# Session E.2: Evaluating A Program Improvement Process

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# EGAD Project

## WHO

Engineering educators and educational developers across Canada (~10 people)

## MANDATE

Supported by national deans council and CEAB

Collect and develop resources and training

Workshops

The goal of EGAD:

To help develop a **quality collaborative process for program improvement** that also (deliberately) meets CEAB requirements for Graduate Attribute assessment & Continuous Improvement.

# EGAD Six-Step Process



2 **Mapping**
the Curriculum

3 **Collecting**
the Data

1 **Defining**
Program Objectives and Indicators

4 **Analysing**
and Interpreting the Data

6 **Managing**
and Implementing Change

5 **Improving**
Curriculum and Processes

# Part I: Outcomes Assessment
# Part II: Continuous Improvement (CI) Overview

# Goals of Part I of the workshop:

**1** To simulate a portion of the review process from an outside observer's perspective using case studies.

**2** To examine examples of CEAB's Exhibit 1 and discuss assessment tools

**3** To help you discover useful information you can apply to your own program

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# Questionnaire for Evaluation
# of an Engineering Program - Exhibit 1

**Sample response by:**

University of Canada

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Name of Higher Education Institution

Handwavium Engineering

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Program name

# CEAB's CEAB (draft) rubric 3.1 - GAs

| 3.1 | Graduate Attributes: | Accreditation Criteria and Procedures Description | Rating | Assessment Category Descriptors |
|---|---|---|---|---|
| | | | | Quantitative definitions: - almost all (at least 10) - many (at least six) - some (at least two) |
| | 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 process by faculty members and engineering leadership. | A | Strong organizational structure in place to assure sustainable development, measurement and review of GAs **AND** clear evidence of engagement by faculty and leadership. |
| | | | M | Weak organizational structure in place to assure sustainable development, measurement and review of GAs **AND/OR** limited evidence of engagement by some faculty and/or leadership. |
| | | | U | No effective organizational structure in place to assure sustainable development and measurement of GAs **AND/OR** no evidence of engagement by most faculty and/or leadership. |
| | 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. | A | Sufficient number of learning activities/courses (at least three per attribute) mapped with respect to GAs and program semesters |
| | | | M | Insufficient number of learning activities (less than three per attribute) mapped with respect to GAs and program semesters for some GAs |
| | | | U | Entries for at least one GA are missing from the curriculum map **AND/OR** only a single assessment point measured for some GAs. |
| | 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. | A | Corresponding indicators are well-alligned for almost all GAs **AND** indicators span all important GA components for almost all GAs (see note 1) **AND** indicators are consistent with expectations for an engineering graduate for almost all GAs (see note 2) **AND** number of indicators consistent with assuring a sustainable data collection program for almost all GAs. |
| | | | M | Misalignment of corresponding indicators with some GAs **AND/OR** indicators corresponding to at least one important GA component for some GAs **AND/OR** indicators are inconsistent with expectations for an engineering graduate for some GAs **AND/OR** number of indicators inconsistent with assuring a sustainable data collection program for some GAs. |
| | | | U | Misalignment of corresponding indicators with many GAs **AND/OR** indicators corresponding to at least one important GA component for many GAs **AND/OR** indicators are inconsistent with expectations for an engineering graduate for many GAs |
| | 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 cyle of six years or less. | A | Selection of sufficient and appropriate tools for all GAs **AND** rationale for selection of assessment tools for all GAs is documented **AND** expected achievement levels are appropriate to the stage of the program for all GAs |
| | | | M | Selection of insufficient or inappropriate assessment tools for some GAs **AND/OR** rationale for selection of tools for some GAs is inadequately documented **AND/OR** expected achievement levels are inappropriate to the stage of the program for some GAs. |
| | | | U | Selection of insufficient or inappropriate assessment tools for many GAs **AND/OR** rationale for selection of tools for many GAs is inadequately documented **AND/OR** expected achievement levels are inappropriate to the stage of the program for many GAs. |
| | 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 the graduates of a program possess the attributes or that remedial action is in progress. | A | Assessment results compiled and documented for almost all GAs over a cycle of six years or less **AND** results are able to demonstrate appropriate levels of achievement for almost all GAs. |
| | | | M | Assessment results not compiled and documented for several GAs over a cycle of six years or less **AND/OR** results insufficiently demonstrate appropriate levels of achievement for some GAs. |
| | | | U | Assessment results not compiled and documented for most GAs over a cycle of six years or less **AND/OR** results insufficiently demonstrate appropriate levels of achievement for many GAs. |

