Competency-Based Assessment of Engineering Work Experience Project

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Final Report

Engineers Canada

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Executive Summary

Based on the recommendations from the Alternative Methods of Licensure Project (2008–2010), members of the Competency-Based Assessment of Engineering Work Experience Project team have worked for the past two years to develop and pilot core engineering competencies and a competency-based assessment process in collaboration with engineering associations across Canada. This project has resulted in three key recommendations for the Engineers Canada Board.

1. Adopt the proposed competencies as the definition of the work experience requirement for licensure as a professional engineer.

2. Endorse the proposed competency-based assessment process as the baseline for national harmonization of the work experience requirement.

3. Support the progressive implementation of the proposed solution by Engineers Canada to:
   - Coordinate the design, development and deployment of an online system.
   - Create a national steering committee to provide oversight for the development of the online tool and implementation by associations
   - Assist each association through the adoption phase

Results of the Project

The following seven core engineering competencies have been developed and validated through face-to-face consultations, surveys and pilot feedback.

A. Apply engineering knowledge, methods and techniques
B. Use engineering tools, equipment or technology
C. Protect the public interest
D. Manage engineering activities
E. Communicate engineering information
F. Work collaboratively in a Canadian environment
G. Maintain and enhance professional knowledge and skills

An accompanying competency-based assessment system has been developed so associations can assess against these competencies in a way that is objective, clear, transparent and equitable. This process requires applicants to submit three competency demonstrations for each of the seven core engineering competencies (21 demonstrations in total). A team of two trained professional engineer assessors then assesses an applicant’s competency demonstrations against the indicators, taking additional contextual factors into consideration.

This assessment process is supported by a series of guidance documents, forms and tools that were developed during the project and updated based on feedback from two pilots conducted in Saskatchewan and Ontario. These materials will likely be further refined when the system eventually moves online.

Rationale

The project found that using the competency-based assessment process to apply the core engineering competencies as the standard for work experience produced many benefits. These included:

- **Clarity.** Both applicants and assessors indicated that the core engineering competencies increased the clarity of both the standard and the process for meeting the standard. This was demonstrated during the pilots by applicants who were able to self-assess and elect themselves out of the pilot.
- **Transparency.** The specificity of the requirement, as defined by the core engineering competencies, makes it possible for assessors to provide applicants with specific details about what they need to improve in order to meet the standard. This improves the transparency of the process.
• **Equity.** This process strives to be equitable by allowing foreign-trained engineers to use experience from outside of Canada in their competency demonstrations. All applicants must submit the same type of information and are held to the same standard.

• **Consistency.** The competency-based assessment system improves consistency by using objective criteria and a five-point rating scale for assessment to minimize assessor error. Additionally, the use of two assessors to independently assess an application before coming to a consensus rating improves accuracy and consistency of assessment.

• **Potential for national convergence.** The core engineering competencies and the competency-based assessment system were developed in consultation with associations across Canada and represent the potential for national convergence on one standard for assessing engineering work experience in Canada.

• **Increased assessor confidence.** Assessors who participated in the pilots unanimously agreed that the competency-based assessment process allowed them to be more confident in their assessments.

• **Defensibility.** The improved clarity of the standard, the increased transparency of the method of assessment and the documentation of the assessment decision and rationale combine to make the competency-based assessment system highly defensible in case of appeals or legal challenges.

Competency-based assessment can provide many important benefits and each association will need to consider the implications of adopting the system, specifically, the time investment required. While the competency-based assessment will require more time investment in some ways, it may also alleviate the time investment required at other points in the assessment process. This trade-off will be highly dependent on the association. Each association will need to consider the benefits of the system and determine if the time investment for their association is worthwhile. However, the project team feels that the benefits of competency-based assessment do warrant the time investment required. The time consideration is further discussed in Section 5.2.2: Key Findings and Considerations.
Section 1: Background

1.1 Project background

The Competency-Based Assessment of Engineering Work Experience Project (Competency-Based Project) was created because of, and influenced by, multiple drivers from both inside and outside the engineering profession.

Key considerations include:

**Licensing Internationally Trained Engineers**
- Multiple associations had difficulties in assessing engineers who had been trained and had practised in other countries. As a result, associations asked for help from Engineers Canada in finding a valid, fair and consistent way of licensing this group of engineers.

**Availability of Skilled Labour**
- It has become a Government of Canada priority to ensure the availability of skilled labour in Canada to enable the Canadian economy to develop and grow. This is mostly due to the high demand for labour from employers, specifically in key growth areas of the country.
- One solution to a shortage of skilled, professional labour is to improve the integration of foreign-trained professionals into the Canadian professional workforce.
- As a self-governing profession, engineering associations in Canada are expected to work towards this objective in a way that is fair and that continues to ensure that engineering is practised safely in Canada.

**A Desire for Common Licensure Processes across Associations**
- In order to contribute to national harmonization in the future, the Competency-Based Project aims to move beyond joint recognition of licences between provinces and territories and develop a common definition of the standard for licensure as well as a common assessment method.

**International Best Practice: Competency-Based Assessment**
- Competencies were selected as the standard and method of assessment after a review of best practices in licensure and careful consideration during the Alternative Methods of Licensure Project. One of the main considerations was that competency-based assessment is an international best practice. This method meets the requirements of transparency and fairness that associations were seeking.
- Countries such as Australia, United Kingdom, Ireland, South Africa, Hong-Kong and some states in the U.S. have adopted competency-based assessment systems for licensing engineers.

1.2 History of previous projects

The Competency-Based Project is a response to the need expressed by engineering associations in 2002: to investigate issues concerning the licensure of foreign-trained engineers. The following projects are the history that led to this work.

**From Consideration to Integration (2003–2005):**
The Competency-Based Assessment Project comes out of a recommendation from the “From Consideration to Integration” project. That project started when engineering associations raised concerns about the apparent difficulties of internationally educated graduates to obtain a licence. Of 17 final recommendations, number 11 was to study “alternative methods of licensure.”

**Alternative Methods of Licensure (2008–2010):**
The Alternative Methods project did three things: studied the current practices of engineering associations, looked at other solutions available, and recommended a new option.
Because other Engineers Canada projects were examining the academic review and language aspects of licensure, the recommendations from the Alternative Methods of Licensure Project in 2010 were to focus on the assessment of work experience only and to focus on a competency-based assessment process.

All 12 associations defined and accepted a framework for a competency-based assessment of engineering work experience and an initial set of core engineering competencies. The associations agreed that work should continue to fully develop and then pilot the competency-based assessment method, which led to the Competency-Based Assessment of Engineering Work Experience Project (2010 – 2012), which is described further in this report.
Section 2: Project Objectives

2.1 Project Success

2.1.1 Definition of success

The steering committee (see Appendix B) defined success for this project as the development of a competency-based assessment system for engineering work experience, implementation and review of two pilots to test the system, and a deployment approach for future adoption. The proposed system must be aligned with the project objectives, as outlined in Section 2.2 Project Objectives

2.1.2 Project Aspirations

In addition to the definition of success, the steering committee also kept in mind the additional goal of supporting the future adoption of competency-based assessment of engineering work experience by the constituent associations. This goal however, was not within the mandate of the Competency-Based Project. It may need to be addressed in other work coming from the licensure initiative.

