Pathways for Assessing Interdisciplinarity

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Workshop on the Implications of Convergence for How NCSES Measures the Science and Engineering Workforce

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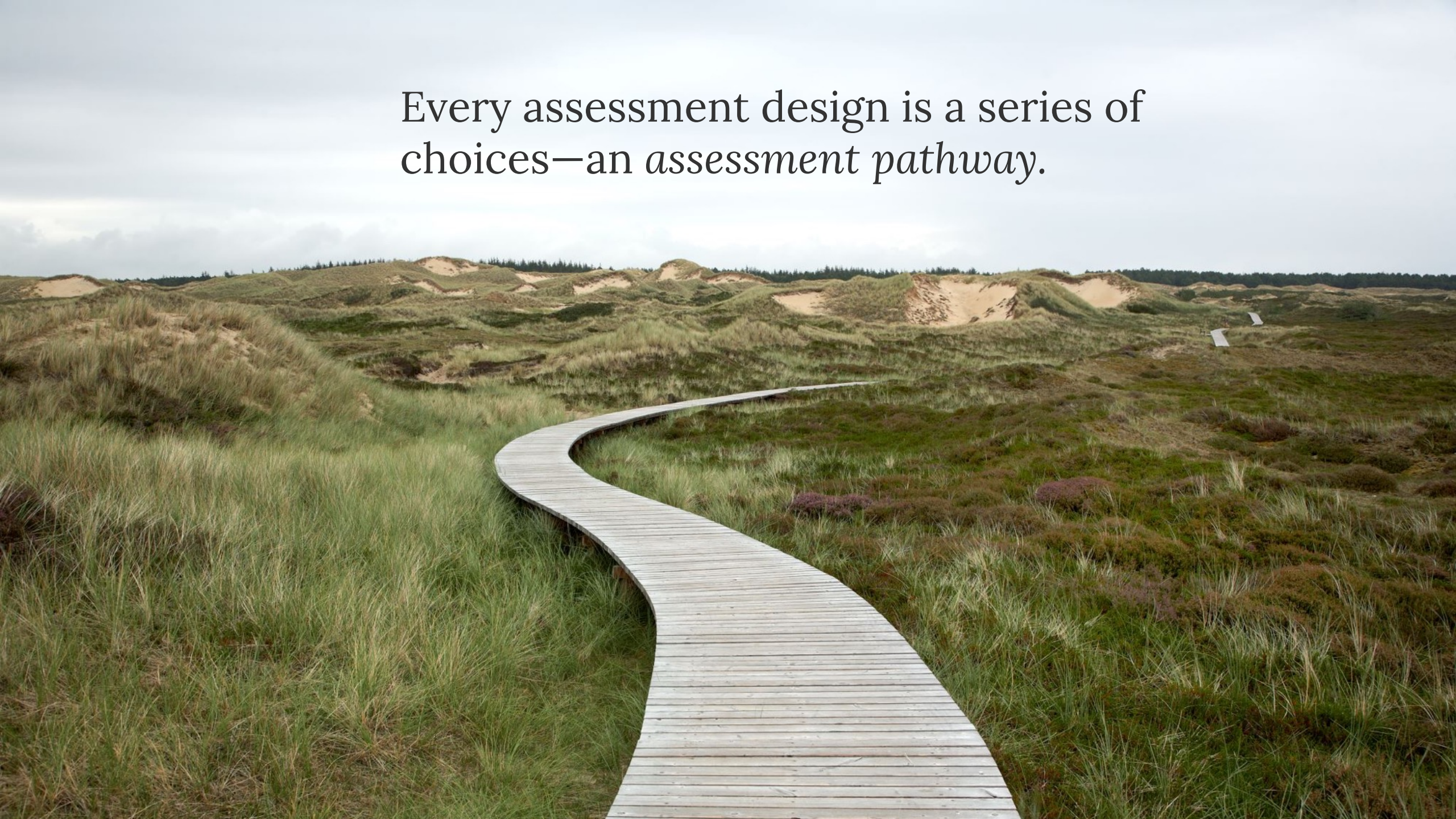
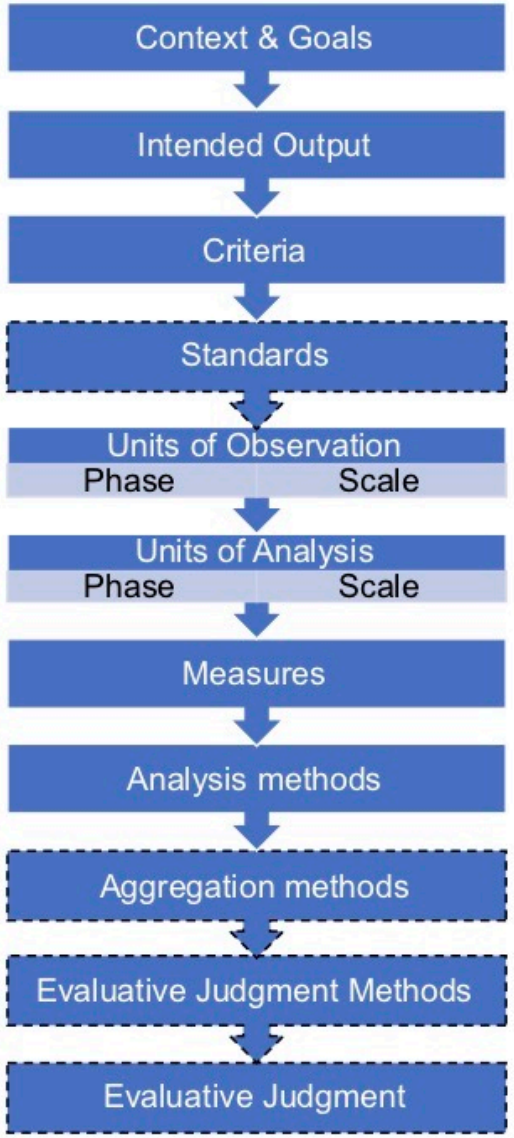
A note on vocabulary

- Interdisciplinarity = “interdisciplinarity”
  (including elements in common with “transdisciplinarity”)
- Convergence = a kind of “inter- or transdisciplinarity”
- Assessment = an empirical summary of important characteristics
- Measure = a unit of empirical observation (qual or quant)


Every assessment design is a series of
choices—an *assessment pathway*.