Note 1: "GA component" – a component of the attribute description in section 3 of the "Accreditation Criteria and Procedures" (e.g. mathematics is a component of the knowledge base description)

Note 2: "Performance Levels" – a scale of descriptors of the performance corresponding to an individual indicator. Performance levels for a coherent group of indicators corresponding to individuals are aggregated to measure graduate attribute achievement levels.

| | 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 cyle of six years or less. |
|---|---|---|

| A | Selection of sufficient and appropriate tools for all GAs **AND** rationale for selection of assessment tools for all GAs is documented **AND** expected achievement levels are appropriate to the stage of the program for all GAs |
|---|---|
| M | Selection of insufficient or inappropriate assessment tools for some GAs **AND/OR** rationale for selection of tools for some GAs is inadequately documented **AND/OR** expected achievement levels are inappropriate to the stage of the program for some GAs. |
| U | Selection of insufficient or inappropriate assessment tools for many GAs **AND/OR** rationale for selection of tools for many GAs  is inadequately documented **AND/OR** expected achievement levels are inappropriate to the stage of the program for many GAs. |

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# CEAB's CEAB (draft) rubric 3.1 - GAs

| | | 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 the graduates of a program possess the attributes or that remedial action is in progress. |
|---|---|---|
| | **Assessment results** | |

| | |
|---|---|
| **A** | Assessment results compiled and documented for almost all GAs over a cycle of six years or less **AND** results are able to demonstrate appropriate levels of achievement for almost all GAs. |
| **M** | Assessment results not compiled and documented for several GAs over a cycle of six years or less **AND/OR** results insufficiently demonstrate appropriate levels of achievement for some GAs. |
| **U** | Assessment results not compiled and documented for most GAs over a cycle of six years or less **AND/OR** results insufficiently demonstrate appropriate levels of achievement for many GAs. |

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# Task 1 (10 minutes): Read and Evaluate

☑ Read the provided Exhibit 1 from the perspective of an outside observer (i.e. a reviewer).

☑ Individually review your Exhibit 1 document and evaluate using rubric 3.1

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# Task 2 (10 minutes): Discuss

- ☑ At your table, discuss your Exhibit 1 document and evaluation

- ☑ Collectively evaluate each item of Exhibit 1 according to the rubrics

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# Task 3 (15-20 minutes):
## Jigsaw

☑ Move to a new table, partner with others who looked at Exhibit 1 for another institution.

☑ Complete an abridged **SWOC** analysis.

**Strengths:** what does each school do well?

**Weaknesses:** what does each school need to fix?

**Opportunities:** what could each school do to enhance GA assessment?

**Challenges:** what challenges does each program face with respect to GA assessment?

☑ De-brief with the whole group

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# Part II: Continuous Improvement (CI) Overview

# Goals of Part II of the workshop:

**1**    See example descriptions of the continuous improvement process from four institutions:
- University of British Columbia
- University of Victoria
- University of Guelph
- Queen's University

**2**    Evaluate these processes and identify strengths and weaknesses using the CEAB rubric.

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# CEAB's (draft) rubric 3.2 - CI

| 3.2 | Continual Improvement: | Accreditation Criteria and Procedures Description | Rating | Assessment Category Descriptors |
|---|---|---|---|---|
| | Improvement process | There must be processes in place that demonstrate that program outcomes are being assessed in the context of graduate attributes, and that the results are validated, analysed and applied to further development of the program. | A | Process (committees, annual cycle, authority, reporting) is in place **AND** process is adequately documented |
| | | | M | Process for continual improvement has some inadequate components **AND/OR** process documentation is limited |
| | | | U | Process for continual improvement is not in place **AND/OR** process is not adequately documented |
| | Stakeholder engagement | There must be demonstrated engagement of stakeholders both internal and external to the program in the continual improvement process. | A | Stakeholders broadly selected (e.g. internal:students, program faculty, engineering faculty; external: non-engineering faculty, alumni, engineering professionals, other professionals, employers, learned societies, etc.) |
| | | | M | Stakeholders narrowly selected (some internal and some representation) **AND/OR** stakeholder roles in the improvement process is inadequately demonstrated. |
| | | | U | Stakeholders insufficiently selected (e.g. only program faculty) **AND/OR** stakeholders are not specified |
| | Improvement actions | There must be a demonstration that the continual improvement process has led to consideration of specific actions corresponding to identifiable improvements in the program and/or its assessment process. **This criterion does not apply to new programs.** | A | One or more program-level/process change action(s) implemented **AND** timelines and accountability for changes documented |
| | | | M | Program-level/process change action(s) implementation in progress **AND/OR** timelines and accountability for changes not yet assigned **AND/OR** rationale for decisions not to act yet to be developed. |
| | | | U | No program-level/process change actions implemented **AND/OR** no timelines and accountability for changes assigned **AND/OR** no rationale for decisions developed . |

