EGAD Project

Planning, Implementing and Sustaining Graduate Attribute Assessment

CEEA 2016 Workshop 5a

Administrative issues

Slides will be posted to EGAD website http://egad.engineering.queensu.ca. **Direct link to this material will be:**

http://bit.ly/CEEA-5A

Other support and resources will described at the end.

This is an **open** workshop - feel free to ask questions or comment throughout.

Goals of this workshop session

1. You should be able to describe the 6 steps of the EGAD Program improvement process

2. You should be able to describe methods to define and map your program

3. You should be able to describe strategies to collect, manage, visualize and interpret data

4. You should be able to describe strategies for implementing, managing and sustaining continuous improvement

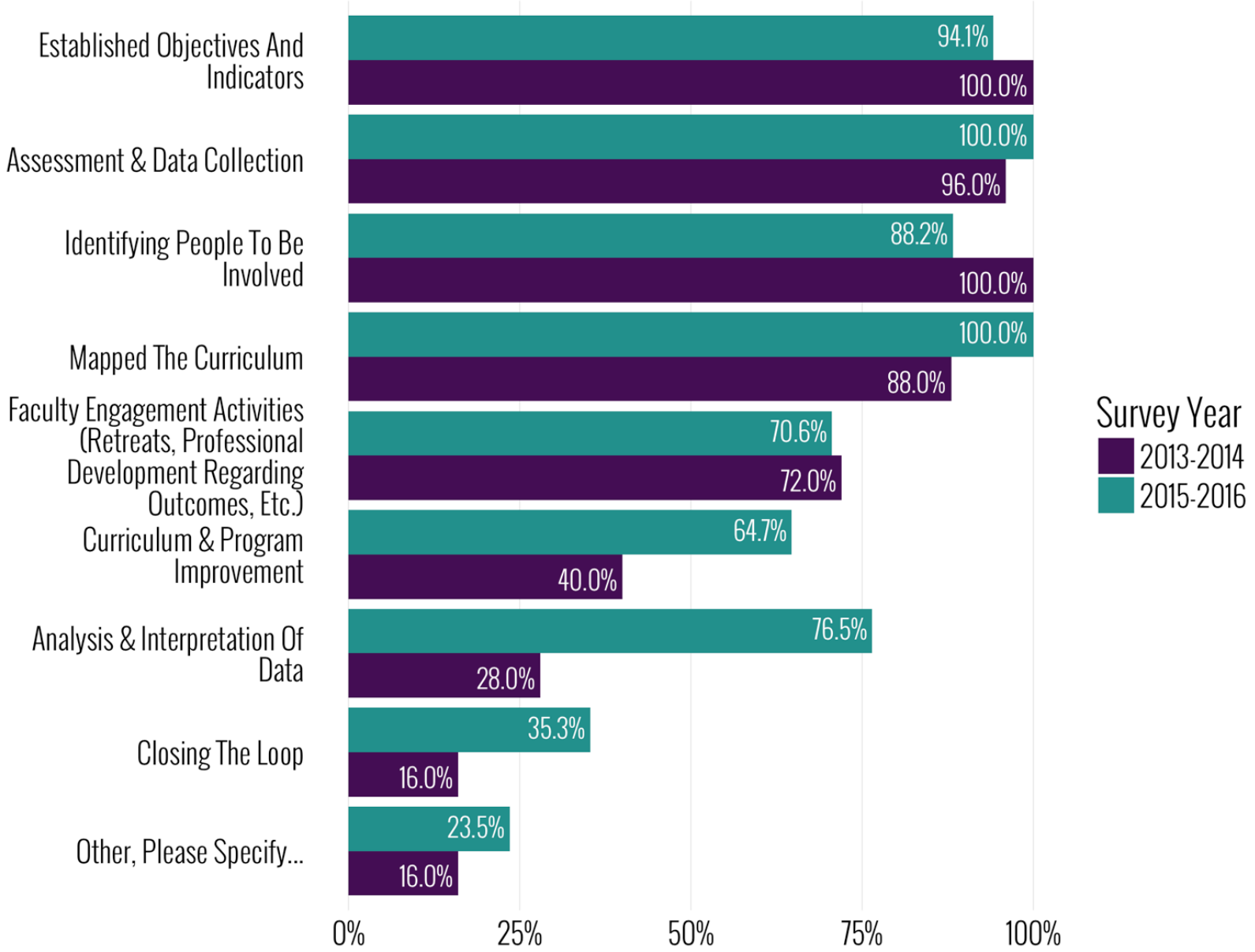
The New 6-step EGAD Process

We've been at this a while...

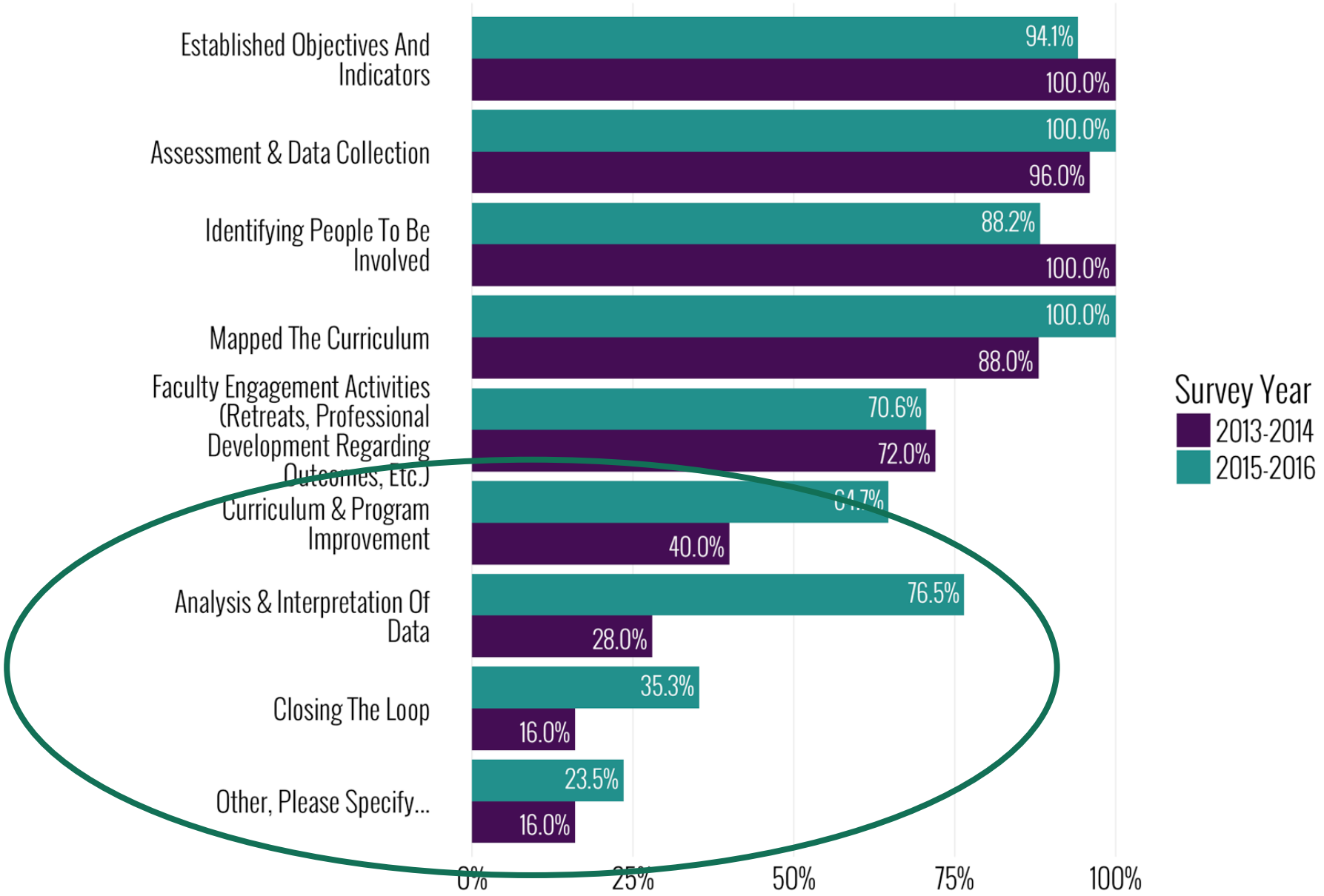
2009

2015

What we're comfortable with



What we're not…



Key Issues and Challenges in Continuous Improvement

1. Faculty **engagement** and **buy-in**
2. **Resources**, **time** and **workload**
3. **Closing** the **loop**


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

Effective Practise in Outcomes As

1. Has a plan with clear purposes that are related to goals people value.

2. Bases assessment approaches on clear, explicitly stated program objectives.

T. Banta (2002), Building Scholarship of Assessment. Jossey-Bass

Define Program Purpose

A program's purpose should be:

1. **be student focused**
   help students achieve outcomes and is therefore driven by their needs
2. **aligned with larger goals**
   be aligned with that of the Faculty or School which in turn is aligned with that of the institution

A programs purpose should address:

What do you do? For whom? For what benefit?

