Review of the College of Engineering

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SUMMARY

This report outlines the findings and suggestions of the Review Team that was established to undertake a review of the College of Engineering at the University of Saskatchewan. The Team visited the University on October 17 – 19, 2016, and met with a broad range of faculty, staff and students of the College, as well as some members of the University's leadership. It assembled the feedback it received, along with its own observations and analyses, into a set of key findings and recommendations.

Specifically, the Team has provided a series of recommendations relating to the following: the review process for colleges, the search for a new dean, the desirable qualities of a new dean, the needed strategic planning for the College, the organization structure within the college, the need for an increased emphasis on research, arrangements for graduate teaching, the circumstances of some units within the College, and finally its resources and infrastructure.

The overall findings of the Review Team are that the College has a first rate set of undergraduate programs and many additional strengths, but it also has a number of areas where efforts are needed in order to assure future enhancements. The Team trusts that the suggestions and recommendations made here will help position the College to be a national leader in engineering education and research.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUMMARY</td>
<td>i</td>
</tr>
<tr>
<td>1. BACKGROUND AND PROCESS</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Review Terms of Reference, Membership and Process</td>
<td>2</td>
</tr>
<tr>
<td>2. LEADERSHIP OF THE COLLEGE</td>
<td>3</td>
</tr>
<tr>
<td>2.1 Search for a New Dean</td>
<td>3</td>
</tr>
<tr>
<td>2.2 Qualities of a New Dean</td>
<td>3</td>
</tr>
<tr>
<td>2.3 Associate Deans and Heads</td>
<td>4</td>
</tr>
<tr>
<td>3. STRATEGIC PLANNING</td>
<td>4</td>
</tr>
<tr>
<td>4. ORGANIZATIONAL STRUCTURE AND GOVERNANCE</td>
<td>5</td>
</tr>
<tr>
<td>4.1 Organizational Structure</td>
<td>5</td>
</tr>
<tr>
<td>4.2 Ron &amp; Jane Graham School of Professional Development</td>
<td>6</td>
</tr>
<tr>
<td>5. ACADEMIC AND EDUCATIONAL ACTIVITIES</td>
<td>7</td>
</tr>
<tr>
<td>5.1 Undergraduate Program</td>
<td>7</td>
</tr>
<tr>
<td>5.2 MSc and PhD Programs</td>
<td>7</td>
</tr>
<tr>
<td>5.3 MEng Programs</td>
<td>8</td>
</tr>
<tr>
<td>6. RESEARCH ACTIVITIES</td>
<td>8</td>
</tr>
<tr>
<td>6.1 The University's Signature Areas</td>
<td>8</td>
</tr>
<tr>
<td>6.2 Research Indicators</td>
<td>9</td>
</tr>
<tr>
<td>6.3 Discussion of Approaches</td>
<td>11</td>
</tr>
<tr>
<td>7. PARTNERSHIPS AND INTERACTIONS</td>
<td>12</td>
</tr>
<tr>
<td>7.1 University-Wide and External Interactions</td>
<td>12</td>
</tr>
<tr>
<td>7.2 Fundraising</td>
<td>13</td>
</tr>
<tr>
<td>8. FACULTY, STAFF AND STUDENTS</td>
<td>13</td>
</tr>
<tr>
<td>8.1 Faculty</td>
<td>13</td>
</tr>
<tr>
<td>8.2 Staff</td>
<td>14</td>
</tr>
<tr>
<td>8.3 Undergraduate Students</td>
<td>15</td>
</tr>
<tr>
<td>8.4 Graduate Students</td>
<td>15</td>
</tr>
<tr>
<td>8.5 Diversity</td>
<td>15</td>
</tr>
</tbody>
</table>
9. RESOURCES AND INFRASTRUCTURE ........................................................................15
   9.1 Budget Processes ..............................................................................................15
   9.2 Budgets .............................................................................................................16
   9.3 Physical Infrastructure .....................................................................................17

10. SUMMARY FINDINGS AND RECOMMENDATIONS ...........................................18

APPENDIX I – REVIEW TERMS OF REFERENCE ...............................................20

APPENDIX II – TEAM SUGGESTIONS FOR FUTURE REVIEWS .........................24
1. BACKGROUND AND PROCESS

1.1 Introduction

The Interim Provost of the University of Saskatchewan established a review team to undertake a review of the College of Engineering at the University.

For context, an overview of the College of Engineering at the University of Saskatchewan, drawn largely from documentation provided to the reviewers, is as follows: the College of Engineering is one of 13 academic colleges of the university; it includes 5 academic units: the Departments of Chemical and Biological Engineering, Civil, Geological and Environmental Engineering, Electrical and Computer Engineering and Mechanical Engineering, and the Ron and Jane Graham School of Professional Development. It also includes a number of programs and activities that are joint with other academic units outside the College. It consists of approximately 90 faculty members and 60 technical and administrative staff. It delivers eight undergraduate programs (chemical engineering, civil engineering, computer engineering, electrical engineering, engineering physics, environmental engineering, geological engineering, and mechanical engineering) and a range of PhD, MSc and MEng programs in engineering. Currently, enrolment is approximately 1,700 undergraduates and 400 graduate students. Its operating budget was approximately $22 M in 2015/16.

This report outlines the Review Team's mandate and membership, and the process used to develop the report. The report then provides a discussion of the various findings and suggestions arising from the Team's visit to the University. These relate primarily to the review process for colleges, the search for a new dean, the desirable qualities of a new dean, the needed strategic planning for the College, the organizational structure within the college, the need for an increased emphasis on research, arrangements for graduate teaching, the circumstances of some units within the College, and finally its resources and infrastructure. The report concludes with a set of summary findings and recommendations.

The Team is grateful to Mr. Troy Harkot, Director, Institutional Effectiveness, for all the arrangements for the review. The Team is also grateful to the Interim Provost, Dr. Michael Atkinson, the Interim Dean, Dr. Don Bergstrom, and to the many individuals from the College community that met with the Team and provided input to the review process. The external reviewers are especially grateful to Dr. Vikram Misra for his valuable insights and very helpful advice and comments during the visit through his role as internal reviewer. The inclusion of an internal team member was critical to the success of this exercise and Dr. Misra did an exceptional job in this role.