# Task 3 (20 minutes): Listen and E

**1** Listen to examples of the continuous improvement process at four different institutions

**Take notes!**

**2** Each person at your table is in charge of one dimension from the CEAB's Continuous Improvement (CI) Rubric. Evaluate the strengths and weaknesses using your dimension

**3** Discuss with people at your table who have evaluated the processes using a different dimension, to get a complete picture of each continuous improvement process according the CEAB rubric.

**4** Report to larger group.

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Peter Ostafichuk

# Improvement process

- Graduate attribute assessment is being built into core, attribute-rich courses at all year levels

    - e.g. design courses, labs, communication courses, etc.

    - Extensive use of rubrics integrated with LMS

    - Data collection becoming part of normal operation of course

    - Data analysis still on "as needed" basis, but moving towards three-year rotating cycle

- Review of most recent data is currently underway with design and lab instructors and the curriculum committee

- Review of Attribute 1 will take place with the full department this fall; more attributes will come later

# Stakeholder Engagement

- Internal program engagement processes

  - Program course review meetings at the end of each term

  - Multiple student focus groups each term

  - Regular course- and program-level surveys

  - Faculty retreat

- External program engagement processes

- Little interaction with stakeholders is currently based on graduate attributes data – this will increase once we have a more complete data set
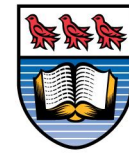
# Improvement Actions

| | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 |
|---|---|---|---|---|---|
| Process | | Indicators updated | Introduce "assessment strength" metric | | |
| | | External review | | | |
| 1st year | Review of 1st year curriculum | New courses introduced | | | |
| | | Review of MATH / PHYS | | MATH/PHYS to be updated | |
| 2nd year | | | | | |
| 3rd year | | Review lab course; develop new course | | New lab course to be delivered | |
| | | | Review machine design courses | | |
| 4th year | | Rubrics and assessments reviewed | | Rubrics and assessments to be updated | |

*Margaret Gwyn*

# Improvement process

University
of Victoria

- Course-level data is collected every term and compiled into annual GA Assessment Reports

- The time-line for the CI process is:

  - July : Report produced by Faculty's Accreditation Analyst (covering Summer to Spring terms)

  - August:  Review of GA Assessment report  by Faculty and External stakeholders at the Department summer retreat.

  - Monthly meetings: decision-making on curriculum changes through meetings of the Department Curriculum committee.

- Responsibility for CI process rests with the Department Curriculum Committee. Actions necessary to achieve improvements may need to be taken by individual faculty, the Department Chair or within the wider Faculty.

# Stakeholder engagement
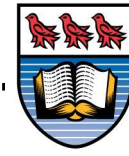
- Departmental Curriculum Committee provides broad representation:
  - Faculty
  - Laboratory Supervisor
  - Department Administrative Office
  - Department Secretary
  - Undergraduate Academic Advisor
  - Faculty Co-Op Liaison for Civil Engineering
  - Student representative.

- External stakeholders have been engaged as part of on-going program development:
  - Partner with a building consulting company with provincial government experience and strong track record in environmental advocacy
  - Owner of a water resources consulting company
  - Professor of Environmental Studies
  - Director of Engineering with a municipal government

# Stakeholder engagement

Stakeholders have preferred to engage in broader "Big Picture" discussions about the program, although we have introduced them to the assessment of GAs.