Define Program Indicators

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

Indicator Best Practise

Well-constructed indicators should:

Be meaningful and measurable

It should mean something to students and to programs, and be able to be directly measured

Have content, context and a verb

This answers the 'what, when, why and how come?'

Be focused on what the student DOES

Should be phrased to describe demonstration or performance of a skill or ability

Be useful to YOU in articulating key expectations to students

These will form the basis for the expectations of program, and what they expect their students to be able to do upon graduation.

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

Sustainability

Literate & Implementation

Savvy

Mapping

Approaches

Attribute/Indicators to Courses	Top-down
Course to Indicators/Attributes	Bottom-up
Assessment Mapping	Middle-out
Alignment Mapping	Bottom-up
Progression/Sequence Mapping	Kitchen Sink

Useful Mapping Information

What are your course learning outcomes and their links to indicators ?

How do you assess your course learning outcomes and indicators (assessment tools)?

When do these assessments occur?

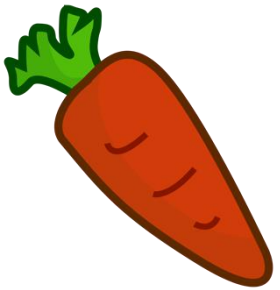
Who does the assessment?

What are the scoring criteria (rubric descriptors, etc.)?

Coincidence is the word we use when we can't see the levers and pulleys.

— Emma Bull —

Levers



Carrots

Sticks

Group Exercise

At your table, provide one example of a lever, carrot or stick used in your program.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the Curriculum
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the Data
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and Interpreting the Data
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and Implementing Change
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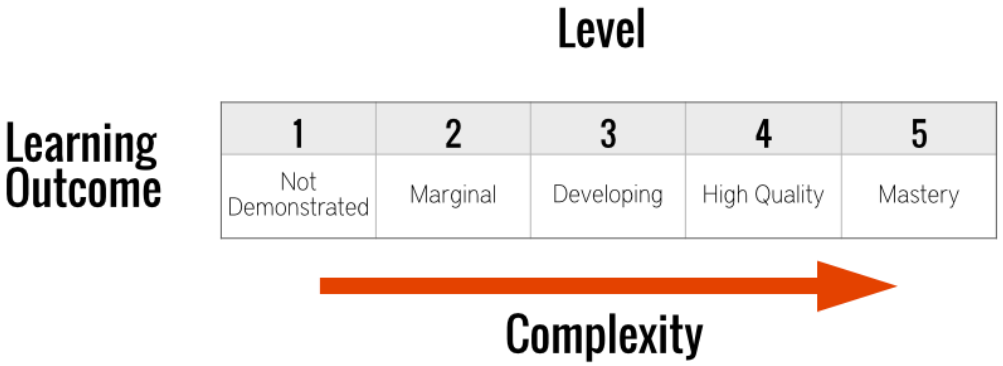
Curriculum and Processes

FIT FOR PURPOSE

Purposefully gathering meaningful evidence and information on program effectiveness and student performance

Assessment of Learning Outcomes

Students are assessed by a **set of levelled performance criteria** that outline the requirements that must be demonstrated to achieve a specific level.



What to look for in assessment tools

1. **Workload:** Results in a feasible workload for students and graders
2. **Generalizability:** Results are representative of entire program/class
3. **Validity:** The assessment tool is clearly aligned with the outcome
4. **Reliability:** Results will be consistent between graders, or if tested again
5. **Actionable:** Provides useful information related to educational experience that can be used for course and/or program improvement

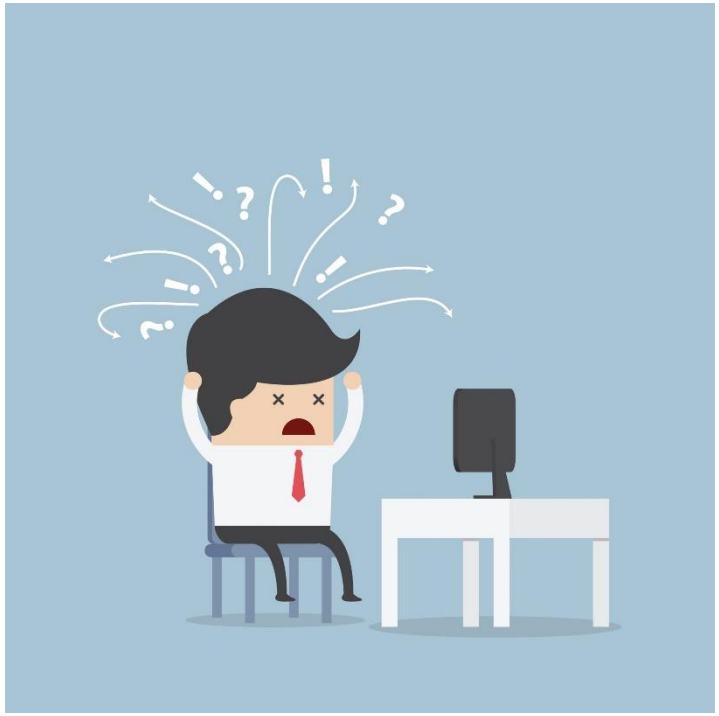
5 Indicators 15-20 Courses 4 Years

10 Programs

approximately 5000 measurements

+Repeated measures +Triangulation

MANAGE
the flow of data



Standardize with templ

Document and detail p

Focus on workflows

Use familiar tools

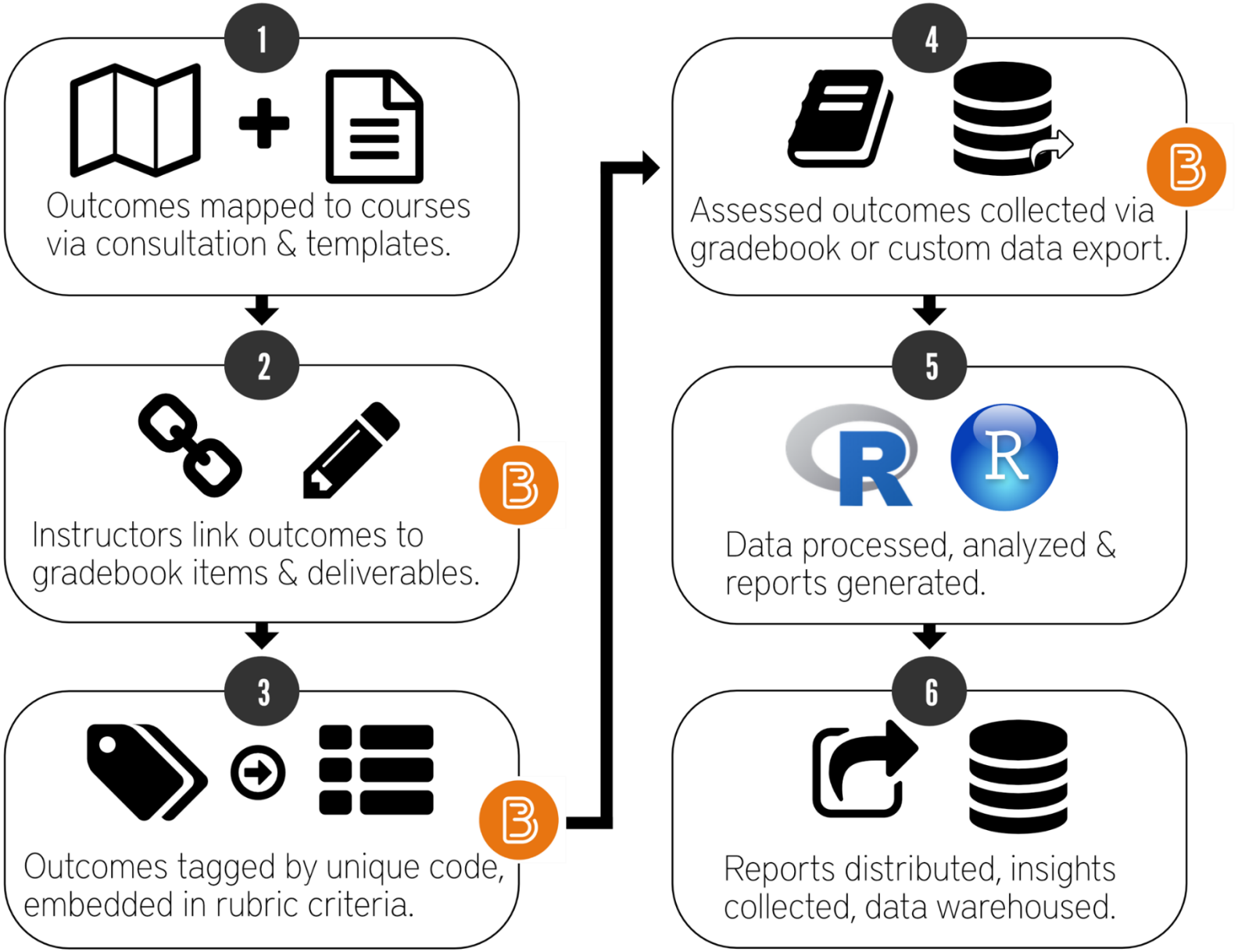
Archive and backup th

Student Number	*Indicator Code*	APSC-1-CO-3	APSC-1-DE-4
	Assessment	MEA 2	MEA2
	Assessed By	TA	TA
	Week Assessed	6	6
	Context	Group	Group
10089314		5	3
…		3	3
…		2	4
…		2	5
…		4	3

