Why Good Measurement, Estimating and Control Techniques are Important for Process Improvement

by

Larry Putnam, Sr.
Quantitative Software Management, Inc.
2000 Corporate Ridge, Suite 900
McLean, VA 22101
703 790-0055
larry_putnam_Sr@qsm.com
www.qsm.com

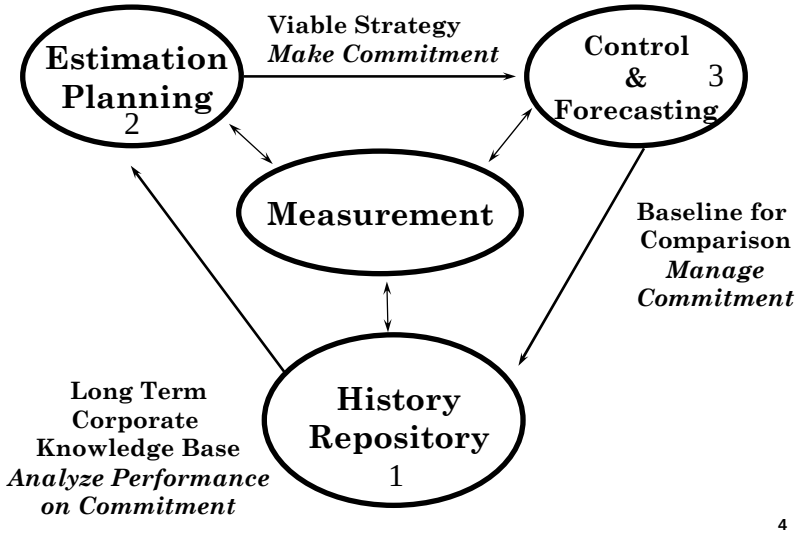
Presentation Overview

- **Application Development Measurement – how it relates to estimating and control**
  - **What frustrates commercial managers**
  - **Turning measurement into information**
  - **The benchmark as a platform for learning, comparison and measuring process improvements**
  - **Using benchmarks to set realistic expectations on the next project - good estimates**
  - **Using measurement as a monthly project health check – control and adaptive update**

Commercial Managers Frustration with Application Development

- **Projects take too long & cost too much**
- **Am I getting good value for the investments being made in process improvement?**
- **Always find out that projects are in trouble when it is too late to do anything**

A Mature Applications Measurement Process



Turning Measurement into Information

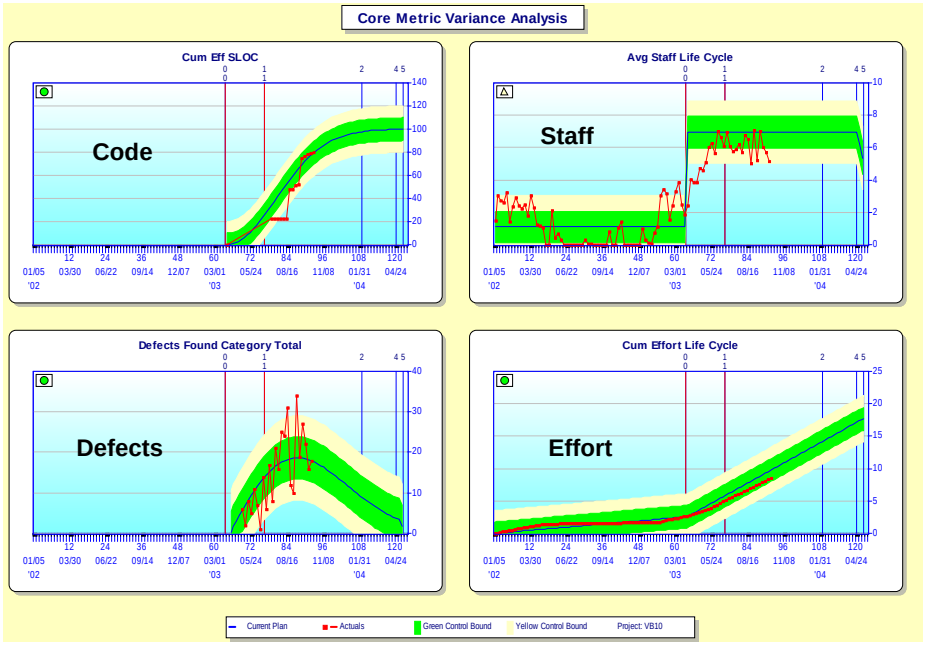
- What do we need to measure to answer the key management questions?
- What are the behavior patterns observed from the measurements?
- How do we build processes to use measurement to manage better?