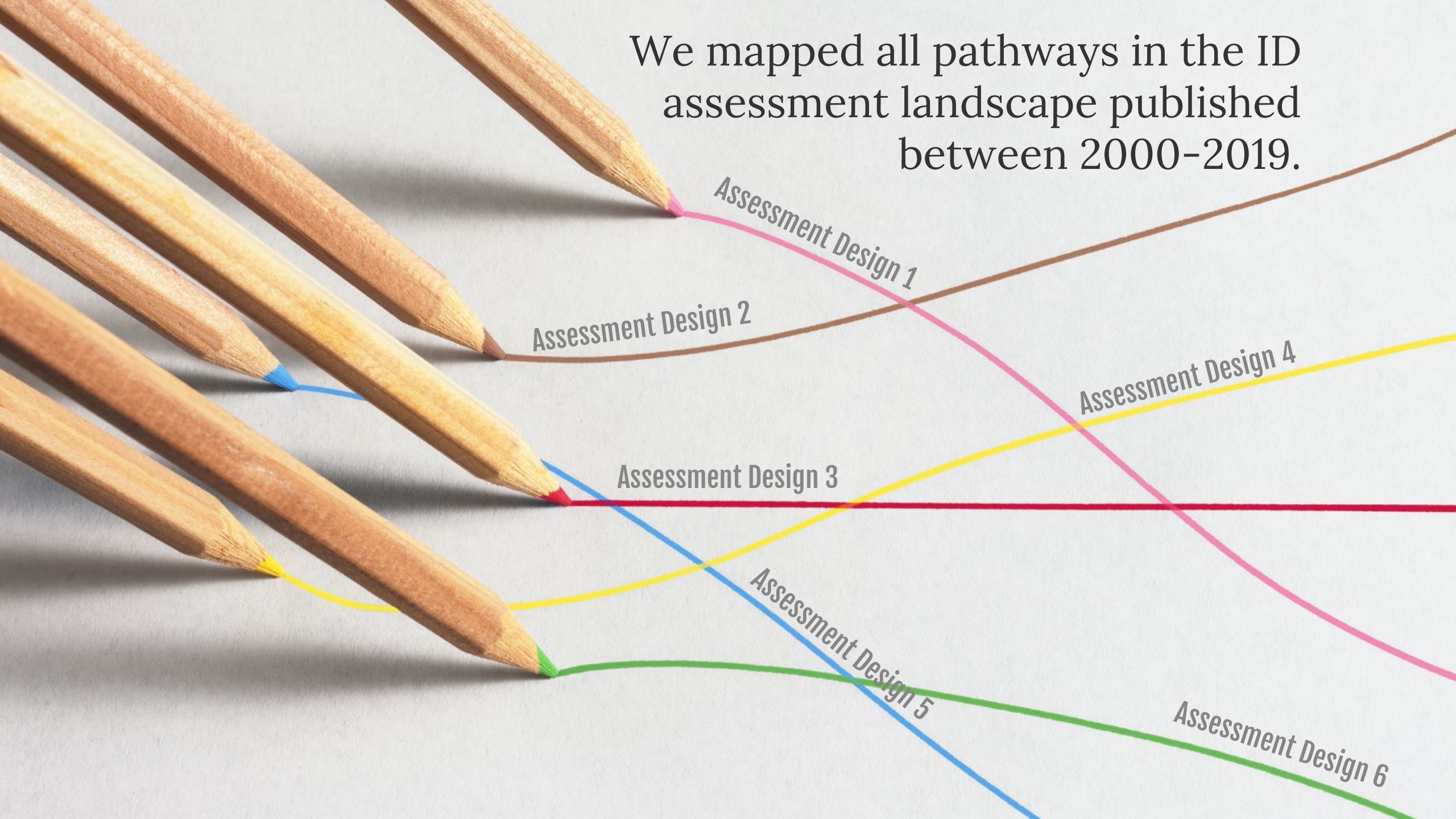
a. Assessment Pathway Framework



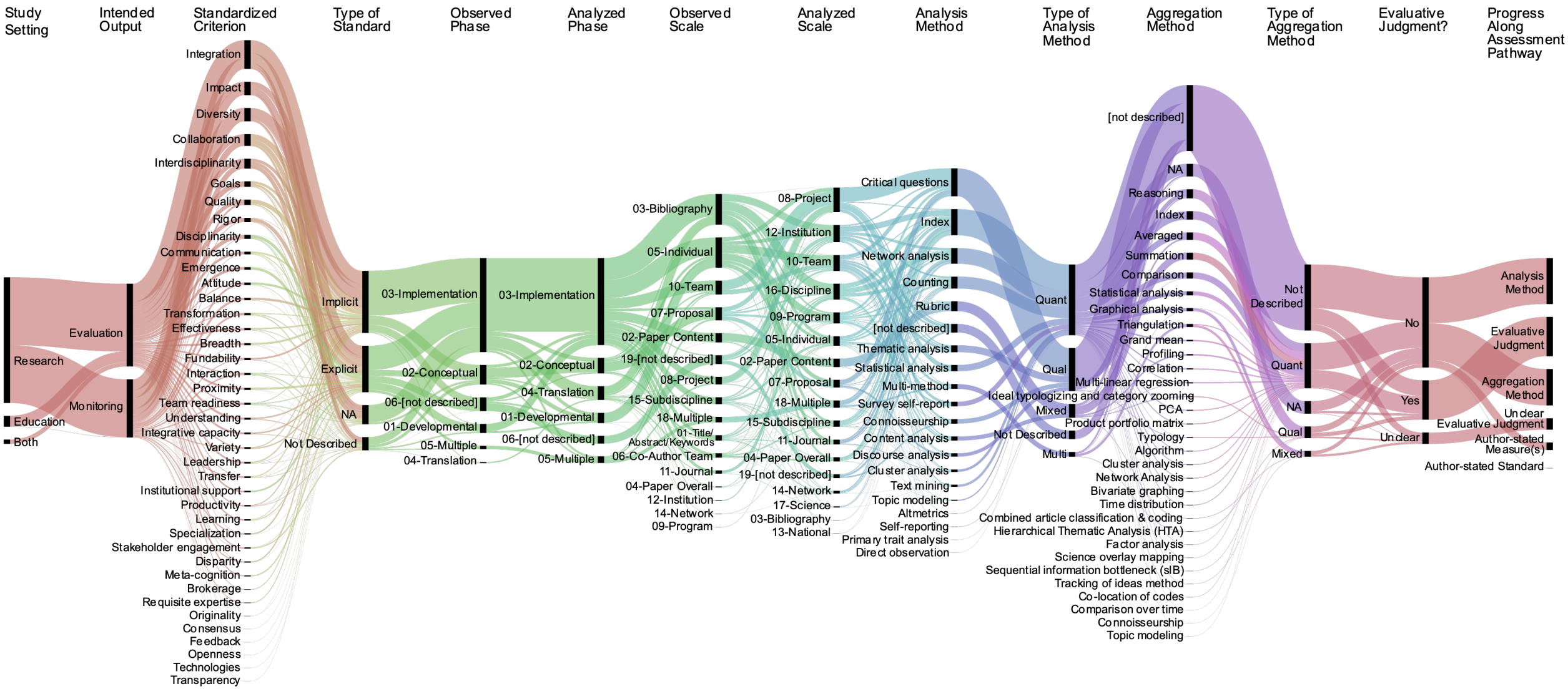

a. Assessment Pathway Framework
Context & Goals
Intended Output
Criteria
Standards
Units of Observation
Phase
Scale
Units of Analysis
Phase
Scale
Measures
Analysis methods
Aggregation methods
Evaluative Judgment Methods
Evaluative Judgment
b. Two example pathways from Aydinoglu, Allard, & Mitchell (2016)
Context & Goals
NAI-funded research teams
Intended Output
Evaluation
Criterion
Diversity
Standard
N/A
Units of Observation
Conceptual Phase
Individual Scale
Units of Analysis
Conceptual Phase
Team Scale
Measure
Shannon entropy measure
Analysis method
Index
Aggregation method
N/A
Evaluative Judgment Method
N/A
Evaluative Judgment
N/A
Context & Goals
NAI-funded research teams
Intended Output
Evaluation
Criterion
Diversity
Standard
Project score ≥ Team score
Units of Observation
Individual Scale
Conceptual Phase
Units of Analysis
Project Scale
Conceptual Phase
Measure
Shannon entropy measure
Analysis method
Index
Aggregation method
[Reasoning]
Evaluative Judgment Method
Comparing units of analysis
Evaluative Judgment
