Metrics Mania!

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Considering Measures Benchmarks Metrics

And some tricks for using them
A Natural Progression

Measurements → Benchmarks → Metrics

Measures ∩ Benchmarks → Metrics

Outcomes
Measurements Can Be

**Nominal**  – Did you log on (Y, N), gender, etc.

**Ordinal**  – U.S. News and World Report ranking

**Interval**  – IQ scores

**Ratio**  – How much you weigh
Measurements Must Demonstrate

Validity - Measure something

Variability - Score differences

Reliability - Assurance of consistency
Characteristics of Measurement: The Classical Measurement Model

Observed Score = True Score + Measurement Error

Reliability Estimate
Characteristics of Measurement: The Item Response Model

Probability of responding correctly

Ability

Low 0.5  High
Characteristics of Measurement

Everyone does not have to respond to the same items - Tailored Tests

**Item Response Theory**

Ability and item difficulty cast on the same scale

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Item Difficulty

Response Ability

Chuck’s Score
The Problem of Cut Scores

The Measurement Scale

Cut Score 1 above this I’m sure they have it

This range, not so sure

Below this I’m sure they don’t have it
The Measurement Compromise

The Measurement Scale

100

Inevitable Misclassification

The Compromise Cut Score

0
An Index of Efficiency for a Fixed Length Measure

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<th>Person</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
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</table>

Would they pass if the cut score were...

1 = Pass
0 = Fail
Graphing the Efficiency Index

The Index of Efficiency

Most efficient cut point 50%


Passing score possibilities
Benchmarks
No Measurement ... No Management

A process of making comparisons against peers’ best practice or past performance to monitor and improve
The Many Varieties of **Benchmarks**

- Strategic
- Operational
- Critical Success Factors
- Performance Improvement
- Best Practices
So Then Benchmarks Morph Into Metrics ➔ (Targets)

But:

They still should have the attributes of good measurements
# College Completion Metrics

## Reimagining the First Year – AASCU*
- Credit Completion
- Credit Completion Ratio
- Gateway Courses Completed
- Persistence (Fall to Fall)
- Declared Major

## Gates Frontier Set
- Credit Accommodation Ratio
- Gateway Courses Completed
- Graduation Rate
- Credit Completion Ratio
- Retention Rate

*American Association of State Colleges and Universities*
Preeminent Metrics 2017-18

1. Avg GPA and SAT score
2. Public university national ranking
3. Freshman retention rate
4. 6 yr graduation rate
5. National Academy memberships
6. Science and engineering research expenditures
7. Non-medical science and engineering research expenditures
8. National ranking in STEM research expenditures
9. Doctoral degrees awarded annually
10. # of post-doctoral appointees
11. Endowment size
CIS Security Metrics

1. Incident management
2. Vulnerability management
3. Patch management
4. Application security
5. Configuration management
6. Financial metrics

Taylor Russell Problem
What Is It Going To Cost You?

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<tr>
<th></th>
<th>Hire</th>
<th>Don’t Hire</th>
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<tr>
<td>Qualified</td>
<td>✔</td>
<td>❌Oops 1</td>
</tr>
<tr>
<td>Unqualified</td>
<td>❌Oops 2</td>
<td>✔</td>
</tr>
</tbody>
</table>

Which is worse, oops 1 or oops 2?

## Taylor Russell Problem

### What Is It Going To Cost You?

#### What you Decide

<table>
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<th>Breach</th>
<th>No Breach</th>
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<tbody>
<tr>
<td>Breach</td>
<td>✔️</td>
<td>✗️ Oops 1</td>
</tr>
<tr>
<td>No Breach</td>
<td>✗️ Oops 2</td>
<td>✔️</td>
</tr>
</tbody>
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Which is worse, oops 1 or oops 2?
Why Are **Metrics** Like The Walking Dead?
Because they turn into targets...
And When They Do ...

≠ Measurements
≠ Benchmarks
≠ Metrics

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