Consultation Regarding

Proposed Changes to Accreditation Criteria

Prepared for Engineers Canada

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CONTENTS

EXECUTIVE SUMMARY 3

Proposed Change to criterion 3.4.6 – Minimum Program Content 3

Proposed Change to criterion 3.4.6 – Interpretive Statement 4

The Future of Accreditation 5

SCOPE AND METHODOLOGY 8

FINDINGS 9

Minimum Program Content - Responses from the Educators 10

Minimum Program Content - Responses from the Accreditors 15

Minimum Program Content - Responses from the Regulators 18

Interpretive Statement - Responses from the Educators 20

Interpretive Statement - Responses from the Accreditors 26

Interpretive Statement – Responses from the Regulators 30

Comments on the Future of Accreditation - Responses from the Educators 33

Comments on the Future of Accreditation – Responses from the Accreditors 40

Comments on the Future of Accreditation – Responses from the Regulators 46

CONCLUSION 50

Appendix A - PARTICIPANTS 52

Appendix B– MEMO RE: Consultation on Proposed Accreditation Criteria 2016 62

EXECUTIVE SUMMARY

In May 2016, Engineers Canada, as part of its consultation on proposed accreditation criteria, undertook a survey of stakeholders to garner their views and responses to the proposed changes. Consultant, Georges Lozano MPA, CAE, was engaged by Engineers Canada to conduct a telephone survey with stakeholders selected by Engineers Canada including: engineering deans and faculty, members of the Accreditation Board, and senior managers of the constituent associations. In total, 39 interviews were completed including 11 Accreditation Board members, 8 constituent associations, and 20 universities.

The telephone survey participants were asked to respond to three broad questions about the proposed changes to the accreditation criteria:

- Do you have any comments on the proposed changes to criteria 3.4.6?
- Do you have any comments on the proposed Interpretive Statement?
- Do you have any other comments on the broad future of accreditation?

Throughout this report, the participants will be referred to as the educators, the accreditors, and the regulators – corresponding to the deans of engineering and faculty staff, the members of the Accreditation Board, and the senior managers of the constituent associations, respectively.

Proposed Change to criterion 3.4.6 – Minimum Program Content

Currently, criterion 3.4.6 states: “The program must have a minimum of 1,950 accreditation units that are at a university level”. The proposed criterion states: The program must have a minimum of four years of full-time (or equivalent) appropriate content at a university level”.

In response to the question: do you have any comments on the proposed change to criterion 3.4.6, a few educators said that they were fully in agreement with the proposed change. However, a significant number of educators thought that the proposed change was neither meaningful, nor clear.

Some of the accreditors thought that the proposed change was useful and would make the accreditation requirements easier to understand. However, a few indicated that they were not in agreement with the proposed change and said it was not providing a definitive solution.

Most regulators were in agreement with the proposed change. A few mentioned that the proposal wasn't really changing anything.

Some of the educators did not see a problem with continuing to require 1,950 accreditation units (AUs), in addition to the four-year program requirement. Others did not see the need and asked if there was a way to reduce the number of AUs from 1,950. Some educators felt that no change was needed with respect to the 1,545 AUs of core content. However, the educators were all in agreement that engineering programs should be four-year undergraduate programs, and that there had never been any intention by the engineering schools to change that.

A few accreditors thought that the use of years to define a program was ambiguous whereas the AU system was clearer. These accreditors thought it important to keep the requirement for 1,950 AUs plus a minimum of four years of study.

Some regulators thought that the length of the program was not as much of an issue so long as the entire requisite engineering curriculum was covered.

Proposed Change to criterion 3.4.6 – Interpretive Statement

Several educators thought that the Interpretive Statement offered much of the same as before and did not add much with respect to flexibility and expanding the ability of engineering programs to innovate. A few thought that it provided a useful guideline and added some flexibility to criterion 3.4.6. Some educators were pretty disappointed and thought that the Interpretive Statement by its very nature could lead to multiple interpretations and confusion.

Most accreditors thought that the Interpretive Statement was clear and would give universities more flexibility. A few were less positive and thought that the Interpretive Statement offered too little information to allow for more innovation without increasing the risk of an engineering program not being accredited**.**

Most regulators thought that the Interpretive Statement was an improvement and that the added details were useful and would help to maintain consistency. However, some indicated that they preferred not to have the Interpretive Statement as it could allow for unacceptably greater latitude, and reduce their ability to properly gauge engineering graduates as to whether they were acceptable for licensing purposes.

The Future of Accreditation

Educators

The educators felt that the focus of accreditation should be learning acquisition and continuous improvement. On a go forward basis, they said, accreditation needed to further take into account the emerging trends in engineering education and the different learning modes that are not classroom based. They indicated that there is a need to streamline the accreditation process and make sure it is less onerous. Given that accreditation depends on the interpretation of the visiting teams, the educators indicated that there was a need to have clear criteria that are understood by all stakeholders.

In the future, accreditation should incorporate an effective outcomes assessment process that will work to align the accreditation of Canadian engineering programs with the assessment methodologies employed for individuals with foreign engineering education credentials.

Some educators felt that the accreditation program should not move to a full outcomes approach but that outcomes assessment be a part of the accreditation process. It was suggested that Engineers Canada and the Accreditation Board should work with all the stakeholders to set a date certain for the move to an outcomes-focused accreditation system.

The educators all concurred that no one wanted to lower the quality of engineering programs in Canada. They said they wanted to enhance engineering education and help to ensure that the engineering graduates of tomorrow are multidisciplinary professionals with a high awareness of the social and environmental impact of their work.

Accreditors

The accreditors felt that gradually, the accreditation process would rely increasingly on outcomes assessment. Most agreed that the graduate attributes would see a process of

evolution over the next decade and there would not necessarily be only one way to assess them. Going forward, engineering schools will need to move to redevelop their curricula and incorporate the necessary elements that will ensure the achievement of the twelve graduate attributes.

The accreditors thought that the focus of accreditation should be on improving the current accreditation system. In this respect, Engineers Canada needs to keep working on continuous improvement with respect to the accreditation program and its implementation. Further down the road, completely different approaches to accreditation should be taken into consideration, in addition to the established. Methods such as statistical quality control for the entire program might be attempted. However, no matter what alternative approaches are considered the accreditation system should not shift entirely to outcomes assessment.

Regulators

There was agreement among the regulators that the accreditation system needed to continue to assess curriculum content failing which, the system would no longer be relevant and it might be necessary to impose final technical exams. On a go-forward basis, the accreditation system needs to achieve greater efficiencies, and a more streamlined process.

Some regulators thought that perhaps it was time to consider moving to a risk-based approach through which accreditation visits could be focused on new programs, and on programs that have been problematic to the accreditation teams.

A few regulators thought that eventually, engineering accreditation might move to an outcomes assessment approach. Recognizing that the Washington Accord signatories are moving to an outcomes-based model, the regulators felt that Engineers Canada needs to go in the direction of what is required in the global community.

The regulators thought that accreditation process would need to adapt over time to successfully incorporate the proposed changes to the accreditation criteria into the existing framework. The regulators acknowledged that in this respect, they needed to show more trust towards the engineering schools and allow them greater leeway, but in turn, the educators needed to accommodate some of the needs of the regulators and accreditors. It was agreed that as long as

the accreditation process continues to ensure that engineering graduates have acquired the necessary knowledge to become licensed, there would be no need for a final technical examination.

SCOPE AND METHODOLOGY

In May 2016, Engineers Canada retained the services of consultant, Georges Lozano MPA, CAE, to undertake a survey aimed at informing the association's accreditation review process by obtaining feedback about proposed changes to the accreditation criteria, and criterion 3.4.6 – Minimum Program Content, in particular.

Mr. Lozano worked closely with the Engineers Canada senior staff throughout the project. The work included a review of Engineers Canada's proposed changes to its accreditation policies and criteria, the undertaking of telephone interviews with key stakeholders, the collection and compilation of the information obtained through the telephone calls, and the preparation of this report.

A review was initially undertaken of relevant policy documents including the Engineers Canada consultation documents about the proposed changes to the accreditation criteria. This information was useful in conducting the telephone interviews and provided information that was helpful in compiling the responses and preparing the report.

The Engineers Canada staff identified selected stakeholders, and subsequently an email invitation was sent. The invitation was accompanied by a memorandum from Engineers Canada CEO, Kim Allen entitled Consultation on Proposed Accreditation Criteria 2016 which provided a summary and background information on the proposed accreditation criteria changes (see Appendix B). The three stakeholder groups that were contacted by Engineers Canada included: engineering deans and faculty members, members of the Accreditation Board, and senior managers of the constituent associations. In total, 39 interviews were completed including 11 Accreditation Board members, 8 constituent associations, and 20 universities (see Appendix A). The telephone survey participants were asked to respond to three broad questions about the proposed changes to the accreditation criteria:

1. Do you have any comments on the proposed changes to criteria 3.4.6?
2. Do you have any comments on the proposed interpretive statement?
3. Do you have any other comments on the broad future of accreditation?

FINDINGS

The participants in the telephone survey can be classified into three broad groups namely: deans who are members of the National Council of Deans of Engineering and Applied Sciences, members of the Accreditation Board, and senior managers of Engineers Canada constituent associations. At times, the telephone interviews included several participants. Interviews with universities often included the dean and other members of the engineering faculty. The interviews with constituent associations often involved the executive director accompanied by key senior managers.

The interview participants were asked if they had had an opportunity to read the Engineers Canada memo. An explanation was provided with respect to the aim of the consultative process and the telephone interviews in particular. They were advised that the information obtained through the telephone interviews would be used to develop a report containing the perspectives of the participants. They were further advised that only aggregated information would be included in the report and no individuals would be identified. The participants were asked to respond to the three questions and encouraged to provide additional comments and suggestions.

Throughout this report, the participants will be referred to as educators, accreditors, and regulators – corresponding to the deans of engineering and their faculty members, the members of the Accreditation Board, and the senior managers of the constituent associations, respectively.

Proposed Changes to criterion 3.4.6 – Minimum Program Content

The current criterion states: “The program must have a minimum of 1,950 accreditation units that are at a university level”.

The proposed criterion states: The program must have a minimum of four years of full-time (or equivalent) appropriate content at a university level”.

It was noted that an Interpretive Statement on minimum program content was prepared to support criterion 3.4.6.

Minimum Program Content - Responses from the Educators

A number of educators indicated that they were fully in agreement with the proposed change confirming that engineering programs must have a minimum of four years of full-time or equivalent appropriate content at a university level. A few of the educators said that the proposed change was “definitely the way to go” and in the spirit that prevailed when outcomes assessment was discussed. One added that the four-year minimum should be restated as a confidence measure to let people know that engineering programs will not be diluted.

Several said that they were not opposed to the idea of requiring a minimum of four years of full-time or equivalent undergraduate level studies as long as the requirements include ancillary courses in such subjects as economics, ethics etc. It was noted that this is the reality for most engineering programs.

Some educators indicated that generally, it takes longer than four years to complete the studies especially at universities that have co-op programs. They said that many undergraduate programs are stretching out to five years.

It was thought by some that the statement that accredited programs must have a minimum of four years of undergraduate study is also a way to align Canadian engineering programs with others around the world. One participant reminded that notwithstanding the restatement of the four-year requirement, faculties couldn’t unilaterally make changes or water down programs, as university senates must approve all undergraduate degrees. They noted that a four-year program is what prevails and no one wants to do less.

Some of the educators did not see a problem with continuing to require 1,950 accreditation units (AUs), in addition to the four-year program requirement. They indicated that engineering programs fulfill and often exceed the 1,950 AU requirement and many have embedded the additional relevant learning activities in their core programs. While several were in agreement with the continued requirement of 1,950 AUs including 405 AUs of additional relevant learning activity, they thought more details were needed on how the 405 AUs would be recognized by the accreditation teams.