Everything needed from an instructor in **one table**

Outcomes Tracking, Assessment & Reporting

Process Outline & Workflow



Graduate Attribute Assessment

Quick Start Guide for Course Instructors

Queen's University | Faculty of Engineering and Applied Science

Indicate an included file (word, excel, pdf) found in the instructor package

This guide was developed for instructors incorporate graduate attribute assessment into their course, meet accreditation requirements and the standards set by the Faculty Office.

Purpose

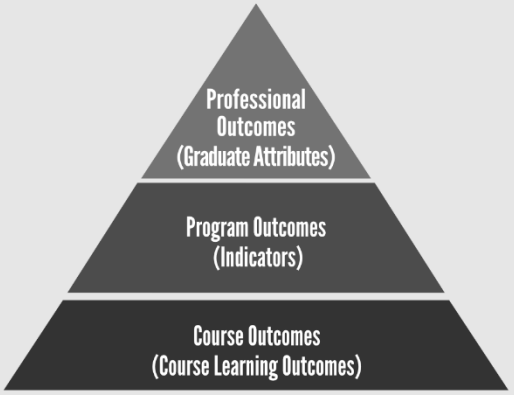
The Canadian Engineering Accreditation Board requires programs to:

1. Demonstrate that graduates from programs possess 12 attributes

   - **Knowledge Base**
   - **Problem Analysis**
   - **Investigation**
   - **Design**
   - **Engineering Tools**
   - **Teamwork**
   - **Communication**
   - **Professionalism**
   - **Impact of Engineering**
   - **Ethics and Equity**
   - **Economics**
   - **Life-long Learning**

2. Demonstrate a process that assesses program outcomes and applies the results to develop and improve program quality

Outcomes-based Assessment



Assessing Graduate Attributes utilizes ***outcomes-based assessment***: Clearly specify what students are expected to learn (***learning outcomes***), provide them meaningful tasks to demonstrate the outcomes, and assess them using clearly defined criteria.

Outcomes can be defined at both the course, program and professional levels, with each clearly linked to the other. Course outcomes are specific to a course experience, while program outcomes are representative of the more broader expectations of a program.

For accreditation, the professional outcomes are the ***Graduate Attributes*** which are broad and difficult to directly measure. Instead these are measured by program outcomes called ***Indicators***. Instructors assess the indicators by linking to a ***Course Learning Outcome.***

Example

Graduate Attribute	Indicator	Course Learning Outcome
Knowledge Base	Evaluate states of equilibrium for objects subjected to forces and moments	Applies boundary conditions to determine reaction forces in simply supported beams

Workflow and Timeline

Step 1: Course Learning Outcomes & Mapping — Start of semester → **Step 2: Assessment** — During the semester → **Step 3: Collecting & Reporting Data** — End of semester → **Step 4: Interpreting & Reflecting** — After the semester

Step 1: Course Learning Outcomes & Mapping

1. Meet with your program representative for accreditation to ***determine which indicators can and should be measured in your course*** and the ***learning level of instruction*** (introduced, developed, applied). Be sure to copy the code associated with the indicators (e.g. APSC-1-CO-1).

2. For each indicator assessed in your course, create a course learning outcome or link the outcome to a suitable existing course learning outcome. Well constructed learning outcomes are ***meaningful***, ***measurable*** and ***clearly describe what the student is able to do.*** Please consult **Writing learning outcomes** for more information.

3. For each course learning outcome, ***identify appropriate deliverables in your course.***

4. Fill out the **FEAS sample syllabus** using all of the results from steps 1-3. The syllabus is ***required*** by Queen's Senate to be sent to the AMS for all of Queen's, and ***must be completed for all courses***. Email the completed syllabus to your program representative.

Step 2: Assessment

Learning outcomes are assessed by a ***set of 5 level performance criteria*** that describes what must be demonstrated to achieve a specific level.

Learning Outcome

Level				
1	2	3	4	5
Not Demonstrated	Marginal	Developing	High Quality	Mastery

e.g. for a Communication Outcome

5 Mastery	Writes with clear purpose and concision, applies varied transitions to linking ideas and sections seamlessly.

Each course is different. What fits one course may not fit another.
To help find an approach for your course, see the diagram below:

What type of course do you teach?

Natural, Physical or Engineering Science Course

Primarily courses that focus on developing knowledge base in the sciences.

Deliverables are typically 'closed-ended': linear, or procedural style problems with a single answer.

1. For each deliverable, determine the question or section that best reflects the mapped outcome(s).
2. Use the **Outcomes rubric for close-ended problems**.
3. Modify the rubric to include a row for each outcome being assessed.
4. Assess student performance using the rubric, recording the results.

Laboratory Course

Blend knowledge base development with problem solving, investigation, experimentation and analysis.

Deliverables can be both 'closed-ended' or 'open-ended' lab and technical reports.

1. For each deliverable, determine the question or section that best reflects the mapped outcome(s).
2. *For closed-ended problems*: **Outcomes rubric for close-ended problems**.
   For lab & technical reports: Develop a 5-level analytic rubric. **Writing effective rubrics**.
3. If necessary, modify rubrics to include a row for each outcome being assessed.
4. Assess student performance using the rubric, recording the results.

Design or Capstone Course

Embody professional engineering practise; complex, open-ended, ill-defined problems.

Deliverables are typically proposals, technical briefs, presentations and reports.

1. For each deliverable, determine the question or section that best reflects the mapped outcome(s).
2. Develop a 5-level analytic rubric. **Writing effective rubrics**.
3. Include a row for each outcome being assessed.
4. Assess student performance using the rubric, recording the results.

Step 3: Using brightspace by D2L for Collecting & Reporting data

*Contact **Eric Tremblay** (tremblae@queensu.ca) or **Leigha Tregunna** (leigha.tregunna@queensu.ca) for assistance setting up and using Brightspace for graduate attribute assessment in courses.*

1. Email your program representative. Inform them that your course was using Brightspace, and include the information shown below for each outcome.

Course	Indicator	Assessment	Assessor	Context
APSC 112	APSC-1-KB-3	Quiz #1 (Question 7)	TA	Individual

Please note: please include which question(s) or rubric rows were used to assess each outcome.

OR

Step 3: Collecting & Reporting Data

Outcomes data is processed, analyzed and stored by the Faculty Office and used to create reports for programs and instructors.

1. Use the **Outcomes data collection template**. Rows are students, each column is an assessment of an outcome and its metadata. *Please note: multiple assessments of the same indicator should be in separate columns.*
2. Complete column headers. Paste student numbers and assessment data for each outcome. Once complete, send it to your program representative.

Step 4: Interpreting & Reflecting

1. Review your course report. You are the best person to interpret and provide meaning to the data, regarding any trends, oddities or omissions.
2. Reflect upon the data, considering improvements you may make as a result. Send any insights and potential improvements to your program representative for accreditation.