2.2 Project Objectives

Based on the context and history outlined above, the steering committee determined that the Competency-Based Project should address the following objectives. The status of these objectives is also detailed in the following table.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Description</th>
<th>Current Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain Standards</td>
<td>The process continues to assure that only qualified individuals are permitted to practise professional engineering in Canada.</td>
<td>Confirmed and Clarified.</td>
</tr>
<tr>
<td>Equity</td>
<td>The process equitably assesses Canadian and internationally educated engineering graduates, as well as mature applicants.</td>
<td>Achieved.</td>
</tr>
<tr>
<td>Transparency</td>
<td>The process and assessment results are transparent. The applicants are aware of what is expected of them and how they must meet those requirements.</td>
<td>Validated by applicants.</td>
</tr>
<tr>
<td>Consistency</td>
<td>The proposed method provides consistent results every time it is used by different assessors and by different associations.</td>
<td>Validated by assessors.</td>
</tr>
<tr>
<td>Clarity of Process</td>
<td>The process is sufficiently clear that applicants could “self-assess” and determine what they need to do to meet all the requirements.</td>
<td>Achieved. Applicants were able to self-assess during the pilot. Modifications based on pilot learnings have brought additional clarity to the process.</td>
</tr>
<tr>
<td>Efficiency of Administration</td>
<td>The licensure process must allow the applicants and assessors to complete the process as efficiently as possible. Therefore, the process should avoid duplication of effort and have tools available to make it as efficient as possible.</td>
<td>Time redistribution required to achieve the other benefits of the solution.</td>
</tr>
<tr>
<td><strong>Mobility of Engineers</strong></td>
<td>Professional engineers currently enjoy full national mobility under the Agreement on Internal Trade. The process must not compromise that, and should work to further enhance it where possible.</td>
<td>Enhanced through potential harmonization across associations.</td>
</tr>
<tr>
<td><strong>Align with Accreditation Board Graduate Attributes</strong></td>
<td>The assessment criteria should be aligned with the graduate attributes created by the Canadian Engineering Accreditation Board.</td>
<td>Validated by Engineers Canada staff.</td>
</tr>
</tbody>
</table>
Section 3: The Proposed Solution

There are five requirements for licensure as a professional engineer in Canada. This Competency-Based Project addresses only one: work experience.

The proposed competency-based solution has three parts:

- the seven core engineering competencies that define the engineering work experience requirement;
- the assessment process for determining if an applicant has demonstrated the competencies in their engineering work;
- a suggested deployment approach for rolling out the competencies and the assessment system in the provincial and territorial associations.

All tools and materials needed to manually implement the system at the association level have been developed and are available in the Competency-Based Project Deployment Toolkit. During the course of this project it became apparent that an online system would be the most practical approach to implementation. While all the materials developed are directly relevant and reusable as part of the baseline requirements for an online system, the development of such a system is beyond the mandate of the current project.

3.1 The Core Engineering Competencies

3.1.1 The Standard

At the outset, the Competency-Based Project consulted broadly with Canadian professional engineers in order to determine the competencies that represent the minimum standard of work experience required for engineers to practise safely in Canada. Through multiple rounds of face-to-face consultations, an online survey of 337 professional engineers, and continuous refinement in consultation with the associations, the core engineering competencies were determined to all be critical to safe practice.

The Project set out to maintain the standard for licensure as is currently being enforced across Canada. Nonetheless, as the project progressed it became apparent that there was no precise and consistent definition of this standard. The perceived standard could become subjective when the need for unique interpretations arose due to exceptional circumstances. This type of situation tended to arise when dealing with foreign-trained engineers, mature applicants and other unique situations that preoccupy associations. Irrespective of these challenges, the professional engineers who participated in the Project were able to use the tools provided to work through these unique situations in order to clarify, but not redefine, the standard. The feedback from the pilots clearly indicates that the objective of a well-defined standard for licensure has been achieved. Both assessors and applicants confirmed that they had a better understand of what was required and that they had greater confidence in the accuracy of assessments. While the standard has not changed, this increase in clarity and precision of the defined standard will have an impact on associations as they apply it. The following paragraphs are some examples in which the competency-based system may change the way that the standard is applied.

Comprehensive Definition of the Standard

The Competency-Based Project started by refining the competencies that were set forth in the Alternative Methods of Licensure project. Through consultation, and the pilot process, it was found that all seven competencies are critical to safe practice, and are therefore required for licensure. In some associations, the seven competencies may be seen as broader than what is currently applied. If so, this is a reflection of the greater emphasis that in the past tended to be placed solely on the technical aspects of the engineering profession.
Specific Definition of Requirements

Each of the core engineering competencies includes behavioural indicators, all of which applicants must demonstrate in their competency demonstrations. These specific criteria clarify the standard for both applicants and assessors. Assessors in the pilots, as well as the project steering committee, feel that these indicators are an accurate definition of the current standard required for safe practice. The increased clarity and specificity provided by these indicators will likely result in a reduction of the “grey area” or ambiguity in assessment. This improved clarity may mean that some applicants who may previously have been granted a licence are no longer able to meet the standard because it has been more precisely defined. This is not seen as having “raised the bar,” but instead, as a natural consequence of having clarified where the bar rests.

3.1.2 The Competencies

The core engineering competencies were developed by professional engineers from across Canada and confirmed through a national survey. The survey asked 1) if each competency was critical to safe practice and 2) the level of risk to the public that would exist if a professional engineer did not possess this competency. This process determined that all seven competencies are necessary for the safe practice of engineering and therefore represent a defensible standard for licensure.

Following the national survey, the competencies were tested in two pilots, which provided an additional opportunity for refinement. After the pilots, some modifications were made to the indicators and in one case two competencies were combined to provide clarity in areas that applicants had found to overlap. This pilot and consultation process revealed unanimous support from participating applicants and assessors, as well the associations represented on the steering committee. The following seven competencies are the definition of the engineering work experience requirement which represents the minimum standard for safe practice by professional engineers in Canada:

The seven core engineering competencies are:

A. Apply engineering knowledge, methods and techniques
B. Use engineering tools, equipment or technology
C. Protect the public interest
D. Manage engineering activities
E. Communicate engineering information
F. Work collaboratively in a Canadian environment
G. Maintain and enhance professional knowledge and skills

For full descriptions of each competency, please see Appendix B.

3.2 The Assessment Process

The development of the seven core engineering competencies was a significant achievement and addressed some of the objectives of the Project, particularly improving the clarity of the standard for work experience. However, in order to achieve the objectives of consistency, equity, and transparency it was equally critical to address the method of assessment used to apply the standard.

Like the competencies themselves, the assessment process was developed and tested in consultation with a large number of stakeholders – including professional engineers, employers, assessors, potential applicants, recently licensed engineers, and association staff.

3.2.1 Using Competencies

The assessment of competency-based experience records have strong predictive validity (a strong correlation between an assessment rating and future job performance) in comparison to other assessment tools, such as reference checks, years of experience, or education. This assessment process is based on the assumption that past...
performance is the best predictor of future performance and that experience records can provide accurate information about past performance.

Because competencies provide specific criteria and detailed information, they can be used to conduct assessments that are defensible, reliable, valid and accurate. However, the successful deployment of competency-based assessment depends on adhering to a standardized assessment process, and on having the assessment completed by experienced professional engineers who have completed training.