Others did not see the need and pointed out that some educators had been asking if there was a way to reduce the number of AUs from 1,950. They agreed that there are 1,545 AUs that should continue to comprise the core of the engineering programs, and they said that this would ensure that the programs would not be diluted. These respondents thought that the proposed change added a bit of flexibility but were of the opinion that if there is too much flexibility the system could become less precise. They noted that while Canadian engineering programs are pretty similar across the country, universities seek to differentiate themselves.

A significant number of educators thought that the proposed change did not materially change anything. Some said no progress had been made since the consultation started. One respondent suggested that the proposed change is basically a repackaging of the existing criteria. Many said there was no meaningful change, and that the proposed changes were not very clear. They thought that there is ambiguity about what four years of full-time undergraduate study means that could lead to pushback. They didn't see the proposed change as adding much value and they thought it would not provide greater flexibility. They believed that instead of increasing flexibility and facilitating innovation within engineering programs, the proposed change would only reduce freedom and continue to impose constraints. In fact, they said the proposed change might complicate the issues.

There was concern by a few, that the proposed change to criterion 3.4.6 could end up lowering the existing standard unless the four-year programs also incorporated the 1,950 AUs that are required under the current policy. They thought that the current requirement is very effective in maintaining the quality of engineering programs. There was a fear that unless the number of AUs is clearly defined then they will become arbitrary. They added that the current accreditation system is highly respected, and there is fear of it being watered down. Further, engineering program quality assurance systems are not in place in all provinces. This could result in uncertainty about the quality of engineering degrees coast-to-coast.

Some educators felt that no change was needed with respect to the 1,545 AUs of core content. They added that it was not appropriate to have both a four-year undergraduate requirement, and the need for 1,950 AUs. It was noted that if the requirement of 1,950 AUs remains, then the

minimum time to achieve this would certainly be four years. The 1,950 AU requirement effectively has created a five-year engineering program, they said.

However, the educators were all in agreement that engineering programs should be four-year undergraduate programs and there had never been any intention by the engineering schools to change that. The concern over any watering down of the program may have emerged as a result of miscommunication with respect to the 1,950 AUs. The suggestion that the 405 AUs of additional learning activity be left to the discretion of the engineering schools may have prompted concerns among some stakeholders that engineering programs might be reduced to three years. This was never the intention, they said.

Others pointed out that the intention of the consultations was to move from input measurement to an outcomes assessment approach focused on graduate attributes. The proposed change, they thought, did not go far enough or move fast enough in this respect. One educator thought the consultative process had not properly understood what the deans have been saying and it was often dismissive of the deans.

They thought it disappointing that both AUs and graduate attributes were still being counted. In addition to not removing the existing constraints, the proposed change, according to them, did nothing to address the increasing workload that engineering faculties are experiencing with respect to preparing for accreditation visits. Nonetheless, some educators felt that the proposed change was part of a transitional process and would serve for now.

The interviews with the educators highlighted a number of issues with respect to the proposed change to criterion 3.4.6 and related matters.

There is debate about what constitutes a four-year program. Some universities use two semesters while others have three semesters. Not all students attend three semesters consecutively.

The goal of the universities is to prepare graduates to meet the needs of industry and the marketplace for engineers, and it is not aimed at licensing individuals. However, the focus of the accreditation system is licensing. The educators noted that AUs do not measure academic

quality. There is a need to know better what is the base qualification to ensure competency and to protect the public.

The minimum requirements have increased over time. As a result, one educator explained, only half of the students can graduate in four years. This is affecting everything from mental health to anxiety, which is on the rise among the engineering student population, he added.

There is too much focus on the classroom, and students are trained for too narrow a segment of the workplace for engineers. A number of the educators remarked that AUs do not capture all the material and teaching provided. In particular, the AUs don't address the content. The existing system, they said, drives the schools to focus on achieving the target number of AUs. Despite the AUs, which are intended to allow many kinds of learning activity to be quantified, it was noted that accreditation is mostly based on lecture hours. The AU's are based primarily on attending classes.

Several educators were concerned that the consultation on the proposed changes is lacking in trust. They felt that there is an implication that universities have an ulterior motive of diluting education. A few thought that the regulators don't fully trust the universities.

Some were concerned over the discrepancies between the assessment of national, and of foreign engineering graduates. While foreign students are gauged on competencies, national students must fulfill the requirements of successfully completing four years of undergraduate level engineering education comprising the 1,950 AUs.

With respect to the accreditation visits, some educators commented that the Accreditation Board doesn't train its program visitors well enough. The Accreditation Board Chair is responsible for putting the teams together, they noted, and there is inconsistency from one visiting team to the next. Some felt that the universities are at the mercy of the program visitors, and more needs to be done with respect to training the visitors.

Meanwhile, they said, the current accreditation criteria cause schools to be wary of deviating from the norm. Given that the program visitors are engineers, they tend to focus on the technical components of a program. Further, it was expected that with the greater openness in

the interpretation of the criteria there would be less certainty about what learning activities will be acceptable to visiting teams.

Some of the educators suggested that more definitive guidelines be established with respect to what are acceptable courses and content. They thought that there is significant difference in the way that different visiting teams interpret the acceptability of courses and content. They thought that better communication is needed in advance of the accreditation visits.

With respect to the AUs, it was suggested that the requirement of 1,950 AU be reduced to 1,545 AUs of core engineering content and that the universities be free to decide on the remaining 405 AUs. It was noted that most engineering programs always incorporate more than 1,545 AU's.

While a few educators thought that the additional relevant learning required needed to be quantified, others said the 405 AU requirement should not be specified any more than it has been. Several educators thought that the list of additional relevant learning activity provided in Note 2 was valid as is. With respect to Note 2, it was suggested that 'management and entrepreneurship' should be included under Complementary Studies. Some went further, stating that the program should continue to be a four-year program but the 405 AU requirement should be removed altogether.

It was thought that accreditation should shift its focus on outcomes and not rely as much on AUs. AU should be used in the short term but the move should be more toward qualitative assessment.

The proposed changes to the accreditation criteria should not make accreditation more burdensome. A few educators suggested that accreditation should move to a syllabus-based process. International students are already being recognized this way, and we need to line up with the rest of the world, they noted. The syllabi are being used for assessing the credentials of foreign trained students. There is a need to streamline the program and achieve more consistency between the national, and the foreign accreditation systems.

Minimum Program Content - Responses from the Accreditors

Some accreditors thought that the proposed change to criterion 3.4.6 requiring a minimum of four years of full-time equivalent undergraduate study at a university level was useful and would make the accreditation requirements easier to understand given that the definition of class time is subjective and there are many differences from one university to the next. Further, different countries use different ways of recognizing university class time. Semesters are variable from school to school. The goal, they thought was to have a single uniform engineering program across Canada. The proposed change they said, was in line with the Washington Accord.

It is interesting to note that in Canada, unlike in other countries, there is no organization above the provincial regulators that establishes standards with respect to such things as what the length of a university degree should be. In other jurisdictions, the time element is well defined.

Several accreditors said that the requirement of a minimum of four years of full-time or equivalent undergraduate study was not providing a definitive solution. Measuring in years, they felt, was going back to the old pre-1995 system. Moreover, they reminded there is a wide disparity among universities as to what constitutes a four-year undergraduate program.

One, thought that the proposed changes were “backwards and dangerous”. It was noted that the use of AUs was more precise than using time-based criteria and the proposed change was open to a large number of interpretations. In particular, it was pointed out that the current language related to criterion 3.4.6 was too vague. While it is important to say that four years of full-time equivalent undergraduate level studies are needed for an accredited engineering degree, there is a potential for this to cause more confusion than in the past. Therefore, the accreditors thought it important to keep the requirement for 1,950 AUs plus a minimum of four years of study.

A few accreditors indicated that they were not in agreement with the proposed change as there was a danger that universities could use it to reduce the amount of content to be more in line with arts and sciences undergraduate programs. In this respect, it was noted that engineering programs must continue to be more rigorous than other undergraduate programs. Simply

stating that the programs must be a minimum of four years was seen as problematic because it did not take into account a number of experiential issues such as other forms of learning, and transfers from other programs. They thought that the use of years to define a program was ambiguous whereas the AU system was clearer.

One accreditor explained that while the accreditation program allows for flexibility there seems to be a perception problem that AUs are tied to lectures and tutorials. He thought that perhaps more work needed to be done to explain AUs. He added that while the AU does allow for a broader interpretation, some schools play it safe in order to ensure that they are accredited.

With respect to communications, it was agreed that more work was required to ensure that policies are clear. For example, some stakeholders didn't appear to understand such things as the fact that accreditation visiting teams don't make decisions. It was thought that better listening by all is needed.

The accreditors expressed concern over the weariness that institutions have demonstrated with respect to the many changes that have taken place in recent years (e.g. graduate attributes). There have been adjustments required with respect to the graduate attributes. There have been additional interpretations and suggestions on how to measure them. The established accreditation process has been disrupted and there seems to be a lack of clarity. The accreditors recognized that all these changes would have to be clarified, and that there was a need to improve coordination among all stakeholders including educators, accreditors, and regulators.

It was suggested that perhaps a review of course activity hours and their relationship to the learning experience should be undertaken. It was noted that a typical course is 35 to 39 of lecture hours plus assignments, labs, projects, study time in preparation for exams, and writing exams, etc. If agreement could be reached on activity hours and their contribution to required learning, it might eliminate the need for AUs.

It was suggested by one accreditor that criterion 3.4.6 should be kept at 1,950 AUs. He thought that the flexibility sought by engineering schools was incorporated in the 405 AUs of additional relevant learning activity and that it should be left up to the universities to interpret how the 405 AUs are achieved.

It was suggested by some that the four-year program minimum be left in the Interpretive Statement recognizing that the 1,950 AU requirement makes an undergraduate engineering degree effectively a four-year program. Alternatively, it was suggested that the 1,950 AUs be clearly defined thereby eliminating the need for the Interpretive Statement. It was noted that it has never been specified how many courses are required but only the number of AUs.

The definition of four years needs to be more precise. Four years means different things to different universities. For example, in Ontario it requires a minimum of three courses per term, which would amount to 24 courses over four years. It was suggested that the text be revised to say eight semesters of full-time study and that the term ‘semester’ be defined.

Minimum Program Content - Responses from the Regulators

Most regulators were in agreement with the proposed change. They thought it important to affirm the four-year minimum requirement in case someone should want to change it. It was suggested that all stakeholders know what is meant by four years of full-time studies. One respondent noted "we all have the same system across the country so there shouldn't be any problem with that".

A few mentioned that the proposal wasn't really changing anything. One regulator preferred criterion 3.4.6 as it is currently stated. He said that the requirement of 1,950 AUs is a quality control measure that is relied upon for consistency among engineering education programs.

Another considered that the four-year minimum for engineering programs was being used as a safety factor. Some regulators thought it may be possible to teach the 1,950 AUs in less than four years but this is not generally the case right now.

However, the length of the program was not seen as much of an issue by the regulators so long as the entire requisite engineering curriculum was covered. They mentioned that individuals who transfer from college level programs receive some transfer credits when entering university engineering programs but they still need to add up to the equivalent of four years of full-time undergraduate studies. Further, four years of undergraduate study seems to be in line with the global norms.

There was some concern that if the requirements for the 405 AUs of additional relevant learning were relaxed the programs could lose quality. Having a requirement for 405 AUs was thought to be a bit better than a wide-open approach to additional relevant learning.