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1.2 Review Terms of Reference, Membership and Process

The statement setting out the terms of reference for the review is reproduced in Appendix I. In summary, the Review Team has been asked to make recommendations in the following areas: mission and vision, organizational structure and governance, academic and educational activities, research activities, partnerships, other. This review report largely follows these topics, but they are supplemented by additional considerations relating to the search for a dean, personnel, resources and infrastructure.

Review Team Membership

The External Review Team has the following membership:

• Dr. Michael Isaacson, P.Eng., Professor of Civil Engineering and former Dean of Applied Science, the University of British Columbia
• Dr. Douglas Ruth, P.Eng., Professor of Mechanical Engineering and former Dean of Engineering, University of Manitoba
• Dr. David Barnes, P.E., Professor of Civil and Environmental Engineering and Associate Director of the Institute of Northern Engineering, University of Alaska Fairbanks.

The External Review Team was complemented by an Internal Reviewer:

• Dr. Vikram Misra, Professor of Veterinary Microbiology, University of Saskatchewan.

It is noted that the role of the internal reviewer was to participate with the external review team in the meetings and discussions during the site visit. However, the review report is authored by the external reviewers alone.

Review Process

The Team undertook its work on the basis of the following steps:

• It received a package of materials from the University in advance of the visit.
• The Team visited the University on October 17 – 19, 2016. It held a series of meetings with the leadership, faculty, staff and students of the College, as well as some members of the University's leadership beyond the College.
• The Team held an exit meeting with the Interim Provost, the Interim Dean, and Mr. Harkot, at which its key findings were presented and discussed.
• Subsequent to the visit, the Team formulated its report and submitted a draft report.
• Upon receiving factual corrections to the draft report, it developed and submitted its final report.
Commentary on Review Process

We understand that this is the first review of a college at the University of Saskatchewan in the recent past. The University is to be commended for undertaking such an approach. In order to enhance similar reviews in the future, the Review Team has offered some general suggestions regarding future reviews as provided in Appendix II. Although these suggestions may be considered to be outside the scope of this review, they have been retained here since some aspects of these may be viewed as have a bearing on the present report. (For example, the level of detail provided in this report with respect to different stakeholders may reflect the extent of the meetings held with the different groups.) Even so, the Team very much appreciates the detailed arrangements for the review that were made, and it is confident that its report provides an accurate assessment of the strengths/weaknesses of the College of Engineering and of the opportunities/challenges that the next dean will face.

2. LEADERSHIP OF THE COLLEGE

2.1 Search for a New Dean

The Review Team found that the key issue identified in its review is that the College has been through a difficult period without clear, stable leadership for an extended time, so that the need to appoint a dean with a long-term view and commitment to the College is paramount. The Team notes that there are a relatively large number of leadership positions in the University that are interim appointments, some lasting several years, and wondered whether there may be a systemic issue with regard to leadership recruitment and retention.

2.2 Qualities of a New Dean

The Review Team has developed the following list of qualities and characteristics that a hiring committee should consider when recommending the appointment of the next dean:

1. Although the search for a new dean should be open and may consider both external and internal candidates, the successful candidate must either have roots at, or a clear connection to, the University of Saskatchewan or at least to the Province, along with a commitment to make a long-term career at the University.

2. The successful candidate must have extended and bona fide experience as an academic administrator, preferably in the position of a Department Head/Chair and/or a Dean/Associate Dean.

3. The successful candidate must demonstrate a clear understanding of the modern role of a dean as a friend-raiser/fundraiser and be prepared to interact with the external community to enhance the standing and reputation of the College.

4. The successful candidate must demonstrate excellent, even exceptional, human interaction skills to meet the challenges caused by an extended period of unstable leadership that the College has endured.
5. The successful candidate must understand that the College needs initially to become unified in a common vision before major changes can be accomplished.

6. The successful candidate should be willing to work with the University administration and the College's faculty members on achieving the goals that the University has set for research.

In order to assure the success of the next dean, the University must commit to provide:

1. Mentorship appropriate to the qualifications/background/experience of the successful candidate.

2. A compensation package that will ensure that both the successful candidate and his or her dependents can create a home in Saskatoon.

3. Meaningful reasons for the successful candidate to remain in the position for at least one complete term.

2.3 Associate Deans and Heads

The Team found that the leadership at the level of the Associate Deans and Department Heads is strong, despite the long period of instability. There are two Associate Deans, Dr. James Bugg (Operations) and Dr. Aaron Phoenix (Students) who are providing very able assistance to Interim Dean Don Bergstrom. The Interim Dean is providing strong leadership; however, the fact that he is also serving as the Associate Dean Research is problematic, especially given the current need for a major commitment in that position. The Review Team notes that the unusual appointment of an Associate Dean (Operations) appears to be very effective.

The Review Team found that the Heads of the Departments have strong support from their faculty members. However, there is a serious lack of uniformity in how the five academic units are administered. In two departments the administrative staff reports to the Department Head, in another and in the School, the administrative staff reports to an individual in the Dean’s Office, while in the fifth case one staff member reports to the Department Head and another to an individual in the Dean’s Office. This lack of uniformity has led to confusion among administrative staff, non-uniformity of communication among administrative staff, and a severe erosion of morale. In discussions about this situation, it became apparent that it arose in part because of the perception that not all department heads had the same supervisory skills/desires. However, the Review Team recommends that this problem is addressed by training programs, rather than by accommodating different reporting structures.

3. STRATEGIC PLANNING

The Review Team was asked to comment on the mission and vision of the College. The vision and mission were not readily apparent from the documentation provided, nor did this arise in the various conversations that the Team held. Perhaps this is not surprising given that the College has lacked stable leadership for some time. At the University level, an earlier plan, termed "The Third Integrated Plan" has concluded, while a new vision statement has only recently been
adopted (see: www.usask.ca/ourvision).

One of the key tasks of a new dean will be to develop a strategic plan for the College. This plan and planning process will require four critical elements to assure its success in bringing about major benefits to the College:

1. A broad and inclusive consultation process leading to the development of the strategic plan;
2. Consistency with the University's vision statement;
3. An increased emphasis on graduate programs and research – given that the College already has very strong undergraduate programs in place; and
4. A deliberate operational plan and process that seeks to implement the strategic plan that is developed.