Average project score < average team score, which implies that diversity promises in the grant proposal are not achieved on average, which is bad


These choices determine how
one navigates the complex landscape
of interdisciplinarity
assessment.

We mapped all pathways in the ID assessment landscape published between 2000-2019.



1,006 PATHWAYS




so what?!

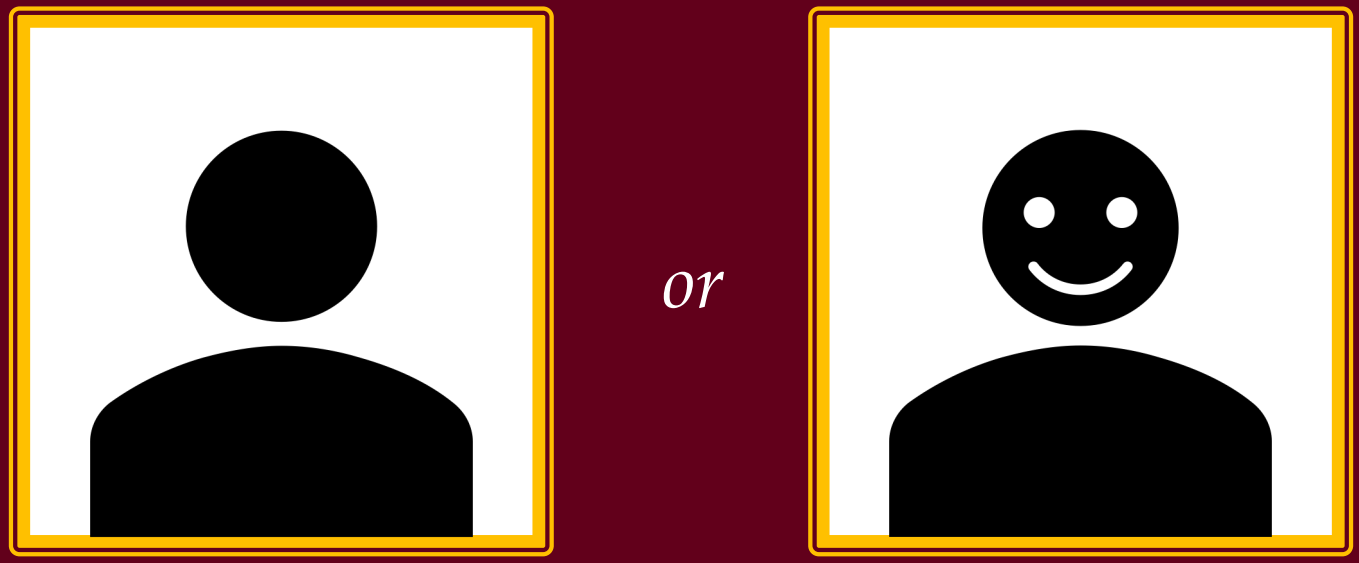
1.

2.

3.

4.

1. Decide to Monitor or Evaluate



or

and declare this intention.

Assessment = Monitoring + Evaluating

Assessment = Monitoring + Evaluating

Description
(No Value Judgment)

Assessment = Monitoring + Evaluating

Description
(No Value Judgment)

Diagnosis
(Value Judgment)

Assessment = Monitoring + Evaluating

Description
(No Value Judgment)

”Results are ###ABC.”

Diagnosis
(Value Judgment)

”Results are high quality.”

Assessment = Monitoring + Evaluating

Description
(No Value Judgment)

”Results are ###ABC.”

Diagnosis
(Value Judgment)

”Results are high quality.”

2. Use Rigorous Evaluative Reasoning to Avoid Dead Ends.

Assessment = Monitoring + Evaluating

Description
(No Value Judgment)

”Results are ###ABC.”

?

Diagnosis
(Value Judgment)

”Results are high quality.”

Action!

