Building Trust and Reliability in GA Processes

Session 1 – University of Moncton Workshop 2017

Brian Frank
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Administrative issues

Slides, handouts and any material highlighted in the presentation will be posted to the EGAD website later. However, everything is available now at:

http://bit.ly/EGADMoncton

Interactive – feel free to ask/comment throughout.

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

egad.engineering.queensu.ca

EGAD Project | Engineering Graduate Attribute Development Project

HOME   ACCREDITATION RELATED RESOURCES   CONTINUOUS PROGRAM IMPROVEMENT RESOURCES   EGAD RESOURCES   CONTACT   GLOSSARY

A 5 Step Guide To Curriculum Development

Welcome

The EGAD Project group has designed a 5 step guide which parallels the stages and steps involved when undertaking a systematic program review – particularly useful, we think, for faculty members, curriculum teams and others preparing for accreditation visits from the CEAB.

Each step consists of a learning module containing information relevant to some aspect of outcomes-based program review. The intention isn't to influence your institution's approach to program review but rather to highlight some of the key elements of a comprehensive review, highlighting the approaches and tools being used successfully by some of the schools across the country. And, using the CEAB accreditation questionnaire as a guide, we've also been very careful to use CEAB-compatible language and share processes that align well with what CEAB site teams are likely to be looking for.

egad-redesign.engineering.queensu.ca

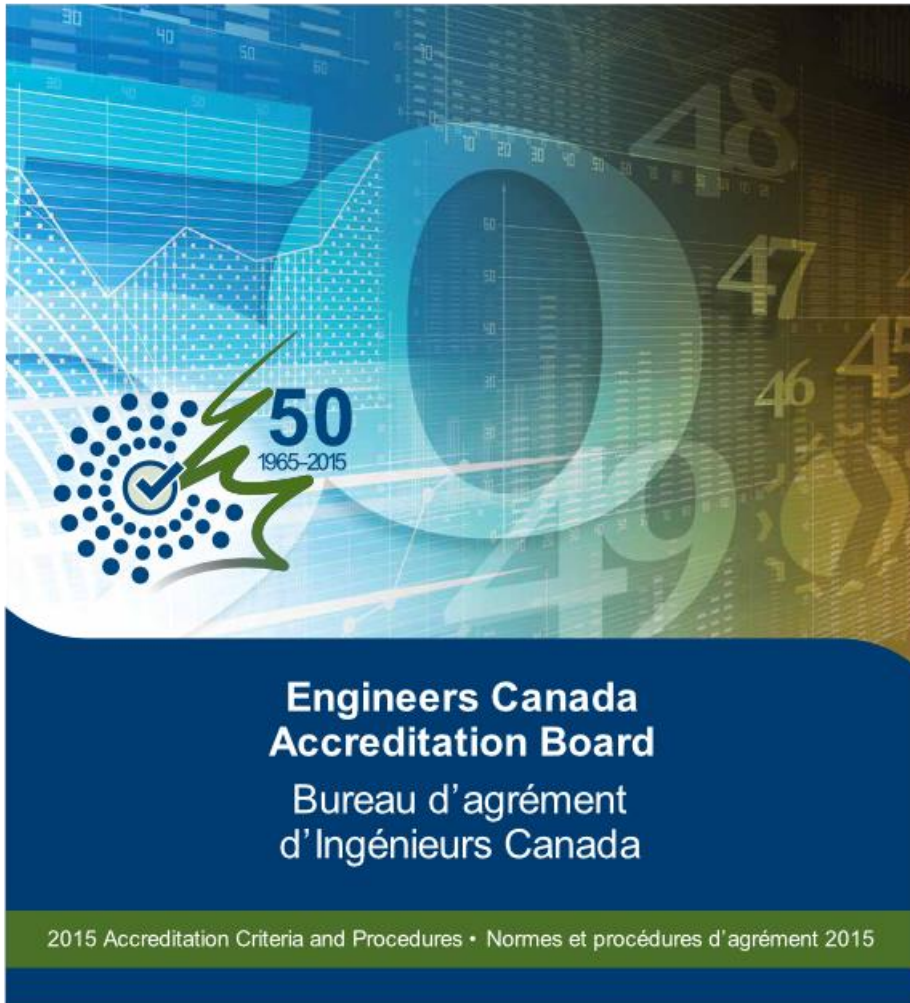Supporting Canadian engineering programs in the development of effective continuous program improvement practices

EGAD 6-Step Guide

Having conducted workshops on university campuses across the country, as well as experiencing our own program reviews, the EGAD group has developed the 6 Step Guide to provide a concise summary of relevant information to consider when approaching the challenge of developing the approach to outcomes based assessment that will be best suited to your particular institution.

CEAB Reporting Requirements

Engineers Canada / Ingénieurs Canada

Engineers Canada Accreditation Board
Bureau d'agrément d'Ingénieurs Canada

2015 Accreditation Criteria and Procedures • Normes et procédures d'agrément 2015

a) **indicators** that describe specific abilities expected of students

b) A **mapping** of where attributes are developed and assessed within the program

c) Description of **assessment tools** used to measure student performance (reports, exams, oral presentations, ...)

d) **Evaluation** of measured student performance relative to program expectations

e) a description of the **program improvement** resulting from process
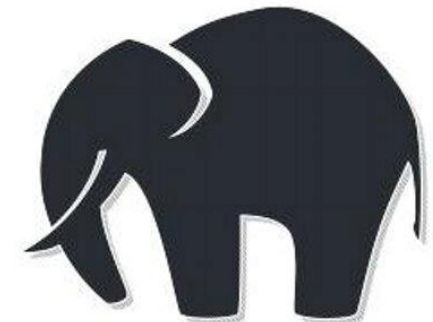
Our goal

Help develop quality collaborative process for program improvement that also (deliberately) meets CEAB requirements for
 Graduate Attribute assessment
 &
 Continuous Improvement

Outcomes-based assessment means...