While it was agreed by all that Canadian universities are meeting many quality control measures, one of which is accreditation, some regulators voiced concern that too much engineering could be cut out of the program as a result of the proposed change.

It was noted that the strength of the current accreditation program makes it possible to license graduates without challenging them with a technical exam. But the four years minimum full-

time undergraduate study requirement was not satisfactory in itself; the requirement for 1,950 AUs of course content was also required. Concern was expressed that if the criterion were limited to just a four-year minimum engineering program without mention of the AUs, variations would be introduced across Canada. One respondent cautioned: “when you build in the idea of minimum path some people will do the minimum”.

It was suggested by one regulator that the four-year minimum be kept for now but perhaps in the future, it might be possible to ascertain the competency of individuals who have less than four years of study. If it could be demonstrated that the requisite competencies could be achieved in less than four years perhaps the four-year minimum could be changed, he added.

It was thought that some of the international agreements that Engineers Canada has signed may speak to a requirement of a minimum of four years for accredited engineering programs.

Further, some of the bylaws in the regulations across Canada might need to be changed if they reference a four-year or equivalent university level engineering program.

There may also be commitments in some of the international agreements signed by Engineers Canada with other groups that may require adherence to a four-year program.

It was noted that the strength of Engineers Canada is the accreditation program and there was concern that if too much engineering content were cut out of the program, the constituent associations might not be able to license engineering graduates without administering a final technical exam to demonstrate competency as is done in the United States.

2. Do you have any comments on the proposed Interpretive Statement?

The aim of the proposed change to criterion 3.4.6 is: "to provide institutions with more flexibility for educational innovation while ensuring that the overall quality of an engineering degree will remain unchanged or improve". The Interpretive Statement supports the proposed change and aims to provide clarity and added details about the means and methods of measuring curriculum components.

Interpretive Statement - Responses from the Educators

A few educators thought that the Interpretive Statement provided a useful guideline and added some flexibility to criterion 3.4.6. However, they felt that there was an opportunity to write clearer criteria and not have as much detail in the Interpretive Statement.

They thought some sections of the Interpretive Statement could be made clearer. For example, there is an "n/a" in the column opposite the additional relevant learning activity detail when in fact universities will continue to be required to account for 405 AUs of additional relevant learning activity. With respect to Note 1, one respondent indicated that the criteria used to say that complementary studies must include some humanities and social sciences but now Note 1 says it "may include, but are not limited to". He thought that the text should read "must include" and not "may". Many thought that Note 2 concerning the 405 AU's was sufficient the way it was written and did not need additional detail. Overall, the Interpretive Statement was seen to be somewhat helpful although it could be clearer.

A number of educators said that they did not believe that the current accreditation system was limiting and they stated that the proposed change should stress the need to maintain the 1,950 AUs. They further thought that the information regarding the 405 AUs of additional relevant learning activity was helpful and provided flexibility but they noted that it had always been done this way.

These educators thought that there was a danger of going too far with respect to program flexibility and they were concerned about the additional uncertainty it might create. On the other hand, they recognized that if the criteria are too prescriptive they could place constraints on the educators. There are already some problems with the interpretation of the 405 AUs

related to additional relevant learning activity. They reaffirmed the need to ensure that the Interpretive Statement did not become too vague. One educator noted that the proposed "housekeeping" changes on pages 7 and 8 of the consultative document were helpful.

Several educators thought that the Interpretive Statement offered much of the same as before. They pointed out that over time, the number of AUs required had increased from 1,800 to 1,950. Subsequently, and for greater clarity, the 1,950 AUs were divided into 1,545 core subject AUs, and 405 AUs of additional relevant learning activity. The Interpretive Statement reconfirmed this by making it clear that in addition to a four-year minimum requirement for engineering programs, the course content must add up to 1,950 AUs. In the opinion of some, this was not entirely necessary as eliminating the AUs altogether was no one's intention. One respondent however, thought that the Interpretive Statement while nothing new, would likely make accreditation easier for universities than before.

Some educators were pretty disappointed about the proposed changes. They thought that the Interpretive Statement by its very nature could lead to multiple interpretations and confusion. As it stands, they felt it was not adding much with respect to flexibility and expanding the ability of engineering programs to innovate.

There was no disagreement about the need for 1,545 AUs of technical content but for some educators, further to stating that the program must be a minimum of four years in duration, the additional relevant learning activity should be left up to each engineering school to decide.

There was particular concern that the Interpretive Statement could cause visiting teams to interpret the AUs, and particularly those related to additional relevant learning activity, differently. In particular, they thought that the Statement would exacerbate the differences in interpretations by accreditation visiting teams at different times. Moreover, some felt that once challenged by a visiting team, a program would likely not be accredited.

One respondent wondered what the purpose was of having criterion 3.4.6 stating that a four-year minimum program was required. He thought the proposed criterion might be seen as taking precedence over the Interpretive Statement, thereby placing less importance on the requirement of 1,950 AUs.

It was also thought that the acceptance in the Interpretive Statement of the use of AUs or Higher Educational Institution (HEI) equivalent academic credits might cause more problems. This was also the thinking with respect to allowing the use of K factors and other methods of calculating academic units. Some educators pointed out that the K factor doesn't address all the emerging trends in learning that do not involve classroom time. The AU model had served the system well in the past but now with the shift to more online learning, self-paced learning, project work and other learning modes that are not classroom based, the K factor and AUs were serving the system less well.

Some of the educators stated that the proposed change to criterion 3.4.6 and the Interpretive Statement were a short-term solution and hopefully, part of the transition towards outcomes-based accreditation.

The educators echoed the fear of some other stakeholders that engineering could be diluted with the introduction of many soft skill courses at the expense of technical content. At the same time, they thought that there was a need to recognize the many different modes of teaching including online learning, engineering projects, and problem-based programs. Further, recognition within limits should be given to international credits. This could provide some added flexibility, they said.

They noted that there is always a risk with innovation. Universities are challenged by trying to innovate but at the same time, working to ensure that they will be accredited. Because they are unsure about how visiting teams will interpret a program, universities tend to overcompensate on AUs. For example, it was pointed out that the list of additional relevant learning activities in Note 2, notwithstanding that it is not limited, could send a message to some that if you do anything different than that which is on the list, a visiting team might challenge it. As such, the educators felt that there is a need to better understand the boundaries from the perspective of the Accreditation Board.

With respect to the AUs, a number of educators thought that the system of counting contact time does not accurately reflect learning time and where learning takes place. Many engineering programs are now delivering learning outside the classroom, they added. As such,

the AU system needed to be reviewed and simplified. For example, said one respondent, an easy method of counting AUs could be established if class time tutorials, and labs were all equivalent to one AU.

The proposed criteria changes continue to rely on the requirement of 1,950 AUs. However, under the Washington Accord outcomes assessment should be emphasized. The AUs, said one respondent, are a straitjacket for educators.

Some educators pointed out that engineering curricula have been largely geared to the demands of regulators. Further, the constituent associations, through the Accreditation Board, are driving the curriculum for the 30% to 50% of the graduates that will apply for a license. They said industry wants something different from that which regulators want. Moreover, the engineering schools are not in the business of creating P.Eng.'s. They felt that as a result, students were being squeezed to ensure that everyone could be licensed.

It was thought that there would be some initial problems under the proposed criteria changes at the time of accreditation visits. The educators reminded that accreditation visits are now more work for the universities and more difficult for both the universities and the visiting team. They noted that there are now two systems: input and output measurement. This creates a lot more work for all. However, said one, it must be kept in mind that generally, this is only once every six years per program. He thought it was worth the pain.

Several educators pointed out that the accreditation teams are different from one visit to the next, and not always consistent. The visiting teams may accredit one time, and not the next even though not much may have changed in the program being reviewed. However, it was pointed out that even though there is more leeway today than before, the schools might not take advantage of it for fear of not passing muster with accreditation of visiting teams. As such, it was thought that there is a need to standardize what is meant by full-time undergraduate studies.

A few educators thought that the K factor was not that helpful. Moreover, very few deans were using the K factor, they said. The K factor is not uniform and can be challenged. This, they said, is what forces the universities to play it safe.

While the document mentions other methods than the K factor, it is not clear what these are. Some thought that the examples provided with respect to the complementary studies and the additional relevant learning activity were nonetheless helpful.

With respect to foreign students, some of the educators noted that there was a divergence between the expectations for Canadian, and for international graduates. One respondent mentioned that international students don't write technical exams and yet there are no specific AU requirements for them. Some felt that despite the growing burden placed on Canadian students, engineering graduates from other countries were dealt with in a different, and perhaps less rigorous way. For example, said one respondent, we don't ask ABET accredited engineers to write exams when they come to Canada. If this continues, he added, we may be turning away Canadian students from our engineering programs.

A number of educators thought that the requirement of 1,950 AUs is too constraining and that the requirement of 405 AUs of additional relevant learning activity should be dropped. Further, the use of the K factor should be avoided.

A few educators suggested that the Interpretive Statement be made more general. For example it might just state that 30% of an engineering program should be engineering science and 25% should be engineering design.

One educator suggested that very clear accreditation criteria needed to be developed absent which universities might focus on meeting provincial standards which are different than the Accreditation Board standards, and lower.

While most educators agreed with the requirement that engineering programs be a minimum of four years of full-time or equivalent appropriate content at a university level, they thought the Interpretive Statement should clarify by saying a minimum of eight semesters.

With respect to the accreditation process, some thought that there was too much material for the visiting teams to review in 3½ hours. They suggested that all materials should be uploaded ahead of time.

It was suggested that accrediting teams receive further training. Currently, only the Accreditation Board representative is the chair of the team, noted one educator. It was also suggested by some that regulators receive training to help them better understand the accreditation process. Further, the definition of additional relevant learning needs to be expanded to better allow engineering schools to teach lifelong learning and professionalism the way they should.

Some educators commented that more should be done to expose students to professional engineers in the same manner that other professions have on-the-job training with progressively more responsible roles. Moreover, greater reliance should be placed on the syllabi rather than on input measurement. Why not use the same syllabus for all students, said one educator. The international students are only checked by subject category, he added.

Interpretive Statement - Responses from the Accreditors

A number of accreditors thought that the Interpretive Statement was helpful in giving universities more flexibility. They recognized that the Statement was not exhaustive but it matched what is required currently. One respondent pointed out that the NCDEAS had raised some concerns that the original criteria were too restrictive and didn't allow them to expand the curriculum content. The Interpretive Statement was developed in response to these concerns.

Most thought that the Interpretive Statement was clear and would not cause a problem. These accreditors thought that the Interpretive Statement made it relatively easy to quantify and convert not only class hours, but also meaningful activities into AUs. They noted that although the AUs are focused on contact/class time, there are many other ways of imparting knowledge. The Interpretive Statement calls for engineering programs to incorporate 1,545 AUs of core engineering content plus additional relevant learning equivalent to 405 AUs. Alternatively, schools may choose to simply build their programs to achieve a total of 1,950 AUs. Both ways are acceptable and it was recognized that the 1,950 AUs need not all consist of class time.

One accreditor said that some deans were taking exception to having to prove additional relevant learning activity equivalent to 405 AUs. However, he pointed out that if only 1,545 AUs were required then an engineering degree could be completed in three years instead of four. While most students take five years to complete an engineering program in Canada, the introduction of the four-year minimum was meant to ensure that the programs were not diluted to three years, he remarked. The proposed changes should dispel those fears. In particular, as long as an HEI recognizes additional relevant learning as equivalent to 405 AUs then it should not be challenged by accreditation visiting teams.