Assessment = Monitoring + Evaluating

Description
(No Value Judgment)

”Results are ###ABC.”

a standard

Diagnosis
(Value Judgment)

”Results are high quality.”

Action!

Rigorous Evaluative Reasoning

at minimum

Premise 1: ”Results are ###ABC.”

Conclusion: “Therefore, these results are high quality.”

Rigorous Evaluative Reasoning

at minimum

Premise 1: ”Results are ###ABC.”

missing link

Conclusion: “Therefore, these results are high quality.”

Rigorous Evaluative Reasoning

at minimum

Premise 1: ”Results are ###ABC.” → Accurately measured criterion

Premise 2: “ABC is high quality.” → Explicit standard for criterion

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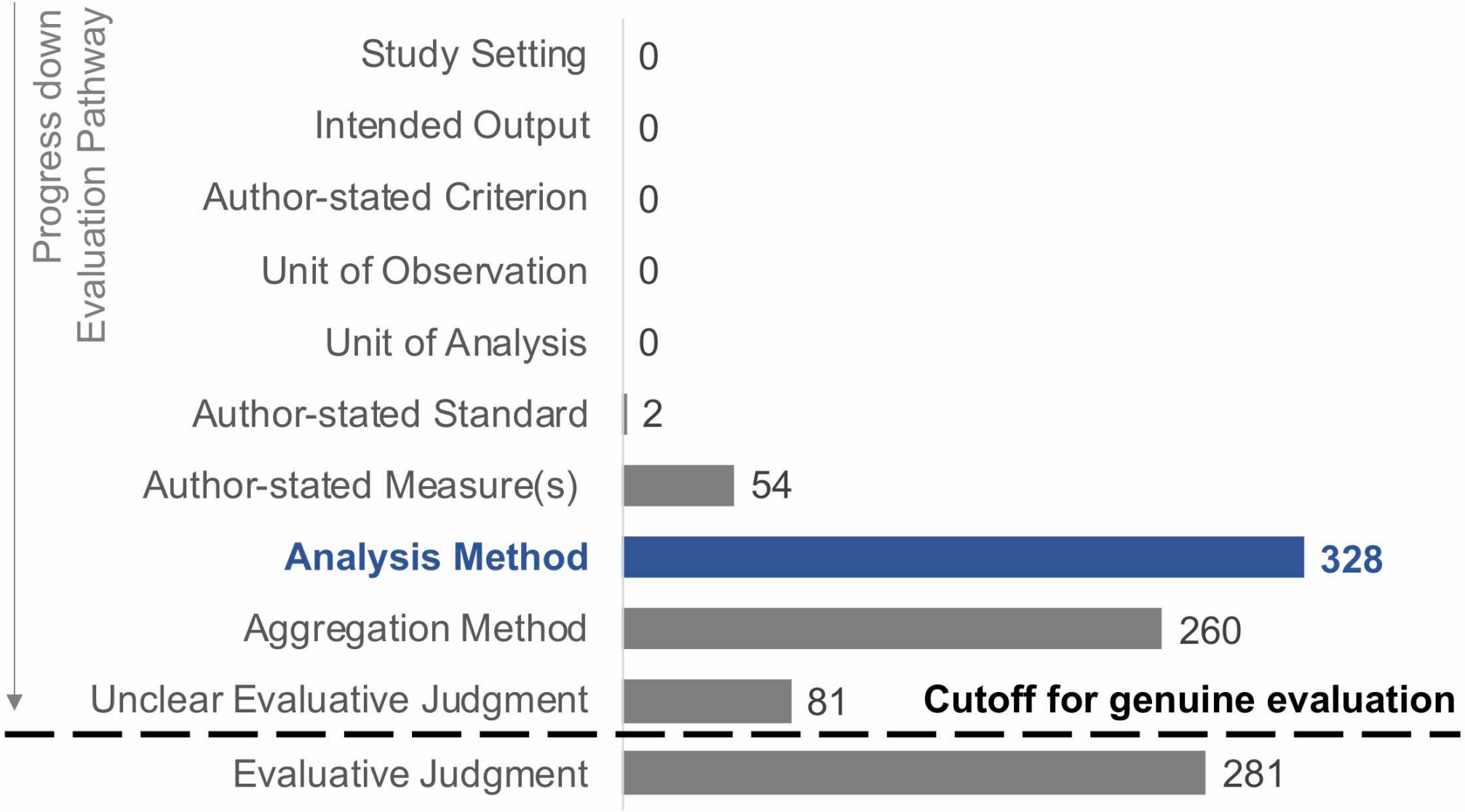
Conclusion: “Therefore, these results are high quality.” → Clear evaluative judgment

At least

83%

of pathways aiming to evaluate
did not include all minimum elements
required for rigorous evaluative reasoning.