Some of the key characteristics that make competency-based assessment a good fit for the objectives of the Project include:

Criteria
The seven core engineering competencies and their associated behavioural indicators provide clear criteria for assessing an applicant’s engineering work experience and readiness for licensure.

Rating Scale
The competencies are rated using a rating scale of five proficiency levels. Additional factors of context, consistency and level of guidance, are considered to reinforce the rating process.

International best practice in competency assessment has shown that five-level rating scales are more defensible than three-level scales and they provide a higher level of standardization and consistency between assessors. They also reduce rating errors, and increase the reliability and validity of assessments.

Validation
The validator is the person who has first-hand experience of the applicant’s engineering work described in the competency demonstration. In most instances, the validator is a professional engineer and the applicant’s direct supervisor. However, in order to ensure that applicants, particularly foreign-trained applicants, can use experience gained outside of Canada in their competency demonstrations, it is important that validators are not required to be professional engineers. Validators are asked to provide assurance that the applicants’ competency demonstrations accurately describe the event that took place, that the demonstrations are characteristic of ongoing performance, and to report on the level of guidance needed to complete the work described.

Evidence-Supported Decisions
Assessment of past experience is based on the information provided by the applicant. A strong focus on the facts helps to avoid assessment errors.

Two Assessors
Accuracy and defensibility of the assessment ratings are improved by having two assessors independently rate competencies. The assessors then agree on a single final ratings by providing solid justification based on evidence provided by the applicant.

Training
It is critical that assessors complete training to ensure the success and defensibility of the assessment process. Research findings clearly demonstrate that training significantly improves the reliability and validity of assessor ratings.

3.2.2 The Application, Validation and Assessment Process
In order to determine if an applicant has demonstrated the seven competencies required for safe practice, the applicant must submit competency demonstrations in the form of a Report of Engineering Competencies (REC). The REC compiles information about an applicant’s past work experiences and behaviours through written “competency demonstrations.” These demonstrate that an applicant has the competencies required for safe practice as a licensed professional engineer and can be reasonably expected to perform in a similar manner in the future.
There are four steps in the work experience assessment process:

1. Application
2. Validation
3. Assessment
4. Decision on work experience for licensure

**Step 1: Application**

Applicants for licensure are provided with materials and instructions to assist them in using their work experience to demonstrate how they have met each of the core engineering competencies. Applicants are asked to illustrate how they have successfully demonstrated the indicators associated with each competency by describing three situations from their work experience for each competency—a total of 21 competency demonstrations of their engineering work. Applicants are required to write specifically to the indicators and are provided with “benchmark examples,” which are examples that illustrate the best way to do this. It is important to note that applicants are not required to have completed a given number of projects, but instead, may write about the same project as it relates to different competencies. This makes it easier for the assessor to assess one competency at a time.

Applicants are responsible for:
- Choosing situations that best illustrate the indicators that must be demonstrated to satisfy each competency
- Writing competency demonstrations that show how they have met all indicators
- Choosing a validator for each competency demonstration and having all competency demonstrations validated
- Ensuring that their application is complete when submitted to their association

**Step 2: Validation**

All competency demonstrations an applicant develops must be validated prior to submission as part of the application for licensure. The validator is the person who was responsible for the applicant’s work and had firsthand experience with the engineering work described in the competency demonstration. In most instances, the validator is a professional engineer and the applicant’s direct supervisor.

Validators are responsible for:
- Confirming that the competency demonstrations accurately portray the applicant’s roles and responsibilities in the situation(s) described
- Confirming that the competency demonstrations are characteristic of the typical performance of the applicant
- Reporting the level of guidance the applicant required

Note: Validators are not asked to attest to the readiness of an applicant for licensure. This function is performed by assessors, who must be professional engineers.

**Step 3: Assessment**

Applications are assessed by two trained assessors, appointed by the engineering association, who are professional engineers with experience in the applicant’s field of practice. They independently evaluate the three competency demonstrations for each competency using a structured process and assessment criteria. Assessors base their assessment on:
- Whether or not applicants have demonstrated all indicators
- The complexity of the situation in which the competencies were demonstrated
- The level of guidance that the applicant received
- The consistency with which the applicant was able to demonstrate the required indicators

Assessors are trained to make a holistic assessment considering all competency demonstrations in order to determine where an applicant falls on a five-point rating scale for each competency.

Assessors then discuss their independent ratings with a second assessor and agree on final ratings for each of the seven competencies. Applicants must meet all seven competencies to be recommended for licensure.
Assessors are responsible for:
- Reviewing all of the information that applicants submit about their work experience
- Reviewing information provided by validators
- Deciding whether the demonstrated behaviours meet the work experience requirement for each competency

**Step 4: Decision on work experience requirement for licensure**

The final decision to license an applicant as a professional engineer is made by the engineering association. They assemble information on all five requirements for licensure—academics, language, law and ethics, good character and professionalism, and engineering work experience—in order to make their decision.

### 3.2.3 Tools

The materials needed to implement the Competency-Based assessment system have been developed, including guidance documents for applicants, assessors and validators, forms for applicants and assessors, and training materials. Benchmark examples are available to both applicants and assessors to assist in training. The benchmark examples are competency demonstrations from the pilots that have been made anonymous and illustrate what a competency demonstration should look like and what is expected at the “meets requirements” level. All available tools and guidance documents are described in Section 4.4.1: Deployment Toolkit Binder Contents.
The Assessment Process

**Step 1**
Applicant writes 3 competency demonstrations for each of the 7 engineering work experience competencies. A total of 21 competency demonstrations.

**Step 2**
- Applicant submits examples to validator(s)
- Validator(s) review examples and provide comments
- Applicant submits completed and validated Record of Engineering Competencies to association

**Step 3**
- Assessor 1 independently reviews file and makes initial assessment
- Assessor 2 independently reviews file and makes initial assessment
- Assessors reach consensus on joint ratings and submit to association

**Step 4**
- Association consolidates application and makes a final decision on licensure
- Association submits feedback to applicant

**Other Four Requirements for Licensure**
Applicant completes and submits other 4 requirements for licensure
### 3.2.4 Key Considerations

In the development of the assessment process, there were a few key considerations that were put forward as essential to ensuring the viability of the competency-based process within the current engineering association environment. The following table outlines some of these key considerations and the rationale for how they have been addressed in the assessment system.