1 **Developing clear descriptions** of what students should be able to do in a course, program, or institution

2 **Measuring** student performance

3 **Using data** to improve quality of the learning environment

Why learning outcomes?

- Assessing and improving quality of learning
- Space planning
- Student services and academic support planning

Responding to needs including...

- Pressure for accountability
- Mobility, credit transfer
- Multiple modes of delivery

What is the value of identifying learning outcomes/indicators?
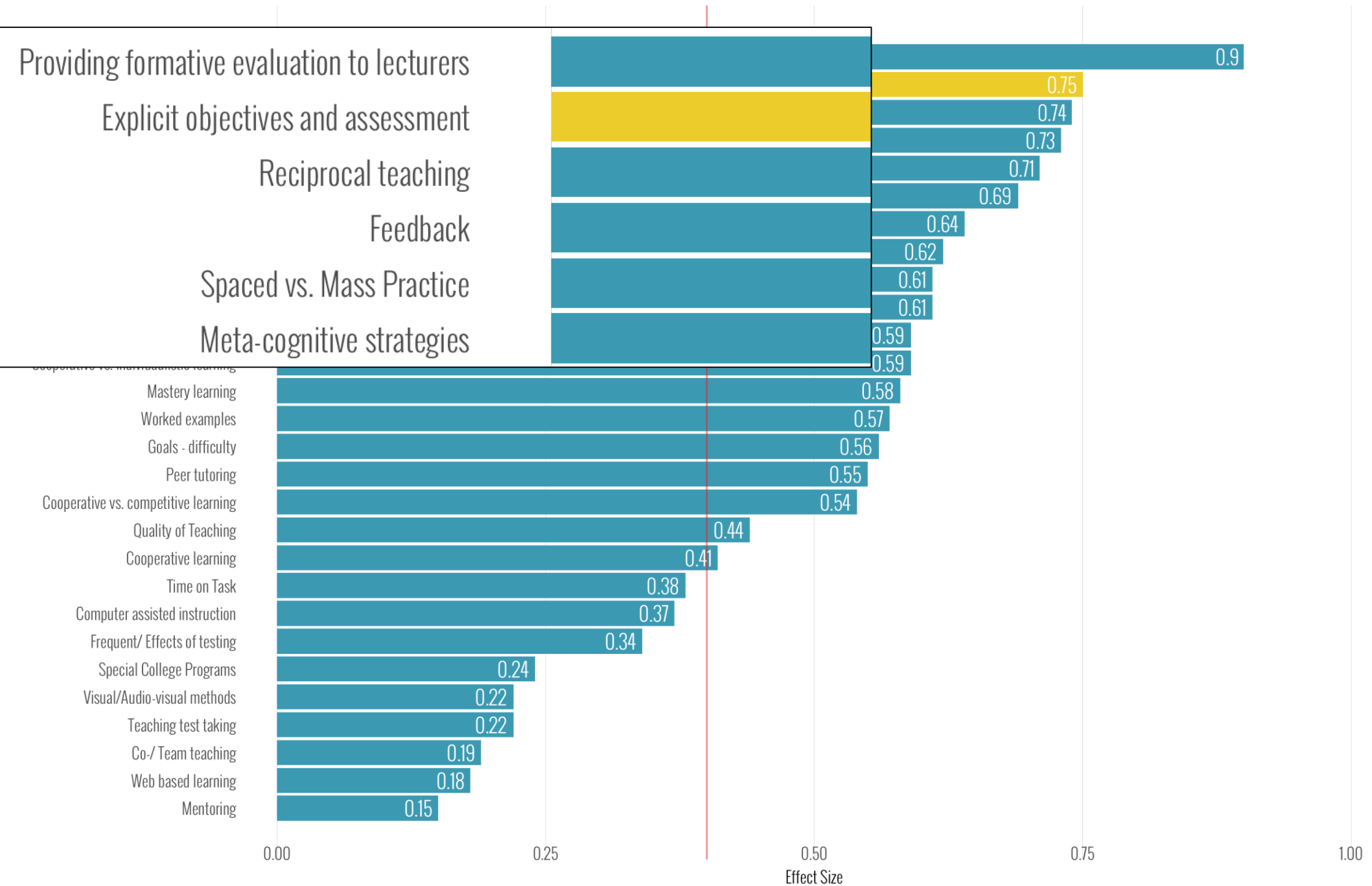
A study synthesizing:

800 meta-analyses

50,000+ studies

200+ million students

found that explicit outcomes and assessment has one of the largest effects on learning...

Hattie, J. (2009). The Black Box of Tertiary Assessment: An Impending Revolution. In L. H. Meyer, S. Davidson, H. Anderson, R. Fletcher, P.M. Johnston, & M. Rees (Eds.), Tertiary Assessment & Higher Education Student Outcomes: Policy, Practice & Research (pp.259-275). Wellington, New Zealand: Ako Aotearoa

Teaching influences on student learning

Influence by Effect Size (gain in SD)

Influence	Effect Size
Providing formative evaluation to lecturers	0.9
Explicit objectives and assessment	0.75
	0.74
Reciprocal teaching	0.73
	0.71
Feedback	0.69
	0.64
Spaced vs. Mass Practice	0.62
	0.61
Meta-cognitive strategies	0.61
	0.59
Cooperative vs. individualistic learning	0.59
Mastery learning	0.58
Worked examples	0.57
Goals - difficulty	0.56
Peer tutoring	0.55
Cooperative vs. competitive learning	0.54
Quality of Teaching	0.44
Cooperative learning	0.41
Time on Task	0.38
Computer assisted instruction	0.37
Frequent/ Effects of testing	0.34
Special College Programs	0.24
Visual/Audio-visual methods	0.22
Teaching test taking	0.22
Co-/ Team teaching	0.19
Web based learning	0.18
Mentoring	0.15

Effect Size: 0.00   0.25   0.50   0.75   1.00

Hattie, J. (2013). Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement. Routle

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

Updates to materials required for CEAB visits:

Context, reasoning, justifications for indicators, mapping, tools, results (Exhibit 1).