As further data is collected and stakeholders become familiar with the assessment process then more granular discussions may result.
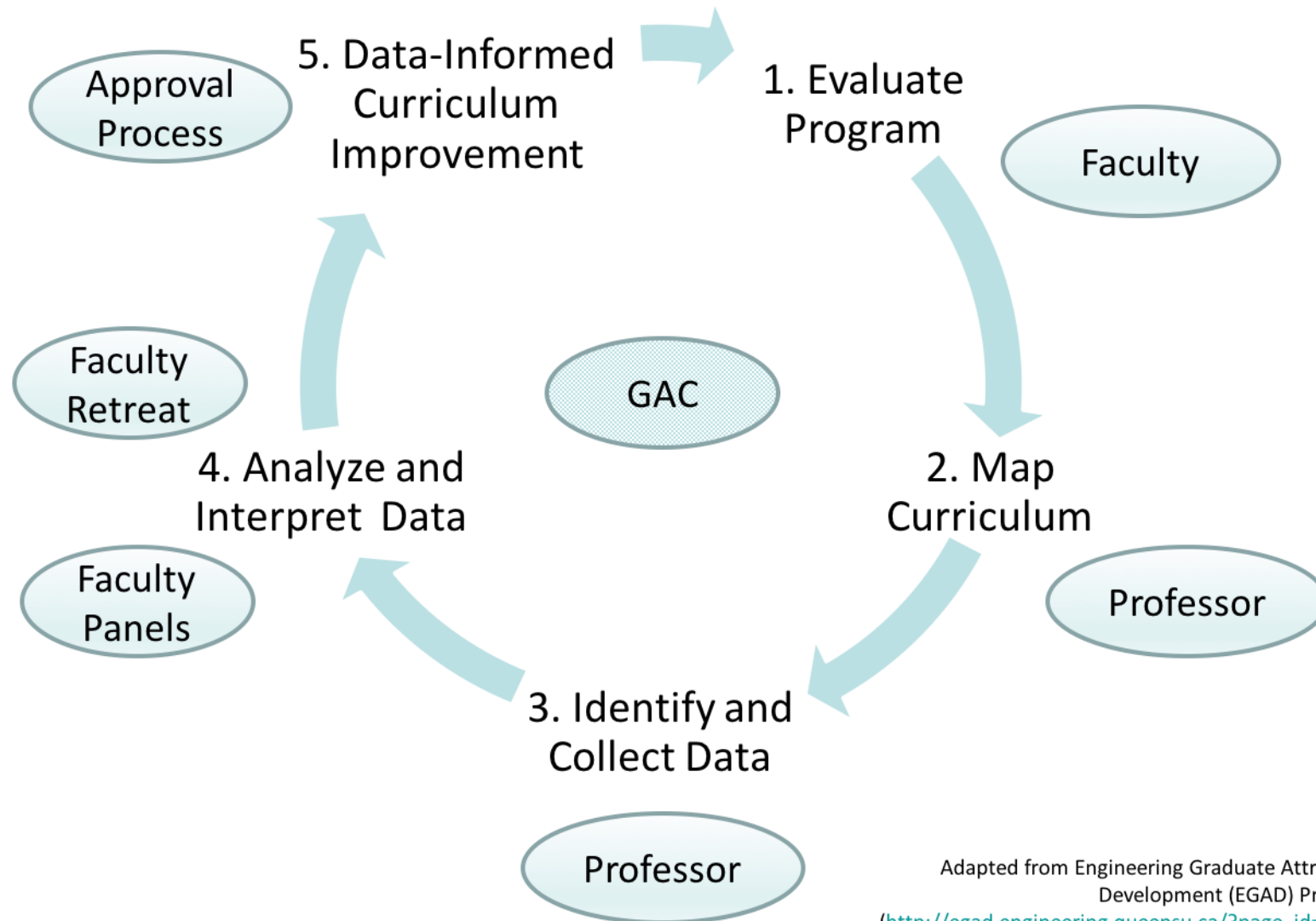
# Improvement actions

- Assessment of data focus is on percentage of students meeting or exceeding acceptable performance thresholds

- Our instinct is to first act upon attributes (and levels) where the percentage of students achieving acceptable performance is below 70%. Over time, with continual improvement we will raise this bar.

- We also act when we observe a discrepancy between assessments performed by different assessors (e.g., instructor assessment versus student self-assessment)

- We need to collect several years of data before making substantial changes. The timeline for making changes is 3 to 5 years.