It was noted that the Interpretive Statement also allows engineering programs to be counted using academic credits in addition to AUs. This means, for example, that students don't have to spend 405 hours of study on additional relevant learning as long as the university recognizes that the relevant activity is acceptable in terms of engineering credits. However, universities must show that the additional relevant learning is equivalent to 405 AUs. Nonetheless, it was

understood that the use of AUs as well as equivalent institutional academic critics might not provide enough flexibility for some deans.

With respect to additional relevant learning activity, the Interpretive Statement is clear that 405 AUs or the equivalent will be required. Most of the accreditors thought that the requirement of 405 AUs of additional relevant learning activities should be kept. They added that most universities are exceeding the 1,950 AU requirement by about 250 AUs per term. It was noted that the 405 AUs of additional relevant learning activity were wide open, and it had always been left to the engineering schools to determine what they were so long as they were relevant to engineering. One respondent thought that while added flexibility was desirable, some activities should still not be acceptable with respect to AUs. For example, study time should not count for academic credit nor should co-op time, he said.

Overall, most accreditors thought that greater clarity was required. They agreed that the proposed Interpretive Statement should allow for more innovation without increasing the risk of an engineering program not being accredited.

A few of the accreditors were less positive about the proposed Interpretive Statement. They thought that the Interpretive Statement offered too little information to encourage anyone to use alternative methods of quantifying learning activities. Someone suggested that individuals would continue to use AUs and K factors but would also continue to complain about them.

These accreditors felt that there was more certainty in the established system. One acknowledged that the determination of AUs has had its shortcomings, but the K factor had been used to standardize them especially when calculating the value of field trips, labs etc. He said, “if you use AUs and K factors you are sure to get the approval from the Accreditation Board”. However, if you used alternative methods there was no assurance that a program would receive accreditation.

It was noted that the accreditation teams are made up of volunteers who may have different understandings and interpretations of the accreditation process. Unless there is something that is very clear in place, there will be continued disagreement for a few more years until the system has been refined.

One respondent said that this was what had happened with the graduate attributes. Initially, there were different ideas. There was a request for diversity from the Accreditation Board but then the normalization and the evaluation had to be somehow made consistent. It took the Accreditation Board a while to do that. When you give flexibility without any guidelines it can seem a bit disingenuous and sets up people for failure, he added.

There was a prevailing concern that engineering programs that stray too far from the traditional are at risk of not being accredited. However, it was thought by some Accreditation Board members that the deans might be too conservative in designing their curricula. It was pointed out that the University of Sherbrooke's engineering program was a case study on how flexible a program can be; it is 100% problem-based. One respondent reminded that the visiting teams do not make decisions but only provide reports to the Accreditation Board which can then challenge the visiting team findings and ultimately decide whether an institution is accredited or not.

There seemed to be some misperceptions about lecture hours, K factors etc. – It was noted that the K factor can be confusing at times when calculating certain kinds of non-traditional activities. For example, one respondent wondered why is a lab hour worth less than a classroom hour. Another mentioned the challenge of calculating AUs for co-op programs. They thought that a simpler definition was needed.

With respect to the implementation of the proposed changes, it was noted that accreditation visiting teams are trained under the current system and they will need to be trained further to take into account the proposed changes. Visiting team members will need to apprise themselves, and become familiar with the new criteria. As before, the visiting team chair should be an Accreditation Board member.

It was suggested that the Interpretive Statement should confirm that the 405 AUs of additional relevant learning activity must be recognized as university credit courses. It was further suggested that the Interpretive Statement make it clear that 80% of the AUs need to be core content to meet the 1,545 AU requirement allowing the remaining 20% - 405 AUs for additional relevant learning activity.

One accreditor suggested that the Interpretive Statement make explicit all the opportunities that it makes available to universities with respect to their ability to innovate under the proposed changes.

Interpretive Statement – Responses from the Regulators

Most regulators thought that the Interpretive Statement was an improvement and lined up with what the stakeholder community was doing anyway. They thought that the added details provided in the Interpretive Statement were useful and would help maintain consistency. As far as they were concerned, the Interpretive Statement provided sufficient guidance. They added that documenting more details would be good to have for posterity and for newcomers to the accreditation environment.

Some thought that while the Interpretive Statement did not represent a big change, it didn't pose a problem otherwise. Their only concern was that the Statement might open the door to watering down the system. In this respect, the regulators emphasized that while engineering schools are selling engineering as a stepping stone degree, their concern is with protecting the public by ensuring that graduates from accredited programs who apply for professional licensure are well qualified.

They noted that the Accreditation Board was a brain trust with a mandate to, among other things, inform the rest of the country about what the appropriate engineering academic standards should be. They said that the constituent associations trust the Accreditation Board to determine what is appropriate. They also recognized that the definition of "appropriate" is changing constantly.

While most regulators were in agreement with the gist of the Interpretive Statement, some thought the Interpretive Statement to be somewhat confusing. They indicated that they preferred not to have the Interpretive Statement as it could allow for unacceptably greater latitude. One regulator thought the Interpretive Statement would allow universities to do whatever they wanted with respect to the 405 AUs of additional relevant learning activity.

Some regulators said they were concerned that the Interpretive Statement could reduce their ability to properly gauge engineering graduates as to whether they were acceptable for licensing purposes. They thought that if there were too much variation among graduates then the constituent associations would have to resort to checking each and every individual in the same manner that they do for individuals with foreign credentials. They stated that in the past,

they had relied on accredited programs that all adhered to the same standard, and they noted that the end-users of the accreditation system are the constituent associations and not the engineering schools.

While some regulators said they had no concerns over the proposed changes, they thought that the Interpretive Statement was a bit confusing with respect to the requirement of 405 AUs of additional relevant learning activity. They thought it important to keep the requirement but added that Note 2 should be expanded to make sure that all the acceptable additional relevant learning activity was listed. In particular, Note 2 should be revised to clarify what is meant by "international learning experience" – it should be made clear that it must be relevant experience.

Another thought that the requirement for 405 AUs of additional relevant learning activity was pretty clear. It was suggested that the 405 AUs needed to be accounted for, failing which, one could not continue to insist on the minimum total requirement of 1,950 AUs.

The regulators thought that it was relatively easy to determine the AUs and surmised that the only reason someone would want to stop counting the 405 AUs of additional relevant learning activity is if they wanted to do less. One regulator offered a uniquely different view and said the 405 AUs should consist primarily of additional technical content.

A number of regulators said that it was important that we trust the judgment of the universities. With respect to the 405 AUs, they thought the engineering schools needed to prove that they were teaching relevant subjects but the constituent associations must trust the schools to continue to provide high quality engineering programs. They acknowledged that there was still a bit of a control mechanism in place by requiring the 405 AUs. They thought that, going forward, the proposed changes and their implementation would require an iterative learning process. One respondent noted that as long as the twelve graduate attributes are in place, it might be possible to forego measuring the additional relevant learning.

With respect to outcomes assessment, some regulators felt that strong arguments were yet needed to make the case for moving exclusively to outcomes based accreditation.

It was generally agreed that the hybrid program that was being proposed at the moment would be more work but it was pointed out that the hybrid system was never meant to be permanent, but only a temporary measure while the outcomes assessment approach was tested. Further, one respondent recalled that Engineers Canada had said it would go to an outputs only accreditation process eventually. However, in the short term it may be necessary to make a choice between inputs or outputs because the hybrid program had created more work, he thought.

3. Do you have any other comments on the broad future of accreditation?

Comments on the Future of Accreditation - Responses from the Educators

A number of educators thought that the current accreditation system is constrained several ways. In particular, these educators said that the current accreditation system's reliance on input measurement is too constricting. They felt that the accreditation system needed to move away from AU counts but not ignore curriculum content altogether. They thought that there was no need to quantify as much as is currently done and that greater use of the syllabi should be made.

The educators generally agreed that the profession must decide which way it wants to go with respect to the measurement of inputs versus outputs. Some thought that there is an emphasis on AUs that is disproportionate with the program content. Most thought that outcomes assessment is a better approach, but some thought that the stakeholders might be too timid to fully move to an outcomes assessment based accreditation system. A number of educators said that a balance of both input and outcome measurements is needed. Some thought that the current balance is about right, as per the proposed changes, and in line with what is done in other countries.

A few felt that the AU system could be preserved but currently, there is too much reliance on contact time. Contact hours are not the most important aspect of an engineering education. In their opinion, the attempt to measure curriculum content in a simpler manner has not been achieved. They said that Canada needs an accreditation system that allows for a modern engineering education and not only to produce P. Eng.'s

It was suggested that the focus of accreditation should be learning acquisition and continuous improvement. Noting that Engineers Canada had introduced the concept of outcomes assessment ten years ago and promised that the accreditation program transition would be completed by 2014, the educators all agreed that the process needed to move more rapidly. On a go forward basis, they said, accreditation needed to further take into account the emerging trends in engineering education and the different learning modes that are not classroom based.

One respondent thought that the accreditation program's guiding principles needed to be restated in positive terms. Instead of saying that integrity and rigour will not be compromised, we need to move to positive statements that go beyond the status quo and dispel the myth that making changes will degrade engineering education, he said.

One educator suggested that as the changes to the accreditation criteria were further developed, the curriculum maps would need to be defined. He thought that not enough detail had been provided to allow universities to proceed with the development of the maps. He wondered what would be the process to link courses to the graduate attributes, and whether there would be an expectation that each course should lead to one or more graduate attributes. He thought the expectations for the implementation of curriculum maps had not been well articulated.

The educators all agreed that the engineering accreditation program is still relevant and of high quality but it needs to focus more on meeting industry needs. It must move more towards outcomes-based approaches rather than time-based ones, they thought. The accreditation program needs to improve and do better than the status quo.

A number of educators thought that recent changes to the accreditation criteria and process had increased the workload for universities by a huge amount and that there was a need to reduce the workload required to prepare for accreditation visits. Some maintained that all the changes to the accreditation rules had made the preparations for accreditation visits increasingly burdensome. They indicated that there is a need to streamline the accreditation process and make sure it does not become onerous.

A few noted that since the graduate attributes were introduced, they had to hire more staff to handle the additional work created. They cautioned that the accreditation system could not continue as it had because it was placing undue hardship on the universities, which face pressure not only from the engineering regulators, but also from government.

It was thought that the collection of data prior to accreditation visits was especially burdensome. Some suggested that perhaps not as much information should be collected as it overwhelms both the visitors, and the universities. Clearly, there is too much paper being

produced for the accreditation visits. Several educators agreed that there is a need for greater clarity with respect to the collection of data and course material information and they suggested that samples of the course material samples might be used instead.

The educators concurred that outcomes assessment had so far added a lot of extra work. Continual improvement and outcomes measurement were beneficial, they thought, but represented constant work. Noting that accreditation visits take place only every 3 to 6 years, these educators thought that outcomes assessment was an important part of ongoing quality control and inquiry.

On the other hand, one educator thought that the accreditation process encouraged faculty members to work in a more coordinated manner. It has an impact on the culture and the way that faculty prepare. He said, these are good habits that help to bring cohesion to the faculty. He suggested that the data gathering needed to be undertaken by all the professors and not just the faculty managers.

Several educators mentioned that moving to an outcomes assessment approach to accreditation would be a challenge to the visiting teams who are used to interpreting criteria in a different way currently, than they will need to. They thought that visiting teams are not sufficiently trained and that they adhere to varying standards. Often there is a lack of knowledge within the visiting teams.

Given that accreditation depends on the interpretation of the visiting teams, the educators indicated that there was a need to have clear criteria that are understood by all stakeholders. This would improve the accreditation process and help to ensure that visiting teams would not be making significantly different interpretations of programs than what the university might have thought appropriate. One educator noted that even though visiting teams do not make decisions, they do however bias the Accreditation Board, which does. The educators all agreed that Accreditation Board members needed to be part of the visiting teams.

