faculty and to choose what it will and won't do, enabling the shift of resources to where they are needed most, and creating opportunities for strategic growth or enhanced excellence. In addition, the Review Team noted a strong willingness of members of the community to learn and work with each other to advance common objectives and, as such, it recommends that communities of practice be established around key thematic roles or issues to create efficiencies, best practices, and consistent and harmonized approaches to common issues shared by its administrative and academic units.*

6. The scope and nature of the Faculty's relationships with other University of Toronto campuses and divisions.

In meeting with participants from outside the FASE, including leaders from multiple faculties or collaborative initiatives, there was a strong sense that the University of Toronto sees FASE as a willing and productive partner in education and research. We also heard from many that with the consistently high level of excellence and reputation of Faculties across the University, there was an opportunity for the University to distinguish itself as one that is not only grounded in strong disciplinary expertise but one that has the capacity and flexibility to do impactful research and teaching across disciplines. While many institutions might make similar claims, the Review Team feels that the University of Toronto is uniquely poised to play a leading role in this space, given the excellence of divisions throughout the University and especially given the importance and value placed on interdisciplinary collaboration expressed by community members at all levels.

Despite their willingness, many meeting participants cited complexities that hinder such collaboration. For example, the Review Team heard that cross-disciplinary programs require a more coordinated approach to governance, marketing, development, and business planning. The long-term sustainability of key initiatives including ISIs is in the opinion of many participants hampered by their placement within departments; here, smaller units and even smaller Faculties feel particularly left out. Skepticism was expressed that ISIs could become self-sufficient by the conclusion of their three-year terms, which suggests that such initiatives should be seeded with funding for a longer period to allow them the time needed to bear fruitful results and with the specific goal of becoming self-sufficient or, at least, revenue generating. One conceivable approach to this would be to build graduate programs around the ISI initiatives, leading to not only interdisciplinary research, but educational experiences for graduate students that extend beyond their traditional disciplinary boundaries. It was said, however, that the ISI groups were not allowed to pursue the development of such programs. Perhaps, if true, this should be reconsidered. Of course, if such programs are to be created, they must bring net benefits to the FASE and the University and must avoid cannibalizing strong programs that are essential to the University.

While people throughout the University saw the benefits of the Resource Centered Management budget model (and would not want to give it up), this model, like any other, has its shortcomings. Importantly, the budget model is seen to hinder interdisciplinary collaboration (across the Faculty and the broader University) such as in the establishments of minors for students coming into FASE from other divisions and campuses. A characteristic remark was, “[The] *budget model of the University quietly but relentlessly discourages collaboration,*” although another participant countered this by saying, “*The budget is only a barrier to doing things together if you let it.*” The latter reflects that a decentralized

budget model, while advantageous from many perspectives, requires the appointment of academic leaders at the department and Faculty level who are outwardly engaged and connected to the broader mission of the Faculty and University, including advancement of its shared strategic priorities. But it also points to the need for business planning across units to ensure that new collaborative initiatives ultimately are designed to produce a win-win for all participants. Hence, the Review Team suggests that mechanisms and perhaps business planning templates should be developed to specifically overcome this real or perceived barrier. It was also noted that while there is a model in place that creates clarity about interdivisional teaching, it only covers undergraduate studies at present, and there is opportunity to develop something at the graduate level. The Review Committee recommends that the Faculty develop teaching program agreements that enable programs linked to institutional priorities across divisions and campuses.

In terms of the connection of FASE with the other University of Toronto campuses, the participants were surprisingly silent on this issue during our meetings, apart from a few individuals who pointed to increased collaboration and sharing of programs between campuses as a lost opportunity if not pursued. The Review Team heard of a willingness to collaborate, but it seemed to be quite uncertain as to what form this might take. As one individual put it, “*between us, we are a community of 90,000 people and more can be done together.*”

Recommendation: *The Review Team recommends that the FASE work in collaboration with the central administration and counterparts from other Faculties to develop models for shared educational and research initiatives that create win-win opportunities linked to the excellence of disciplines across the University of Toronto and its three campuses. FASE could play an important leadership role in this given that it and its faculty leadership are seen as very effective and willing collaborators.*

7. The scope and nature of the Faculty’s contributions to and influence on local, national and global initiatives, industry collaborations, and alumni partnerships.