<table>
<thead>
<tr>
<th>Key Considerations</th>
<th>How the Consideration is Addressed</th>
</tr>
</thead>
</table>
| **Limited Resources**                       | All parts of the assessment process were streamlined to limit the time required by association staff and volunteers, while still ensuring assessments are consistent, transparent and objective. Examples of time-saving measures include:  
• Limiting indicators to only those that are critical to safe practice  
• Requiring applicants to submit the fewest competency demonstrations possible, while still being able to demonstrate all indicators  
• Streamlining forms and reporting structures to minimize the administrative burden placed on assessors |
| **Use of Foreign Work Experience**          | • By allowing that validators do not need to be professional engineers, applicants are able to use experience that was gained outside of a Canadian work environment  
• Validator contact information is still required, allowing associations to follow up when necessary. |
| **Canadian Context**                        | • In order to ensure applicants have demonstrated all competencies in a Canadian context, applicants must submit one competency demonstration in a Canadian context for each of the seven core engineering competencies. |
| **Confidence in Competency Demonstrations** | • All competency demonstrations that are provided by applicants are signed off by a validator that has first-hand experience of the applicant’s work. Validator contact information is provided to enable follow up by the association if needed.  
• Associations maintain their own assessment methods to determine “good character” via references, which would be separate from the assessment of work experience. |
| **Assessment Errors**                       | • Training assessors helps to minimize the common errors of assessment.  
• Associations are recommended to change the pairings of assessors often to ensure consistency across assessors and assessor teams. This can include pairing new assessors with those who are more experienced.  
• A five point rating scale helps define the “meets requirement” line in more detail than a pass/fail assessment process. This improves consistency of assessment. |
| **Underlying Intentions**                   | • Applicants are instructed to write each action with information pertaining to the WHAT, HOW and WHY of their action. This provides assessors a depth of information about the decision making process of the applicant. |
Section 4: Guidance for Implementation

4.1 Adoption of the engineering work experience competencies

The engineering work experience competencies developed during this project were well-received during broad consultation with the associations across the country and pilot tested with two provincial associations. These competencies provide a solid definition of the engineering work experience requirement for licensure and may be adopted by associations for that purpose.

It is worth noting that these engineering work experience competencies are currently being proposed through the Canadian Framework for Licensure initiative and may benefit from closer integration with the other licensure requirements as that work continues.

4.2 Development of an online system

The assessment process validated during this project was based on a small-scale, manual, file-based system of document and process management. Practical deployment of the proposed system requires the development of an online system that at a minimum automates the following:

- Workflow for applicants, validators, staff and assessors.
- Forms and process checklists for applicants and assessors
- Transmission and reception of authenticated applicant and assessor files
- Method for applicants and staff to review status of an application as appropriate

The need for an online system suggests that the most practical next step for Engineers Canada and the associations may be to foster a centrally coordinated effort to develop an online tool that is capable of meeting the needs of the associations to implement the competency-based assessment process.

Such a coordinated effort would require the input of a national steering committee similar to the one in place for this project, broad national collaboration on system requirements, the development and testing of a prototype system and the piloting of the online system in two or more associations to ensure full compliance with requirements. As witnessed on this project, Engineers Canada may once again be well suited to act as a catalyst for national collaboration and day-to-day management of next steps.

Once a suitable online system is available associations could be provided with specific support in their deployment of the automated work experience assessment process to help them with the details of deployment sequencing, policy updates and change management. This would ensure that best practices and lessons learned from all work conducted to that point were exchanged for the mutual benefit of all associations.

The development of an online system should occur in close consultation with APEGBC and APEGM given both these associations have experience in this domain.

4.3 Interim role of the Associations

As noted above, associations may wish to adopt the work experience competencies as the definition of the licensure requirement for engineering work experience while noting that the Canadian Framework for Licensure work is likely to provide tighter integration of all licensure requirements over time.

During the early collaboration phase of any online tool development, associations will have the opportunity to examine their current assessment process in order to understand the nature of any changes needed to adopt a new system, as well as offer any requirements they may have for the online system.
Similarly associations may wish to be proactive in:
- Reviewing their strategies for recruiting and training assessors as more assessors may be required in the future
- Informing their members of the new approach for the assessment of engineering work experience
- Establishing a single point of contact on staff to receive updates on next steps and coordinate collaborative work
- Considering becoming a volunteer pilot site for the online prototype
- Providing a member to the steering committee
- Assessing their current practices to arrive at a transition plan that fits their situation so that this part of the approach is well understood well in advance of implementation (see next section)
- Reviewing their overall admissions processes to investigate how to incorporate the use of engineering work experience competencies and the proposed online tool

**Transition Planning by Associations**

Each association will need to arrive at a transition plan on how they wish to handle pending, current and future applicants as any new assessment system is adopted over time. Early consideration and communication of this intention will make it easier to adopt the system in the future.

While each association’s processes and experiences are unique, in general it is recommended that:
- Applicants who have begun an existing licensure process be allowed to continue that process until a final licensure decision is rendered. This means that associations will be managing two assessment systems during the transition period. Obviously this should be minimized to the extent possible, and a deadline will likely need to be set for those applications which are not being actively pursued by applicants.
- A start date be selected for the transition to the new system and be published widely at least one year in advance so that new applicants are aware of the process they must follow after that date.
- Employers and academic institutions who work closely with the association should be briefed on the transition as soon as the start date for transition is available. Orientation sessions or small workshops could be offered as appropriate.
- Applicants who begin the new process but are unsuccessful remain within the new process and are given the opportunity to submit updated competency demonstrations to demonstrate any competency they missed rather than have to the option to re-try under the old system.
- Associations begin recruiting assessors three to six months before the transition start date and make plans to train their first assessors as close as possible to the time when they need to begin completing assessments. It is recommended that assessors work in teams of two and that these teams rotate at least semi-annually. Assessors would benefit from any opportunity to discuss issues and best practices at least annually.

The Deployment Toolkit binder that is provided separately to this report (contents listed below) captures the communications, deployment processes, and checklists developed during the pilot competency-based assessment process. Associations may use this binder as a source of information on the additional details that may require attention during deployment. The tools in the Deployment Toolkit binder will need to be updated to take into consideration the particular needs of an online system deployment versus the deployment of a manual system as was used in the pilots.

**Communications Planning by Associations**

Based on the experience gained in this project it is strongly advised that associations proactively and extensively communicate the transition to competency-based assessment. Understanding how this new process works can take some time. Associations will be well-served to spend time clarifying the purpose and practicality of the new process with all key stakeholders

Appropriate messaging should be prepared for the following audiences:
- Members of the association
- Association executives and staff
- Provincial / territorial governments
- Volunteer board members and assessors
• Employers
• Potential applicants including new engineers-in-training and engineering students
• Existing applicants (both Canadian and foreign-trained)
• Media
• The public

Pre-deployment communications should include:
• Targeted communications to current and new assessors
• Targeted communications to employers, particularly those supervising engineers-in-training
• General communications to membership
• Updating association websites with general information, frequently asked questions, transition plans to move from existing to new assessment process, and intended roll-out schedule of the new process

Key messages
The Deployment Toolkit binder contains communications support information and a list of frequently asked questions that associations may wish to share with the above audiences at the appropriate time

4.4 Available Documentation: Deployment Toolkit

In order to assist associations in implementing the competency-based assessment process, the materials developed during the project have been compiled into a Deployment Toolkit, available separately. See the specifics of the content below.
## 4.4.1 Deployment Toolkit Binder Contents:

<table>
<thead>
<tr>
<th>Section</th>
<th>Type of Document</th>
<th>Name of Document</th>
<th>Description of Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Guidance Documents</td>
<td>Overview Guide</td>
<td>This guide provides all participants with a short orientation to the competencies and the competency-based assessment concept.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Applicant Guide</td>
<td>In addition to the Overview Guide, applicants will receive this guide to assist them with the preparation of the work experience portion of their application. It provides detailed instruction to the applicant on how to document their work experience appropriately, how to get their competency demonstrations validated and gives a short description of how the assessment of their work experience will be conducted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assessor Guide</td>
<td>In addition to the Overview Guide, assessors will receive this guide as part of their training and to use as a reference as they conduct assessments. This guide covers the basic assessment process, as well as tips for assessment accuracy and step-by-step instructions for assessors conducting an assessment. In addition to this guide, assessors must also receive training on how to conduct assessments in a competency-based system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Validator Guide</td>
<td>This guide clearly describes the role of the validator and makes clear who could act in this role. It provides guidance to validators as they fill out their short questionnaire and gives them contact information in case they need additional assistance.</td>
</tr>
<tr>
<td></td>
<td>Core Engineering Competencies</td>
<td>All pilot participants, as well as the general public, will have access to the complete set of core engineering competencies. They are currently available in Appendix A of this report.</td>
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<tr>
<td></td>
<td>Forms</td>
<td>Competency Demonstration Forms</td>
<td>Applicants will use this form to fill out their 21 competency demonstration. All of the competency demonstrations together are submitted as the applicant’s Record of Engineering Competencies (REC). A signed validator form will accompany each of the applicant’s 21 competency demonstrations.</td>
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<td></td>
<td></td>
<td>Validator Contact Information Form</td>
<td>Each validator must complete a Validator Contact Information Form so that the association is able to contact them with any questions.</td>
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<td></td>
<td></td>
<td>Individual Assessment Form</td>
<td>This form provides a way for assessors to track their ratings for each competency. Assessors use the five-point rating scale found in this form to document their assessment of a competency based on the three competency demonstrations provided by the applicant.</td>
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<tr>
<td></td>
<td></td>
<td>Consensus</td>
<td>After each assessor has completed an individual assessment form, they discuss the assessment together</td>
</tr>
<tr>
<td>Section</td>
<td>Type of Document</td>
<td>Name of Document</td>
<td>Description of Document</td>
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<tr>
<td></td>
<td></td>
<td>Assessment Form</td>
<td>and complete a consensus assessment form, which contains the same rating scale as the individual assessment form. This form captures the consensus rating for a competency, that the assessors come to after discussing their individual ratings and agreeing on a single rating for the competency.</td>
</tr>
<tr>
<td>Assessment Tools</td>
<td>Indicator Checklist</td>
<td>The applicant completes an indicator checklist as part of their application. This form lists all of the indicators for each of the seven competencies and provides checkboxes for the applicant to complete to ensure they have demonstrated each of the indicators at least once across their three competency demonstrations for a given competency. This helps the applicant to ensure that they have submitted a complete application, but is also useful for the assessors to cross-check where the applicant believes they have demonstrated each of the indicators.</td>
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<tr>
<td>Benchmark Examples</td>
<td></td>
<td>The benchmark examples are competency demonstrations from the pilots that have been anonymized and can therefore be used to illustrate to both applicants and assessors what a competency demonstrations should look like and what is expected at the “meets requirements” level.</td>
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<tr>
<td>2</td>
<td>Training Guide</td>
<td></td>
<td>The Training Guide provides a step-by-step account of the training program that was used with assessors in the pilots and provides a short discussion on possible training options for associations going forward.</td>
</tr>
<tr>
<td>Training Material</td>
<td>Assessor Training Deck</td>
<td>This is the power-point presentation that was used during the 2-day face-to-face assessor training sessions in the pilot.</td>
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<tr>
<td></td>
<td>Assessor Orientation Webinars</td>
<td>Before the face-to-face assessor training sessions, the pilot included two orientation webinars for assessors. These presentations have been edited to include any information that may be relevant and reusable for associations going forward.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Suggested Deployment Strategy</td>
<td>Decision Checklist</td>
<td>This checklist highlights all of the decisions that an association will need to make before adopting the competency-based system.</td>
</tr>
<tr>
<td></td>
<td>Deployment Checklist</td>
<td>This checklist outlines the deployment steps that an association could modify to assist them in planning a deployment of the system. It is laid out in a three-step “Ready, Set, Go” approach.</td>
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</tr>
<tr>
<td>4</td>
<td>Communication Material</td>
<td>General Communication Slides</td>
<td>This collection of communication slides has been compiled from various communication decks that were used during the pilot. They may be useful in developing tailored materials to communicate the competency concept, as well as the assessment process.</td>
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<tr>
<td></td>
<td>FAQs</td>
<td>This collection of FAQs is meant to provide much of the background rationale for different elements of the process and to clarify many of the questions that were most frequently asked during the pilot.</td>
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<tr>
<td></td>
<td>Applicant Webinar</td>
<td>This webinar was provided to applicants as an orientation to the pilot and instruction on how to write competency demonstrations. The feedback after the pilot suggested that this orientation was very useful for applicants in writing their competency demonstrations.</td>
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</table>
Section 5: Recommendations and Rationale

5.1 Recommendations of the Steering Committee:

The Steering Committee recommends that the Engineers Canada Board pursue the following actions:

1. Adopt the proposed competencies as the definition of the work experience requirement for licensure as a professional engineer.

2. Endorse the proposed competency-based assessment process as the baseline for national harmonization of the work experience requirement.

3. Support the progressive implementation of the proposed solution by Engineers Canada to:
   • Coordinate the design, development and deployment of an online system.
   • Create a national steering committee to provide oversight for the development of the online tool and implementation by associations
   • Assist each association through the adoption phase

5.2 Rationale

5.2.1 Improved Transparency and Fairness

As noted in Section 2, the key objectives of this project included the need to improve the equity, transparency, consistency and clarity of the assessment process. Through the feedback from the pilots, and careful review by the steering committee, we believe that the competency-based assessment process delivers on all four of these objectives.

Transparency and Clarity
After participating in the pilot, applicants were asked to indicate whether they agreed with two statements in relation to each of the competencies:

a) The competency title, definition and behavioural indicators provided me with a clear understanding of the requirement, and

b) Based on the competency description, I was able to identify relevant examples of my work experience and write competency demonstrations.

For each of the competencies used in the pilot, between 80 and 100 percent of applicants either agreed or strongly agreed with both of these statements, suggesting a high level of clarity of the requirement and the process. Since the pilot, adjustments have been made to improve the clarity of the competencies where one or two applicants indicated some difficulty understanding the requirement. Additionally, the project team received strong feedback from applicants that they were easily able to self-assess based on the material that was made available to them.

The assessment method also improves transparency. Because assessments are conducted based on a clearly defined set of criteria, applicants are better able to understand the requirement and self-assess their engineering competencies. Competency definition and indicators improve the ability of assessors to be precise in their assessments and specific in their feedback. This specificity should make it easier for applicants to gain any additional work experience required before re-applying.

Equity and Consistency

After participating in the pilot, assessors were asked to comment of their experience with the assessment process as it related to equity and consistency. All assessors felt that their ability to be consistent across multiple assessments was improved with the competency-based assessment process. They also felt that the consistency between different assessors would be improved with the new system. Assessors felt that the objective criteria, as
well as the use of the two-assessor system contributed to improved equity and consistency. Finally, all assessors agreed that their level of comfort in making an assessment – both assessments of meets and does not meet – was improved. Multiple assessors commented that the competency based assessment process allowed them to go from being “comfortable” with the accuracy with their assessments to being “confident” that they had made the correct recommendation.