While the educators thought that more training was required for accreditation teams generally, one suggested that perhaps, some accreditation team members could be trained to focus on graduate attributes. Further, and because outcomes assessment requires special knowledge

from the faculty, the faculty members of the future might require additional knowledge with respect to teaching, measuring outcomes etc.

One respondent summed it up by saying: "whatever the accreditation process, we need to reconcile the interests of the Accreditation Board while allowing certain amount of independence to the universities. It is desirable to give the universities the flexibility that they require".

The educators generally thought that the graduate attributes were important in helping to ensure that the engineering graduates of the future are multidisciplinary in addition to having core competencies. They noted that the graduate attributes, which were not fully understood at first, were now becoming increasingly integrated in engineering programs. Graduate attributes are qualitative measures and should not cause problems to accreditation visiting teams provided they understand them, said one respondent. Another thought that a continuous monitoring process should be put in place to help ensure that the attributes are valuable to industry.

Some educators thought that the accreditation program should not move to a full outcomes approach but that outcomes assessment should be part of the accreditation process. An entirely outcomes-based accreditation system could work, they said, but a feed back and feed forward system was preferable.

Others thought that in the long run, outcomes assessment needed to be the method of choice with which to measure engineering programs in Canada. They said input measurement would not be necessary but might be required in the short to medium term until a full transition to outcomes assessment could be achieved.

One respondent thought it possible to move to an outcomes-based accreditation system exclusively. This would involve reworking accreditation criterion 3.1 and making it discipline-specific. He suggested that for each discipline there should be a different body of knowledge requirement. Accreditation criterion 3.1 could be expanded, and criterion 3.4 deleted completely as it would all be covered in 3.1, he said.

Another suggested that an agreement and a standardized approach were needed on how to implement outcomes assessment. Otherwise, outcomes assessment might not be an efficient way to determine whether engineering programs incorporate the twelve graduate attributes. In addition, the Engineer-In-Training (EIT) program needed to incorporate the twelve graduate attributes.

It was recognized that the outcomes assessment process was new and there would be challenges along the way. Therefore, suggested one educator, there needed to be an intermediate phase before the accreditation process moved entirely to outcomes. It would be reassuring to have a timeline and a sense of what the expectations are for the introduction and implementation of outcomes assessment, he added. It was suggested that Engineers Canada should work with all the stakeholders to set a date certain for the move to an outcomes-focused accreditation system.

Moreover, the future of accreditation should be aimed at developing an effective outcomes assessment approach that will work to align the accreditation of Canadian engineering programs with the assessment methodologies employed for individuals with foreign engineering education credentials.

It was pointed out that the regulators are already using an outcomes approach when they deal with individuals who apply for licensure yet don't have degrees from Canadian accredited engineering programs. Foreign students are assessed differently than nationals, and some thought that greater demands were being placed on national engineering students. In the future, commented one educator, we need to relax the curriculum content criteria and align the Canadian accreditation program with the assessment of international students.

Several educators pointed out that there needs to be further recognition that an engineering degree is a broad-based applied science degree that leads to many different careers that do not require licensing. They thought the universities are paying a price to satisfy engineering licensing requirements that may only impact half of the graduates. One educator suggested that perhaps consideration should be given to the development of professional examinations for

engineers who want to become licensed. Were this case, the universities would surely adapt and provide options for students who needed to prepare for board exams.

The educators welcomed the consultative document's emphasis on continual improvement but they thought that universities would need further guidance. They made it clear that engineering education community did not want to break the existing accreditation system but only help to improve and adapt it to emerging needs. They said the accreditation system had seen more changes in the last five years than in the previous twenty-five. They thought more clarification was needed with respect to the proposed accreditation criteria changes, including a clear understanding of what the Accreditation Board's expectations are.

It was generally agreed that the engineering schools needed to share best practices in preparation for accreditation visits in the future. One respondent suggested that Engineers Canada should continue to work closely with the Engineering Graduate Attribute Development (EGAD) project to identify best ways to prepare engineering schools to integrate the graduate attributes in their engineering programs.

With respect to section 3.2.2 – Stakeholder Engagement, one educator asked what would need to be involved, and how far back would universities need to go to demonstrate engagement. He also suggested that it be made clearer when the accreditors would be asking the universities to comply with the proposed changes. Lastly, he thought that criterion 3.3.3 regarding the advising of students needed further explanation. Currently, most students turn to their professors or department heads for such information. Should universities be developing policy documents in this respect?

Everyone thought that communications needed to be strengthened in order to ensure all stakeholders have a clear understanding of the accreditation program's expectations. It was felt that, to date, communications had been lacking. Some felt that the Engineers Canada consultative documents had not reflected what had actually happened. Further, there had been relatively poor consultation with the deans and it was felt that the consultation process was not reflecting their views.

It was thought that more and better communications would be needed to ensure everyone understood the proposed changes and their objectives. Faculty engagement is critically important in this exercise. In addition, appropriate change management strategies will be needed.

A few added that there had been a lack of progress from the regulators. It was felt they needed to trust the universities more, and that Engineers Canada and the Accreditation Board should work together closely to champion modern accreditation processes while meeting the needs of the regulators.

Some educators saw the current Canadian engineering accreditation system as very conservative. They believe that although the Canadian system may be better than what is used in other countries, it is still not a leader and certainly not very imaginative. They hope that the accreditation process will eventually move to outcomes assessment. In doing so, there will be a need to connect some input measurements to the graduate attributes.

The educators all concurred that no one wanted to lower the quality of engineering programs in Canada. They want to enhance engineering education and help to ensure that the engineering graduates of tomorrow are multidisciplinary professionals with a high awareness of the social and environmental impact of their work.

Comments on the Future of Accreditation – Responses from the Accreditors

The accreditors generally were of the opinion that the accreditation system has served stakeholders well, and that with some improvements it can continue to do so in the future. They noted that under the current system, the achievement of input-side criteria is required, and it is expected that graduates of accredited engineering programs will have successfully fulfilled all of those. In addition to the requisite AUs and the minimum of four years of full-time undergraduate study, the accreditation process incorporates an audit by visiting teams of such things as admission processes, faculty, counseling, pass rates, laboratories, libraries, etc. It is expected that these input measurements will need to continue.

The accreditors thought that outcomes assessment should not be a huge extra burden if the engineering faculties stay current in advance of accreditation visits. They said efforts were being made to streamline the accreditation process including the creation of specialized forms to record data. They thought that there is no need to prepare excessive amounts of documentation. Yet, they observed, some engineering schools continue to err on the side of caution in this respect, resulting in a lot of work for both faculty and the visiting teams.

One accreditor noted that as a result of the hybrid accreditation system with its measurement of both inputs, and outputs, the universities needed to be on top of their game to make sure that accreditation does not become an undue burden. In this respect, engineering schools should prepare for accreditation visits on a continuous basis to make it easier for them at accreditation visit time. Further, the schools should share accreditation best practices among themselves.

Several accreditors mentioned that accreditation data collection needed to improve. One explained that while the Accreditation Board had provided forms to facilitate input and output measurement there was still some difficulty because the forms are in Excel spreadsheet format and it has been reported that sometimes the macros didn't work. The forms should be easier to fill out and thereby facilitate the data collection process. "We haven't yet taken advantage fully of the software available to teach curriculum content", he said.

It was noted by some accreditors that university faculties need more accreditation training that takes into account outcomes assessment. They thought that program visitors needed to be sensitized to the expected outcomes, and allow greater flexibility.

Further, it was thought that the accreditation visiting teams need better training also – right now only the chairs are providing the mentoring. Perhaps a workshop is needed, said one, to show universities how the accreditation system can help them to prepare for accreditation visits. It was thought that even with the inputs and outputs being measured, accreditation visits should not take more than the three days that they do currently. Further, it might be possible to shorten some of the accreditation interviews with professors, supporting team members, and students.

The accreditors generally agreed that the introduction of the twelve graduate attributes was positive and would enhance the accreditation system. However, they thought that a less quantitative approach should be used when measuring the attributes than when evaluating curriculum content. They thought that the twelve graduate attributes were open enough to allow educational institutions to incorporate them as they saw fit.

Most agreed that the graduate attributes would see a process of evolution over the next decade and there would not necessarily be only one way to assess them. The graduate attributes will continue to develop, and become more detailed. In this respect, it was noted that performance indicators will need to be identified, and perhaps a task force including all stakeholders should be established to further develop the graduate attributes.

One accreditor pointed out that, notwithstanding the addition of the graduate attributes to the established accreditation criteria, engineering graduates would still require years of experience as EITs before being able to work as professional engineers. He noted that while industry had been known to complain that graduates are not ready to be engineers, it was never intended that graduates should start working as engineers right away. Professional competency is acquired subsequent to graduation through the EIT period with appropriate on-the-job experience. He cautioned that succumbing to industry pressure to provide engineering

graduates with all the additional soft skills that industries have provided through in-house training in the past, risked eroding the technical content of an engineering education.

Another accreditor thought that there was a misconception among some of the constituent associations that the Accreditation Board does not follow the syllabus. However, he said, program visitors do look at the courses being taught and compare them to the syllabus and its engineering discipline-specific requirements. Nonetheless, it is not absolutely necessary to do this as the AUs overcome the need for specific program review. In this respect, the syllabus is a good tool that provides a snapshot of what you would find in an accredited engineering program. However, in his opinion, a syllabus-only based approach would smother innovation because universities are regularly coming up with unusual programs and this would require the development of specific syllabi.

With respect to outcomes assessment, some accreditors felt that it had been imposed from above. One noted that there is a trend towards outcomes assessment in education, and provincial governments are moving towards requiring the reporting of outcomes. Outcomes assessment is about teaching, he said. Outcomes-based assessments are core pedagogy tools. He felt that outcomes assessment should not add to the workload because that's what responsible educators should be doing anyway.

The accreditors felt that gradually and increasingly, the accreditation process will rely on outcomes assessment. However, they said: "we are still in a transition stage". It was noted that outcomes assessment is not a requirement but only a program goal. Moreover, there is no guarantee that every student that graduates will exemplify the twelve graduate attributes.

Most thought that the accreditation process should never become completely outcomes-based. However, the accreditors acknowledged that there would be more and more reliance on the twelve graduate attributes and less reliance on the achievement of a specific number of AUs. A measure of productivity always requires both input and output, noted one accreditor. Until the Accreditation Board feels that universities are doing a good job with respect to producing engineering graduates with the twelve attributes, the accreditation process will still rely on

input measurement, he added. It was not expected that accreditation would move to outcomes assessment-only in the short term.

One accreditor compared the proposed outcomes-based assessment to the ISO standards used in industry. Industry uses quality control systems that allow them to plan, implement, check, and adjust their programs on an ongoing basis, he said. This is part of their culture. Going forward, engineering schools might benefit from such quality control models as they move to redevelop their curricula and incorporate the necessary elements that will ensure the achievement of the twelve graduate attributes.

It was pointed out that Engineers Canada works for the constituent associations, whose main function is to license engineers. The constituent associations assume that each and every graduate meets the Accreditation Board requirements. Regulators need to know that everyone who wants to be licensed can fulfill the minimum requirements for engineering work. They need to be able to guarantee that every single person who wishes to be licensed is qualified to practice anywhere, as indicated in the Washington Accord. One accreditor noted that the Washington Accord is moving its emphasis towards graduate attributes, but doing so without totally removing input measurement.