Additional Resources

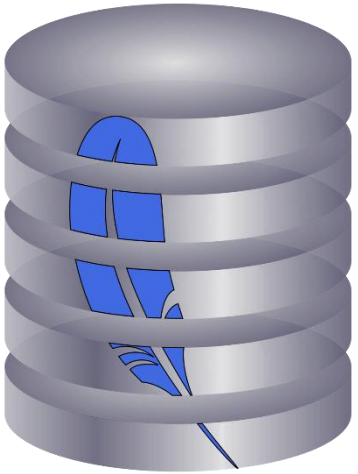
Detailed Graduate Attribute Guide for Course Instructors
HEQCO Learning Outcomes Assessment: A Practitioners Handbook
Developing Effective Learning Outcomes: A Practical Guide
Queen's Centre for Teaching and Learning (queensu.ca/ctl)
The EGAD Project (egad.engineering.queensu.ca)
National Institute for Learning Outcomes Assessment (learningoutcomesassessment.org)

Created by: Jake Kaupp, Assessment and Quality Assurance Coordinator, Faculty of Engineering and Applied Science, jake.kaupp@queensu.ca

Familiar Tools

Archive and backup the d

Use a database.
(Excel is NOT a database, but a useful starting point)


Use what resources are available, find the already existing data and use it in your processes

DRY & DRTW

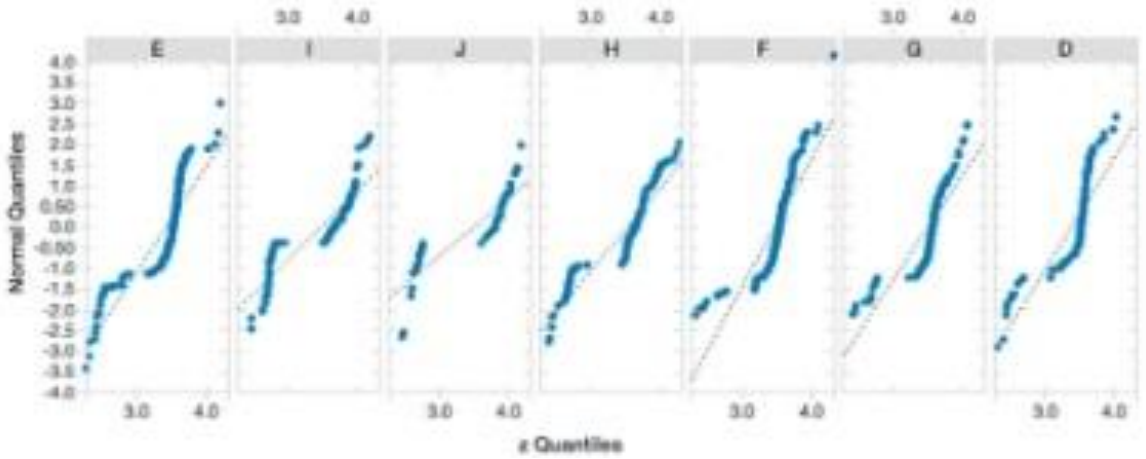
Exploratory Visualization

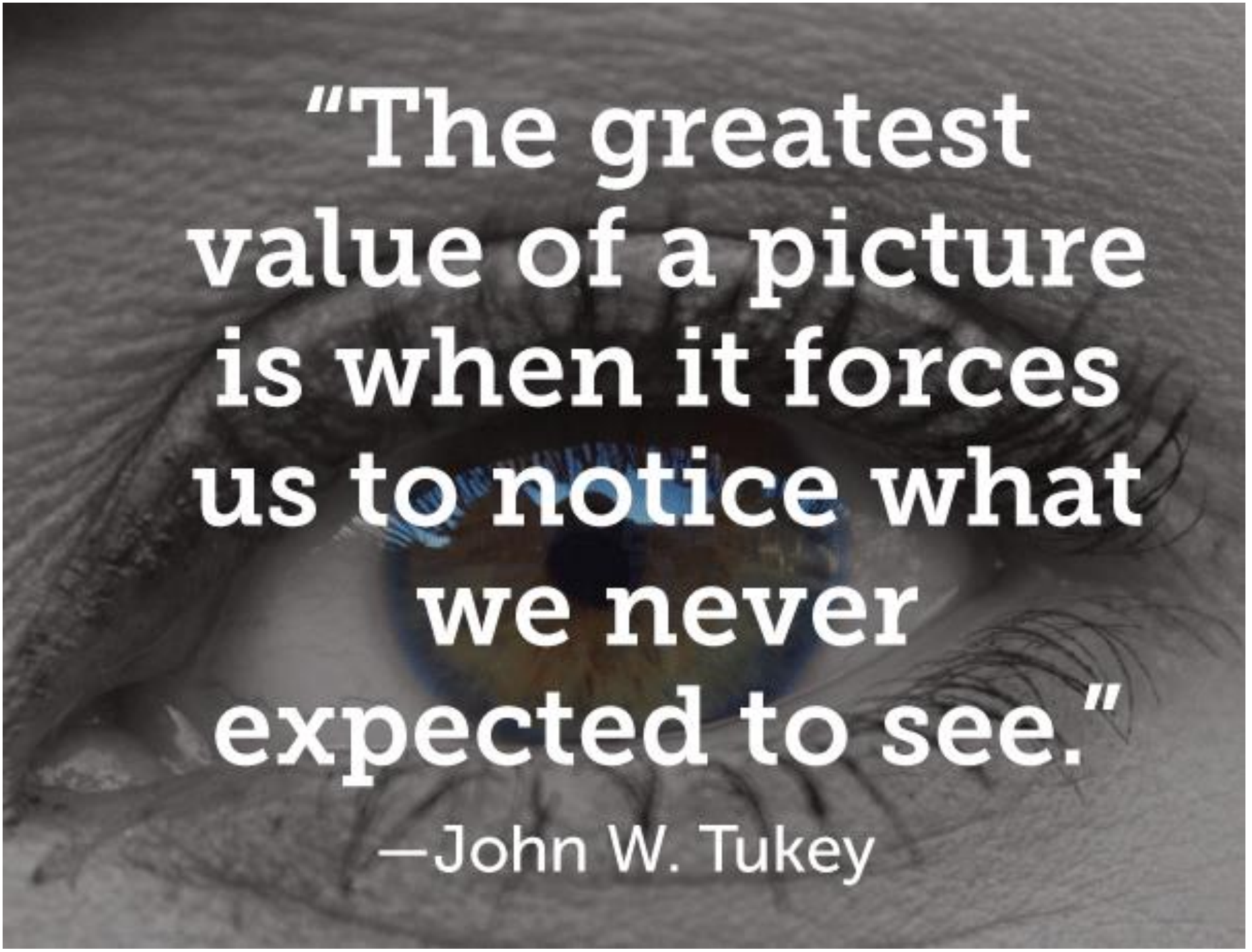
"Critical part of data analysis"

—William S. Cleveland

Put visualization back in the normal workflow of data analysis regardless of data size.

- Interactive
- Collaborative
- Reproducible



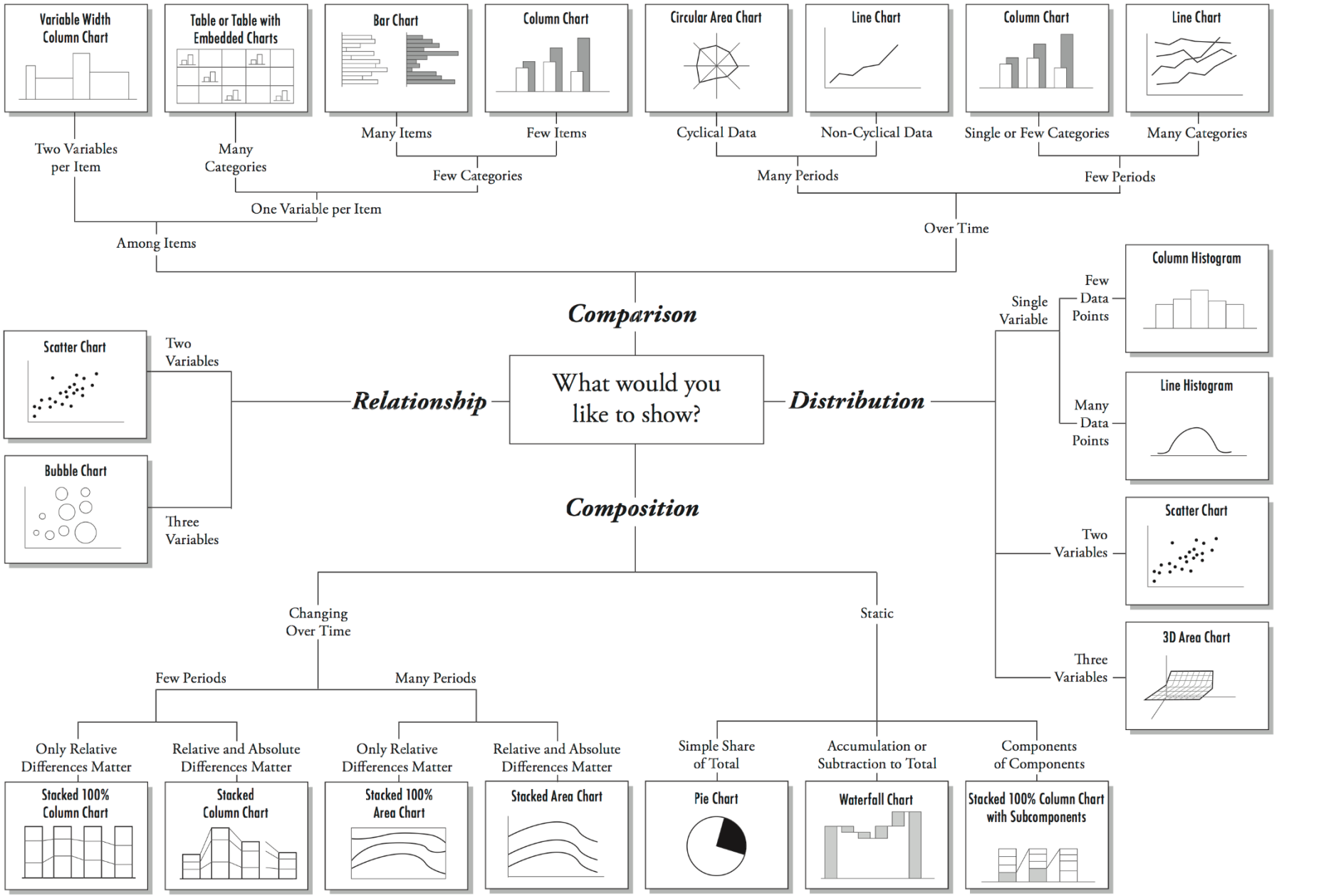

"The greatest value of a picture is when it forces us to notice what we never expected to see."
—John W. Tukey