5.2.2 Key Findings and Considerations

Through the pilots, the Competency-Based Project team identified key findings and considerations that associations will need to be aware of in making the decision to adopt the competencies and/or the assessment system.

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Details</th>
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<tbody>
<tr>
<td>Work Experience Standard</td>
<td>Each association needs to be comfortable that the seven core engineering competencies and indicators are the appropriate standard for licensure. For many associations the competencies are a more specific description of the standard than currently exists. By explicitly stating that all seven competencies are required for licensure, and defining each competency with a series of behavioural indicators, associations may: Eliminate any assessment “grey zone” – ensuring that everyone is held to the same, clear standard Improve applicants’ ability to self-assess Improve the defensibility of the assessment process and licensure decision if challenged</td>
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<tr>
<td>Convergence</td>
<td>The seven core engineering competencies provide a baseline reference that allow associations to more easily view and consider how their licensure procedures align with those of other associations.</td>
</tr>
<tr>
<td>Return on Time Investment</td>
<td>Each association needs to consider the time investment required to implement the competency-based assessment process and the return this investment provides on ensuring the standards of the engineering profession. When considering the time investment required, it is important to consider the whole assessment system and all of the different activities that require the time of staff and assessors. In some ways this process will require more time and in other ways it may eliminate steps in current processes, which may save time. The following elements of the proposed system require staff or volunteer time: One time: training or “read-in” time for new assessors Time to train/orient applicants Time assessors spend evaluating applications Assessors and staff committee time Staff and assessors coordination time Staff time to perform checks of the applications (# competency demonstrations, Canadian example, currency of competency demonstrations, writing style, etc.). The ways in which this assessment process might save time will vary depending on the approach currently in use by the association, however the following areas merit consideration: Time assessors spend re-assessing applicants. The competency-based system makes it easier for applicants to self-assess. This will likely reduce unsuccessful applicants. Furthermore,</td>
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</table>
### Consideration | Details
--- | ---
applicants who must re-submit will be able to re-submit only the competency demonstrations that they were unsuccessful with the first time. This should reduce assessor time spent re-assessing applications.

**Assessors and staff committee time.** Both assessors and staff in the pilot felt more confident in the decisions they made using the competency-based assessment method. This confidence, along with the two-assessor system, could reduce and/or eliminate the time that is currently spent in committee.

**Administration time.** This would include time spent by staff and assessors coordinating, filling out paperwork and transmitting files. Once an online tool is available to implement the competency-based assessment method, coordination and administration time could be reduced.

Finally, this time investment needs to be considered in relation to the benefits achieved. These include improved clarity, transparency, equity, consistency, applicant ability to self-assess and assessor confidence.

### Applicant Time Requirement
Applicants in the pilot felt as though the time required to complete the Report of Engineering Competencies – all of their competency demonstrations – was fair and manageable. The feedback indicated that licensure is an important process and that as a one-time process the time requirement was not too much to ask. However, each association would need to consider the time requirement for applicants to ensure that they are comfortable with this commitment.

In the pilots, 57% of applicants said they took an average of less than two hours per example, while 43% said they averaged more than two hours per example.

### Applicant Orientation
One of the strongest findings from the pilots is that applicant orientation and support is both necessary and worthwhile. Applicants require support to be able to write their competency demonstrations in the proper format for assessment within the competency-based process. However, assessors also found that the quality of the applicant submission has an impact on how quickly they were able to assess. This suggested that time invested in orienting applicants may pay off through saved time for assessors.

### Assessor Training
In order for the competency-based assessment process to be applied consistently and equitably, it is critical that all assessors are trained in competency-based assessment. The Deployment Toolkit binder includes more detailed information about how assessor training could be implemented.

### Development of an Online Tool
An online approach will be necessary for the implementation of the competency-based assessment process. Each association will need to participate in the development of this online system in order to ensure it fits their needs.

### Validators and references
One of the key elements that enables the competency-based assessment process is the separation of the role of validators and references. The role of the validator is to:

- a) Confirm that the competency demonstrations accurately portray the applicant’s roles and responsibilities in the situation
- b) Confirm that the competency demonstrations are characteristic of the typical performance of the applicant
- c) Report on the level of guidance the applicant required

The role of the reference is different across associations, but they are often asked to make judgements about an applicant’s readiness for licensure. In comparison, it is important to note that validators need not be professional engineers because they are only asked for
<table>
<thead>
<tr>
<th>Consideration</th>
<th>Details</th>
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<tbody>
<tr>
<td>Yes/no type information and are not asked to judge the quality of the applicant’s work or whether they are ready for licensure. This judgement of the acceptability of an applicant’s engineering work rests with assessors who are professional engineers trained in competency assessment.</td>
<td></td>
</tr>
<tr>
<td>Validators are not required to be professional engineers</td>
<td>In order for this process to be consistent and fair to both Canadian and foreign-trained engineers, it is important that validators do NOT need to be professional engineers. This allows foreign-trained engineers to be able to use work experience from outside of Canada. As mentioned above, it is for this reason that the validator’s role is limited to confirming the accuracy of the applicant’s competency demonstrations and the judgement of whether or not an applicant is ready to be licensed is left to assessor, all of whom are professional engineers.</td>
</tr>
<tr>
<td>Terminal Performance</td>
<td>Competency-based assessment is based on terminal performance at the time of licensure and does not consider progression of an applicant. This is deemed important in a fair and transparent process that is the same for all applicants – both Canadian and foreign-trained. Some associations may choose to engage in a parallel process of interim reporting to ensure engineers-in-training are progressing towards the standard for licensure. This secondary use of the competencies as a parallel tool for measuring progression is an additional benefit outside the scope of this project.</td>
</tr>
<tr>
<td>Interdependencies</td>
<td>The competency-based assessment process has some interdependencies with the other requirements for licensure. Each association will need to consider how this process interacts with each of the other requirements for licensure, such as references and the four-year requirement.</td>
</tr>
</tbody>
</table>
Appendix A: Core Engineering Competencies

Competency A – Apply engineering knowledge, methods and techniques

Engineers are problem solvers. This competency is about solving engineering problems in a systematic way. Engineers define, analyze, and investigate problems so that solutions can be developed, tested and verified. This process is applied to all engineering problems. An “engineering problem” is any challenge that you are faced with that makes you apply your knowledge of engineering principles. When you answer questions like “How do we fix this process?” “How do we make a better product?” “How do we design this component?” you are applying engineering knowledge.

As you approach a project and define the problem, you analyze all relevant data to make sure that you fully understand the issues. Typically there are several possible solutions, but by evaluating them you narrow it down to the preferred one. The solution is developed and tested to make sure that it does satisfy all the original requirements. A key component of this process is evaluating and verifying that the solution interacts as it was intended in the environment for which it was designed.

To demonstrate this competency, think of an engineering challenge that you have faced, and describe how you solved it. What did you do? How did you do it? Why did you do it?