Key Application Measurement Numbers

- Software Engineering Institute Core Metrics
  - Cycle time (Schedule)
  - Effort, Cost
  - Quality - Reliability
  - Size – Amount of functionality

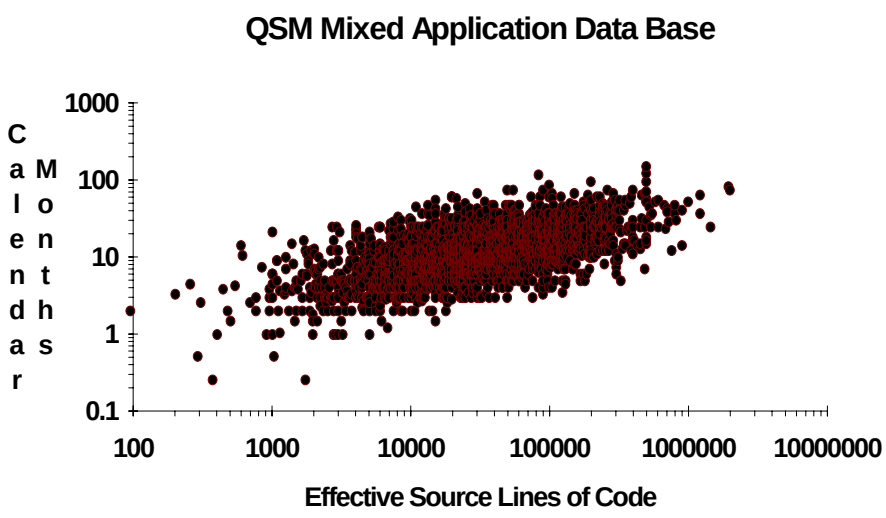
The Project View of Core Metrics

- Staffing Profile – month by month
- Defect Profile – month by month
- Code Production Profile – month by month

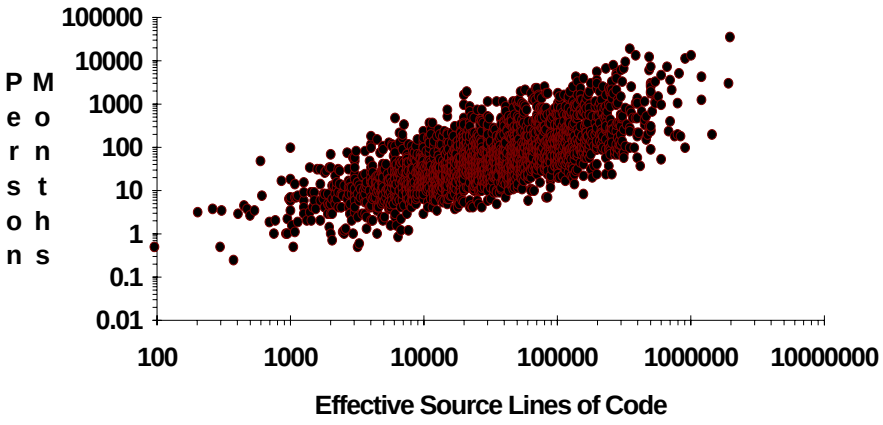


What does the data look like when there are many projects?