# UNIVERSITY of GUELPH

*John Donald*

# Improvement Process

5. Data-Informed Curriculum Improvement

Approval Process

1. Evaluate Program

Faculty

Faculty Retreat

GAC

4. Analyze and Interpret Data

2. Map Curriculum

Professor

Faculty Panels

3. Identify and Collect Data

Professor

Adapted from Engineering Graduate Attribute Development (EGAD) Project (http://egad.engineering.queensu.ca/?page_id=857)

# Identify and Collect Data/Student Work

- Student Work & Learning Outcome Assessment (LOA) Form
  - Every semester, every ENGG course
  - Identify assessments, data and supporting docs
  - Example Form – ENGG*2120 – Material Science (handout)

- Use CourseLink (D2L Brightspace) LMS as key database
  - Assessment rubrics/grades associated to GA Indicators
  - Course work captured in Dropbox where appropriate
  - Results consolidated for Faculty panels.

# Recommendation Approval/Tracking

## Approval



SOE FLOW CHART FOR ANALYSIS OF GRADUATE ATTRIBUTE DATA & CURRICULUM IMPROVEMENT
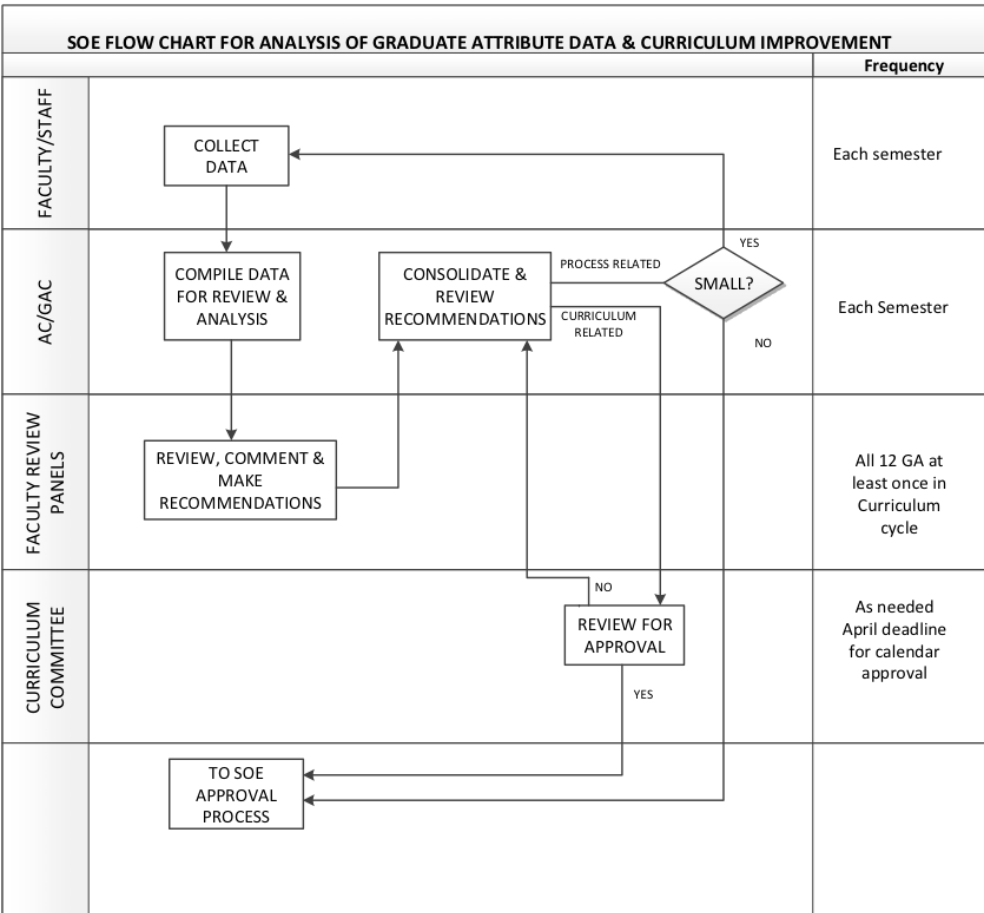
## Tracking

- Ticket tracking approach
  - RTracker – link  (open source)