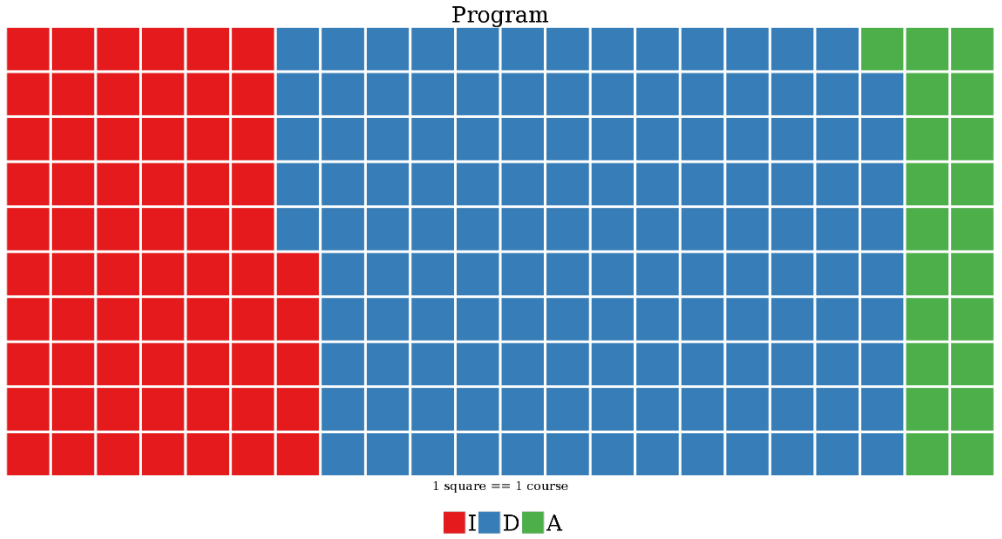
Freely Available Tools

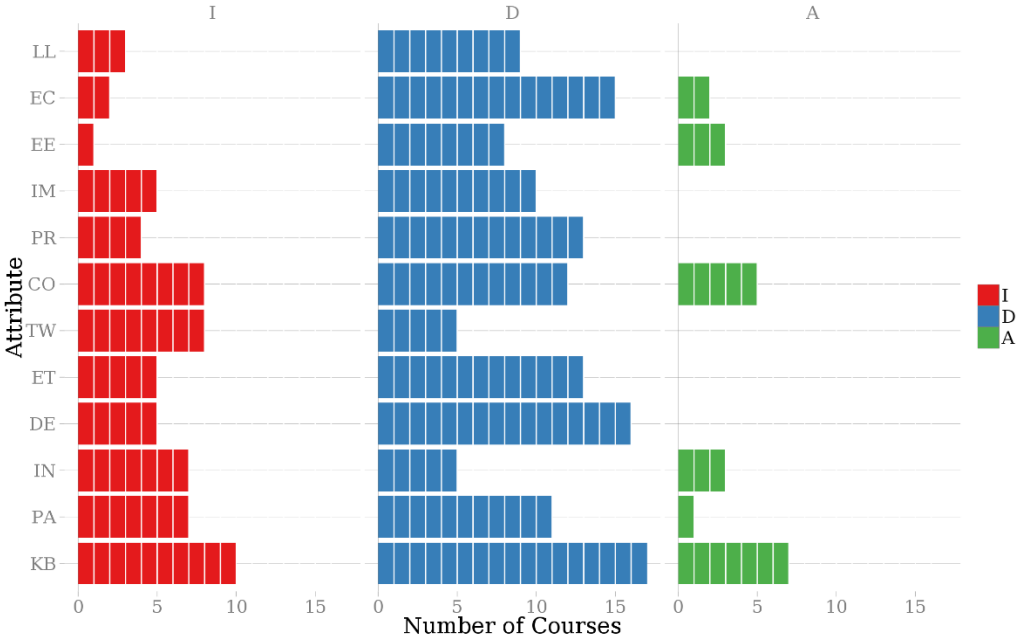
tableau

ABZV Datawrapper

plotly




Program
1 square == 1 course
I D A


I
D
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CO
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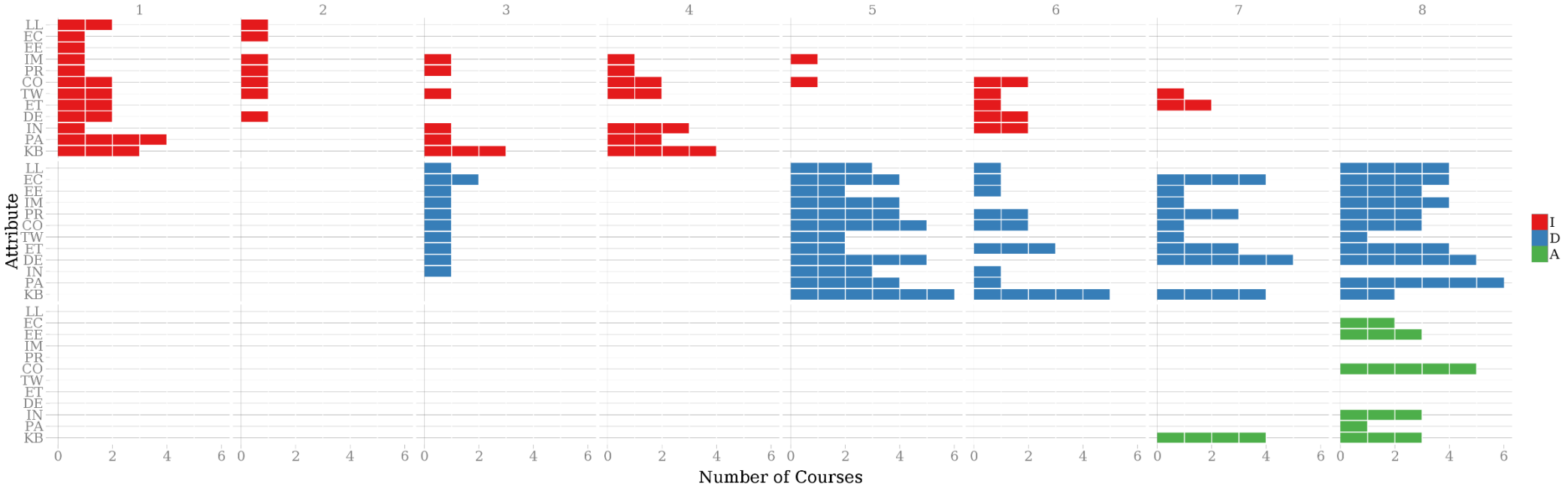
PA
KB
Attribute
0 5 10 15
Number of Courses
I
D
A