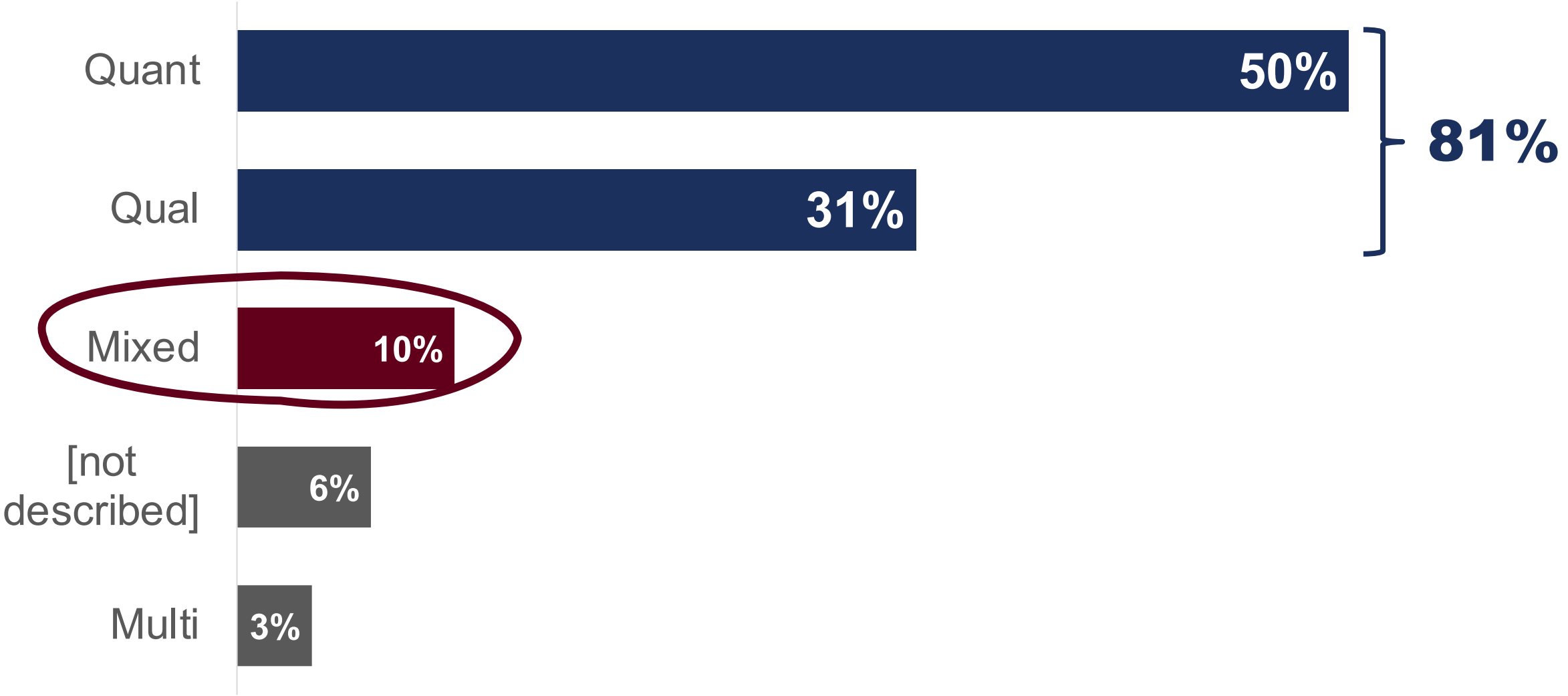
The vast majority of pathways **ended** before reaching a clear evaluative judgment. It was most common to stop with **analysis**.



3. Mix Methods to Keep Both Eyes Open

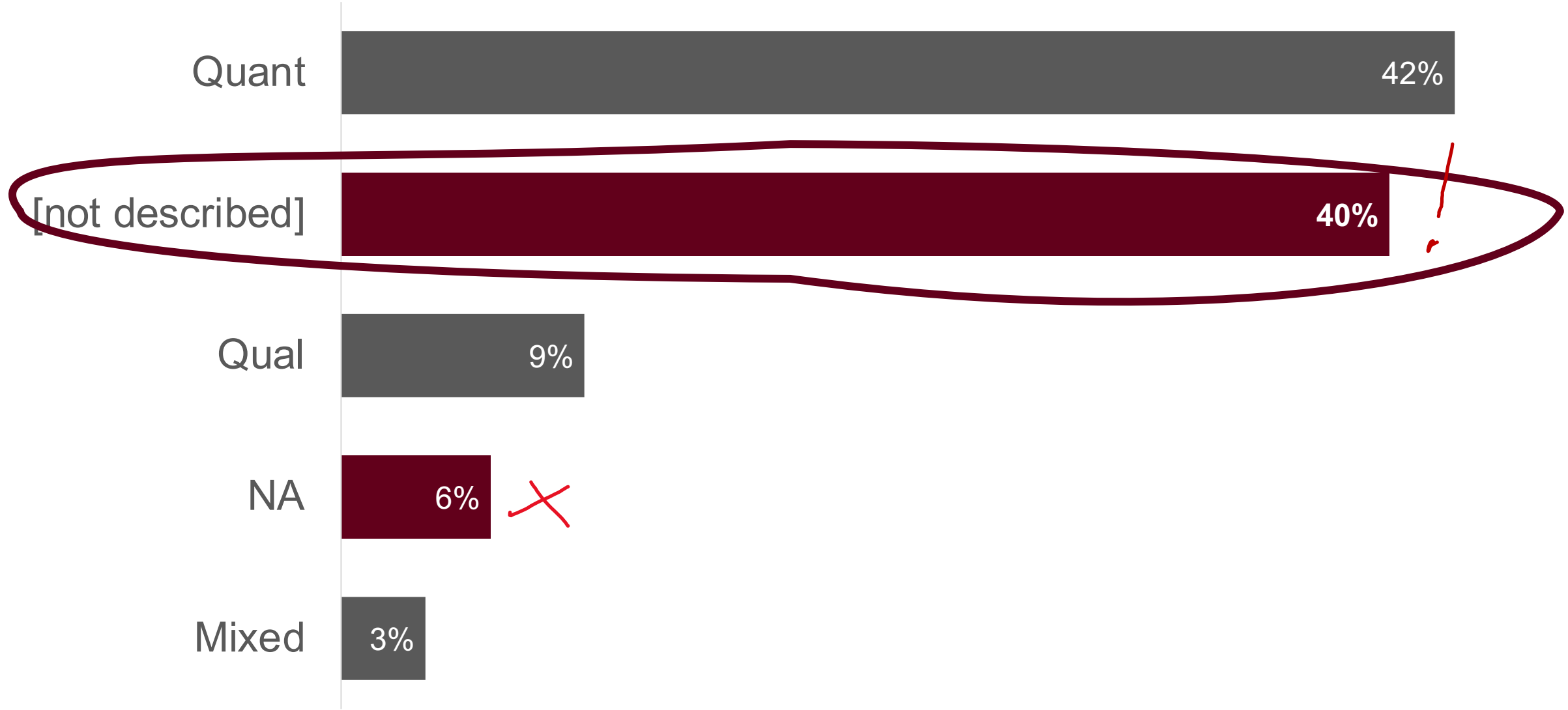
Over 80% use either quant or qual methods, but quant dominates.

Only 10% used mixed methods.

