

Software Metrics

Measure progress,
improve process

What are Metrics?

“Collecting data and developing mathematical tools for analyzing data.”

Numbers and Techniques that
help you measure!

In our case:

Product or development activities

Quantify

If we measure what we are doing,
We may use that data to learn to improve.

Why?

- Software projects complex beasts
- Difficult to predict
- Over budget
- Failure!
 - Optimism
 - Crappy estimation
 - Management
 - Remember Dr.Ack's speeches about the CHAOS reports

Help Predict

- Defects
- Risk
- Success
- Budget
- Effort
- Schedule
- Size/Complexity

Some Typical Categories

- Personal
- Process
- Project
- Product

Personal

- One's own productivity
- Help estimations
- Identify opportunities for improvement
- Better articulate what you've done

Process

- Not project-dependent
- Help identify trends across projects
- HR
- Time
- Effort
- Schedule
- Methods

Project

- Largely similar to Process metrics, but these deal with specific outcomes per project, rather than allocation and logistics issues
- Productivity: difficult to measure
 - 1x through 25x coders

Product

- Lines of Code
 - Operations
 - Classes
 - Inheritance
 - Dependencies/Complexity
 - Design
-
- Use to identify correlations, improve practices (see Modeling)

Benchmarking

- Compare own numbers with those of other projects
- Quality organizations keep databases.

Modeling

- Interpret data
- Help understand a system
- Make predictions
- Use:
 - Graphs
 - Statistical analysis
 - Find trends
- Fault prediction models

What does it measure and how do we know?

- Purpose
 - Importance a factor in effort devoted to it
- Scope:
 - Definition essential for interpretation
 - Larger scope, more confounding variables
- What are we trying to measure?
 - Natural scale, size, variability
- Instrument to measure
 - Natural scale, size, variability (what small changes mean)
- Effects of a change based on this metric

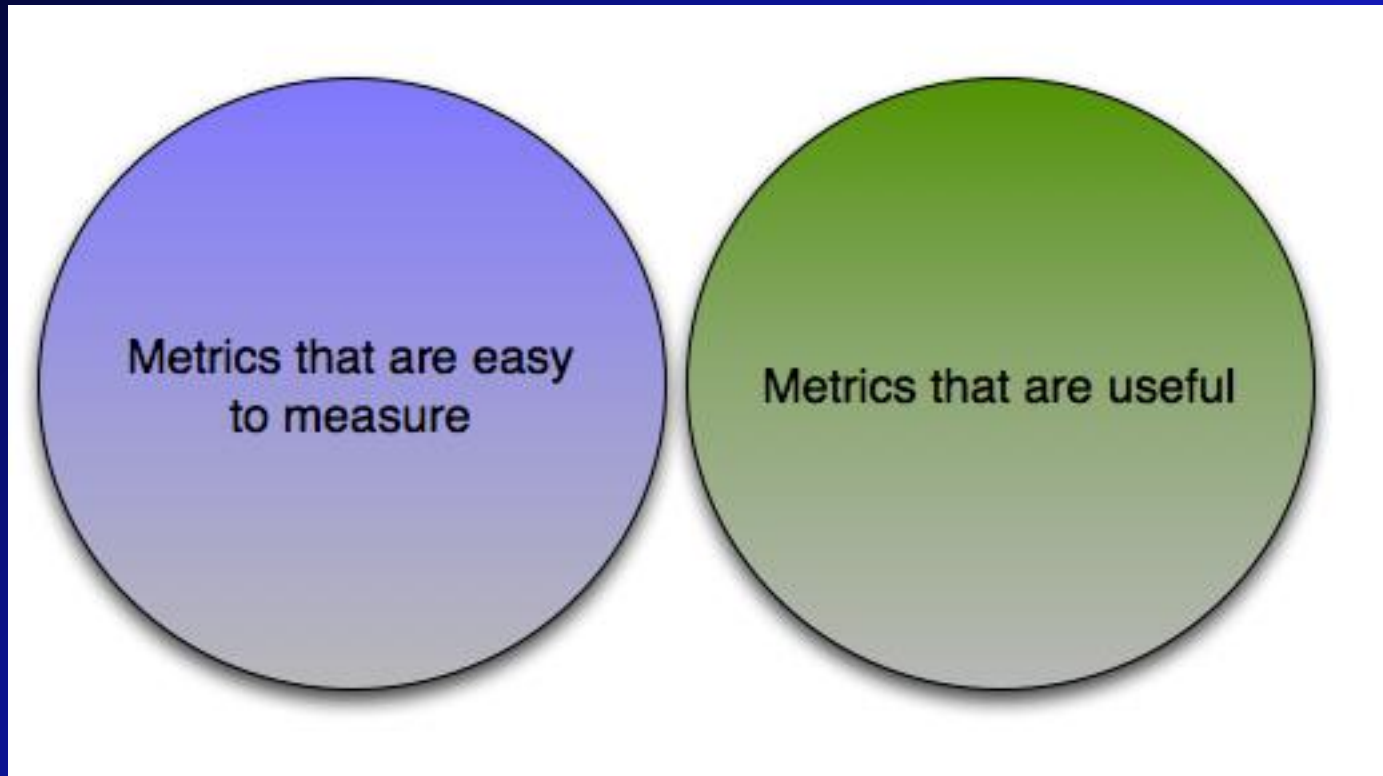
Validity

- Do the numbers measure what they're supposed to?
- MTTF:
 - Why mean? Different modes of operation
 - Operational time? Processor time? # ops?
 - First failure? Between failures?
 - Define “failure...”
- Ultimately, we are trying to measure “good.”

Arguments Against

- Given more weight than their worth, become more important than reqs
- Giving one measurement more limelight skews perceptions even more
- Managers love metrics.
- People (see above) tend to forget intrinsic error, bias, and variance
- Easy metrics vs. useful metrics

Easy and Useful Metrics, Venn Diagram



The Future

- Lots of research!
- Projects fail, so we fund research to find out why, and why we suck at getting better.
- Management
- Developer error
- Human cognition research
- Ways to get more bang for our metric

Conclusions and Opinions

Do Opine

- Use only what you need
- Keep cognizant of pitfalls
- Do record for yourself
- We're still an empirical profession
- We'll all probably feel the effects in organization.