4. ORGANIZATIONAL STRUCTURE AND GOVERNANCE

4.1 Organizational Structure

The organizational structure of the Faculty includes a Dean's Office, four departments and one school (considered to be equivalent to a department) and linkages to joint programs in engineering physics (undergraduate) and biomedical engineering (graduate). The reporting structure includes the Dean, three Associate Deans, the Department Heads, the School Director, faculty and staff. A particular feature is that the leadership (Dean, Associate Deans and Department Heads) and their more direct support staff are largely based at one location; the graduate student advising staff are at another location (Graduate Commons); and the undergraduate program staff are at a third location (Engineering Student Centre). This physical layout appears to work effectively.

As noted earlier, there is a mix of reporting arrangements relating to administrative staff, and this has led to problems. Thus, the Review Team heard a large number of concerns with the current organizational structure. It appears that there is a wide mix of arrangements relating to three kinds of interaction for several staff members: work flow / work assignments, formal reporting, and the (existing or potential) roles of coach/mentor. As a result, staff are sometimes conflicted between work requests by one individual and denial of authorization by another individual, there is an inconsistent flow of information, there is an inconsistent degree of mentoring provided to staff, and communications are challenging with key information sometimes provided to some individuals only "through the grapevine." This is exacerbated by some split positions with asymmetrical dual reports that have led to tensions and confusion.

Furthermore, the Associate Deans and Heads often have fewer staff reports than is typical at many universities. This arrangement has probably evolved over time because of a lack of leadership by a number of deans in the past. That is, there is a sense that history, in combination with a leadership vacuum, has resulted in non-academics taking on much more extensive leadership roles than would otherwise be the case. As a consequence, there is a perception that
the College is run by non-academics and this needs to be addressed. While the Review Team is not advocating any specific solution, there is no doubt that morale in the College is being negatively impacted by the present structure.

The Review Team recommends that a review of the reporting structure be undertaken. This review will need to:

- address the inconsistencies that are currently in place,
- clarify potential coaching roles for some positions,
- provide a consistent communications mechanism, and
- develop a clear and responsive route for budgetary approvals.

4.2 Ron & Jane Graham School of Professional Development

A distinct governance arrangement relates to the Ron & Jane Graham School of Professional Development. The School appears to be entirely equivalent to a department, although this is in contrast with other examples across the campus. Schools often reflect a greater degree of autonomy than do departments, although the Review Team could not find a Senate / Council statement that clarified the roles and responsibilities of a school versus a department. Therefore it is unable to comment on the suitability of the "school" label in this case.

The School's director is a faculty member in Chemical and Biological Engineering and its faculty complement includes Academic Program Appointments ("APA's" – see Section 8.1), those with Teacher-Scholar duties and Lecturers. The school is primarily engaged in teaching engineering communications. This is very different to a more common understanding of professional development – and by extension professionalism – in engineering. That is, even with a limited presence of entrepreneurship and even with a long-term intent of broadening the range of offerings, the current name of the school is a significant misnomer and is no doubt leading to misunderstandings beyond the College.

Perhaps not surprisingly, there is an associated disparity with respect to views of the role of the School within the College. Thus, despite the School's role in the scholarship of teaching and learning, engineering faculty largely view it as a service unit providing instruction in communications, whereas the School's faculty feel that they are insufficiently appreciated by the engineering faculty. This is hardly surprising and cannot be resolved while maintaining the current structure and labeling. One possible resolution is that it is indeed recognized as a service unit providing instruction in communications, and may be re-named accordingly; another possibility is that it is expanded via additional faculty positions so as to provide professional development and professionalism instruction in the curriculum more broadly. This may be particularly apt given the increased focus of the accreditation process on related graduate attributes. The Review Team makes no recommendation in this regard.
5. ACADEMIC AND EDUCATIONAL ACTIVITIES

5.1 Undergraduate Program

The University offers a series of baccalaureate programs leading to the Bachelor of Science in Engineering (BE) degree. The Review Team considered the most recent submission to the Canadian Engineering Accreditation Board and subsequent documentation and is able to confirm that the BE programs are very impressive and that there are no serious issues with any of them. In meeting with students from the programs, the Review Team found that students are generally very satisfied with the programs.

The Review Team noted that, in common with arrangements at many other universities, the programs have a common first year, and that students make a choice for entry to the second year based on a quota system. The recruitment process may be summarized as follows: In the first term, there are short presentations (10-15 minutes) on each discipline; in the second term, the College holds "discipline nights," where a longer presentation is given on each discipline by a faculty member representative for that discipline – usually the program chair. These presentations are repeated such that students may attend a maximum of three presentations.

This process may not provide sufficient familiarity to the basic characteristics of the various programs. A review of the curriculum shows that there is very little engineering content specific to disciplines in the first-year program. It would be beneficial if more engineering-oriented content could be included in the first year program so that students could develop an appreciation of what to expect in various programs in the upper years.

5.2 MSc and PhD Programs

The University offers graduate programs leading to the Master of Science (MSc) and PhD degrees in a number of engineering disciplines. The Review Team reviewed the Graduate Program Review submissions and reports and noted that, in most cases, the programs meet the "expectations for a quality graduate program." However, this was not always the case, and one particular finding was that "the graduate programs are of moderate quality, with … low numbers of graduate students …"

In meeting with students from the programs, the Review Team found that students were generally very satisfied with the programs. They did however have one substantive comment as elaborated upon below.

A key challenge of the graduate programs appears to relate to the planning and delivery of graduate courses. Attracting top performing graduate students is a key element in building a strong research program in the College. Prospective top-performing graduate students need to have some assurance that they will be able to take the relevant courses in their study area and will be able to complete their degrees in a reasonable time.

There are several aspects to this issue that need consideration. First, it appears that graduate teaching is not directly included in a faculty member's teaching load, but is sometimes considered an "add-on" – whereas there needs to be a more formal recognition of the teaching
load associated with graduate courses. While very small enrollment courses are an ineffective use of the College's teaching resource, and therefore lead to such classes being cancelled, there are several steps that need to be taken to assist with student planning:

- There needs to be a clear statement to incoming students confirming which courses will be delivered with certainty and which courses may possibly be cancelled; and then identifying the arrangements and timing of classes being potentially cancelled because of enrollments falling below some threshold.
- Students should be required to meet formally with a faculty advisor or supervisor to plan and secure approval of an intended program of courses.
- Some specialization areas require a minimum set of graduate courses to ensure that graduates are prepared to practice in these areas. A plan must be put in place to ensure that such packages of "core courses" will be available to students despite low enrollments.