1
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EC
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PR
CO
TW
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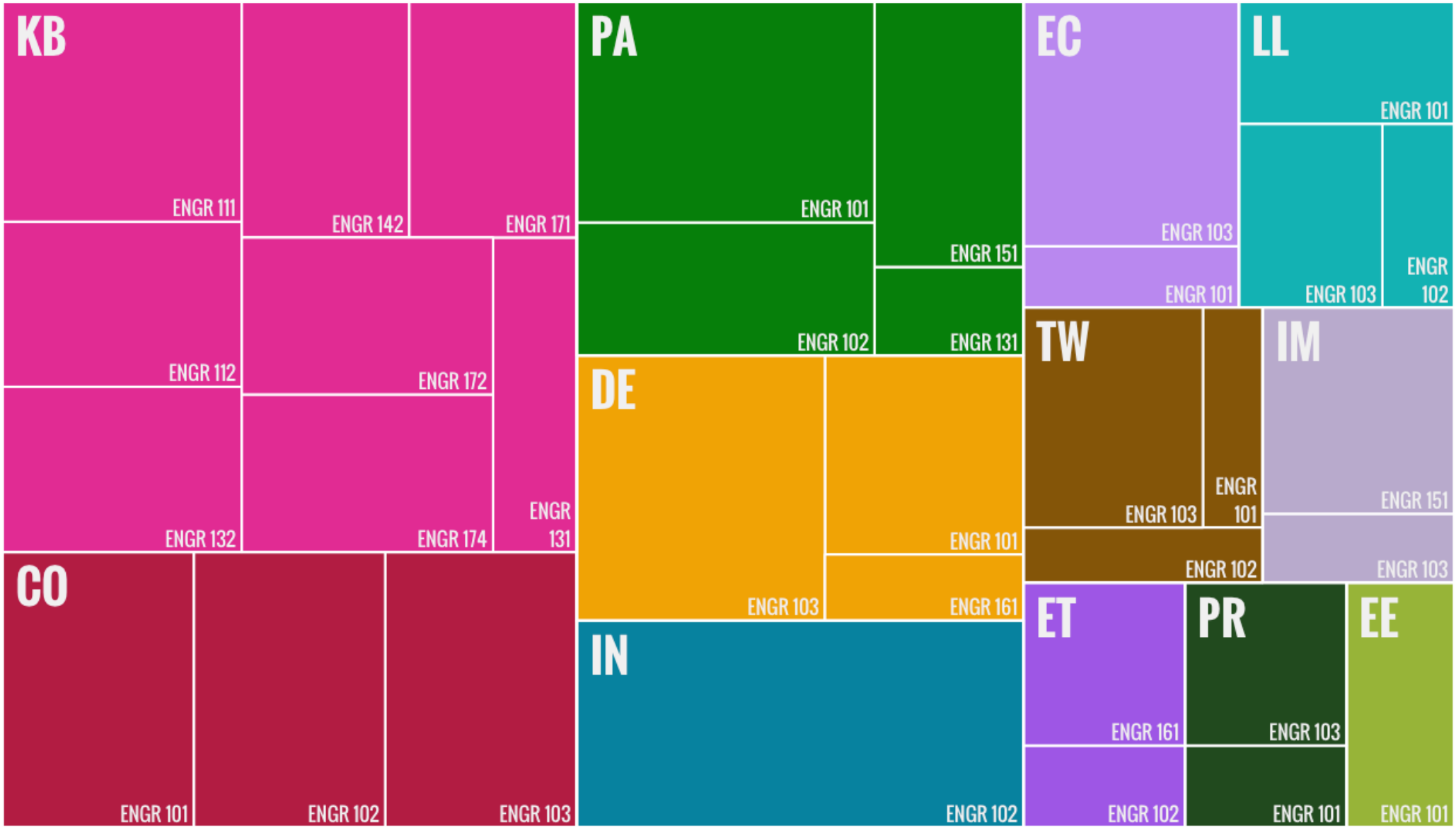
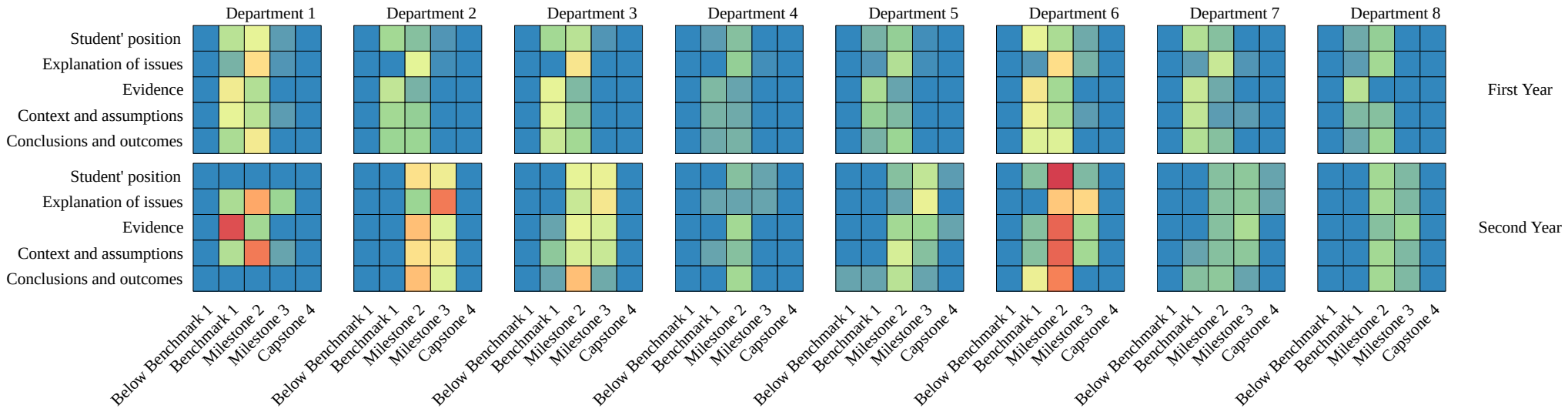
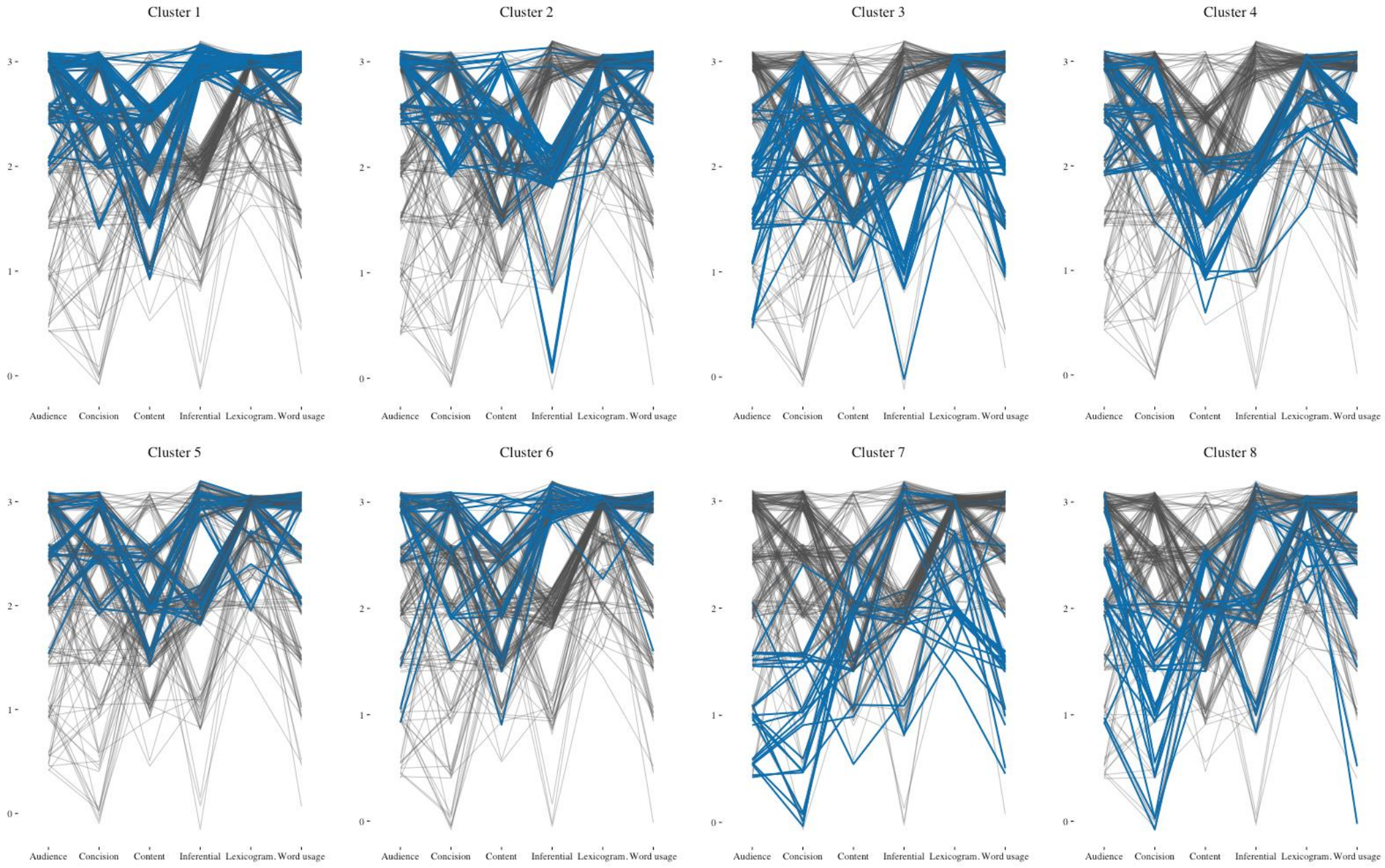
Attribute
0 2 4 6
Number of Courses
I
D
A