<table>
<thead>
<tr>
<th>A. Apply engineering knowledge, methods and techniques</th>
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<tbody>
<tr>
<td><strong>Definition</strong></td>
</tr>
<tr>
<td>Solves engineering problems using appropriate theoretical and practical engineering principles.</td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
</tr>
<tr>
<td>A1. Defines the engineering problem to be solved.</td>
</tr>
<tr>
<td>A2. Analyses relevant data.</td>
</tr>
<tr>
<td>A3. Identifies alternate solutions based on feasibility, technology and economic assessments.</td>
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<tr>
<td>A4. Develops the solution that best meets system requirements and specifications.</td>
</tr>
<tr>
<td>A5. Tests the solution to verify that it meets system requirements and specifications.</td>
</tr>
<tr>
<td>A6. Evaluates and verifies the practicality and effectiveness of the engineering solution in the environment for which it was designed.</td>
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</tbody>
</table>
Competency B – Use engineering tools, equipment or technology

**Engineers use the right tool for the job.** This competency is about demonstrating that you can use appropriate engineering tools, equipment and technology to solve engineering problems. These include everything from software to earth-moving equipment; from measuring devices to data analyzers, in other words, the engineering tools, equipment and technology that are used in your field of practice. You may use these engineering tools, equipment and technology yourself, or you may supervise their use by others.

For this competency we are not interested in the analysis or solution to the problem, we are interested in **what** you used to solve the problem and how and why you picked those particular tools, equipment or technology over all the available ones. You need to understand the underlying principles behind the tools, equipment or technology that you use, even if you are using a standard one, and provide reasons for selecting them. You need to be able to use what is relevant in your field. It is very important to detail the evaluation that you did before you used the tool, equipment or technology. Detail what you did to check that it was reliable, effective or appropriate for the application, and what you did to check that you were using it within its operating limits. Finally, you need to be able to check that the tool, equipment or technology that you used gave you a reasonable and valid result.

To demonstrate this competency, think of the engineering tools, equipment and technology that you have used and tell us why you used those ones, how you selected them, and what you did to apply them in the solution of engineering problems.

<table>
<thead>
<tr>
<th><strong>B. Use engineering tools, equipment or technology</strong></th>
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<tbody>
<tr>
<td><strong>Definition</strong></td>
</tr>
<tr>
<td>Uses appropriate engineering tools, equipment or technology based on a sound understanding of engineering principles.</td>
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<tr>
<td><strong>Indicators</strong></td>
</tr>
<tr>
<td>B1. Evaluates the reliability, effectiveness and limitations of available tools, equipment or technology for solving engineering problems.</td>
</tr>
<tr>
<td>B2. Selects the appropriate tool, equipment or technology to solve engineering problems.</td>
</tr>
<tr>
<td>B3. Uses, or directs the use of, the appropriate tool, equipment or technology to solve engineering problems.</td>
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<tr>
<td>B4. Verifies that the tool, equipment or technology gave a valid result.</td>
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</table>
Competency C – Protect the public interest

*Engineers protect the public.* This is the primary duty of engineers, and the reason that the practice of professional engineering is regulated. Protecting the public interest is about more than just adhering to legislation, regulation, codes, standards and following the law. It also involves being aware of the risks inherent in engineering work, and of the short- and long-term impacts of engineering activities.

Whether you are working on a job site, or creating new designs, keeping the public safe is an engineer’s professional responsibility. When we talk about the public, we mean anyone who could be affected by your engineering work: your colleagues, yourself, the people who build your products, the people who use your products, and the people who are affected by your products. No matter who you are, or what your position is, when you identify safety concerns it is your responsibility to speak out and take action: you might design a redundancy, change a work procedure, or stop unsafe work.

Engineers must also understand the risks and the short- and long-term impacts inherent to engineering activities, and they must take action to assess, inform, address and mitigate those risks and impacts. These impacts could be environmental, economic, social or issues of sustainability. Consider how your work will impact the physical environment. Which members of society stand to gain or lose from this work? Will your work be sustainable? Will it provide benefits or harm the economy it operates in? Assess those impacts, employing expertise as appropriate, and make sure that decision-makers know what you know. Do others in your field recognize these same impacts?

To demonstrate this competency, think of the engineering work that you do and its safety, risks and impacts – both positive and negative. Tell us what you have done to hold paramount the health, safety and welfare of the public, how you did it, and why you did it. Tell us about the risks and impacts of the engineering work that you have been involved in: what were they? How did you consider them? And why did you do that?

<table>
<thead>
<tr>
<th>C. Protect the public interest</th>
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<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>Practises engineering while safeguarding life, health, property, economic interests, and the environment, with an awareness of the risks and impacts of engineering work.</td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
<td></td>
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<tr>
<td>C1. Adheres to all applicable legislation, regulations, codes, and standards.</td>
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<tr>
<td>C2. Identifies the impacts of engineering activities, both positive and negative.</td>
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<tr>
<td>C3. Ensures that the positive and negative impacts of engineering activities are assessed.</td>
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<tr>
<td>C4. Assesses safety concerns and risks of engineering activities to identify hazards and potential harm.</td>
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<tr>
<td>C5. Takes action to address safety concerns and mitigate risks.</td>
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<tr>
<td>C6. Shares results of assessments with decision-makers.</td>
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Competency D – Manage engineering activities

**Engineers manage work effectively.** For any engineering undertaking that you are assigned, you need to organize and plan how to get the work done before you start it. This can be demonstrated through managing your own engineering work, managing engineering teams, or managing engineering projects. To do this, you have to identify what work is required, what resources are available (other people? money? materials?), and what the limitations are (deadlines? budget?). Having identified these constraints, you can plan how to do the work. You document that plan as a “work plan” – something that explains who will get what done by when, using what resources.

Scope, schedule and budget are examples of common elements of engineering work that need to be monitored and managed by engineers. While you are executing the plan, things can change: budgets may increase or decrease, people may be hired or leave, workloads may increase unexpectedly. You are always looking out for any of these changes that would pose a risk to completing the work, and planning how to manage those risks. To properly manage your projects, you need to adjust your plan, documenting the reasons for changes, and making sure that you can still deliver. Finally you keep stakeholders informed so that they can adjust as necessary as well.

To demonstrate this competency, think about the work that you are responsible for. How did you plan, organize and manage it, keeping records and people informed. What actions did you take and why did you take them?

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<tr>
<th>D. Manage engineering activities</th>
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<tbody>
<tr>
<td><strong>Definition</strong></td>
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<tr>
<td>Plans and organizes engineering activities, monitors progress, and makes adjustments to complete work within constraints.</td>
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<tr>
<td><strong>Indicators</strong></td>
</tr>
<tr>
<td>D1. Seeks clarity of the assigned activities, including identification of constraints such as time, resources, quality or budget.</td>
</tr>
<tr>
<td>D2. Develops a work plan to complete work within identified constraints.</td>
</tr>
<tr>
<td>D3. Adjusts work plan to respond to changing circumstances that could pose a risk to completing assigned activities.</td>
</tr>
<tr>
<td>D4. Keeps stakeholders informed of progress, obstacles and changes to the work plan.</td>
</tr>
<tr>
<td>D5. Keeps records of engineering work and decisions.</td>
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</table>
Competency E – Communicate engineering information

Engineers are communicators. No matter what kind of engineering work you do, you must be able to clearly communicate engineering information to get that work done. Communication is more than just telling. It also involves active listening – making sure that you fully understand others and that they fully understand you. The audience that you communicate with could be your boss, your clients, your colleagues, your direct-reports or even the public. The ways that you communicate include graphically (such as drawings, sketches, schematics, flow diagrams, or 3-D models), in writing (such as mail, email, or reports) and verbally (such as presentations, meetings, or phone conversations).