Regarding administrative practices for graduate students, the Review Team heard some conflicting comments. While an annual progress report process appears to be in place through the College of Graduate Studies, it appears that this is not uniformly enforced. Furthermore, although that College of Graduate Studies has a standard form for such reviews, we were told (but could not confirm) that each Department has its own form. At many universities, Colleges / Faculties of Graduate Studies play a dual role with respect to enforcement of regulations and standards, while providing support and acting as a facilitator. In this context, we understand that, at the University of Saskatchewan, the role of the College of Graduate Studies has been made uncertain through a former University President contemplating the dissolution of the College. This is an example where instability in leadership at the highest levels has caused confusion within the University. In any event, the current leadership of the College of Graduate Studies appears to be strong and effective. The Review Team was surprised to learn that the current dean is approaching the end of a full term (five years) as an interim appointee!

5.3 MEng Programs

The Review Team notes that the MEng programs (course-based Masters) are relatively small. In some universities, there has been a concerted effort to develop these programs into full-cost recovery programs with a high fee, especially for international students. However, the opinion of the Review Team is that the success of such programs has been mixed. At the University of Saskatchewan, the MEng programs are largely incremental because students attend pre-existing graduate courses except for a number of professional-oriented courses. We suggest that this is an appropriate model for the MEng programs at the present time.

6. RESEARCH ACTIVITIES

6.1 The University's Signature Areas

The Review Team was made aware of six "signature areas" of academic endeavor identified by the University (see: http://research.usask.ca/research-at-usask/signature-areas.php). The
following quote encapsulates the current success of this approach: These are "*areas of outstanding achievement enabled by our research capacity, investments, history and sense of place.*" These six areas are associated with various institutes, centres and other initiatives, some of greater relevance to researchers in the College of Engineering and some with major funding in place. In particular, the Global Institute for Water Security and the Global Institute for Food Security have attracted major funding from the Government of Saskatchewan, the Canada First Research Excellence Fund (CFREF), PotashCorp and elsewhere.

The Review Team heard of significant concerns by the senior administration regarding the College's research and leadership roles with respect to the signature areas, and regarding the potential negative consequences of an insufficient participation in these. This was somewhat alarming. There is no doubt that very significant funding is available through these institutes, that the College needs to better access these funds, that many faculty members are undertaking research that is very relevant to the two institutes, and that the College needs to play a greater leadership role in the signature areas more generally. However, it is not clear whether the shortcomings we heard were more a perception than reality, or whether they reflect a misperception of the nature of engineering research and of the key drivers for individual researchers in engineering. For example, it was stated that no appropriate faculty members in the College of Engineering could be identified with respect to securing a CFREF grant in Water Security, whereas there is at least one faculty member whose area of interest and research record would have made a strong contribution to this proposal.

It is clear that there are different perspectives between the senior administration, the College and the faculty members with respect to faculty participation in the signature area concept. The College's participation in these signature areas is related to the environment, nature, extent and culture of the individual faculty undertaking research within the College. Before considering potential approaches to address these issues, it is useful to provide some commentary on the more typical research indicators in engineering.

### 6.2 Research Indicators

Distinct from participation in the signature areas, research success in engineering is often indicated by a range of indicators such as those relating to research funding, NSERC funding, citation-related rankings, published rankings by various organizations, intellectual property and technology transfer indicators, graduate students enrolled, and graduate students graduating per year. A detailed analysis of such indicators is beyond the scope of the present review. However, research in engineering schools is directly and strongly dependent on the supervision of graduate students – at all engineering schools in Canada there is an expectation that academics (holding the equivalent of Teacher-Scholar positions) will supervise graduate students. Therefore, a good surrogate for all these factors is an examination of the number of graduate students supervised by each faculty member over a period of years. The current assessment does not directly indicate the absolute size of the graduate program (students are counted multiple times in this method) but it does indicate the profile of research activity for each academic.

Data for the last five years has been reviewed. Only academics at the ranks of Assistant Professor, Associate Professor and Professor were considered. Furthermore, those who had
exited their position during the five-year period and those that had been with the College for less than three years were excluded from the analysis. The remaining sample contained 70 academics. In this analysis, there has been no differentiation between the MSc and PhD programs and there is no differentiation by department. The principle observations (please also refer to Fig. 1) were as follows:

1. The sample included 7 Assistant Professors, 26 Associate Professors and 37 Professors.
2. There were 5 academics (7%) with 10 or more graduate students; all 5 held the rank of Professor.
3. There were 16 academics (23%) with between 5 and 10 graduate students, 1 at the rank of Assistant Professor, 7 at the rank of Associate Professor, and 8 at the rank of Professor.
4. There were 19 academics at the ranks of Associate Professor (9) and Professor (10) with between 3 and 5 graduate students and 3 at the rank of Assistant Professor with between 1 and 5 graduate students; combined, these numbers represent 31% of the academics.
5. There were 24 academics at the rank of Associate Professor (10) or Professor (14) with less than 3 graduate students and 3 academics at the rank of Assistant Professor with less than 1 graduate student. This represents 38% of the academics.
6. The 7% of academics with more than 10 graduate students account for 27% of all the graduate students.
7. Approximately 11% of all academics have one or fewer graduate students.

Fig. 1. Number of graduate students advised by each faculty rank.
The above analysis suggests the following:

1. There is a large group of academics (30) with 5 or more graduate students.

2. There is also a large group of academics (38%) with less than three graduate students (for Associate Professors and Professors) and less than 1 graduate student (Assistant Professors).

3. There are no academics at the rank of Associate Professor who have more than 10 graduate students, and only 23% of Associate Professors have more than 5 graduate students.

4. Fully 38% of academics at the rank of Associate Professor and 38% of academics at the rank of Professor have less than 3 graduate students.

Two other factors that need to be considered are as follows:

1. An analysis of grants awarded by NSERC committees in engineering shows that the University of Saskatchewan ranks in the top 30% of universities across Canada.

2. Maclean’s ranking of engineering schools is based on reputation and publications, and finds that the University of Saskatchewan ranks in the top 34% (using the number of schools with accredited programs – based on Engineers Canada data). It gives a strong weight to field weighted citation impact (FWCI – which calculates how often a paper gets cited, normalized based on the global standards within each discipline), and finds that the University ranks in the top 17% of schools in Canada.