The accreditors noted that the Accreditation Board's main purpose is to ensure quality education standards that prepare graduates for licensure while responding to the needs of the marketplace. It was thought that if only the outcomes were assessed, perhaps regulators might want to set the limits. However, thought one accreditor, then the regulators would be moving towards defining university work, which wouldn't be taken kindly by the universities. If we go to a complete outcomes-based approach, he guessed, the regulators wouldn't trust it and they might have to impose exams.

Another accreditor thought that if accreditation were bypassed in favour of examination, not one, but a series of exams would be needed. Such a system would be more onerous on the engineers themselves. This would be expensive and the cost could offset the benefit. He thought that the benefits and costs would need to be carefully weighed before acting. He added that having a single exam like they do in the USA, although it sounds like a good idea, lowers the

quality of the engineers because passing an exam is a lot simpler than being continuously assessed over a period of time. The regulators are happy with no exams, he added, because they are satisfied with the amount of core engineering being taught in the curriculum.

It was felt by some, that the communication channels between Engineers Canada and the regulators were not completely effective. Further, they thought that the Accreditation Board needed to do a better job communicating with stakeholders, and with the engineering schools in particular to help ensure that the accreditation process is relevant to all concerned.

Some accreditors said that there is a need for better feedback on the suggestions provided by stakeholders. One accreditor suggested that: “we must do a better job of recognizing and acknowledging all the contributions made by stakeholders and volunteers”.

It was pointed out that the Accreditation Board has a deans liaison committee but it doesn’t have a regulators liaison committee. It was felt that the Accreditation Board should maintain ongoing liaison with the policy arms of the regulators, and not with the administration arms. It was further thought that the people within the constituent associations that develop academic policy (e.g. academic requirements committee) needed to be included in the discussion.

Several accreditors said that the consultation process needed to go beyond talking mostly to the engineering schools and the Accreditation Board. For example, noted one accreditor, employers do not seem to be included in the stakeholder group. Moreover, he thought, the members and the students have had very little voice so far with respect to policy development.

It was generally agreed that there is a need for more integration among the engineering schools, the Accreditation Board, and the regulators. As one accreditor said: “students are paying significant tuition fees and deserve an education that is relevant, and will make them productive professionals”.

The accreditors concurred that reasonable timelines should be developed for the implementation of any proposed changes including outcomes assessment. One accreditor said that we should avoid the stop and go with respect to changes to the accreditation system that had been experienced in the past.

It was agreed by most that the current accreditation system is fairly good. The combination of input and output measurement is reliable and trusted. The graduate attributes are new and evolving. More organic changes are on the way. It was acknowledged that the outcomes assessment approach would take a lot of work if done exclusively. Further, the graduate attributes don't cover the depth of the engineering body of knowledge.

The accreditors acknowledged that the existing hybrid system is more work. But noted one respondent, it is a one-shot effort to set up the outcomes assessment portion and should not be much more work over time. The accreditors thought that the focus of accreditation review should be on improving the current accreditation system. In this respect, Engineers Canada needs to keep working on continuous improvement with respect to the accreditation program and its implementation.

Further down the road, completely different approaches to accreditation should be taken into consideration, in addition to the established. One accreditor highlighted that discussions had taken place about the possibility of implementing sampling methodology to assess engineering programs on a continuous basis instead of periodic accreditation. Methods such as statistical quality control for the entire program might be attempted. This could help normalize workloads, and reduce costs and effort every time there is an accreditation review. However, no matter what alternative approaches are considered, he thought, the accreditation system should not shift away from an input, to an outcomes assessment method only.

Comments on the Future of Accreditation – Responses from the Regulators

There was agreement among the regulators that the current accreditation system needs some improvements. A few regulators perceived a great part of the accreditation process as unnecessary work. In their view it was essential to keep the AU system and to continue to assess curriculum content. If eliminated, they said the existing accreditation system would no longer be relevant and it might be necessary to impose final technical exams.

Most regulators thought that it was important to measure both inputs and outputs. It would be very difficult to measure outcomes only, they said. Outcomes assessment must not be exclusive if only because of regulatory requirements under the Engineers Act. According to one regulator: "the deans have not convinced us that the system is too burdensome to manage". On a go forward basis we need to work more on achieving greater efficiencies and streamlining the accreditation system, he said.

The regulators understood that the engineering schools need and want more flexibility. However, in their opinion, more consultation was needed. The consultative process that is being employed has not been conducive to a meeting of the minds as yet, they thought. One regulator reminded that the constituent associations established the Accreditation Board to help them regulate the profession. The regulators are more than stakeholders, he said. The deans don't have a responsibility to ensure that the regulatory system works, but the regulators do.

With respect to the existing system, it was noted that the accreditation process is still paper-based and as a result, both university staff and accreditation team visitors must wade through large quantities of documents. Yet, it is unclear whether the results of accreditation visits are representative of the quality of the programs being audited. The one-size-fits-all approach was seen as burdensome, and some regulators thought that perhaps it was time to consider moving to a risk-based approach through which accreditation visits could be focused on new programs, and on programs that have been problematic to the accreditation teams. This approach could give universities a break and dedicate resources where they are really needed.

One regulator noted that the Accreditation Board tools are outdated. Greater use of information technology is needed to make the process less onerous and more efficient. Perhaps a review of best practices in other countries should be undertaken. Ultimately, the accreditation process needs to be a win-win for all concerned.

The regulators thought that the Accreditation Board had been doing a good job. They said that they had confidence in the people that make up the Accreditation Board. It was acknowledged that the universities are the customers of the Accreditation Board and engineering faculty members are the people on the ground working within the accreditation framework and impacted the most by the changes. The regulators thought it was highly important to listen to the universities and what the engineering faculties were saying.

The regulators said that the constituent associations are generally happy with the quality of the engineering graduates. The constituent associations are not experts in education and as such, they rely highly on the Accreditation Board. Similarly, Engineers Canada is not the technical expert but it has a role to play in managing the accreditation program. It was thought that coordination was generally good among the constituent associations and Engineers Canada.

It was understood by the regulators that the experts in education and accreditation are the National Council of Deans of Engineering and Applied Science (NCDEAS), and the Accreditation Board, respectively. However, it would appear that this relationship is strained. They thought that the Accreditation Board should work more closely with the NCDEAS to achieve mutually desirable results.

With respect to the graduate attributes, the regulators showed their disappointment in the slow progress that has been made towards implementation of the twelve graduate attributes since they were introduced in 2008. They thought the process had not been well managed and said that Engineers Canada should play a stronger role in moving it forward. It was thought that by now we would have moved to outcomes assessment.

A few regulators thought that eventually, engineering accreditation might move to an outcomes assessment approach. They underlined the importance of ensuring that the outcomes closely

match the identified competencies. Therefore, they said, the inputs must be aligned to the expected outcomes.

Some respondents expressed trepidation over moving to an outcomes-based accreditation process and underlined that it must all be acceptable to the regulators. They thought that the outcomes assessment process needed to be further developed, and added that the constituent associations must be satisfied that the public is protected. They noted that the regulators are not bound by a deadline on this.

Recognizing that the Washington Accord signatories are moving to an outcomes-based model, the regulators felt that Engineers Canada needs to go in the direction of what is required in the global community. One regulator said: “we rely quite heavily on the Washington Accord and want to meet the Accord’s requirements. We don’t want to see Canada lag behind”.

Another noted that there are a number of initiatives underway to harmonize the assessment of graduates with accredited degrees with the evaluation of individuals with international degrees. In addition, the profession is slowly moving to outcomes assessment for the determination of engineering experience, as well as for education.

One regulator pointed out that engineering is becoming very project management oriented. As a result, many engineers don’t need to get licensed anymore. The only people who are seeking licensing are those who stamp drawings, he said. He thought that there were so few people doing design work that universities are cutting back on the design courses at the behest of employers who are looking for well-rounded engineering graduates with a host of soft skills. That’s what the 405 AUs of additional relevant learning activity are for, he added, but perhaps they ought to be used for more technical content as well.

The regulators recognized that the Accreditation Board did its job primarily for Canadian students. However, the assessment of foreign engineering students was an important function that constituent associations needed to ensure was fairly and equitably managed. In this respect, they thought it important that the proposed changes to the accreditation criteria line up with the other elements of the accreditation framework. One regulator pointed out that the constituent associations relied on other resources to assess engineers for the purposes of

licensure including the International Institutions and Degrees Database (IIDD), and the use of confirmatory examinations for some individuals who had degrees from non-accredited institutions.

The regulators felt that the proposed changes to the accreditation criteria faced a number of challenges. They thought that the accreditation process would need to adapt over time to successfully incorporate the proposed changes to the accreditation criteria into the existing framework. The regulators acknowledged that in this respect, they needed to show more trust towards the engineering schools and allow them greater leeway, but in turn, the educators needed to accommodate some of the needs of the regulators and accreditors. It was agreed that as long as the accreditation process continued to ensure that engineering graduates had acquired the necessary knowledge to become licensed, there would be no need for a final technical examination.

CONCLUSION

The aim of the Engineers Canada consultation on the proposed accreditation criteria changes was among other things, to provide additional clarity regarding existing practice. The consultation only dealt with changes in accreditation criteria related to the measurement of curriculum content and quality for the 2017-18 cycle. To deal with issues beyond the scope of this consultation, Engineers Canada will be hosting a Forum on Accreditation on August 17-18, 2016.

The proposed changes come after years of incremental improvements to an accreditation system that has been successful in maintaining high standards in engineering education, and has helped ensure that accredited programs meet the academic requirements for licensure.

This survey, which forms a part of the consultation process, has revealed that there is general agreement among the groups consulted in a number of areas. The respondents agreed that at minimum, engineering programs must have four years of full-time or equivalent appropriate content at a university level. Further, everyone endorsed maintaining the high levels of integrity and rigour contained in the current core engineering curriculum. The introduction of the twelve graduate attributes too was seen as a positive step as was the notion of making outcomes assessment an important part of the accreditation process.

However, there were also significant differences of opinion among the respondents on such issues as the appropriate level of reliance on input measurement and AU counts, the value of the Interpretive Statement with respect to providing added flexibility and allowing for greater innovation in education, and the merit of moving to an accreditation process fully based on outcomes assessment.

In addition, the educators expressed dissatisfaction with the consultative process to date. They felt that the proposed changes did not go far enough to give them the flexibility that they need and would like. A number of educators felt that the consultations between them, Engineers Canada, and the Accreditation Board had fallen short of their expectations.

The accreditors felt that progress had been made towards making accreditation more responsive to the needs of stakeholders, but more work needed to be done. In particular, greater clarification is needed as well as training for both, engineering schools and the members of the accreditation teams. It was also thought that while the twelve graduate attributes were a positive step, further development would be needed to integrate them into the engineering curricula and to measure the results as a part of outcomes assessment.

The regulators were generally supportive of the proposed changes, noting that they placed their trust in Engineers Canada and the Accreditation Board to drive the process and ensure that quality standards are maintained with respect to licensing requirements. Recognizing that the current need to support the Washington Accord meant moving towards outcomes assessment, they cautioned against abandoning the existing accreditation system, which protects the public, and ensures that final technical examinations are not needed.

In the long run, all stakeholders need to be actively involved in the consultations to ensure that there is a common understanding of the various stakeholder needs and a concerted plan to implement appropriate, and meaningful changes that will enhance the Canadian engineering accreditation system and maintain its place at the forefront of the global engineering community.