Curriculum Mapping:Assessment Approach by Graduate Attribute:




Department 1
Department 2
Department 3
Department 4
Department 5
Department 6
Department 7
Department 8
Student' position
Explanation of issues
Evidence
Context and assumptions
Conclusions and outcomes
First Year
Second Year
Below Benchmark 1
Benchmark 1
Milestone 2
Milestone 3
Capstone 4


Learning Outcome
Project
Alignment
Workplace communication and ethics
Teamwork
Stakeholder needs
Specific building skills
Sepcific tools for testing/troubleshooting
Project management
Professional written communication skills
Professional presentation skills
Problem definition
Models and argumentation
Information source and evaluation
Idea generation Techniques
Ethics and codes
Engineering graphics
Economic analysis
Design Test
Design Evaluation
Decision making techniques
CAD
Building/Implementation
College 1
College 2
College 3
College 4
College 5
University 1
University 2
University 3
University 4
Not Observed
Observed
No Data
Not Observed
Misaligned
Aligned
Undetermined


Cluster 1
Cluster 2
Cluster 3
Cluster 4
Cluster 5
Cluster 6
Cluster 7
Cluster 8
3
2
1
0
Audience
Concision
Content
Inferential
Lexicogram.
Word usage

Group Exercise

How in your own programs do you share the results of graduate attribute assessment?

How you could improve your process by making analysis more collaborative, more interactive and more reproducible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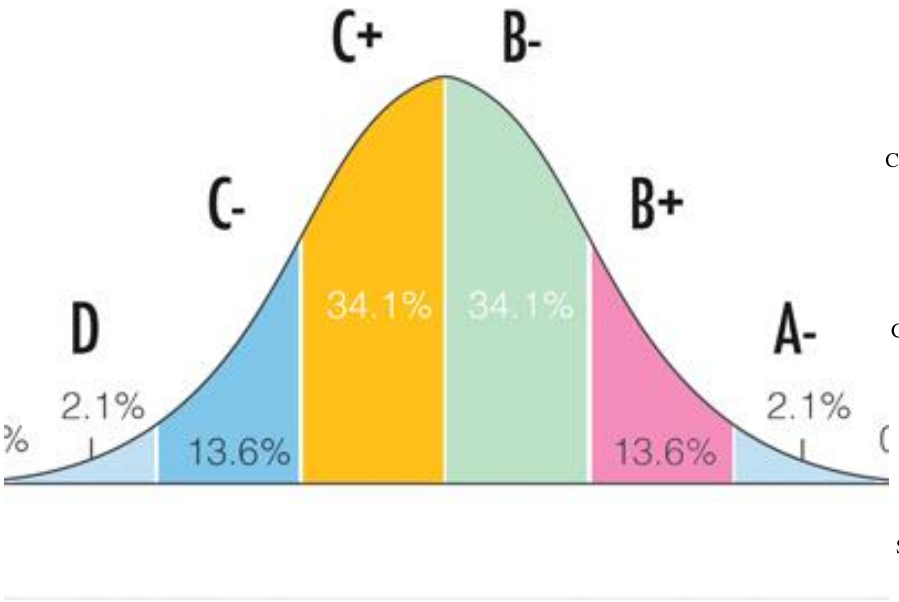
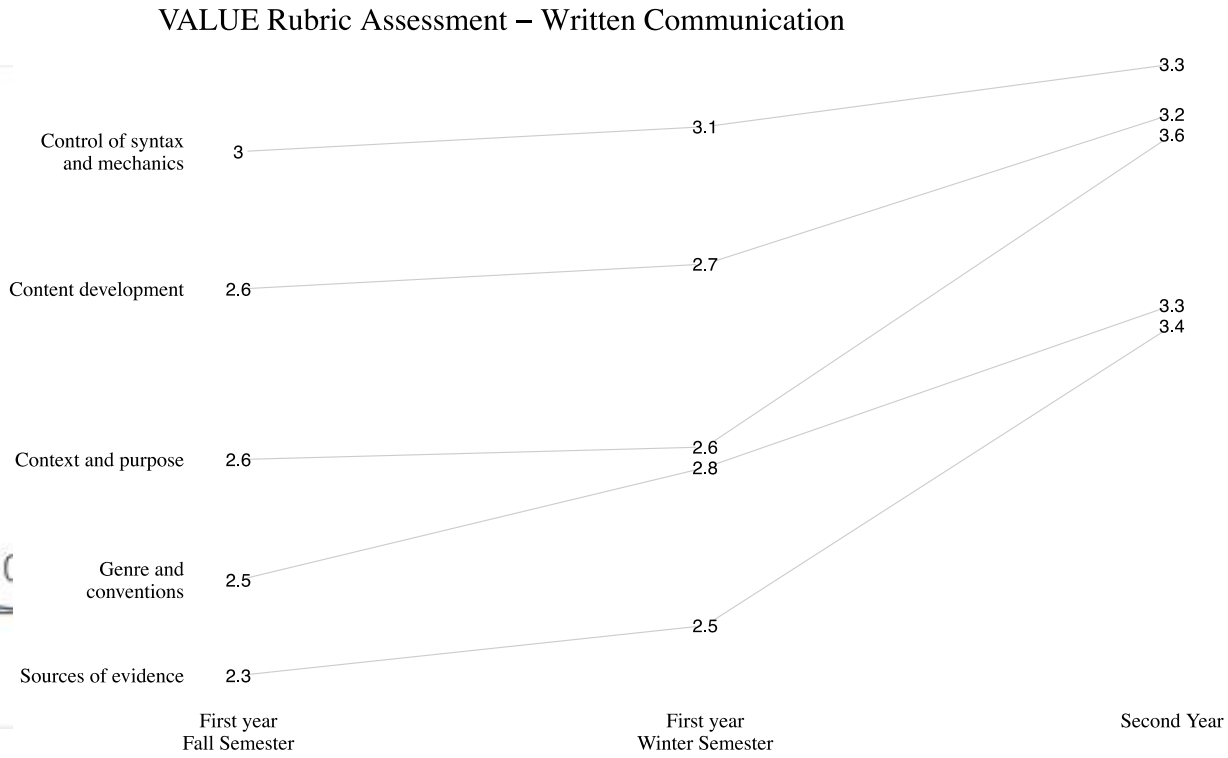
Data-informed Improvement

Engaging with Data

Many instructors don't move beyond this:



If you provide them with the ability to view their data differently:



Interpreting or Making Meaning from Data

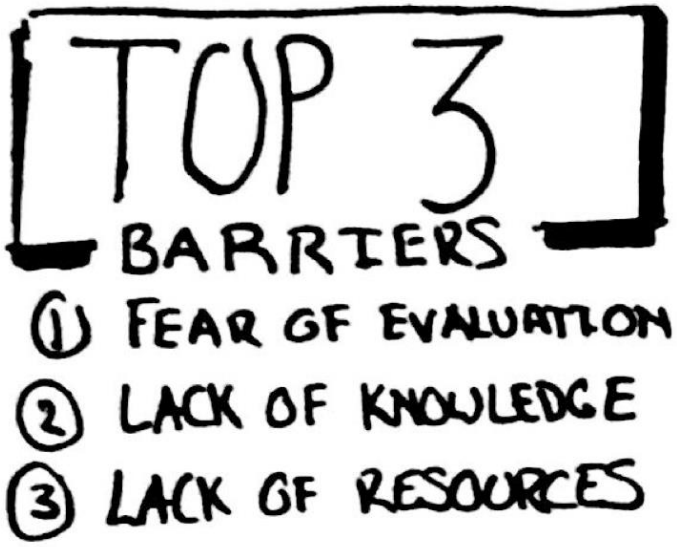
- **Clarify** the question you are asking.
- **Gather** all data that could answer the question.
- **Group, Summarize, Visualize**
- Explore **relationships**
- Give **context** to the data by involving stakeholders
- Form and **test hypotheses**

Approaches to Analyzing data

- Look at data **by indicator/attribute**
- **Aggregate** indicators and plot
- **Cross sectional** comparison (e.g. 1st vs 4th year)
- **Longitudinal** development across courses and programs
- Compare special programs **within institutions**

Building Engagement

Why are people disengaged?