Clear governance, use of data, interpretation and triggers for action for continuous improvement (Exhibit 1).

How courses will develop attributes across programs, and how they assess them (Onsite Materials A2)

Results clearly presented and used by programs (Onsite Materials: GA Dossier)

Safety and Procedures and Safety culture (Onside Materials: Safety Manuals and Procedures)

Programs usually start by thinking about:

a) **indicators** that describe specific abilities expected of students

b) A **mapping** of where attributes are developed and assessed within the program

c) Description of **assessment tools** used to measure student performance (reports, exams, oral presentations, …)

d) **Evaluation** of measured student performance relative to program expectations

e) a description of the **program improvement** resulting from process

Those are simply steps to support:

A Sound, well-planned and flexible approach.

&

Effective Change Management

A Sound, well-planned and flexible &pproach.
Effective Change Management

Borrego, M., & Henderson, C. (2014). Increasing the Use of Evidence-Based Teaching in STEM Higher Education: A Comparison of Eight Change Strategies. *Journal of Engineering Education*, *103*(2), 220–252. https://doi.org/10.1002/jee.20040

Herman, G. L., & Loewenstein, J. (2017). Evidence-Based Change Practices. *Journal of Engineering Education*, *106*(1), 4–13. https://doi.org/10.1002/jee.20152

Culture eats strategy for breakfast[1].
And then snacks on poorly chosen tools.

[1]Peter Drucker

Build a good
change management process,
then select tools to support it.

(not the other way around).

Meeting these requires:
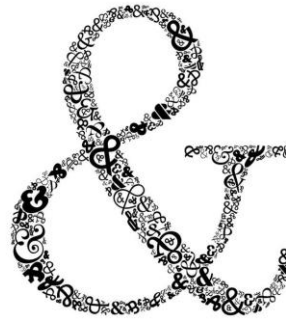
TRUST

&

Reliability

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

Session 3: Oversight co

Goals of Session 1 of the workshop

1 Introduce the EGAD 6 step process for continuous program improvement

2 To help you develop approaches to measuring, mapping and interpreting graduate attributes

3 To help you develop approaches to build trust in your data to draw meaningful conclusions.

Graduate Attribute

Graduate attributes are the qualities, skills and understandings students should develop over a program, as set by the **profession**.

Indicator

Indicators are **program** level learning outcomes that describe what the student should demonstrate for an attribute

Course Learning Outcome

Course learning outcomes are the learning outcomes that are specific to a course experience, they may be related to indicators or attributes, or may be only relevant for the instructor

Example: Attributes and Indicators

Graduate Attribute

Lifelong learning
An ability to identify and address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge

The student:

Indicators

Critically evaluates information for authority, currency, and objectivity when referencing literature.

Identifies gaps in knowledge and develops a plan to address them

Describes opportunities for future professional development.

Uses information ethically and legally to accomplish a specific purpose

Indicator

Verb: Sets the level of expectation

Content: Descriptions of what students do

Critically evaluates information for authority, currency, and objectivity **working independently on a research project.**

Context: conditions/setting by which students demonstrate the outcome

Graduate Attribute Assessment Summary

EGAD Project

| Knowledge | Problem Analysis | Investigation | .... | Life-long Learning |

↓ ↓ ↓ ↓

| Indicator 1.1
Indicator 1.2
Indicator 1.3
... | Indicator 2.1
Indicator 2.2
Indicator 2.3
... | Indicator 3.1
Indicator 3.2
Indicator 3.3
... | .... | Indicator 12.1
Indicator 12.2
Indicator 12.3
... |

e.g. Generates original concepts and adapts existing ones to offer diverse, viable solutions that address the problem definition

Assessment tools: ways of measuring students' work against the indicators.
Examples:

Local written exam	Oral presentation
Standardized exam	Written report
Oral exam	Focus groups
Performance appraisal	Simulation
Oral interviews	Surveys/questionnaires

Outcomes (graduate attributes)

...used to create specific and measurable...

Indicators

...which are measured by...

Assessment tools

...which are often graded using...

Verify the indicators are:

1 Measurable

2 Meaningful

3 Aligned

Mapping Indicators to your Program

Questions to ask yourself as you map these **indicators** within your **program**?

1 Where ? (Courses)

2 How ? (Assessments & Tools)

3 Why ?

When? (Continuously? Mid-term? Final?)

Attributes could be developed by

Laboratory investigation

Case studies

Group project

Research thesis

Lectures & assignments

Simulation

Internship/co-op

Attributes could be assessed by

Local written exam

Written report

Standardized exam

Focus groups

Oral exam/interview

Simulation

Performance appraisal

Surveys/questionnaires

Context for Tasks

Your group is the committee tasked with preparing for the upcoming academic year. At this stage you need to identify your indicators, and where and how your program develops and assesses these indicators.

For the purpose of this task you will be working with four pre-developed indicators covering two attributes (handout).

For some tasks your group will start the discussion in two sub-groups before comparing approaches with your larger group.

Task 1: Developing indicators

You have indicators which were developed by a previous committee, but not assessed. For each indicator determine:

(a) Critique the indicator to ensure it is clear, measurable, and meaningful
(b) Determine where and how you will develop it.

Split into two small sub-groups; discuss (a) and (b) for about five minutes, then come together as a group to compare your ideas.

Task 2: Assessing indicators

(a) Determine where and how you will assess the indicators so that you trust the data. What task/activities and how would it be scored (using what assessment tool?)

(b) How would you collect and document this data so your committee can use the information to make decisions.

Split into two small sub-groups; discuss (a) and (b) for about five minutes, then come together as a group to compare your ideas.