The first step is to know your audience and make sure your message is tailored to their knowledge and needs. After delivering any message, you ensure that the audience understands with question and answer. You respond to questions and their input in the same way, checking that you understand what the audience is asking before responding.

To demonstrate this competency, think about a time that you communicated or received engineering information. Who was the audience? How did you communicate? How did you make sure that they understood you, and that you understood them?

<table>
<thead>
<tr>
<th>E. Communicate engineering information</th>
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<tbody>
<tr>
<td><strong>Definition</strong></td>
</tr>
<tr>
<td>Effectively communicates engineering information verbally, graphically and in writing</td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
</tr>
<tr>
<td>E1. Tailors communications to the audience.</td>
</tr>
<tr>
<td>E2. Communicates engineering information graphically (formal or informal).</td>
</tr>
<tr>
<td>E3. Communicates engineering information in writing.</td>
</tr>
<tr>
<td>E4. Communications engineering information verbally.</td>
</tr>
<tr>
<td>E5. Uses two-way communication to verify own understanding and the understanding of the intended audience.</td>
</tr>
</tbody>
</table>

Note: Applicants who do not communicate verbally due to a disability would demonstrate “verbal” communication through another interactive form of communication (i.e. sign, voice output communication aids, etc.)
Competency F – Work collaboratively in a Canadian environment

*Engineers work in teams.* Most engineering work in Canada involves teams, and engineers must be able to work with diverse teams. These teams can include formal teams such as project teams, or informal ones such as the team of client, engineer and end-user. The diversity of Canadian teams can include but is not limited to people of different professions, educational backgrounds, genders, levels of seniority in the organization, languages, cultures, etc. Engineers must be able to work professionally with everyone regardless of their expertise, background or title.

The first step in good teamwork is to be willing to share information and expertise with your team members, and to be willing to use the input from them as well. In order for the team to work towards a common goal, you must be able to agree on the goals and the best way to achieve them. As the team works towards its goals, you support each other, and recognize each others’ contributions.

All examples for this competency must be demonstrated in a Canadian environment. To demonstrate this competency, think about a time when you worked with a team. Tell us what you did with the team, why you took the actions you did, and how you worked as a team to achieve the project goals.

<table>
<thead>
<tr>
<th>F. Work collaboratively in a Canadian environment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition</strong></td>
</tr>
<tr>
<td>Practises engineering in a Canadian environment to achieve organizational and project goals in a collaborative manner.</td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
</tr>
<tr>
<td>F1. Shares information, knowledge and expertise with others.</td>
</tr>
<tr>
<td>F2. Assists other team members when needed.</td>
</tr>
<tr>
<td>F3. Considers the input of colleagues at all levels.</td>
</tr>
<tr>
<td>F4. Builds consensus among team members.</td>
</tr>
</tbody>
</table>
Competency G – Maintain and enhance engineering skills and knowledge

*Engineers keep their skills current.* Every day brings new challenges, new technologies, and advances in knowledge that you need to incorporate into your engineering practice. As you develop and seek out new challenges, you need new knowledge, skills and abilities to practise competently and to be successful. The first step is to identify any gaps or learning needs. You may have been asked to do something new, or you may need to learn more to enhance your engineering capabilities. Through activities like self-study, professional readings, experiential learning, coaching, mentoring or even courses, seminars, or conferences, you continue to learn throughout your career.

To demonstrate this competency, think about the new knowledge, skills and abilities you have acquired and why you sought those out. Tell us what you've done to stay current and knowledgeable in your field. Tell us about a time that you realized you needed to learn more, and how you did it. Any learning that was required for you to perform better in your job can be included here, but you must explain how it relates to your engineering work.

<table>
<thead>
<tr>
<th>G. Maintain and enhance engineering skills and knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition</strong></td>
</tr>
<tr>
<td>Takes actions to maintain and enhance proficiency in the practice of engineering activities.</td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
</tr>
<tr>
<td>G1. Takes action to address gaps in knowledge, skills and abilities.</td>
</tr>
<tr>
<td>G2. Keeps current with the dynamic nature of engineering.</td>
</tr>
</tbody>
</table>
Appendix B: Project Steering Committee

The project Steering Committee is made up of:

<table>
<thead>
<tr>
<th>Name</th>
<th>Title, Organization, and Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Steering Committee Members</strong></td>
<td></td>
</tr>
<tr>
<td>Christopher Zinck, FEC, P.Eng.</td>
<td>Steering Committee Chair, Canadian Engineering Qualification Board Atlantic Provinces <a href="mailto:czinck@zcg.com">czinck@zcg.com</a></td>
</tr>
<tr>
<td>Michel Couturier, P.Eng.</td>
<td>Canadian Engineering Accreditation Board Member Engineers and Geoscientists New Brunswick</td>
</tr>
<tr>
<td></td>
<td>Associate Dean, Faculty of Engineering, University of New Brunswick <a href="mailto:cout@unb.ca">cout@unb.ca</a></td>
</tr>
<tr>
<td>Bernard Cyr, Ing.</td>
<td>Ordre des ingénieurs du Québec <a href="mailto:bcyr@oiq.qc.ca">bcyr@oiq.qc.ca</a></td>
</tr>
<tr>
<td>Michael Price, FEC, P.Eng.,</td>
<td>Deputy Registrar – Licensing and Registration, PEO, Ontario <a href="mailto:mprice@peo.on.ca">mprice@peo.on.ca</a></td>
</tr>
<tr>
<td>Tina Maki, FEC, P.Eng.</td>
<td>Director of Registration, APEGS, Saskatchewan <a href="mailto:tmaki@apegs.sk.ca">tmaki@apegs.sk.ca</a></td>
</tr>
<tr>
<td>Bill Santo, FEC, P.Eng.</td>
<td>Director of Registration, APEGA, Alberta <a href="mailto:bsanto@apega.ca">bsanto@apega.ca</a></td>
</tr>
<tr>
<td>Gary Faulkner, Ph.D., FEC, P.Eng.</td>
<td>Board of Examiners, APEGA, Alberta</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:Gary.Faulkner@albertahealthservices.ca">Gary.Faulkner@albertahealthservices.ca</a></td>
</tr>
<tr>
<td>Paul Blanchard, FEC, P.Eng.</td>
<td>Canadian Engineering Qualification Board, British Columbia &amp; Yukon Territory <a href="mailto:jaguar@netbistro.com">jaguar@netbistro.com</a></td>
</tr>
<tr>
<td>Gillian Pichler, FEC, P.Eng.</td>
<td>Director, Registration, APEGBC, British Columbia <a href="mailto:gpichler@apeg.bc.ca">gpichler@apeg.bc.ca</a></td>
</tr>
<tr>
<td><strong>Honorary Steering Committee Members</strong></td>
<td></td>
</tr>
<tr>
<td>Pauline Lebel, P.Eng</td>
<td>Manager Licensure, PEO, Ontario <a href="mailto:plebel@peo.on.ca">plebel@peo.on.ca</a></td>
</tr>
<tr>
<td>Allison Brownlee</td>
<td>Project Manager, APEGBC <a href="mailto:abrownlee@apeg.bc.ca">abrownlee@apeg.bc.ca</a></td>
</tr>
</tbody>
</table>