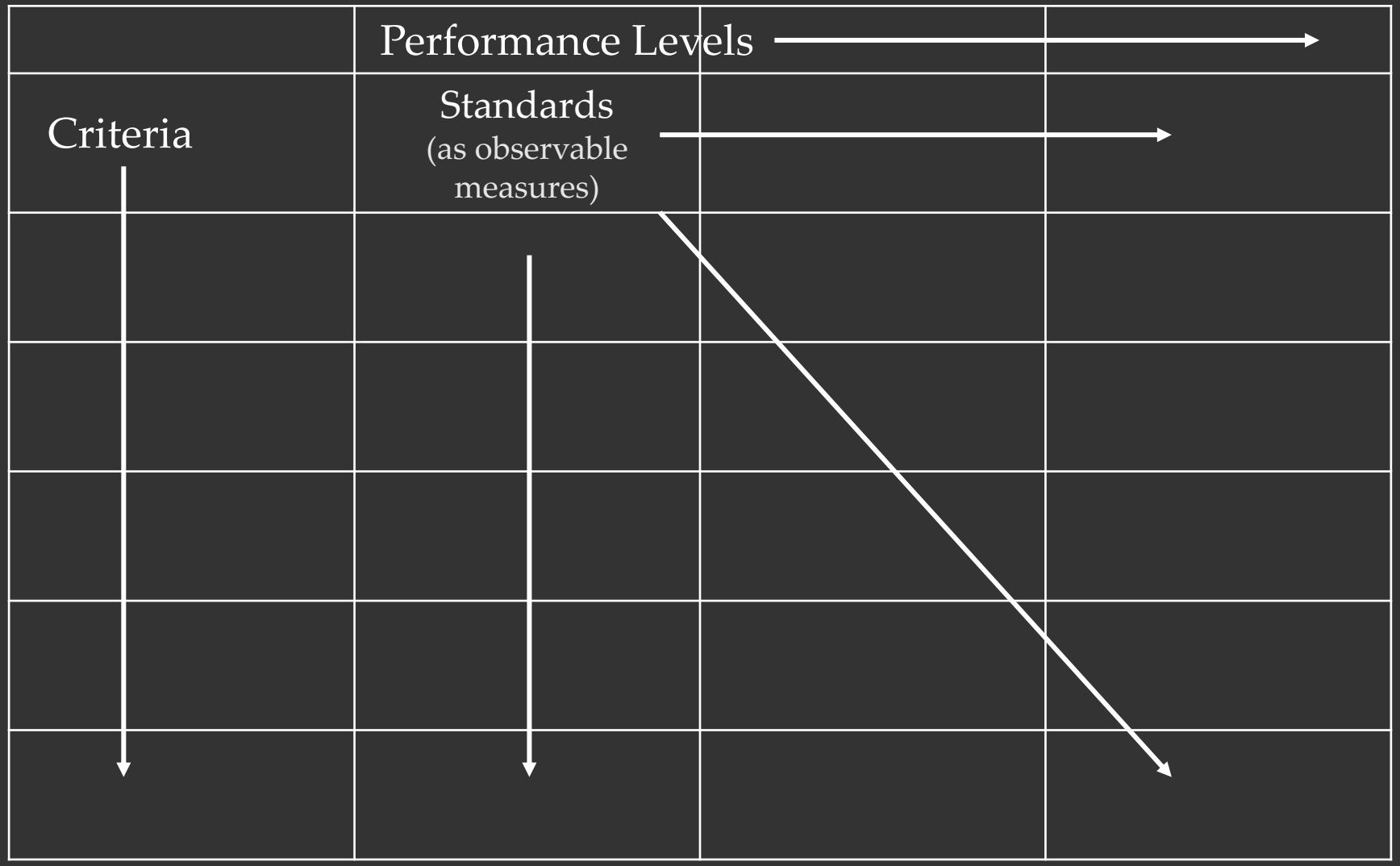


Over a third didn't describe how they used multiple measures to support their judgment.

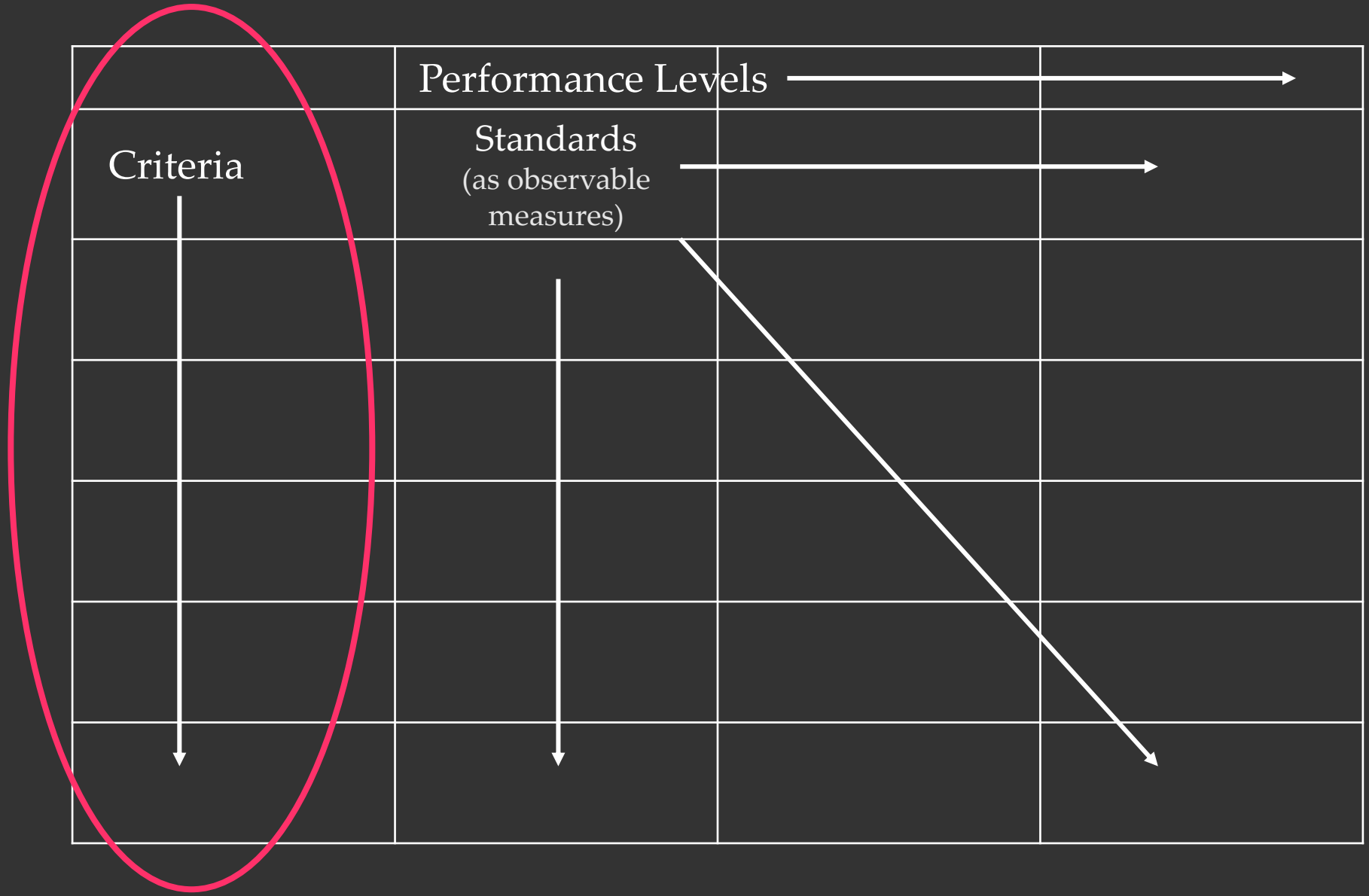
And 6% based evaluative judgments on a single measure.