Outcomes Rubric and Assessment Plan for closed-end problems

	Meaning	Letter Grade	Score /10	General Rubric for Engineering Science Problems (Higher levels include the abilities required in lower levels)
Mastery (5)	**All expectations are met well, some exceeded.**	A	8,9,10	Obtains mathematically correct answer and interprets answer in physical and/or practical context. Presentation clear and concise. Describes all assumptions/approx., and context under which it is true.
High Quality (4)	**All expectations are met well.**	B	7	Justifies simplifications, applies appropriate mathematical approach
Developing (3)	**Many expectations are met. Some aspects need more work.**	C	6	Simplifies equations/models with appropriate assumptions
Marginal (2)	**Most aspects need more work to meet expectations.**	D	5	Recognizes need for appropriate models and related equations, states them in appropriate frame of reference and identifies all boundary/initial conditions
Not Demonstrated (1)	**Evidence is either missing or performance entirely unsatisfactory.**	F	0,1,2,3,4	Makes conceptually incorrect errors

Task 3: Collecting and reviewing data

The final two pages of your handout contains sample data from the end of the year. As a group discuss:

1. What input would you need from the **instructor(s)** to draw conclusions from the data?

2. How would your **committee** aggregate multiple **data** points from multiple courses on the same indicator?

3. How would you **collect** and **document** the **feedback** from the instructor, committee and stakeholders?

Results are presented as bar chart representing the percentage of students attaining each performance level. These results are drawn from a single assessment from each course.
(Course 1 = Final Lab Project Report, Course 2 = Final Exam, Course 3 = Concept Inventory, Course 4 = Final Exam)
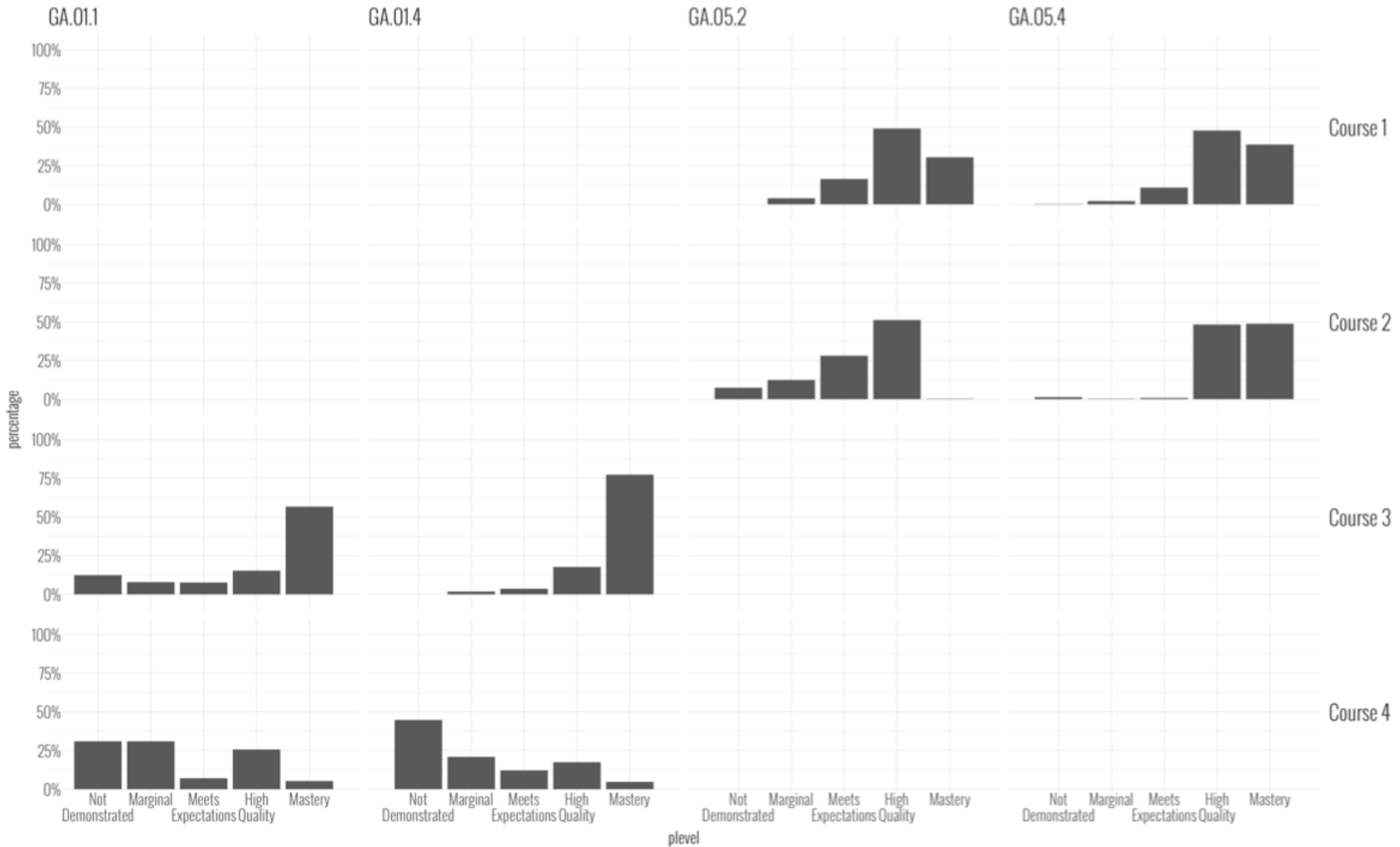
Results are presented as dumbell chart representing the aggregate performance of students in courses between first and second year. Results were aggregated by indicator. GA.01 is comprised of courses 3 & 4 and GA.05 is comprised of data from Course 1 & 2
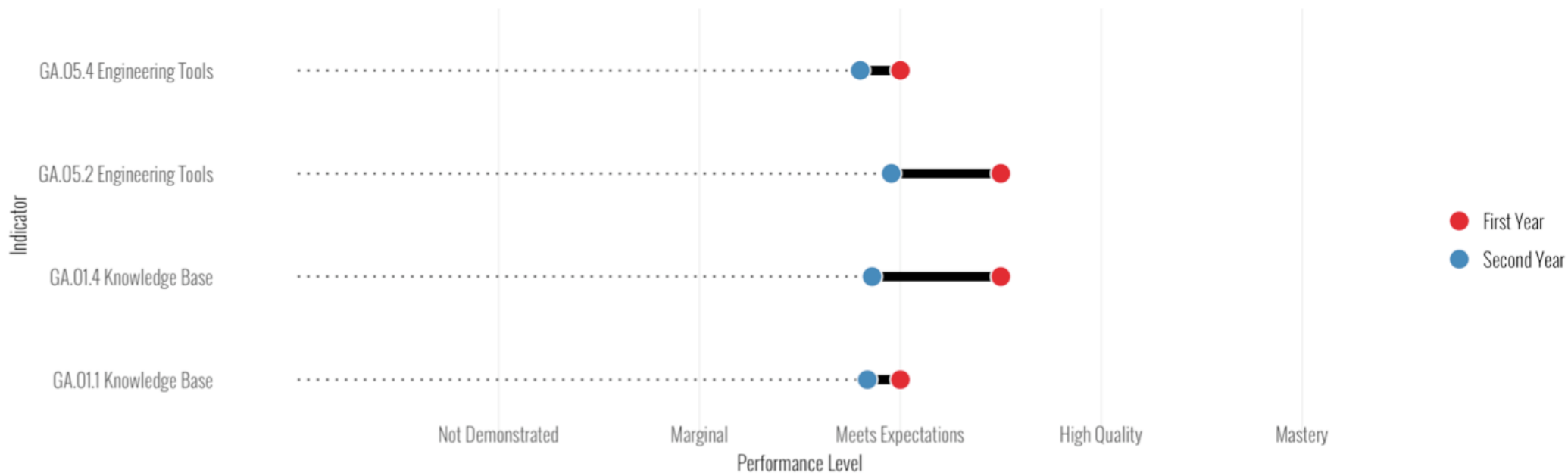
EGAD Project