Without doubt, the College is doing significant and important research. However, this productivity is dependent on a relatively small number of senior academics. It is a major concern that there does not appear to be a group of strong researchers at the rank of Associate Professor aspiring to take on research leadership roles. With the large number of lower productivity researchers at the rank of Associate Professor and even Professor, the new dean will be faced with major challenges in transforming the College into a more productive research unit. This points to the need for the appointment of a strong Associate Dean Research who has a vision for advancing research in the College.

6.3 Discussion of Approaches

The Review Team is of the opinion that the University's desire for the College to be more active in research is not as simplistic as having them play a stronger role in the signature areas. Several factors need to be considered.

There needs to be a better appreciation by the leadership of the University that there is a distinct culture of engineering that is different to that of "big science." Due to the breadth of engineering, there is much more diversity in a typical engineering department than in a typical science department. For example, in Civil Engineering undergraduates study structures, water resources, water treatment, transportation, geotechnics, and sometimes construction and/or geomatics. As a result, there is seldom a large number of academics with expertise in the sub-areas and this has led to a greater number of independent and individualized research programs,
with a greater emphasis on graduating students who are prepared to practice in specialized areas. As well, research tends to be incremental rather than breakthrough and is focused on practical problems that often have a modest scope. Success may come in many forms, but success within this model must be recognized as such.

As related to the signature areas and particularly the CFREF grants that have been secured, there does not seem to be sufficient clarity in the University's expectations. It is notable that a number of engineering academicians are already engaged in research in the signature areas. In order to engage more engineering faculty, the University needs to facilitate research relationships, and provide clarity on exactly how researchers can access the research funds. As indicated above, the drivers for individual faculty research are not necessarily consistent with being leaders of the signature areas. However, a large number engineering academics can make significant contributions to these research programs.

The Review Team saw evidence that the leadership instability in the College has led to a lack of coordination between the expectations of the University and the expectations of the faculty members. A key component of this coordination is the Associate Dean Research. A priority of the new dean will be to make a suitable appointment in this position and provide the resources for the appointee to do an effective job.

Overall, there are inconsistent perspectives from the University, the College and the faculty. It is suggested that steps be taken to assure that the culture of engineering is fully appreciated by the University; that the University articulate more clearly the mechanisms and opportunities relating to the signature areas; and that a new dean quickly appoint an Associate Dean Research who should play a key role in articulating research expectations and facilitating the College's participation in large university initiatives.

7. PARTNERSHIPS AND INTERACTIONS

7.1 University-Wide and External Interactions

By virtue of its schedule, the Review Team did not meet with many stakeholders outside the College and consequently did not examine in detail the College's interactions with other university units and with its external communities. Therefore, the following comments are somewhat cursory.

The College appears to be engaged with other units across the University through a large number of formal and informal interactions. These include formal program collaborations (engineering physics, biomedical engineering), embedded positions, such as a Technology Transfer Manager and Major Gifts Officers (although some of these positions are vacant); "service teaching" undertaken by other colleges, linkages with the College of Graduate Studies, and many formal and informal research collaborations. These appear to be extensive and effective.

Likewise, the College is engaged in many external relationships, such as through the internship program, research collaborations with industry, alumni relations and the presence of some collaborative research centres. Of particular note, the alumni are strong supporters of the
College, and in particular the Engineering Advancement Trust program used to fund equipment renewal is noteworthy. Overall, the various relationships appear to be extensive and effective.

7.2 Fundraising

A critical part of a new dean's role will relate to fundraising. It appears that fundraising has been a challenge for a number of years, in part because of instabilities regarding decanal and vice-presidential appointments for some time. Even so, there are many indications of success, including strong annual alumni support for the College with respect to equipment renewal, and significant industrial support for research.

Key ingredients of a successful fundraising campaign for the new dean will be to develop:

1. a strategy for the College that is strongly supported by College faculty and staff,
2. a sense of funding needs (a detailed "wish list") to stimulate the interest of potential donors and to tailor requests to meet individual donor interests,
3. a strong relationship with the central fundraising organization of the University.

The Review Team notes that a new Vice President University Relations has been appointed very recently; this should provide an opportunity for the new dean to move forward effectively and collaboratively with a renewed fundraising strategy.

8. Faculty, Staff and Students

8.1 Faculty

We understand that faculty members may hold the rank of Assistant Professor, Associate Professor, Professor and Lecturer. Distinct from these ranks, faculty members may also be classified with respect to their duties:

- Most faculty members are designated Teacher-Scholars, which implies a typical load distribution between teaching, research and service. They typically teach 2 – 3 courses per year.

- Some faculty members are designated Academic Program Appointees (APA). They teach, support undergraduate program development and engage in the scholarship of teaching and learning. They typically have a heavier teaching load (nominally 6 courses per year) and may only hold the ranks of Assistant Professor and Associate Professor.

Lecturers, who may have limited-term appointments or appointments without term, are teachers with a heavier teaching load (nominally 7 courses per year). Finally, Sessional Lecturers are part-time teachers who teach on a course-by-course basis.

In this context, the Review Team makes the following observations:
• Lecturers typically have limited-term multi-year appointments and invariably have concerns regarding the insecurity of their positions. Even so, this category of instructor is common at many Canadian universities.

• The use of the spousal hiring program does not appear to be universal.

• The importance of support for new faculty including startup grants and laboratory space may not always be sufficiently recognized. [We heard of two exceptional junior faculty who were on the verge of leaving; while, we are unaware of their specific circumstances, we did hear more generally that insufficient support for new faculty may be an issue.]

The Review Team is of the opinion that the APA positions provide an innovative approach to appointing faculty members so as to carry significantly greater teaching loads. This could apply not only to members of the School, but also to the engineering departments. Such an approach may be used to accommodate unduly heavy teaching loads for a unit. It is noted that the approach of research-stream and teaching-stream faculty is common to some other Canadian universities. The fact that these appointees cannot be promoted to the rank of Professor leads to the perception that they are “second class” citizens of a unit. Different universities have addressed this issue in different ways (e.g. through a "Professor of Teaching" rank). However, this topic is relevant to the Collective Agreement between the University and the Faculty Association and is outside the scope of this review.

Despite a documented process, those holding APA positions within the school have expressed anxieties regarding securing promotion and tenure. Although the formal procedures are identical as with faculty members in engineering, the faculty complement within the School is probably below critical mass with regard to committee composition, and as well the distinct discipline relating to the scholarship of teaching and learning needs to be sufficiently appreciated by those on the various promotion and tenure committees. There is probably no meaningful resolution to this issue unless the School's structure and/or its size and scope are modified.