Suggested approach

Listen	Engage, don't disseminate
Link	Practise to research
Leverage	Existing data and experience
Lead	Clear obstacles, build capacity

- Support that listens
- High quality resources
- Easy access to data

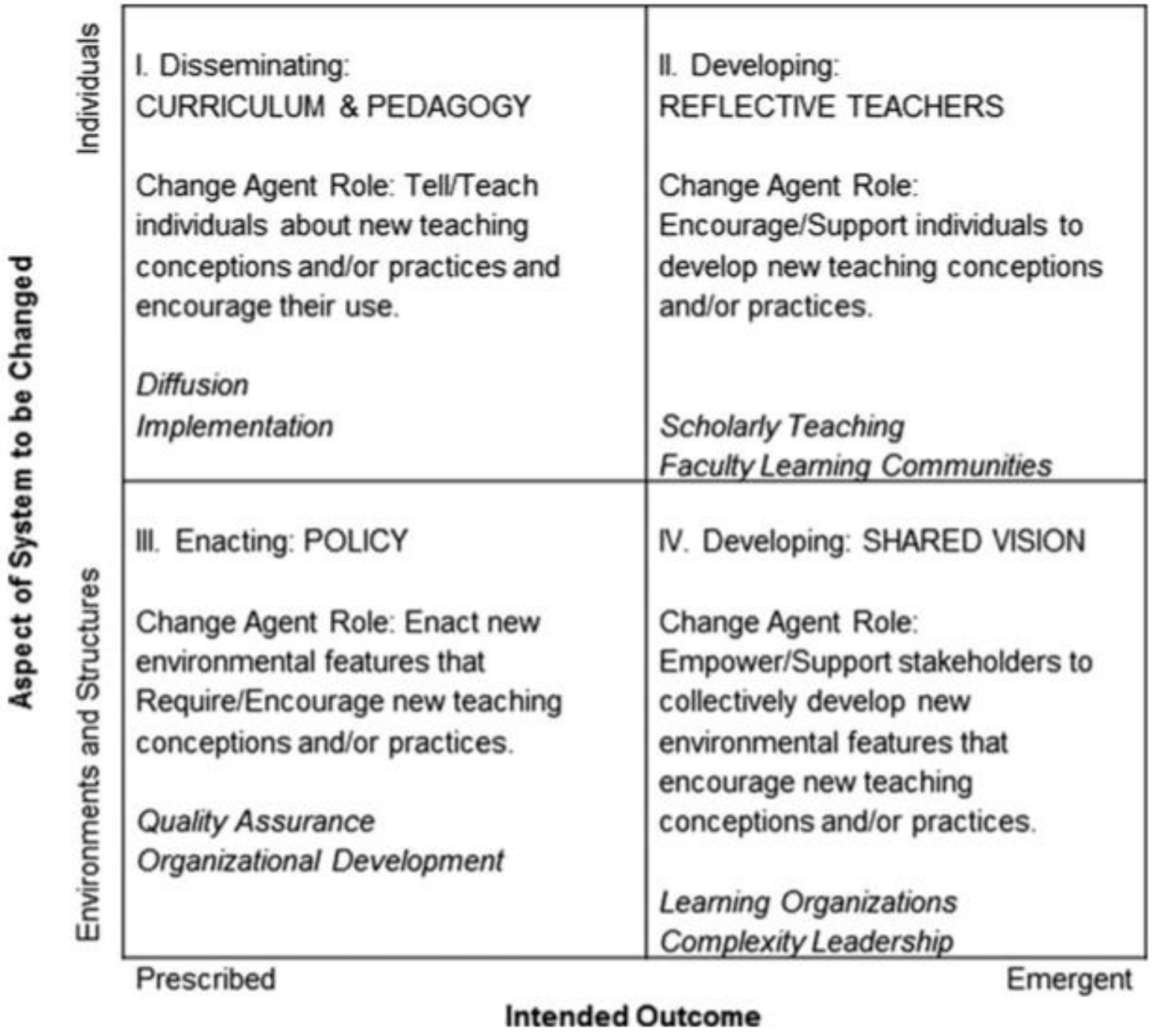
Engage & Support

- Accessible information
- Flexible templates
- Easy-to-follow workflows

Streamline & Reduce

- Leverages existing data
- Facilitate data exploration
- Support meaning making

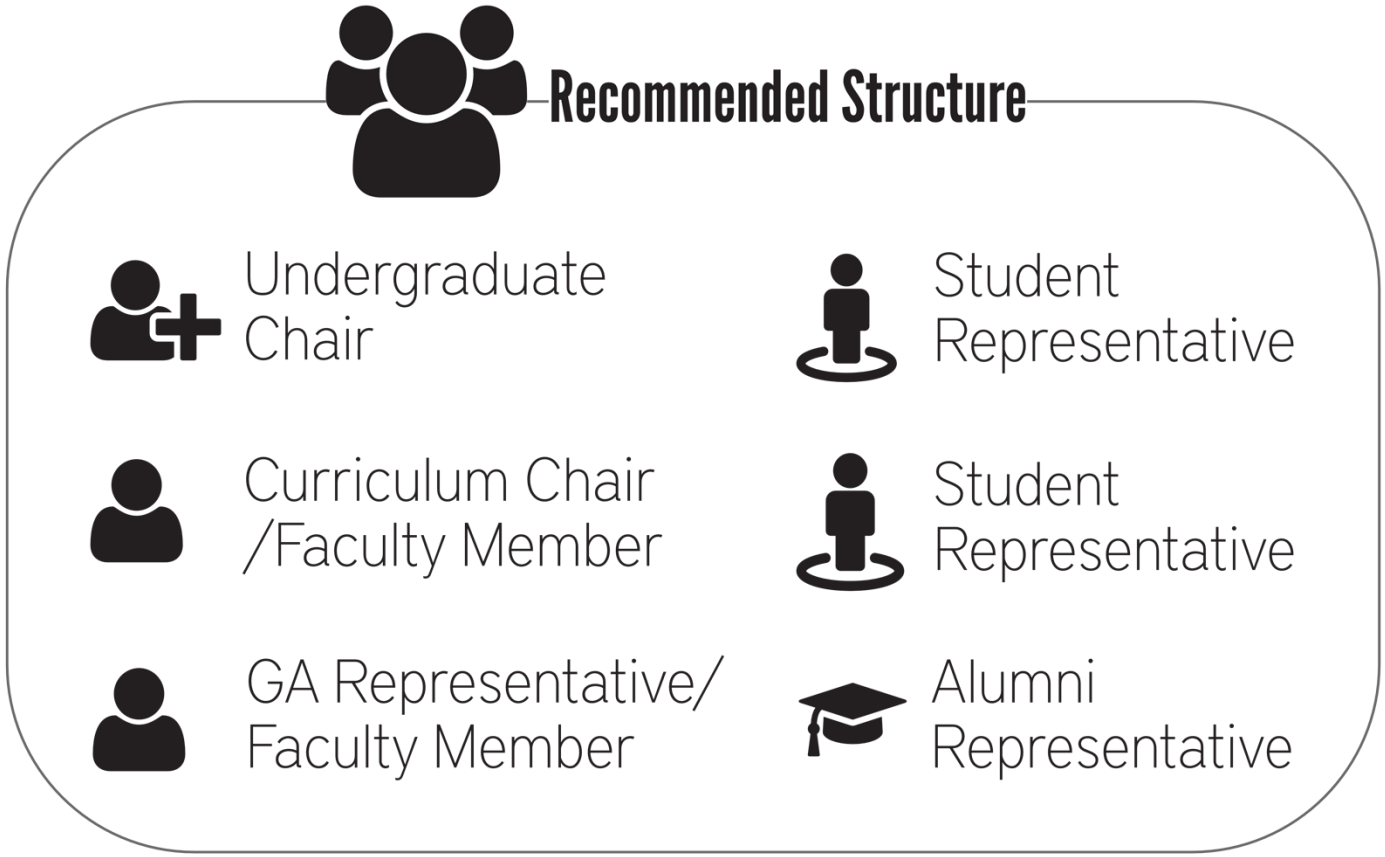
Integrate & Leverage



Borrego M, Henderson C. Increasing the Use of Evidence-Based Teaching in STEM Higher Education: A Comparison of Eight Change Strategies. J Eng Educ. 2014 Apr 1;103(2):220–52.

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**.



Banta's characteristics of effective outcomes assessment

A. Planning

B. Implementation

C. Improving and sustaining

13. Produces credible evidence of learning and organizational effectiveness.

14. Ensures assessment data is used continuously to improve programs and services.

15. Provides a vehicle or demonstrating accountability to stakeholders.

16. Encompasses expectation that outcomes assessment will be ongoing, not episodic.

17. Incorporates ongoing evaluation and improvement of assessment process.

T. Banta (2002), Building Scholarship of Assessment. Jossey-Bass

Evaluation of the process

Change Strategies & Governance

Is this working for the people involved?

Is it Efficient? Effective? Sustainable?

How well do they support the people and the process?

Ultimately….

Are you improving student learning?

EGAD Website

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http://egad.engineering.queensu.ca.

Direct link to this material will be:

http://bit.ly/CEEA-5A

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