Share Significant Ideas

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Building Trust and Reliability in GA Processes

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Mock CEAB Visit

Session 2 – University of Moncton Workshop 2017

Brian Frank
Jake Kaupp
Nerissa Mulligan

Goals of Session 2 of the workshop

1 To think about documenting a process from an outside observer's perspective

2 To evaluate the Continuous Improvement (CI) and Assessment approach of a program

3 To help you highlight observed deficiencies and make suggestions as to how the program could improve

CEAB requirements broadening

1. **Interested in programs providing context, reasoning, justifications for indicators, mapping, tools, results (Exhibit 1).**

2. **Wanting to see clear governance, use of data, interpretation and triggers for action for continuous improvement (Exhibit 1).**

3. Interested in how courses will develop attributes across programs, and how they assess them (Onsite Materials A2)

4. Interested in how results are presented and used by programs (Onsite Materials: GA Dossier)

5. Interested in Safety and Procedures and Safety culture (Onsite Materials: Safety Manuals and Procedures)

Brian Frank, Department Chair

Jake Kaupp, Undergraduate Chair

Handwavium Engineering

Your team is a an external review team, here to evaluate our program.

You have:

- Sample Exhibit 1

- CEAB's draft evaluation rubric for GA/CI

Questionnaire for Evaluation
of an Engineering Program - Exhibit 1

Sample response by:

University of Canada

_____

Name of Higher Education Institution

Handwavium Engineering

_____

Program name

Draft evaluation rubric for GA/CI

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-aligned 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 **AND/OR** number of indicators inconsistent with assuring a sustainable data collection program 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.

Task 1 (10 minutes): Read

Read the provided Exhibit from the perspective of an outside observer (i.e. a reviewer). As a team identify if there are any questions that you need to have answered by the program representatives.
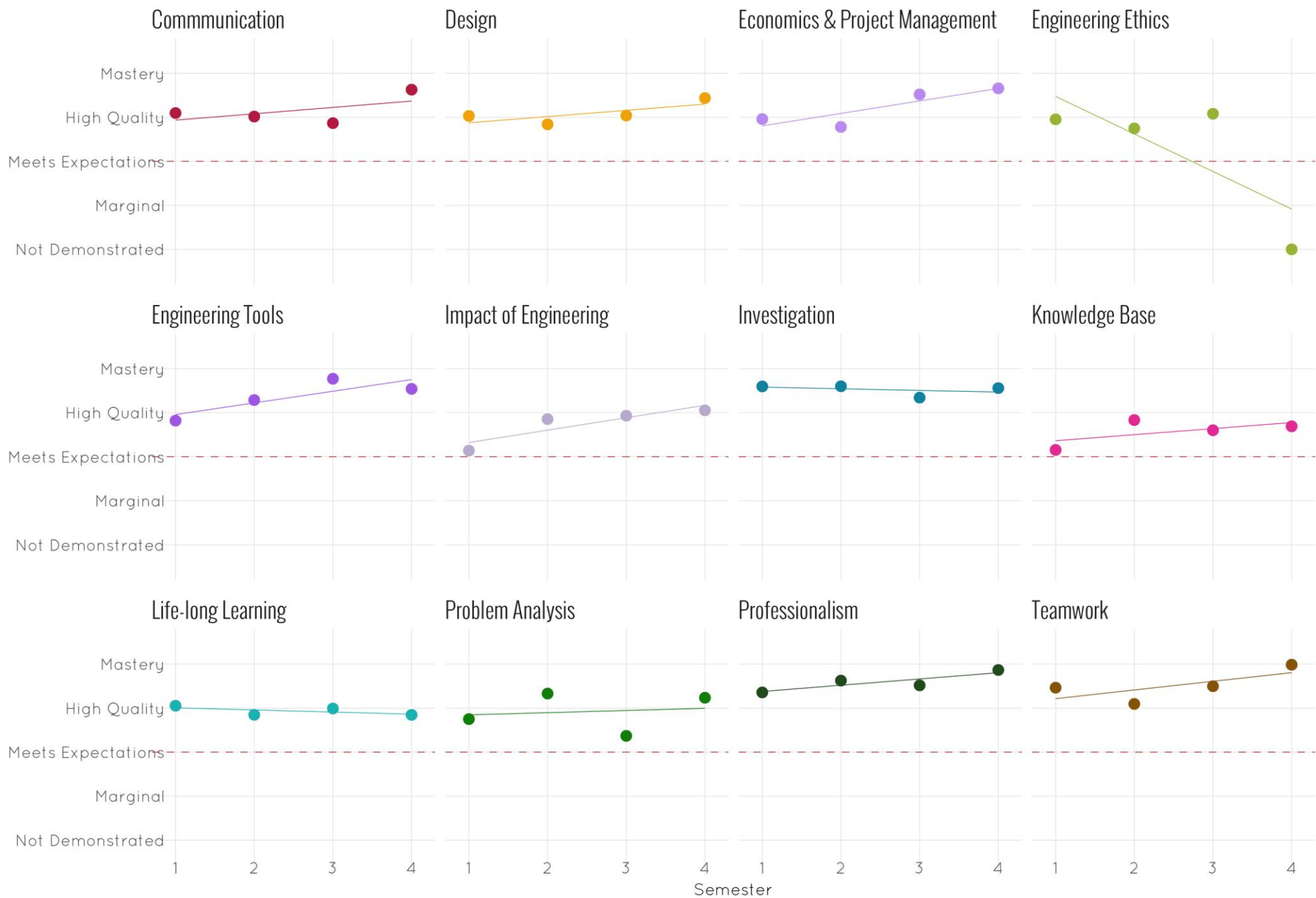
Curriculum Map: Investigation