The Review Team does not have much to comment on here because all evidence points to a strong university of outstanding reputation at the national and international levels, including partnerships with institutions and industry. In particular, the growth in industrial partnerships including many companies on the global stage is very encouraging in terms of future prospects for the FASE. In conversations with leading alumni, it was apparent that they not only appreciate the high-quality education that they received while studying at the University of Toronto but recognize the value of the large community of alumni – locally, nationally, and internationally – from which they have benefited for years. Importantly, alumni are not feeling complacent at all about the University and are very ambitious for their alma mater. They expressed a strong desire to brand the Faculty and the broader institution as an interdisciplinary powerhouse on the international stage. Many of the leaders we spoke to, while being graduates from the undergraduate engineering programs of FASE, reflected on the important preparation their education provided to enable them to enter business, law and other professions outside of the field of engineering. That being said, in response to questions posed by the Review Team to various stakeholders from across the University (not just alumni) regarding what defined the international strategy for the FASE and the University, they were unable to articulate this strategy even in the barest terms. Because of the ability of the FASE to not only attract students internationally but to also place them internationally after graduation, the Review Team feels that the FASE is well-poised to build on this strong foundation to articulate its vision for its international presence and profile and to

execute an international strategy. It also feels that with the international experience of the current Dean, especially gained through prior administrative roles, there is an opportunity in the short term to create an international strategy for education and research.

Recommendation: *The Review Team recommends that priority be placed in a strategic planning exercise on the development of a well-articulated international plan for the FASE, likely in conjunction with the broader University and its three campuses. Furthermore, the Review Team recommends that the leadership from the three campuses be brought together to explore opportunities to create new programs for education and research that can capitalize on this immense community spread across Toronto.*

8. Extent to which initiatives have been undertaken to enhance the accessibility (e.g., for students requiring physical or mental health accommodations) and diversity (including underrepresented groups) of the Faculty in the areas of academic programs, student and faculty complement and recruitment.

The FASE has taken great strides in the past decade in increasing the representation of women in their undergraduate and graduate populations and amongst academic staff. The Faculty rightfully takes great pride in its accomplishments and, while the Review Team found plenty of evidence of initiatives including many led by staff, students, and faculty members (often as a voluntary effort), we heard from stakeholders who are under the impression that results related to EDI appear to have stalled. There also remains a concern that results are not apparent when it comes to improvements in underrepresented groups other than women. This is certainly not due to the lack of action on the part of key people in the Faculty, but it strikes the Review Team that to address these systemic issues, the broader FASE community should be mobilized to work toward shared goals. Worryingly, some participants in meetings of stakeholders (beyond the meeting that was specifically held with EDI leaders in the FASE) reported a perceived “performative” element to EDI efforts, often lacking concrete actions or accountability mechanisms in place including for activities related to hiring, admissions, education, research, and outreach. We heard that FASE needs a better and more integrated process during faculty and staff hiring and student recruitment across programs. Participants asked for a strategic approach that builds EDI into the fabric of the community, with distributed responsibility for EDI that integrates with job functions, responsibilities, authority, and processes.

In reflecting on the numbers of initiatives underway in the Faculty, each with their own specific goals, participants asked for strategic investment and coordination in the use of limited resources to advance priority EDI objectives. They also asked for a better understanding of barriers to entry of underrepresented groups of students, the need for a comprehensive EDI plan, for champions to be empowered at local levels, including admissions, the first-year experience, curriculum development and pedagogy, and student advising and support. They also remarked on the need to engender more trust to obtain meaningful data to track progress on initiatives focused on women, Black, Indigenous and 2SLGBTQ+ community members.

Beyond the focus on underrepresented groups, there was repeated emphasis on the need for rebuilding the FASE community post-pandemic. Participants asked for new models of work (including HR policies and consistency between departments and line managers), identification of space reallocation due to remote work for staff and graduate students, helping students who require assistance because of poor

preparation and social skills, and more robust adaption and utilization of remote and hybrid learning in post-Covid teaching. All of this is necessary to build an equitable, diverse, and inclusive community.