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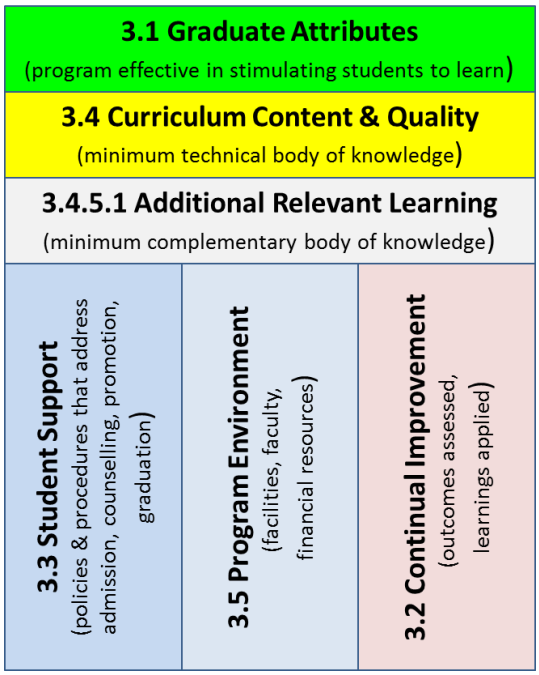
APPENDIX B– MEMO RE: CONSULTATION ON PROPOSED ACCREDITATION CRITERIA 2016

From the office of the Chief Executive Officer / Du cabinet du chef de la direction

To: Stakeholders of Accreditation of Engineering Programs in Canada
From: Kim Allen, CEO
Re: Consultation on Proposed Accreditation Criteria 2016
Date: May 21, 2016

This round of consultation only deals with the changes in accreditation criteria for the 2017-18 cycle. To deal with issues beyond the scope of this consultation we are hosting a Forum on Accreditation on August 17-18, 2016 in Toronto. To ensure we consider all issues at the Forum, we invite you to provide comments through the online survey.

For 50 years, the accreditation of engineering academic programs in Canada has ensured high standards in engineering education. Graduates of accredited programs meet the academic requirements for licensure. Programs accredited in 2015 included the assessment of graduate attributes for the first time. Accreditation will continue to examine all components shown in the diagram below. Detailed information is provided in the *Accreditation Criteria and Procedures Report.*



This consultation is related to the measurement of *Curriculum Content and Quality,* procedure changes and to provide additional clarity regarding existing practice.

Since 1996, curriculum content has been measured in accreditation units (AU). An AU is a measurement of activity between the student and program instructor (i.e. "contact hours" - one hour of lecture = 1 AU, one hour of laboratory or scheduled tutorial = 0.5 AU).

In April 2015, the National Council of Deans of Engineering and Applied Science (NCDEAS) advocated for flexibility in educational innovation, without impacting the overall quality of an engineering degree. The NCDEAS requested that Engineers Canada consider criteria changes related to the 405 AU of *Additional Relevant Learning*. The 1545 AU set out in criteria 3.4.2 would remain unchanged.

We have retained Georges Lozano, MPA, CAE to conducted interviews with interested stakeholders. Please contact Georges at geolozano@rogers.com (613) 731-7372 to set up a time for the interview.

WHAT WE'VE HEARD

Major Themes from Initial Consultation	Adjustments Made
An accredited degree must continue to meet the regulators' academic requirement for licensure.	Remains as the purpose of accreditation in Canada.
A set of overarching principles is needed.	All of the proposed changes comply with the following overarching principles • the overall quality of the engineering degree will remain unchanged or improve • engineering programs will continue to be four years, or equivalent • the core engineering curriculum requirements (math, natural science, engineering science, engineering design, complementary studies) and the requirement for licensure of faculty will remain unchanged
Flexibility for educational innovation can be achieved with an *Interpretative Statement* that provides guidance regarding measurement of the 405 AU of *Additional Relevant Learning.*	An Interpretive statement explaining the flexible methods to measure curriculum components will be part of the criteria. The Interpretive Statement is a living document and will reflect additional methods as they emerge.
Eliminating the 1950 AU requirement will reduce the content in the engineering programs. Stating "four years" is simply a measurement of time, not a standard for curriculum content (it's easy to design a 4-year, 8-semester curriculum with 5 courses per semester, a standard honors degree, that meets the minimum component-specified 1,545 AU).	An Interpretive Statement that provides clarity that the overall quality of an engineering degree will remain unchanged or improve will be part of the criteria. The draft is provided as part of the consultation.
The current system provides the Deans with all the flexibility they are requesting regarding the additional 405 AU and much more. K-factor provides an easy means to calculate AU for courses that do not follow the traditional lecture/lab format. Many HEIs have successfully used the K-factor. The current system accredits a 100% problem-based curriculum at L'Université de Sherbrooke.	The Interpretive statement that explains K-factor and other methods to measure curriculum components will be part of the criteria.
A standard is more transparent and explicit, especially for the regulators. The *standard* should be 1,950 AU, while the methods of how to meet the standard is the purview of a *guideline*.	See above

Major Themes from Initial Consultation	Adjustments Made
The initial consultation process was less than adequate (too rushed, lack of clarity, etc.).	This round of consultation is focused on the changes in accreditation criteria for the 2017-18 cycle only. There is 60 days of formal consultation. Once the consultation has concluded there is an additional 75 day before the Engineers Canada Board makes a decision on the proposed criteria changes. Inputs on other changes are welcome and will be discussed by the stakeholders at the Accreditation Forum.
Comments beyond the scope of the consultation have identified needs: • articulate a clear vision of the future of accreditation • address the workload of the AB and AB visitors • address the workload of the HEIs • provide regular review of accreditation criteria • develop an effective consultation and decision protocol • provide more flexibility for educational innovation	We are hosting a **Forum on Accreditation on August 17-18, 2016** in Toronto to deal with long term matters beyond the scope of this consultation. All of the stakeholders will be invited to attend the Forum. The details of the forum will be published in May 2016. We invite you to provide comments through the online survey.

CONSULTATION DOCUMENT ON PROPOSED CRITERIA CHANGES 2016

We are seeking comments, feedback and input from all stakeholders on proposed changes to accreditation criteria for the 2017-18 cycle. The attached summary sets out the changes to accreditation criteria under consideration. The document lists the changes and the rationale for the changes.

PART A: criteria changes to provide flexibility for educational innovation without impacting the overall quality of an engineering degree.

PART B: criteria changes of a "housekeeping" nature. Items that are policies and/or procedures are moved to Section 4, which is renamed as *Accreditation policies and procedures.* The requirement for licensure for the curriculum committee is aligned with the requirements for licensure in other parts of the criteria.

PART C: procedure changes to provide additional clarity regarding existing practice**.**

CONSULTATION RESOURCES

Available on the consultation site are:

- The comprehensive consultation document *Consultation on Engineering Instruction and Accreditation*
- A "clean" copy of the accreditation criteria renumbered with the proposed changes
- Additional background material

DECISION

After consideration of the feedback from stakeholders, the Engineers Canada Board will make a decision regarding approval of the proposed changes at its September 2016 meeting.

Please send your comments to consultation@engineerscanada.ca by July 15, 2015.

Thank you.

PART A – Proposed changed to criteria 3.4.6 Minimum Program Content

This proposed change is intended to provide institutions with more flexibility for educational innovation while ensuring that the overall quality of an engineering degree will remain unchanged or improve.

Proposed change is to criteria 3.4.6

Current	Proposed
3.4.6 The program must have a minimum of 1,950 Accreditation units that are at a university level.	**3.4.6 Minimum Program Content** The program must have a minimum of four years of full-time (or equivalent) appropriate content at a university level. An Interpretive Statement on minimum program content is attached as an appendix to this document.

Interpretive Statement on proposed criteria 3.4.6 – Draft for consultation purposes

An engineering program is comprised of at least four years of full-time (or equivalent) study at a university level comprised of:

Mathematics and natural sciences Mathematics: Minimum 195 AU Natural sciences: Minimum 195 AU	Minimum 420 AU
Engineering science and engineering design Engineering science: Minimum 225 AU Engineering design: Minimum 225 AU	Minimum 900 AU
Complementary Studies (see note 1)	Minimum 225 AU
Additional relevant learning activity at a university level to meet the four year overall requirement (equivalent to 405 AU). The additional relevant learning activity must be appropriate to engineering education approved by the HEI for academic credit. (see note 2)	n/a
Laboratory experience and safety procedures instruction	n/a

The Accreditation Board accepts the following methods to quantify four years of program content:

a. The continued use of accreditation units with a minimum total of 1950 AU.
b. The use of the HEI's equivalent institutional academic credits.

Principles

1. The integrity and rigour of a four-year engineering degree in terms of content and quality will not be compromised.
2. There will be no dilution or reduction in the total learning requirement.
3. The performance of individual students in all learning activities making up the curriculum must be appropriately evaluated for the assignment of academic credit.

4. The requirements for curriculum content and quality must be satisfied by all students ("minimum path" concept).

Measurement of program content

- The Accreditation Board will continue to require expression of compulsory components of curriculum content in terms of accreditation units (AU).
- CEGEP prior studies at a university level will be considered up to 225 AU (as defined in the transfer credit regulations).

Note 1: Complementary studies may include, but are not limited to:

- engineering economics
- the impact of technology on society
- humanities and social sciences
- oral and written communications
- health and safety
- professional ethics
- equity and law
- sustainable development and environmental stewardship

Note 2: Additional learning activities may include, but are not limited to;

- Management or business studies
- Entrepreneurship, including engineering entrepreneurship
- Active independent learning (project & problem-based; directed research; etc.)
- International learning experiences
- Additional content in the defined curriculum categories for accreditation
- Appropriate post degree courses

PART B – PROPOSED "HOUSEKEEPING" CHANGES

The Accreditation Board has performed an overall review of criteria, and is proposing the following changes that are of a "housekeeping" nature.

Proposed Changes	Rationale
3.1 Graduate attributes The institution must demonstrate that the graduates of a program possess the attributes under the following headings. [The attributes will be interpreted in the context of candidates at the time of graduation. It is recognized that graduates will continue to build on the foundations that their engineering education has provided.]	Verbatim [text] will follow the renumbered attribute list 3.1.1 to 3.1.12.
3.1.9 Impact of engineering on society and the environment: An ability to analyze societal and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, ~~social~~ health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such interactions and the concepts of sustainable design and development and environmental stewardship.	Minor editorial change
To assess the suitability of a program for developing the above list of attributes, the Accreditation Board will rely on criteria 3.1.1 to 3.1.5, given below, and on the *Interpretive Statement on Graduate Attributes* which is attached as an appendix to this document.	Introductory sentence and identifying that the *Interpretive Statement on Graduate Attributes* is available.
3.1.1 Organization and engagement: There must be demonstration that an organizational structure is in place to assure the sustainable development and measurement of graduate attributes. There must be demonstrated engagement in the processes by faculty members and engineering leadership.	Clarity regarding organization and engagement.
3.1.2 Curriculum maps: There must be documented curriculum maps showing the relationship between learning activities for each of the attributes and the semesters in which these take place.	Clarity regarding curriculum maps showing the relationship between learning activities.
3.1.3 Indicators: For each attribute, there must be a set of measureable, documented indicators that describe what students must achieve in order to be considered competent in the corresponding attribute.	Clarity regarding the indicators for the achievement of each attribute.
3.1.4 Assessment Tools: There must be documented assessment tools that are appropriate to the attribute and used as the basis for obtaining data on student learning with respect to all twelve attributes over a cycle of six years or less.	Clarity regarding the assessment tools used.
3.1.5 Assessment Results: At least one set of assessment results must be obtained for all twelve attributes over a cycle of six years or less. The results should provide clear evidence that graduates of a program possess	Clarity regarding that the results must provide clear evidence for each attribute.