8.2 Staff

As already noted, one of the biggest challenges faced by the College is the inconsistent organization / supervision of the administrative support staff. The Review Team heard very divergent views on this situation: some felt the College should be fully decentralized with all (undergraduate and graduate) student support and staff supervision being delegated to the departments; some felt that departments should be further centralized with a single administrative structure. The Review Team has not recommended a “solution” to this issue. However, it earlier recommended that a consistent management structure be implemented across the College.

The Review Team was very impressed by the trend of some departments to hire licensed professional engineers to instruct and to develop and maintain laboratories with respect to the laboratory portion of the curriculum. Of all the groups interviewed, these laboratory instructors were by far the most satisfied with their positions at the University. Consideration should be given to implementing this approach across the College.
8.3 Undergraduate Students

Interaction between the Review Team and undergraduate students was limited to one meeting. At the meeting, the students indicated that they were universally supportive of the College. The Review Team identified no issues with respect to the need for improvements to the students' learning and extra-curricular environment.

8.4 Graduate Students

Interaction between the Review Team and graduate students was also limited to one meeting. There was a lively, positive discussion at the meeting. Graduate students were very supportive of the College, but they did raise some concerns:

• Difficulty in accessing courses within their areas of interest,
• Lack of office space, and
• Lack of a central list of experimental equipment available in the College.

Of these, the first issue, that of course access, appears to require resolution and is referred to in Section 5.2 above.

8.5 Diversity

The College faces the same challenge as all Canadian engineering schools in attracting female undergraduate students, graduate students and faculty.

The College has taken steps to attract more students with Indigenous heritage with the appointment of an Indigenous staff person (Matthew Dunn) to coordinate activities and an Indigenous faculty member (Duncan Cree) who provides an excellent role model. With the large Indigenous population in Saskatchewan, attracting Indigenous students to the College must be a key component of the College's strategic plan.

9. RESOURCES AND INFRASTRUCTURE

9.1 Budget Processes

We understand that the University has moved to an activity-based approach for its budget allocations. This represents a recent change from a more historical-based approach. In the new approach, which is referred to as "responsibility centre management," the College is viewed as a revenue centre and manages its own revenues and expenses. An excellent overview of this approach is available through the link "RCM Resources" from the site www.usask.ca/ipa.

The Review Team's perception is that this approach should serve the College of Engineering well. However, we are not aware of the specific formulae used for making allocations and for recovering expenses. Even so, we hope that these formulae have recognized the differences in the cost of instruction across the campus (the cost of instruction in engineering is generally
higher than for some other disciplines), and differences in the costs of undertaking research – especially since revenues to the University (through tuition and/or government grant) may not sufficiently reflect such disciplinary differences. As well, the key drivers of revenues and expenses (e.g. undergraduate enrollments) need to be widely appreciated, so that the College and its departments can appropriately optimize their research and teaching activities.

Within the College, budgeting is centralized. All salaries for faculty and staff are paid directly without transfers to individual departments. In addition, a portion of the annual funding provided to the College is allocated to each department based on three-year average activity levels (student headcounts) to support program delivery costs. Capital funding is also provided annually from the College's operating reserves, with allocations based on a department's proportionate share of undergraduate and graduate student headcount levels. Finally, the Engineering Advancement Trust, whose source is alumni donations, is used to fund equipment on the basis of approved project proposals.

The Review Team recommends that the College affirm that the new activity-based budget model does not entail unintended negative impacts on it and that it should seek to optimize its revenues and expenses based on the model. Within the College, the key drivers of a department's direct and indirect revenues, including salaries, need to be articulated, so that the departments can in turn optimize appropriately their research and teaching activities.

### 9.2 Budgets

We were unable to access in advance and analyse campus-wide budgetary information (including budgets, faculty positions, enrollments, etc.) so as to determine whether the College's budget overall is adequate or is insufficient relative to those of other colleges of the University (taking account of disciplinary differences) or relative to those of other engineering schools in Canada. Such a study would be informative but would require some effort beyond the scope of this review. It is hoped that the shift towards activity-based budgeting along with more ready access to such information should lead to fair and sufficient allocations across the colleges.

Within the College of Engineering, budgeting is centralized as described above, with resources (beyond salaries) provided to Departments dependent primarily on student enrollments. However, it is not clear that, when salaries are included, department budgets remain reasonably proportional to their weighted student enrollments. That is, at some universities, Masters and PhD students are weighted by factors of 2 and 3 respectively, relative to an FTE undergraduate student, so as to reflect adequately research activities, and such an approach may be appropriate here. Thus, while information on faculty and student numbers for each department is available, it is not easily possible to assess whether the budget (including salaries) per weighted FTE student is reasonably uniform across the departments. Such an approach would allow a determination of whether any one department is relatively underfunded or overfunded and whether there is a need for budget adjustments to assure reasonable uniformity across departments. In our meetings with departments, we heard of two cases where budgets / faculty positions / department teaching loads may be viewed as out of balance.

The Department of Civil, Geological and Environmental Engineering is very ambitious in mounting three programs with a number of options and/or elective streams. Given the
distinctiveness requirements between these (arising in part from accreditation requirements), this implies that there is a need to deliver a large number of courses, sometimes with small enrollments. We heard that the teaching load on individual faculty members is notably higher than in sibling departments. Therefore, there is a need to assure that the budget (including salaries) per weighted FTE student is reasonably consistent with those of other departments. Then, if that is the case, the Department will need to consider approaches to rationalizing or reducing its offerings to better align its faculty teaching loads. Thus, a curriculum and teaching resource review might examine essential program and stream structures, the extent of electives offered, the extent of undergraduate and graduate course offerings, course enrollments and the available teaching complement. This may lead to some rationalization of the level of teaching effort. Approaches may include, for example, a reduction in the number of elective courses offered and the replacement of a retiring faculty member by an APA appointment.

The Department of Electrical and Computer Engineering has suffered the same drop in enrollment as experienced by similar programs across Canada. Most Canadian programs have recovered from this drop – the University of Saskatchewan program has not. Again, it is unclear whether this Department's combined budget per weighted FTE student is reasonably consistent with other departments, or whether particular efforts are needed to address any disparities. For example, in this instance the Department may need to find ways to attract more students in order to justify its faculty complement.