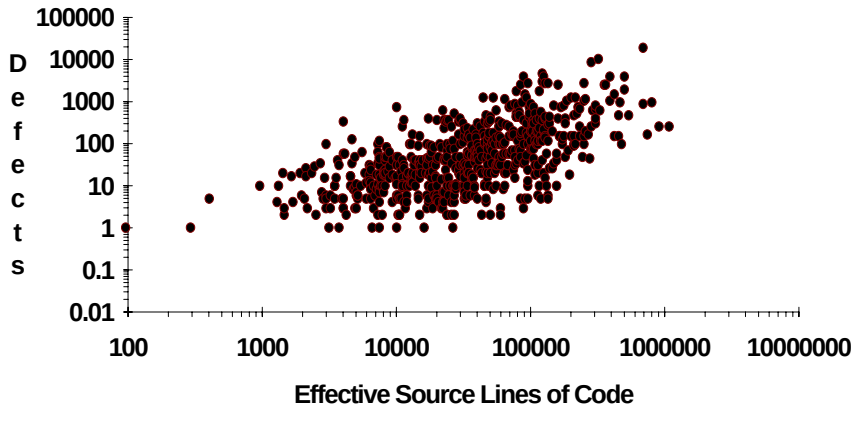
Schedule Behavior
The Big Picture



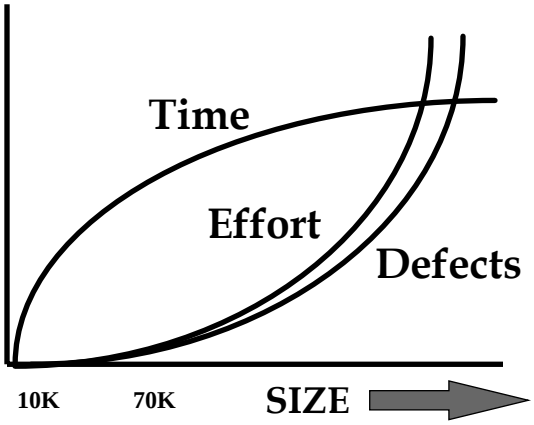
Effort Behavior
The Big Picture



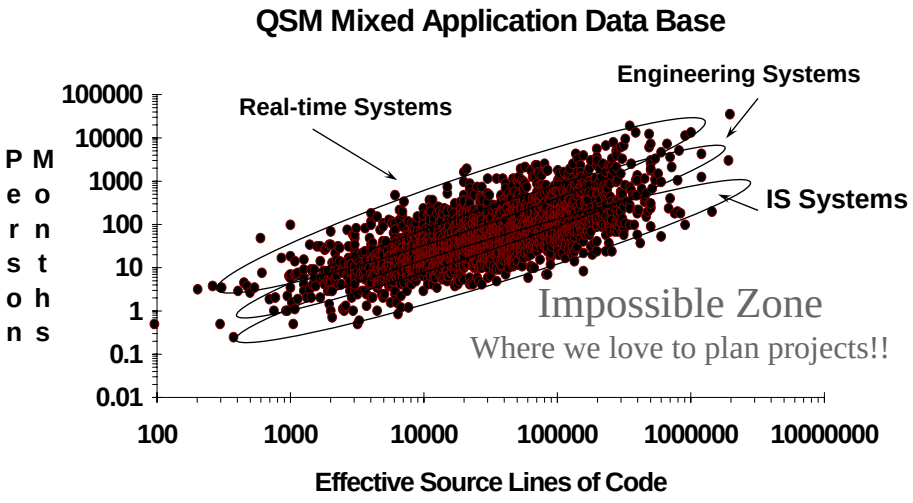
Defect Behavior
The Big Picture



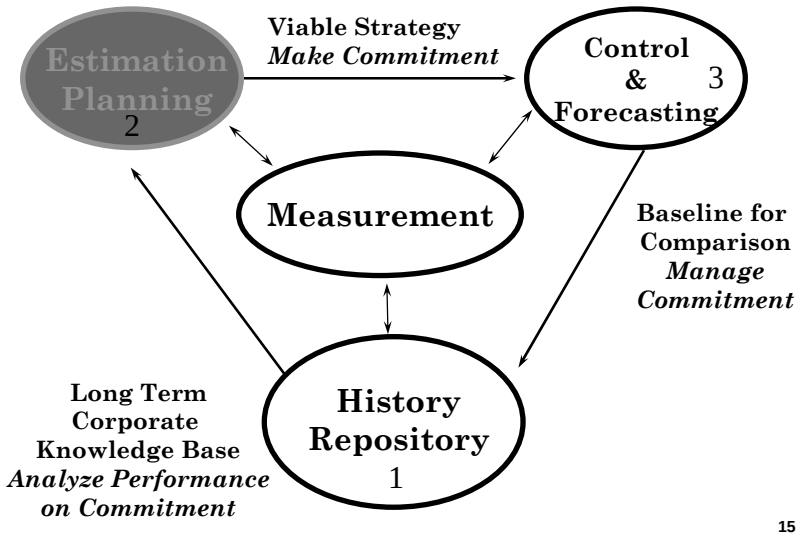
Fundamental Behavior



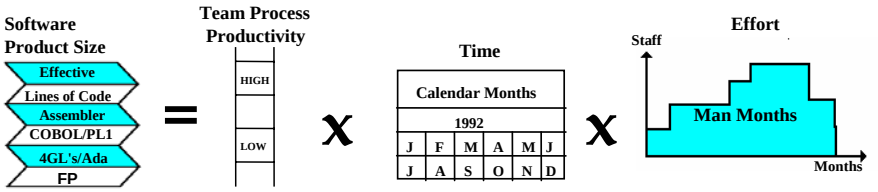
Stratifying the Data