Indicators by Course
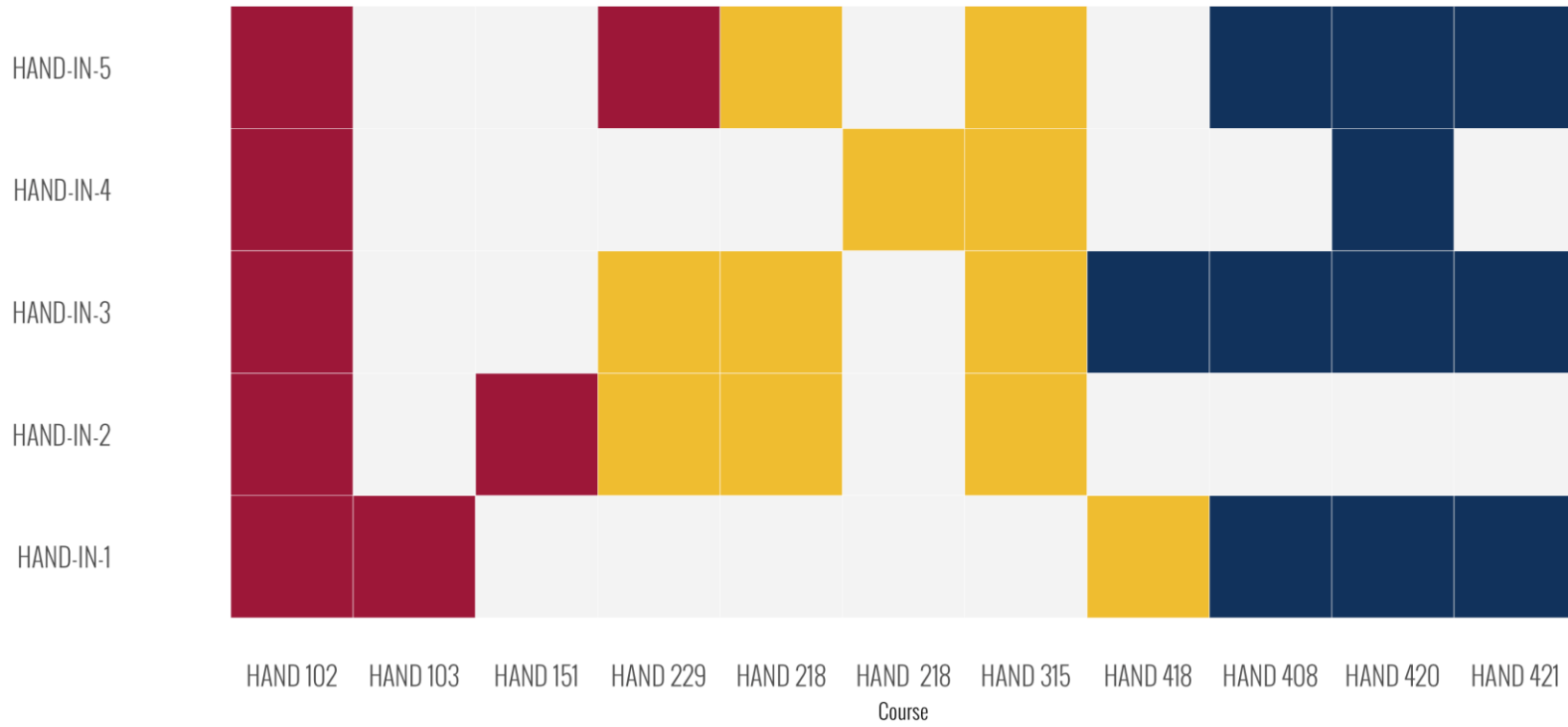

Content Level ■ Introduce ■ Develop ■ Apply

Handwavium Engineering: Graduate Attribute Assessment Results

Below are the assessment results illustrating average performance level over semesters of the program. Each dot represents the average performance on a single indicator, and have been horizontally jittered to avoid overplotting. The dashed red line illustrates the minimal acceptable value for attainment of an attribute