- Status categories
  - New – Not yet reviewed
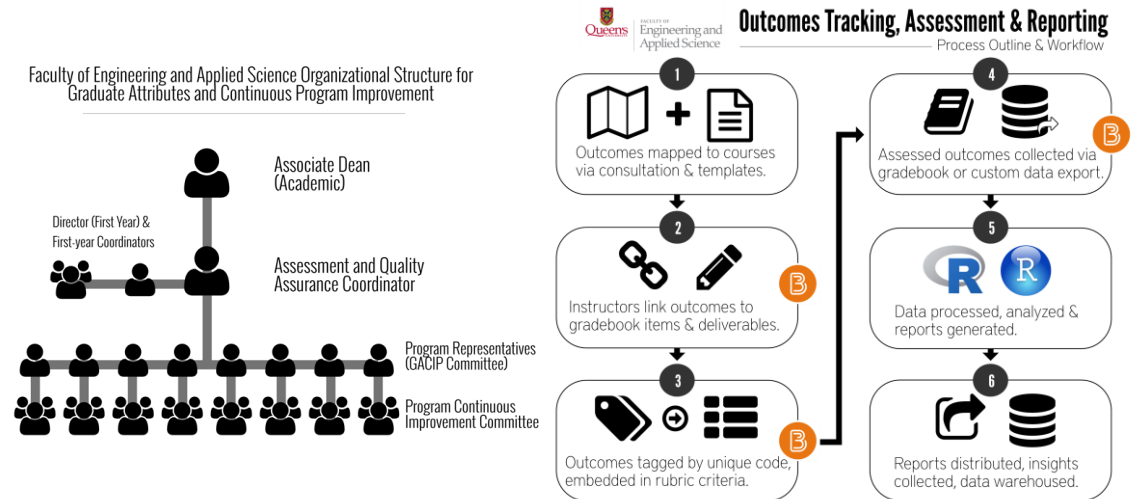  - Open – In progress
  - Stalled – Reviewed, on hold
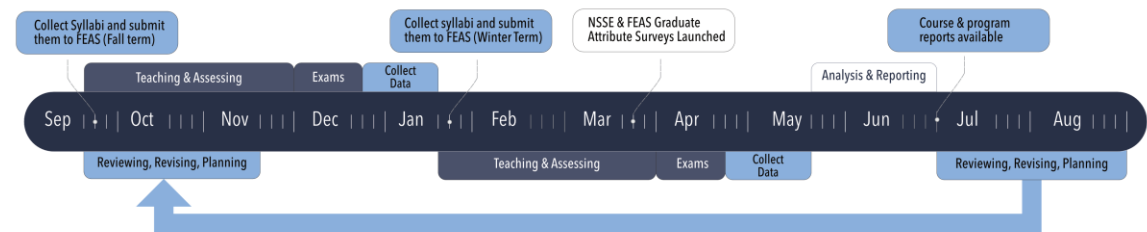  - Resolved – Completed

*Jake Kaupp*

# Improvement Process

- GA efforts linked to core curriculum and EDPS sequence courses.

- LMS used for assessment and data collection

- Data centrally processed via custom open-source tools by AQA

- **Program GA Committee** reviews data annually, consults with instructors, and **GACIP committee** and flags notable items

- **Program** enacts changes on its own accord. Major curriculum changes require Faculty Curriculum Board approval

- Processes managed by programs, with the AQA coordinating FEAS and program efforts



Faculty of Engineering and Applied Science Organizational Structure for Graduate Attributes and Continuous Program Improvement



Outcomes Tracking, Assessment & Reporting
Process Outline & Workflow

1. Outcomes mapped to courses via consultation & templates.
2. Instructors link outcomes to gradebook items & deliverables.
3. Outcomes tagged by unique code, embedded in rubric criteria.
4. Assessed outcomes collected via gradebook or custom data export.
5. Data processed, analyzed & reports generated.
6. Reports distributed, insights collected, data warehoused.