A Mature Applications Measurement Process

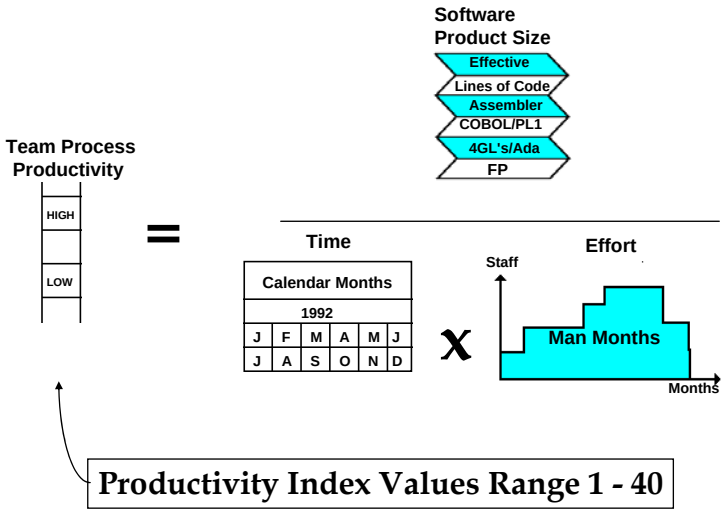


Software Production Equation

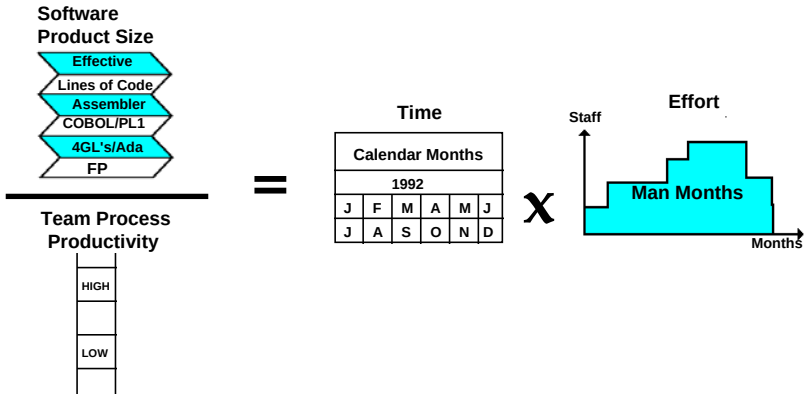


Link Size with Efficiency, Schedule and Effort

History - Calibration Form of Equation
(Conceptual)

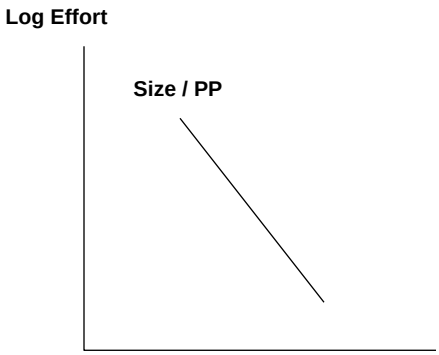


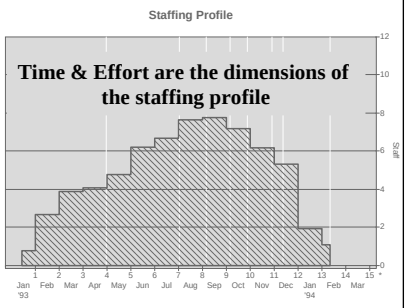
Estimation and Adaptive Forecasting Form of Equation