9.3 Physical Infrastructure

The Review Team heard many comments concerning shortages of space. We also observed instances where additional space would certainly be beneficial. The College's Machine Shop is a good example of the optimal use of space, but with its total amount of space being inadequate. Generally, laboratories are well utilized, with research and undergraduate teaching sharing the same rooms and equipment. (This has the advantage of exposing undergraduates to a larger range of equipment, but has the potential drawback of possible interference with research activities.) Overall, the Review Team was not convinced that there was a major net shortage of space at this time. Rather, there does appear to be an issue with the non-optimal utilization of space – although in many cases the redistribution of space would be unduly costly. (For example, many academic offices are too small, making interactions with students difficult, while adjacent corridors are often excessively wide; but such space re-development would be prohibitively expensive.) On the other hand, there are some cases where the re-assignment of space may be practical and beneficial. For example, there appears to be a very large space in which a number of old design competition vehicles (1/4-scale Tractor Student Design Competition) are needlessly taking up valuable space. In any event, if the College successfully embarks on an expansion of its research activities, then space shortages will become a challenge. Thus, the Review Team recommends that, once a new strategic plan has identified a shift in research activities and an associated change to the faculty complement, a detailed space audit needs to be conducted in order to anticipate needed space changes.

The Review Team observed instances where investment in equipment renewal would be beneficial. It is gratifying to learn that alumni are providing annual donations that are a significant source of funding for equipment renewal. However, it appears that these funds are the only significant source of funds, with the College receiving on the order of $100,000
annually from the University for equipment renewal. Alumni donations cannot be considered a reliable source of funds as this relies both on the generosity and financial stability of the alumni. The Review Team recommends that the College seeks a more stable, long-term source of funding for laboratory renewal.

10. SUMMARY FINDINGS AND RECOMMENDATIONS

The overall findings of the Review Team are that the College has a first-rate set of undergraduate programs and has many additional strengths, but it also has a number of areas where efforts are needed in order to assure future enhancements. While this report contains wide-ranging commentary and a broad range of suggestions and recommendations, the key findings and recommendations of the review are summarized below.

1. **Review Process.** The University is commended for establishing an external review process for its colleges. Suggestions regarding enhancements to this review process are provided in Appendix II. (Although these suggestions may be considered to be outside the scope of this review, they have been retained here since such considerations may have had a bearing on some aspects of the present report.)

2. **Search for Dean.** The University needs to proceed expeditiously with its search for a new Dean of Engineering. Suggestions regarding the search process and the retention of a new dean are provided in Section 2.2.

3. **Qualities of the next Dean.** The new dean will need to demonstrate a commitment to remaining at the University over the long term. Section 2.2 provides a list of the desirable qualities and characteristics of the new dean.

4. **Strategic Planning.** An early initiative of the new dean will be to establish a clear strategic plan. This needs to be based on a broad and inclusive consultation process, consistency with the University's vision statement, and an increased emphasis on research; and it needs to be followed by a deliberate operational plan to assure its implementation.

5. **Organizational Structure.** The organizational structure within the College with respect to administrative staff positions contains inconsistencies in reporting relationships, in communications mechanisms and in mentoring roles. This is causing confusion and has had negative impacts on morale. We recommend that a review of the reporting structure is undertaken in order to address the various inconsistencies, so as to assure an organizational structure that is widely supported.

6. **Research.** There are inconsistent perspectives from the University, the College and the faculty members with respect to the faculty members' role in assuring research excellence. It is suggested that steps be taken to assure that the culture of engineering be fully appreciated by the University, and that a new dean quickly appoint an Associate Dean Research who should play a key role in articulating research expectations and facilitating the College's participation in large university initiatives.
7. **Graduate Teaching.** The planning and delivery of graduate courses requires improvement. Specifically, the graduate teaching loads of faculty members needs to be recognized more formally, there needs to be greater clarity and communication with respect to graduate course cancellations and course planning by students, and a minimum set of graduate courses each year for some specializations needs to be assured.

8. **Ron & Jane Graham School of Professional Development.** While the school provides excellent support with respect to communications teaching, there is a disparity with respect to views of its roles and responsibilities internal to the School and across the College, its name appears to be a misnomer with respect to its role, and its faculty have anxieties with respect to their tenure and promotion. Potential approaches to addressing these issues are discussed in Section 4.2.

9. **Fundraising.** A critical part of a new dean's role will relate to fundraising. In order to assure success, the new dean will need to articulate a fundraising strategy and specific funding needs and will need to develop a strong relationship with the University's central fundraising organization.

10. **Budget Process.** The University has moved to an activity-based approach for its budget allocations. While this is very welcome, the College needs to affirm that the new budget model does not entail unintended negative impacts on it, and it should seek to optimize its revenues and expenses based on the model. Within the College, the key drivers of a department's direct and indirect revenues, including salaries, need to be articulated, so that the departments can in turn optimize appropriately their research and teaching activities

11. **Department Budgets.** There is a need for greater clarity with respect to the relationship between department budgets, including salaries, and budget drivers, notably student enrollments. A suggested approach involves reference to the budget (including salaries) per weighted FTE student. Such an analysis may reveal the need for budget adjustments to assure reasonable uniformity across departments. In the case of Civil, Geological and Environmental Engineering, teaching loads are unduly heavy so that there may need to be a curriculum and teaching resource review so as to rationalize teaching offerings and teaching loads. Similarly, in the case of Electrical and Computer Engineering, such a rationalization may also be needed, although in this case this may be through approaches to increasing student enrollments.

12. **Space.** While the College's overall space may currently be sufficient, there are examples of the non-optimum space usage. While the resolution of some of these may be unduly costly, there are a few instances in which some re-assignment of space may be feasible and beneficial. Once a new strategic plan has identified a shift in research activities and an associated change in faculty complement, a detailed space audit needs to be conducted in order to anticipation needed space changes.
APPENDIX I – REVIEW TERMS OF REFERENCE

COLLEGE OF ENGINEERING REVIEW – TERMS OF REFERENCE

PREAMBLE:

The College of Engineering has a rich history at the University of Saskatchewan and celebrated its centennial in 2012. The college continues to work diligently to enhance its academic and research mission. It is important to periodically review the college’s mission and vision, administrative structure, academic programs, research activities, and partnerships to ensure alignment to institutional objectives and societal needs.

PURPOSE:

The purpose of this review is:

• to assess progress against stated goals, strategic directions and priorities of the college;

• to assess the College of Engineering’s activities and programs at both the national and international levels to better understand the progress made with respect to the University of Saskatchewan’s academic and research agenda and

• to assess the effectiveness of the College of Engineering’s administrative and organizational structures.

