TECAID
Transforming Engineering Culture
To Advance Inclusion And Diversity

WEPAN Women in Engineering ProActive Network
ASME Setting the Standard
PURDUE ENGINEERING
NSF

Measuring Change:
Considerations for Creating Better Change Metrics

How do we know if change has happened? It's a valid question, but not an easy one to answer. The pressures of accountability too often lead to simplistic or misleading metrics instead of ones that inform practice and policy and build our capacity to design ever more effective change efforts. Keep the following in mind as your change team works collaboratively to develop change metrics that truly make a difference.

Know What You're Doing

Don't let the tail wag the dog: know what you want to measure before looking at metrics. Otherwise, easily available metrics will lead you off course at best or, at worst, subvert your intended change effort.

Every metric has a defined context (how it's defined, how it's collected, what it's intended for). **If you don't know or understand the context, the metric is meaningless**. Institutional Research offices are an important resource here; their job is to give extensive thought to the context of existing institutional data.

Remember that **the process of measurement affects what is seen**. For example, differently worded questions can elicit different responses. Furthermore, we know from the Heisenberg Uncertainty Principle that there's a limit to the precision with which *position* and *momentum* can be known simultaneously. Be clear on what you are seeing and what you need to see. Sometimes a disappointing position is associated with important positive momentum.

Do What Is Needed

Measure from multiple angles. Even a simple box needs 3 metrics to understand its size. **A single metric will seldom tell you what you want to know**.

But – don't go overboard. **Too much data is as bad as too little** - or maybe worse, since too much data looks better and can lull into a false sense of accomplishment. Too much data confuses the issues and dulls the senses. Relatedly, know what data is already available. Collecting data is a significant commitment of resources that could be directed instead to making good use of available data.

Quantitative measures and qualitative measures are equally valuable, and equally dangerous. Both can be manipulated and misleading, both can provide significant value. It's how you use them and whether they are the best measure that matters. At a very simple level, **qualitative measures help discover new patterns; quantitative measures illuminate known patterns and test hypotheses.**

Understand the difference between formative evaluation and summative. **Formative evaluation specifically chooses metrics and analyzes them with success and improvement in mind. Summative evaluation is used to make decisions.** Both are necessary, but they cannot be mixed and they often use quite different metrics.

Beware lagging indicators - metrics that show change only after much time has passed and after you have any chance to make corrections. They're attractive (and used a lot) because they can be used to motivate change. They are less helpful for informing a change process in progress. An indicator of a smart change effort is its ability to identify and measure leading indicators: signs that change has begun and is heading in a desired direction.

Learn to measure subtle change. Some of the most effective long-term change starts by harnessing existing efforts. This utilizes existing infrastructure and personnel and integrates new efforts into familiar processes. All of this can be very effective, but it is seldom dramatic.

The Intellectual is Political

Measuring change is inherently both social and political. **Metrics assign or infer value about human endeavors and have implications for the assignment of financial resources, institutional priorities, and individual time and energy**.

This has significant implications for the choice and use of any given change metric. To be effective, change metrics must be valid and focus attention in appropriate ways. The interpretation of data must take into account sources of bias. The import or implications of a given metric must not be overstated, dismissed, or misapplied.

Additionally, working with the data produced by the use of a given change metric is also a political and social process. Reports of change metric data must be properly contextualized and explained. Equally important, discussions of change metric data must incorporate the needs of the audience for education in order to properly understand results, and the potential differential impact of those results on those involved in the discussion.

Finally, measurement design and processes, data interpretation, and application of findings all involve human beings. Differences in language, time and attention, skills, and even personal styles can have a significant impact on what is seen, understood, or put to use. Education, training, internal schema, social pressures, stereotypes and assumptions will affect how individuals engage with each step of this process and how they interact with others. Social norms, structural barriers, distribution of power and resources, and patterns of privilege and inequities all impact the ability of these varied individuals to come together and work collectively toward a goal.

The relevance of human difference and diversity is highlighted further by the complexity of our institutions, educational processes, and change efforts. Just as no one metric will tell us enough, no single perspective, opinion, or experience is enough to understand how to measure change, evaluate whether change has happened, and put that evaluative information to good use. Human beings must work collaboratively to move forward in an intentional direction. Conscious attention to the political nature of even the most logical and fact-based aspects of measuring change creates the best conditions for change efforts to be measured, understood, improved, and successfully enacted.