Handwavium Engineering: Graduate Attribute Assessment Results: Investigation

Below are the assessment results illustrating average performance level over semesters of the program. Each dot represents the average performance on a single indicator, and have been horizontally jittered to avoid overplotting. The dashed red line illustrates the minimal acceptable value for attainment of an attribute
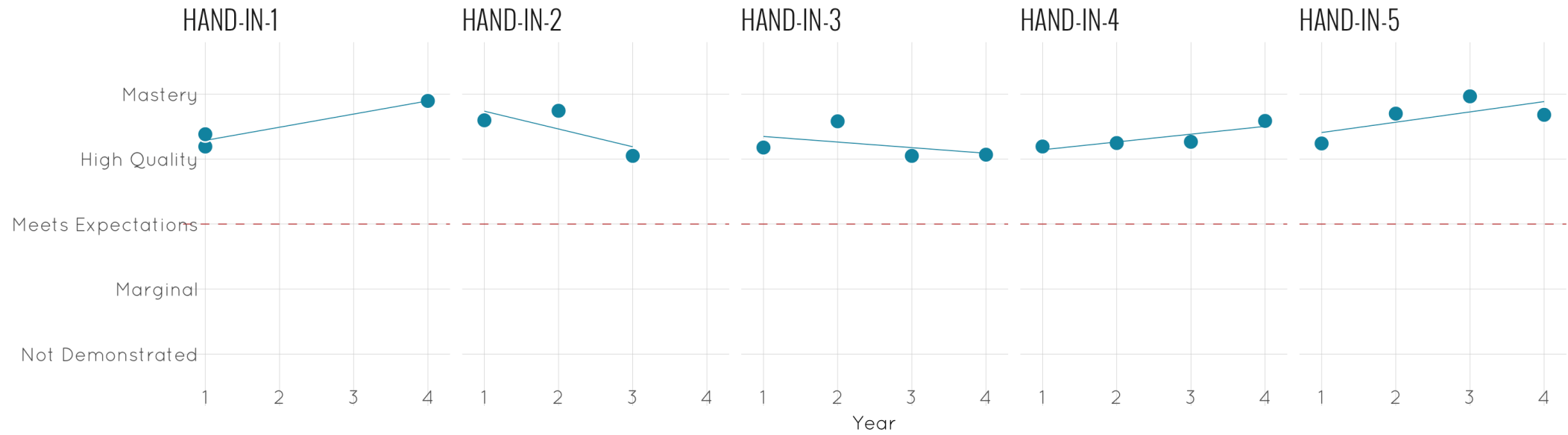
Task 2 (30 minutes): Evaluate

Review the provided Exhibit from the perspective of an outside observer (i.e. a reviewer) using the rubric.

Select a scribe to record your team's evaluation and serve as a spokesperson.

Task 3 (15 minutes): Team report-outs

Present 1-2 key observations about the exhibit.

EGAD Project

Share Significant Ideas

Mock CEAB Visit

Session 2 – University of Moncton Workshop 2017

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Jake Kaupp
Nerissa Mulligan

The Committee

Session 3 – University of Moncton Workshop 2017

Brian Frank

Jake Kaupp

Listen | Engage, don't disseminate
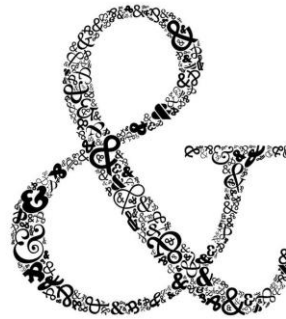
Link | Practise to research

Leverage | Existing data and experience

Lead | Clear obstacles, build capacity

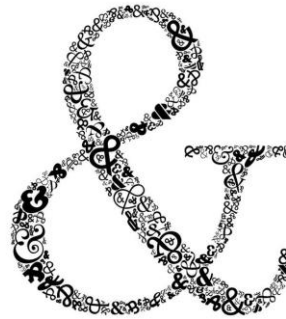Geoff Scott, University of Western Australia

A Sound, well-planned and f l e x i b l e approach.

&

Effective Change Management

Meeting these requires:

TRUST

&

Reliability

Sustainability

Literate & Implementation

Savvy

EFFICIENCY

Focusing on adaptable workflows

In Session 3 of the workshop, you will put together:

1   Materials generated in Session One

2   Lessons learned in Session Two
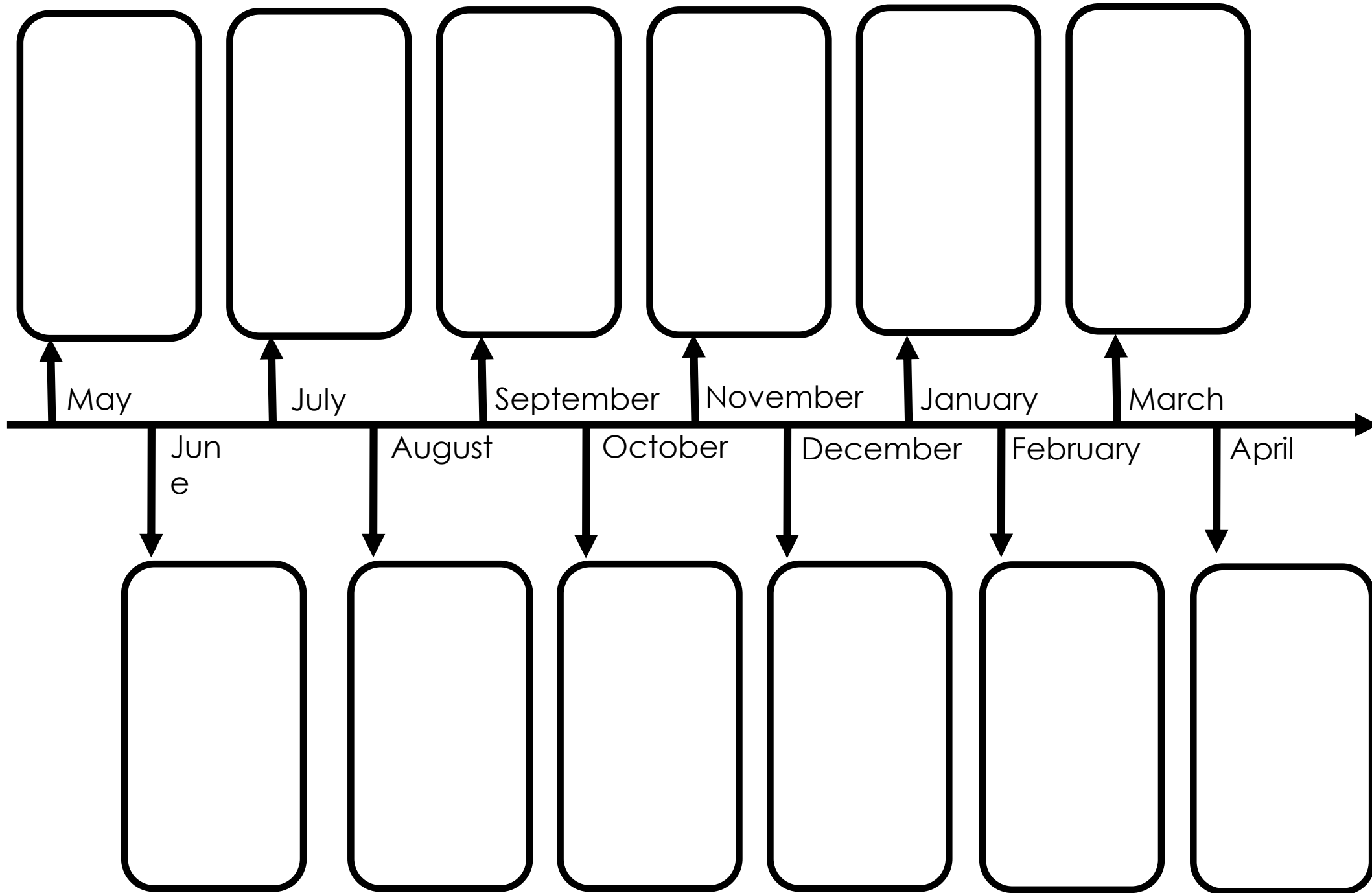
Some Things to Consider for Your Own Approach

1 Measures

2 Timelines

3 Governance

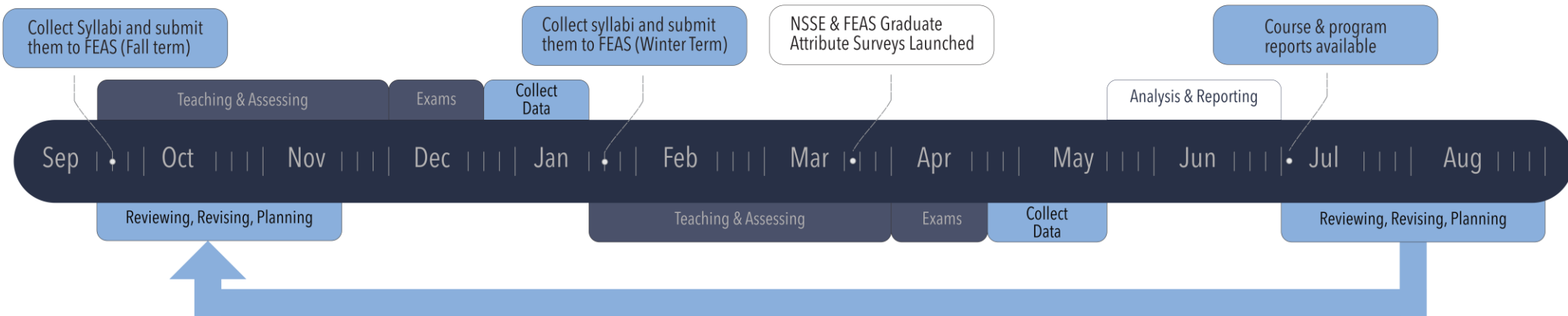4 Strategy

5 Feedback

6 **Stakeholders**

Task 3

1 Determine what your overall process will look like.

2 Create your plan for the committee for the next year, keeping in mind the discussion for the past two tasks.

3 Write down what events will occur, when they will occur, what drives each event, what each event triggers, and how they are all connected.

The Timeline

May   July   September   November   January   March

June   August   October   December   February   April

Task

FEAS Graduate Attribute Timeline

Collect Syllabi and submit them to FEAS (Fall term)

Collect syllabi and submit them to FEAS (Winter Term)

NSSE & FEAS Graduate Attribute Surveys Launched

Course & program reports available

Teaching & Assessing | Exams | Collect Data

Analysis & Reporting

| Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug |

Reviewing, Revising, Planning

Teaching & Assessing | Exams | Collect Data

Reviewing, Revising, Planning

Legend

Department faculty members

Graduate Attribute Committee

Assessment & Quality Assurance Coordinator

Course and Program reports will be ready at the end of June. The reports should be reviewed by both committee and faculty members, according to the workflow outlined below. To facilitate reflection on the data, there are a series of questions attached to each course report.

Report Reviewing Workflow:
1. FEAS shares reports with committee via ownCloud
2. Committee distributes reports to faculty members
3. Faculty members complete reflective memo questions, submit report to Committee
4. Committee submits completed reports to FEAS via ownCloud
5. FEAS archives reports

Committees should then review the program and course reports, along with additional data (e.g. NSSE, FEAS GA Survey) and develop potential suggestions and plans for program improvement. These plans should be reviewed and approved by programs, and the proposed changed be submitted to the Faculty Curriculum Committee for approval.

The findings from review, potential and final improvements should be documented for both CEAB and program use.

New CEAB Aspects

1 Safety Dossier

2 Results Exhibit

➡ What should be included?

➡ How should it be included?

EGAD Project

Share
Significant
Ideas

The Committee

Session 3 – University of Moncton Workshop 2017

Brian Frank

Jake Kaupp