ROLES AND RESPONSIBILITIES:

This review will be led by the Provost and Vice-President Academic with resources from Institutional Planning and Assessment (IPA) assigned to provide support, facilitation and coordination of all aspects of the review. Specifically, the Provost will retain authority for the scope of the review, selection of reviewers, and communication to stakeholders at the conclusion of the review while IPA will provide the data required for the self study, manage the assimilation of the self-study materials, liaise with the external and internal reviewers, and assist with process and logistics for the duration of the review.

Stakeholders associated with the College of Engineering will play an integral role throughout the review process. The Dean will assist where necessary at the discretion of the Provost and will play a role in defining the nature of the review. Faculty and staff will be given ample opportunity to provide input into the process, as will current students and alumni of the college. Specifically, this could include providing verbal and/or written feedback for the Review Team’s consideration. Other colleagues at the University of Saskatchewan and external stakeholders will also be afforded an opportunity to participate in the review, as directed by the Provost.

PROVISION OF BACKGROUND INFORMATION:

The review team will have access to pertinent background material prior to and during the review. This information will include, but will not be limited to the following:
A self-study document provided by the college

Strategic planning documents developed by the college and the University of Saskatchewan

Documents and information relating to the academic and research activities of the college e

• Institutional data pertaining to the college’s:
  o faculty and staff complement
  o student enrolment and outcomes
  o research activity (funding, projects, outcomes, impact)

• Documentation pertaining to recent accreditation activity.

• Summary of results from student, alumni and staff/faculty surveys

SCOPE OF THE REVIEW:

The review team will make recommendations in the following areas:

A. Mission and Vision

An assessment of the appropriateness and effectiveness of the school’s mission and objectives, including the following:

• Are the vision, mission and strategic directions of the College of Engineering clearly stated, communicated and understood by the college’s internal and external stakeholders?

• Are the college’s mission and objectives being met?

• Does the college support the mission and objectives of the University?

B. Organizational Structure and Governance

An assessment of the strengths and weaknesses of the current structure and governance of the College of Engineering, specifically as they relate to the following:

• The adequacy of the organizational structure and the mechanisms in place to manage, coordinate and ensure the excellence of activities undertaken by the college.

• The adequacy of resources (financial, human, physical and information) available and the efficacy and efficiency of their management.

• An assessment of the morale, satisfaction and engagement of the faculty, students and staff.

C. Academic and Educational Activities

An assessment of the strengths and weaknesses of the academic and educational activities of the
college, including the following:

- The quality of the college’s academic and educational activities as they compare to national and international colleges of engineering.

- The applicability of the array of degree programs offered by the college (and what programs might be missing) based on the region that the college is located in and the demographics it serves.

- The quality of teaching including the appropriateness of learning formats used.

- The appropriateness of the methods used for the evaluation of student progress.

- The quality of the learning experiences available to students beyond the classroom (e.g., experiential learning, practica, internships).

- The availability and quality of student advising and counselling.

**D. Research Activities**

An assessment of the strengths and weaknesses of the research activities of the College of Engineering as they relate to the following:

- The quality and quantity of research and publication activities

- Research funding including eligibility for funding, past grant applications/awards.

- How research funding is facilitated, supported and structured by the University.

- The level of engagement in interdisciplinary collaboration for research.

- The relevance of research and training to Saskatchewan, Canada and the world.

**E. Partnerships**

An assessment of partnerships in the following areas and how they compare to partnerships that exist at other similar schools:

- Relationship between the College of Engineering and the private sector/industry.

- Engagement of the college with Indigenous communities and businesses.

- The scope and nature of the college’s relationships from the global, national, regional and local perspectives.
F. Other

Identification of any other issues that may affect the college’s success, hamper the effectiveness, efficiency and quality of services, or reduce its performance. If issues are identified, recommendations will be provided on how they can be addressed.

TIMELINES:

The external review will take place beginning in May 2016 with the review team conducting a site visit at the University of Saskatchewan during a three-day period at some point between September 15 to October 31, 2016 (specific dates to be confirmed). Time will be scheduled for individual and group meetings with university and College of Engineering officials including administration, faculty, staff, students and other stakeholders (e.g. alumni, external partners). Following the site visit, a written report will be due within four weeks. The report will be submitted to the Provost and Vice-President Academic and the Director of Institutional Effectiveness in the office of Institutional Planning and Assessment. A response from the Dean to the recommendations of the review team will be required within four weeks of receipt of the visiting team report. The report may also be shared in confidence with other officials in the college and at the university at the discretion of the provost and/or Dean.

OUTCOMES:

The written report will present findings, recommendations, and outcomes of the review. The results of the review will be instrumental in determining if the governance, organizational structure, mandate, and activities of the College of Engineering are appropriate and in line with the mission and objectives of the University of Saskatchewan. In addition, the results will facilitate decisions about changes within the college to ensure its continued success.

At the discretion of the Provost, results of the review will be posted in the “reviews” section of the Institutional Planning and Assessment website. The Provincial Government will also be apprised of this project in accordance with their expectations around quality and accountability of programs and services of post-secondary institutions.
APPENDIX II – TEAM SUGGESTIONS FOR FUTURE REVIEWS

In order to enhance similar reviews in the future, the Review Team offers the following commentary regarding the review process.

• It would have been helpful if the Team had been provided in advance with additional information containing university-wide data, so that the College’s position within the University could be more easily assessed. (The Team was unable to find relevant university-wide data on the University's website.)

• Although the internal reviewer played a critical role in this exercise, it would be helpful if the Review Terms of Reference provided greater clarification regarding the roles of the internal and external reviewers in the review process and in the preparation of the review report.

• It would have been helpful if the Team was invited to provide feedback on a draft schedule before this was finalized. This would allow the opportunity for the Team to suggest adjustments to the duration of some meetings, to suggest different combinations of participants at some of the meetings, and to suggest other meetings with participants with whom it did not meet.

• It would be especially helpful for some of the meetings to have been held without the “direct report” present. This would allow for more candid feedback from the participants to the Review Team.

• It would have been helpful for the Team to meet with some external stakeholders and some other members across the campus.

Although these suggestions may be considered to be outside the scope of this review, they have been retained here since such considerations may have had a bearing on some aspects of the present report.