Proposed Changes	Rationale
the above list of attributes.	
3.2 Continual improvement Engineering programs are expected to continually improve. ~~There must be processes in place that demonstrate that program outcomes are being assessed in the context of the graduate attributes, and that the results are applied to the further development of the program.~~ To evaluate this criterion, the Accreditation Board will rely on criteria 3.2.1 to 3.2.3 given below and on the *Interpretive Statement on Continual Improvement*, which is attached as an appendix to this document.	Detailed criteria have been added to regarding the program outcomes that are being assessed in the context of the graduate attributes, and that the results are applied to the further development of the program.
3.2.1 **Improvement process**: There must be processes in place that demonstrate that program outcomes are being assessed in the context of the graduate attributes, and that the results are validated, analyzed and applied to the further development of the program.	New criteria to provide clarity on the expectations regarding process improvement.
3.2.2 **Stakeholder engagement:** There must be demonstrated engagement and involvement of stakeholders both internal and external to the program in the continual improvement process.	New criteria to provide to clarity on the expectations regarding stakeholder engagement.
3.2.3 **Improvement actions**: There must be a demonstration that the continual improvement process has led to consideration of specific actions corresponding to identifiable improvements to the program and/or its assessment process. This criterion does not apply to the evaluation of new programs.	New criteria to provide clarity on the expectations regarding improvement actions.
3.2 Students Accredited programs must have functional policies and procedures that deal with quality, admission, counselling, promotion and graduation of students. Although all accreditation criteria connect directly and indirectly with their education, particular attention is drawn to admission, promotion and graduation, and academic advising ~~counselling and guidance~~.	Minor editorial change
3.3.2 **Promotion and graduation:** ~~There must be documented p~~ Processes and policies for promotion and graduation of students must be documented. The institution must verify that all students have met all its regulations for graduation in the program identified on the transcript and that the curriculum followed is consistent with that of the accredited program. The program name must be appropriate for all students graduating from the program.	Minor editorial change
3.3.3. ~~**Counselling and guidance**~~ **Academic Advising**: There must be processes and sufficient resources in place for the academic advising of students. Clear statements of such policies or procedures should be available to faculty and students. Depending	Added text to isolate and clarify academic advising expectations. Non-academic counselling and guidance is moved to section

Proposed Changes	Rationale
on the governance structures in place, aspects of student advising should normally be at both the program and Faculty levels.	3.5.1.2
3.4.2 Minimum curriculum components: An engineering program must include the following minima ~~minimum for the entire curriculum and~~ for each of its components. ~~* The entire program must include a minimum of 1,950 AU~~ Engineering science and engineering design: Minimum 900 AU *Which includes a minimum 225 AU in each of Engineering science and Engineering design* Mathematics and natural sciences: Minimum 420 AU *Which includes a minimum 195 AU in each of Mathematics and Natural sciences.* Complementary Studies: Minimum 225 AU Laboratory experience and safety procedures instruction	Change to accommodate new definition of total program load and provide HEIs with more flexibility for educational innovation while ensuring that the overall quality of the engineering degree will improve or remain unchanged. Criteria 3.4.6 has been amended to ensure the quality remains the same or improves.
3.4.5 **A minimum of 225 AU of complementary studies:** Complementary studies include humanities, social sciences, arts, management, engineering economics and communications that ~~to~~ complement the technical content of the curriculum.	Minor editorial change
c. Professionalism, ethics, equity and law g. Engineering economics and project management	Minor editorial changes to better align with terminology used in graduate attributes in Section 3.1
3.5.1.2 The quality, suitability, and accessibility of the: a. laboratories b. library c. computing facilities d. non-academic counselling and guidance e. other supporting facilities and services	Minor editorial changes. Non-academic counselling and guidance added - see section 3.3.3 *Academic advising* "facilities and services" amended for completeness
3.5.3. Leadership: The dean of engineering (or equivalent officer) and the head of an engineering program (or equivalent officer with overall responsibility for each engineering program) are expected to provide effective leadership in engineering education and to have high standing in the engineering community. They are expected to be ~~engineers~~ licensed to practice engineering in Canada, ~~preferably in the jurisdiction in which the institution is located. In those jurisdictions where the teaching of engineering is the practice of engineering,~~ the officers are expected to be engineers licensed in ~~that~~ jurisdiction in which the institution is located. To evaluate this criterion, the Accreditation Board will rely on the Interpretive statement on licensure expectations and requirements, which is attached as an appendix to this document.	Alignment of the licensure requirement language. The deleted text is a regulatory requirement not a program quality criterion.
3.5.4 Expertise and competence of faculty: Faculty delivering the engineering curriculum are expected to have a high	Letter labels added to simplify referencing of specific issues

Proposed Changes	Rationale
level of expertise and competence, and to be dedicated to the aims of engineering education and of the self-regulating engineering profession, which will be judged by the following factors: a. The level of academic education of its members. b. The diversity of their backgrounds, including the nature and scope of their non-academic experience. c. Their ability to communicate effectively. ~~Their experience in teaching, research and design practice.~~ d. Their experience and accomplishments in teaching, research and/or engineering practice. ~~Their level of scholarship as shown by scientific, engineering, and professional publications.~~ e. Their degree of participation in professional, scientific, engineering, and learned societies. ~~Their personal interest in, and documented support of the curriculum and program related extra curricular activities.~~ f. Their appreciation of the role and importance of the self-regulating engineering profession, and of positive attitudes towards professional licensure and involvement in professional affairs.	"Their" in the subsequent list applies to individual faculty members For individuals experience in engineering practice and/or research is required (but the Faculty as a whole must demonstrate both) Deleted text is redundant - implied by a. and d. above
3.5.8 **Curriculum committee:** Engineering program curriculum changes are expected to be overseen by a formally structured curriculum committee. The majority of the voting members of the committee are expected to be licensed ~~professional engineers~~ to practice engineering in Canada. ~~preferably in the jurisdiction in which the institution is located. In those jurisdictions where the teaching of engineering is the practice of engineering, they are expected to be licensed in that jurisdiction.~~	Minor editorial change Aligned with licensing requirement in 3.5.7. The deleted text is a regulatory requirement not a program quality criterion.
Section 3.6 is renamed as *Additional criteria.* Items that are policies and/or procedures are moved to Section 4, which is renamed as *Accreditation policies and procedures*	
3.6 ~~Accreditation procedures and application~~ Additional Criteria	
3.6.1 ~~Accreditation applies only to programs, not to departments or faculties.~~ For purposes of accreditation, a program is characterized by a formally approved and published curriculum that is regarded as an entity by the institution and that can be considered independently. All options in the program are examined. Following the principle that a program is only as strong as its weakest link", a program is accredited only if all ~~such~~ options meet the criteria.	3.6.1 moved to section 4.1 3.6.4 becomes 3.6.1 with a minor editorial change
3.6.2 ~~Application of the accreditation process to an engineering program is undertaken only at the invitation of a particular institution and with the consent of the appropriate regulator.~~ An accredited program must have the word "engineering" in its title.	3.6.2 deleted - made redundant by Section 4.1 3.6.5 becomes 3.6.2
3.6.3 ~~The accreditation process comprises two parts: program evaluation~~	3.6.3 moved to section 4

Proposed Changes	Rationale
~~by a visiting team and accreditation decision by the Accreditation Board. The evaluation of the program is based on detailed data provided by the institution and on the collective opinion of the members of the visiting team. The accreditation decision is made by the Accreditation Board based on qualitative and quantitative considerations.~~ The title of an accredited engineering program must be properly descriptive of the curriculum content.	3.6.6 becomes 3.6.3
3.6.4 ~~For purposes of accreditation, a program is characterized by a formally approved and published curriculum that is regarded as an entity by the institution and that can be considered independently. All options in the program are examined. Following the principle that a program is only as strong as its "weakest link", a program is accredited only if all such options meet the criteria~~. If a program, by virtue of its title, becomes subject to the content requirements for two or more engineering curricula, then the program must meet the Accreditation Board requirements for each engineering curriculum named.	3.6.4 becomes 3.6.1 3.6.7 becomes 3.6.4
3.6.5 ~~An accredited program must have the word "engineering" in its title.~~ The Accreditation Board must have evidence that all engineering options contain a significant amount of distinct curriculum content and that the name of each option is descriptive of that curriculum con- tent. An *Interpretive statement on curriculum content for options and dual-discipline programs* is attached as an appendix to this document.	3.6.5 becomes 3.6.2 3.6.9 becomes 3.6.5
3.6.6 ~~The title of an accredited engineering program must be properly descriptive of the curriculum content.~~ The Accreditation Board must have evidence that the program name is appropriate for all students graduating in the program regardless of the option taken.	3.6.6 becomes 3.6.3 3.6.10 becomes 3.6.6
3.6.7 to 3.6.13 3.6.7 becomes 3.6.4 3.6.8 moved to Section 4.1 3.6.9 becomes 3.6.5 3.6.10 becomes 3.6.6 3.6.11 moved to Section 4.1 3.6.12 deleted - made redundant by Section 4.6.1 3.6.13 moved to Section 4.7 3.6.14 moved to Section 4.6.5	

PART C – PROPOSED CHANGES TO PROCEDURES

These proposed changes are intended to provide additional clarity regarding existing practices. Most of the changes result from moving policies and procedures that were in the criteria section to this section.

Proposed Changes	Rationale
4. ~~Procedures~~ Accreditation policies and procedures	Title change
The accreditation process comprises two parts: program evaluation by a visiting team and accreditation decision by the Accreditation Board. The evaluation of the program is based on detailed data provided by the institution and on the collective opinion of the members of the visiting team. The accreditation decision is made by the Accreditation Board based on qualitative and quantitative considerations, including the program's responses or clarifications to the visit report.	Moved from 3.6.3 Additional text to provide clarity
4.1 Initiation and timing of accreditation visit An accreditation assessment is initiated only at the invitation of an institution and with the consent of the appropriate member of Engineers Canada. Accreditation applies only to programs, not to departments or faculties. The Accreditation Board does not evaluate or accredit non-engineering degrees, diplomas, or certificates or components thereof; only the engineering degree will be listed in the annual report section on accredited engineering programs. An accreditation visit to assess or reassess an engineering program or programs normally takes place in October or November. A request from the institution for such a visit must be received by the Accreditation Board Secretariat by January 1 of the calendar year in which the visit is to take place. Accreditation of a program is granted only after students have graduated from the program. For new programs, an accreditation visit may be undertaken in the final year of the first graduating class.	This makes 3.6.2 redundant Moved from 3.6.1 Moved from 3.6.8 Moved from 3.6.11
An accreditation visit to assess or reassess an engineering program or programs normally takes place in October or November. A request from the institution for such a visit must be received by the Accreditation Board Secretariat by January 1 of the calendar year in which the visit is to take place. Accreditation of a program is granted only after students have graduated from the program. For new programs, an accreditation visit may be undertaken in the final year of the first graduating class.	

Proposed Changes	Rationale
4.6.1 Accreditation of a program is granted for a specific term, the maximum ~~being~~ is six years. Any term of accreditation may be conditional upon the institution satisfying one or more requirements. . . .	This makes 3.6.12 redundant Minor editorial change
4.6.5 The Accreditation Board reserves the right to alter the accreditation status of any program at any institution if ~~it is discovered~~ that ~~such~~ program is not in compliance with any of the Accreditation Board's accreditation criteria or regulations.	3.6.14 becomes 4.6.5 with minor editorial change
4.7 ~~Formal review~~ Significant change	3.4.13 becomes 4.7
4.8 ~~Informal evaluation or visit~~ Formal review	4.7 becomes 4.8
4.9 ~~Publication~~ Informal evaluation or visit	4.8 becomes 4.9
4.10 Publication	4.9 becomes 4.8