Recommendation: *The Review Committee recommends that the FASE place a high priority on developing a coordinated approach to EDI across the Faculty, one in which responsibility for progress on key metrics and deliverables is shared across the roles of staff and academics, not just in leadership or management positions. Only through engagement at all levels of the Faculty, will an inclusive, equitable and diverse culture be created and operationalized.*

Strategic Planning

Many of the issues mentioned above are complex and point to intersections between faculty, staff and student activities, research, education and outreach, and governance and operations. The recommendations made herein by the Review Team are intended to be constructive and to draw attention to important issues or opportunities that preoccupy a significant number of members of the FASE community, both inside and outside of the Faculty. But the Review Team also recognizes that the FASE community has its own limited bandwidth and resources to tackle all the recommendations made in this report.

Given this, the Review Team is of the view that strategic planning is required to identify and address key academic priorities, especially as FASE transitions out of the pandemic and deals with pressing resource constraints. The urgent need for an executable strategic plan was expressed by numerous participants in our many meetings; by “executable”, it is meant that resources including personnel, space, funds, and time will be dedicated to the planning and execution of strategic priorities. The pandemic was a major distraction and, now, with the transition back to a “new normal” still underway coupled with pressing financial constraints, there is an urgent need to focus on strategy and prioritization. As part of this, more people from across FASE should be empowered to work on priority setting and strategy development to identify common challenges and opportunities. Stakeholders should also be charged with responsibility to execute these plans. Given this, the Review Team recommends that the Faculty hold a series of retreats or workshops with the participation of other University of Toronto and external stakeholders, focused on identifying those issues or untapped opportunities that are most important for them in the coming years. The goal of such meetings would be to identify strategic areas of focus and to implement planning exercises that would identify resource needs and allocations, planning and responsibility for execution, and performance indicators to track progress. As importantly as choosing what priorities require action, it is recommended that distributed responsibility for these initiatives be implemented across the Faculty, each according to their capacity, roles, and responsibilities. Ultimately, the goal would be the development of a comprehensive strategic plan for the coming five or more years that takes into consideration many of the issues that were identified in this report.

To aid in this exercise, the Review Team suggests that the strategic planning exercise could focus on some of the following areas that cut across the responses to the questions posed in the Terms of Reference of this review. In its interactions with stakeholders over the course of the visit, the Review Team found a longing for clarity, strategy and planning around the following pillars, or key thrusts, of a strategic plan:

- **Collaboration within the Faculty and across disciplines, the University, and its three campuses**
– Strategic planning should focus on identifying opportunities for collaboration across the

University and its three campuses to create synergies in the development of innovative and impactful research and educational programs that cannot be achieved by FASE alone. As part of this, an articulation of an interdisciplinary and collaborative vision for FASE is important. Just as importantly, it is essential to plan for execution. Focus could be placed on choosing areas of strength and potential where synergies are aligned with institutional priorities, the identification of barriers to collaboration, and on creating the means and drivers for collaboration including incentives and rewards. A focus on planning for the sustainability (e.g., self-sufficiency) of such initiatives over the long term will be critically important.