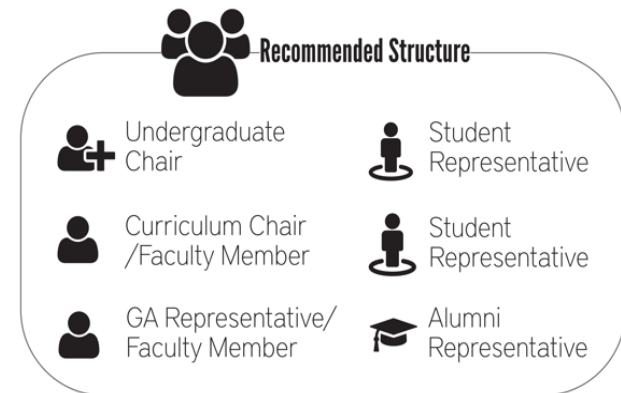FEAS Graduate Attribute Timeline

# Stakeholder engagement

- Student and Alumni representation is encouraged on each programs GA committee.

- **Faculty level** employer engagement provided by an annual session with prominent employers of graduates.

- **Faculty level Student-survey** of competence and perception of GA development is conducted annually.

- Many **programs** establish their own connections with their unique stakeholder groups.

- Data is shared **with stakeholder groups** and their input and interpretation is collected.

- Many **programs** conduct their own exit surveys, and have added GA related sections

- **Smaller programs** hold targeted focus groups related to program improvement and quality



**Governance of Continuous Improvement Processes**

This is a key aspect that CEAB visiting teams are looking for in programs. The expectation is that there is a **committee** in place **to mange the process** and **has the authority to enact changes to programs based on data.**

Recommended Structure

- Undergraduate Chair
- Curriculum Chair /Faculty Member
- GA Representative/ Faculty Member
- Student Representative
- Student Representative
- Alumni Representative

# Improvement actions



Graduate Attribute Course Report: ENGR 460

Jake Kaupp
2017-03-16

1 Introduction

The following is a course-level report on the Graduate Attribute Assessment and Continuous Improvement Process efforts in ENGR. It should help provide a view into the performance of each cohort and potentially reveal some aspects of the program that could be considered for future improvement.

2 Graduate Attribute Overview

The following chart represents the aggregate student performance on each indicator for each graduate attribute assessed in the course. Each data point represents the mean score achieved for a single indicator for each respective attribute. The points are horizontally dodged to reduce over plotting, with dividing lines showing the bounds for each performance category. The chart is interactive, and displays additional details when you hover over each point.
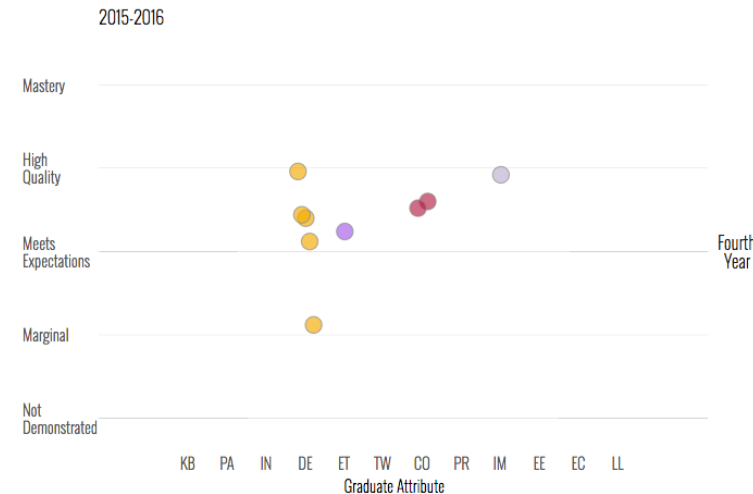
- Early focus of the programs actions are on building trust and reliability in the data

- Early stages also focus on how to address variability in indicator

- Programs to operate on delayed improvement cycle.
  - Flag items of note, keep records and reflect
  - Collect more data
  - Compare flags to the next set of data.
  - Determine if change is necessary or more data required.

- Programs are focused on how well students are doing relative to their targets, at the scale of the overall cohort.

- Programs encouraged to us reliable data sources to triangulate student performance (NSSE, External Assessment, Specialized Projects)

# Task 3 (20 minutes): Listen and E

**1** Listen to examples of the continuous improvement process at four different institutions

**Take notes!**

**2** Each person at your table is in charge of one dimension from the CEAB's Continuous Improvement (CI) Rubric. Evaluate the strengths and weaknesses using your dimension

**3** Discuss with people at your table who have evaluated the processes using a different dimension, to get a complete picture of each continuous improvement process according the CEAB rubric.

Report to larger group.

**4**

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# Questions and Comments