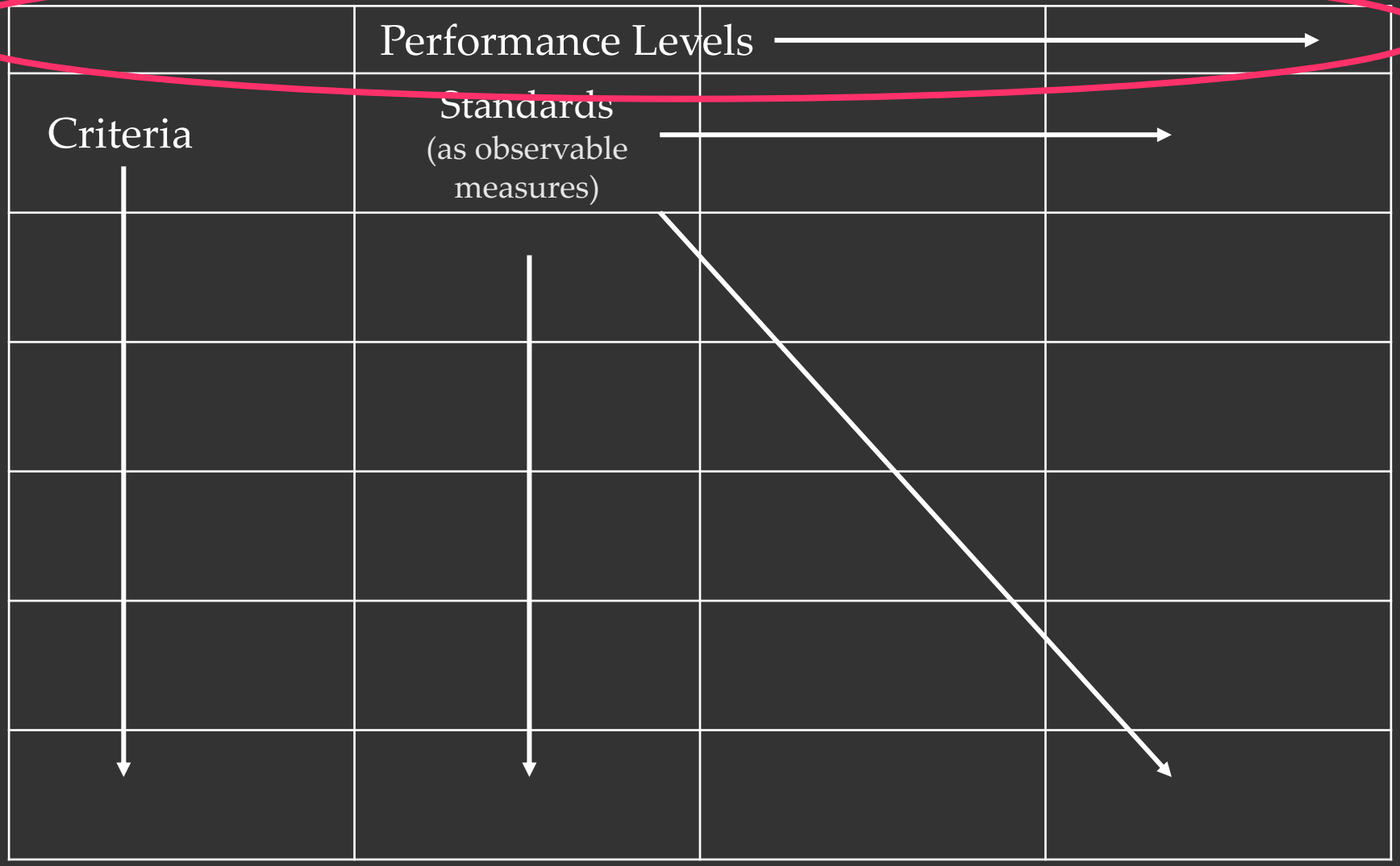
Exemplar: Rubrics



Exemplar: Rubrics



Exemplar: Rubrics



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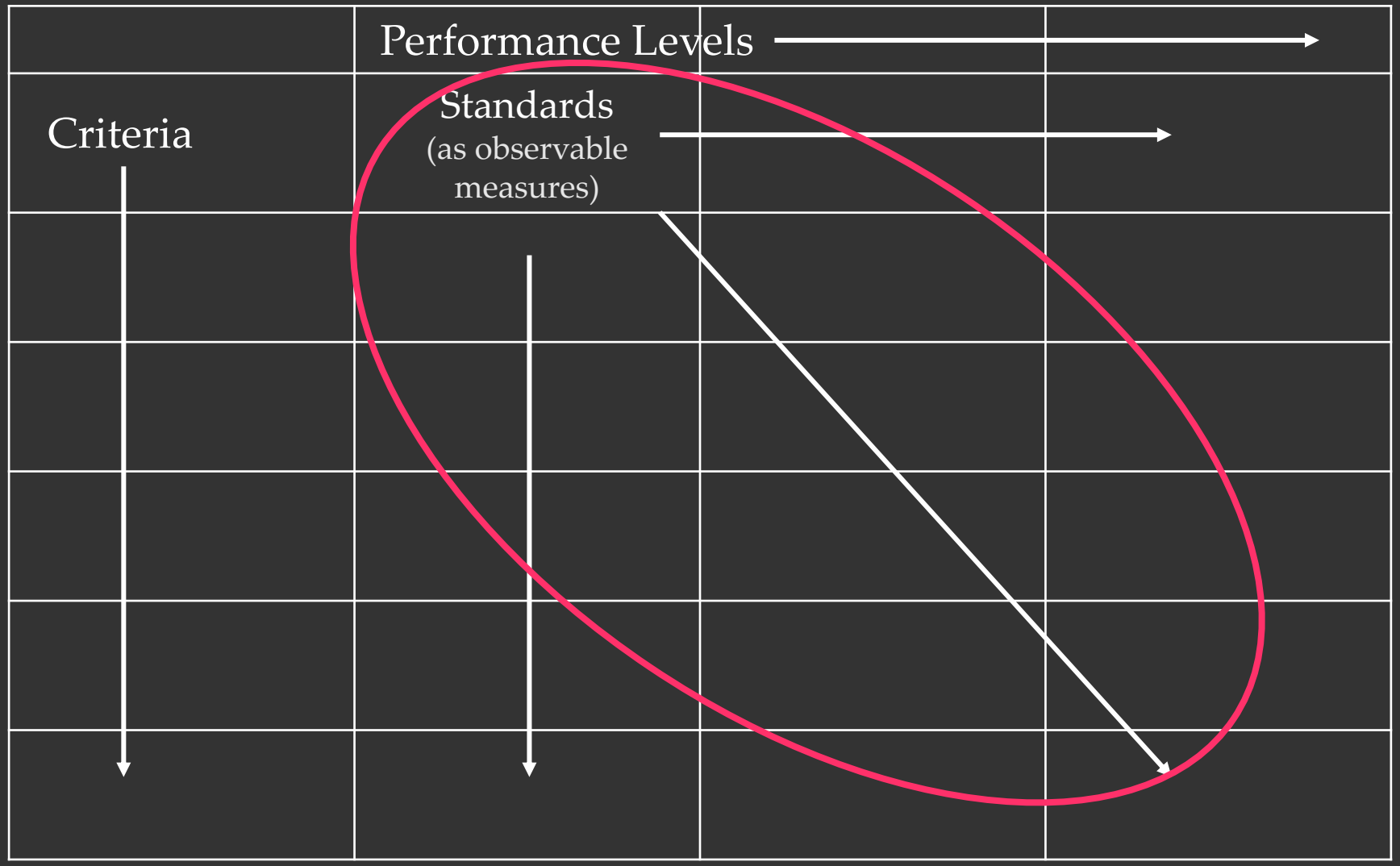
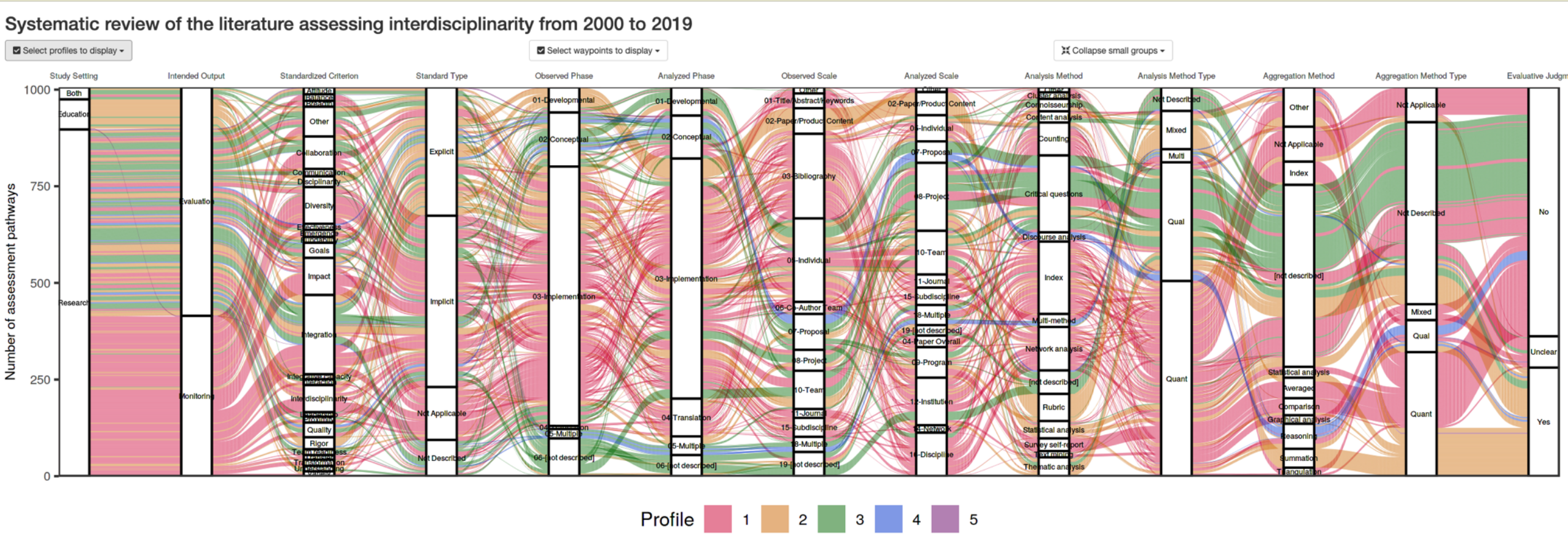


4. Use our dataset to find criteria, standards, measures,

methods, & entire approaches that are appropriate for convergence.

1,006 PATHWAYS – INTERACTIVE

https://shiny.sesync.org/apps/evaluation-sankey/



Dataset creators: Bethany K. Laursen, Kelly Anderson, and Nicole Motzer. Visualization creators: Quentin D. Read and Kelly L. Hondula.

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1. Decide to monitor or evaluate, and declare this intention.

2. Use rigorous evaluative reasoning to avoid dead ends.

3. Mix methods to keep both eyes open.

4. Use our dataset to find criteria, standards, measures, methods, & entire approaches that are appropriate for convergence.

Evaluation basics are *missing*.


Choose, explain, & follow your
assessment pathway *clearly* and *carefully*.

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