- **International strategy** – Given the national and international stature of FASE and the University of Toronto as a whole and given the competitive market for talent in a time of globalization, it is suggested that the FASE focus on developing and articulating an internationalization strategy that creates new opportunities across the many units of the Faculty to pursue and express their research and teaching mission in new and expanded ways. Inherent in this is a need to align this strategy with that of the University and to work in concert with other Faculties who likely have similar ambitions.
- **Graduate student experience** – Strategic planning that engages academic and support staff, graduate students, shared services, and academic and administrative leaders should urgently focus on improving the graduate student experience. The rapid growth in student numbers, particularly in course-based Masters programs provides an important source of revenue to the FASE, but it is apparent that many students (and some faculty members and staff) are not satisfied with the current quality of the graduate programs and the overall student experience. There is a not-unreasonable expectation on the part of students who pay high tuition that they deserve a high or at least reasonable return on tuition investment. If these issues are not addressed, this critical source of revenue may be vulnerable. Moreover, the financial precariousness of PhD students represents an important risk to the admission and retention of graduate students with a corresponding risk to the productivity of research programs at the University of Toronto. Strategic planning might focus on how to address the financial barriers to graduate studies, including a focus of the “Defy Gravity” campaign on supporting these students, with corresponding benefits to research programs and professors. Focus should also be made on improving the overall experience of these graduate students in terms of quality of supervision and mentoring and with the important goal of rapidly achieving measurable reductions in the time to graduation.
- **Equity, diversity, and inclusion** – While great strides have been made in advancing EDI goals in FASE and in engaging many staff, students, and academics in a range of initiatives, it is suggested that now is the opportune time to bring the culture and practice of EDI to a new level. While there are excellent initiatives underway throughout the Faculty, a coordinated approach to the use of limited resources is required (including the limited time and energy of EDI leaders who are highly invested in advancing EDI, but at a personal or professional cost to them). It is suggested that strategic planning should focus on how EDI imperatives can be spread throughout the community, and engaging all professors, staff, and students – not just those in leadership positions - in advancing EDI objectives, each according to their individual capacity and level of responsibility. It is also suggested that EDI should not be seen as just one more thing that needs to be done by people over and above what they already do but rather be integrated into day-to-day activities and decision making (e.g., recruitment and admission of graduate

students into individual labs, staff development, student advising, pedagogy and curriculum development).

- **Optimization of use of limited resources** – In order to execute any strategy, especially with limited resources at hand, a strategic focus on the optimization, distribution, use and access to limited resources is warranted. This includes not only ensuring the availability and efficient use of funds, personnel, space and equipment, but also the optimization of activities and shared practices across the FASE (e.g., administrative processes, remote/hybrid work arrangements, graduate and undergraduate student recruitment), and also the creation and implementation of uniform and consistent policies and practices through FASE (e.g., hiring to advance EDI objectives; roles and responsibilities of employees including teaching-stream and tenure-stream faculty members; staff development; course release for professors). Importantly, because of resource constraints, decisions must be made as to what activities are to be decreased or discontinued and to identify where opportunities exist to release resources to be reallocated elsewhere. As part of this, a key focus should also be placed on inventorying, managing and allocation of space to ensure effective use, fair distribution, and functionality.
- **Community & Wellness Post-Covid** – As with many other organizations, businesses and institutions, the pandemic continues to have a lasting effect on health and wellbeing. It is suggested that it would be prudent for FASE to focus on how it wishes to come out of the pandemic, improving its strength and resilience, and building on new capabilities developed in response to the pandemic. Key elements of this would include a concerted effort to rebuild relationships across the Faculty and build communities of practice. It should also determine how it wishes to take advantage of new models of pedagogy (e.g., distance learning, hybrid courses and programs), new models of work (i.e., remote and hybrid, with corresponding HR policies and practices that ensure consistency in approaches between departments and line managers), and new models of engagement for communications, university advancement, and outreach. This exercise could also identify opportunities for liberating space due to the shift to remote work (e.g., space allocated to administrative and support staff and graduate students). In the short term, attention should also be paid to ensuring student success by addressing their level of preparation, mental health and wellbeing, and perceived deficits in social and collaborative skills.

CONCLUSION

We reiterate our admiration for a world class Faculty at a world class institution with world class professors, staff, students, and alumni. The Faculty is strong and led admirably. The Review Team sincerely hopes that their visit and this report will contribute positively to the advancement of the mission of the FASE and the University of Toronto. At the very least, we hope that it stimulates important conversations about the current state of the FASE and its community and where the FASE might see itself in the coming decade or so.

No faculty works in a vacuum but is ultimately heavily influenced by their local context, the availability of resources, as well as university structures and policies. As such, some of the recommendations made in this document intersect with responsibilities of others that are not within the control of the Faculty. Therefore, we encourage the University of Toronto central administration and partners to consider how they, too, might help address some of the issues and opportunities that are identified in this document.