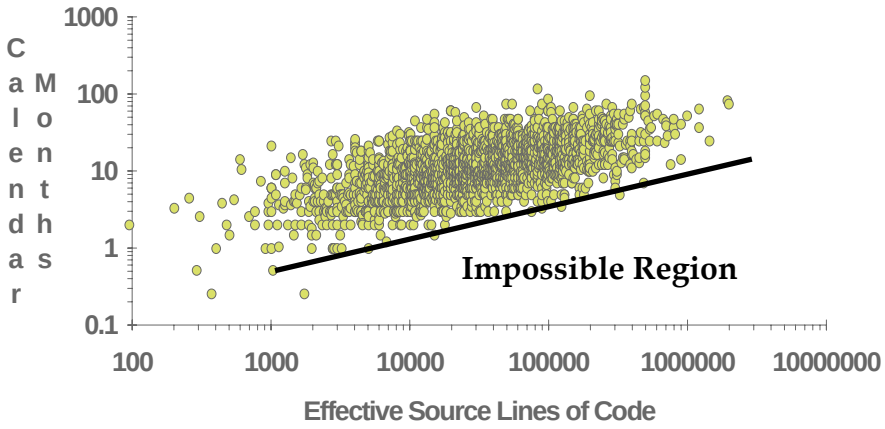
Plot of the Software Equation

(Effort - Time Relationship)

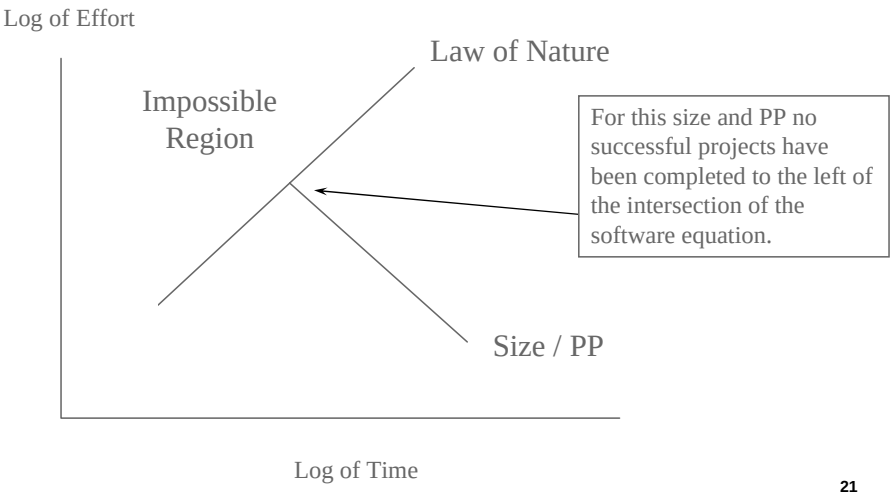




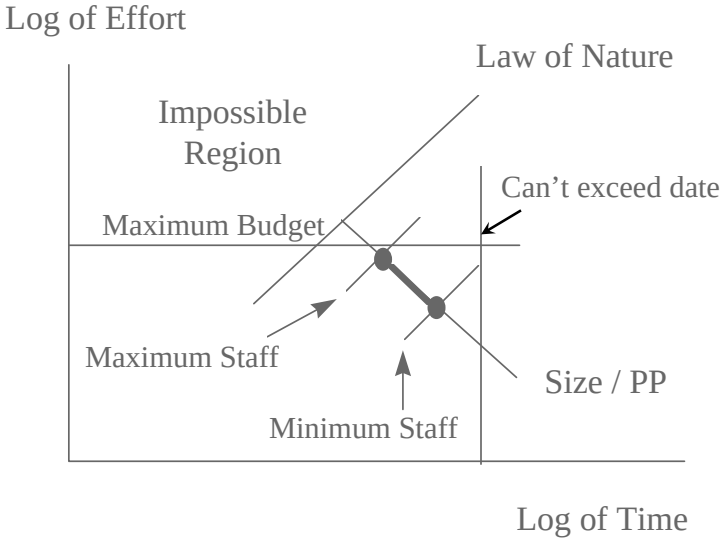
Understand the Impossible Region!



Minimum Schedule Concept

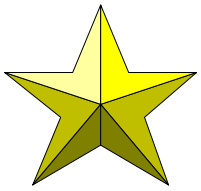


Finding a Feasible Region Subject to Constraints



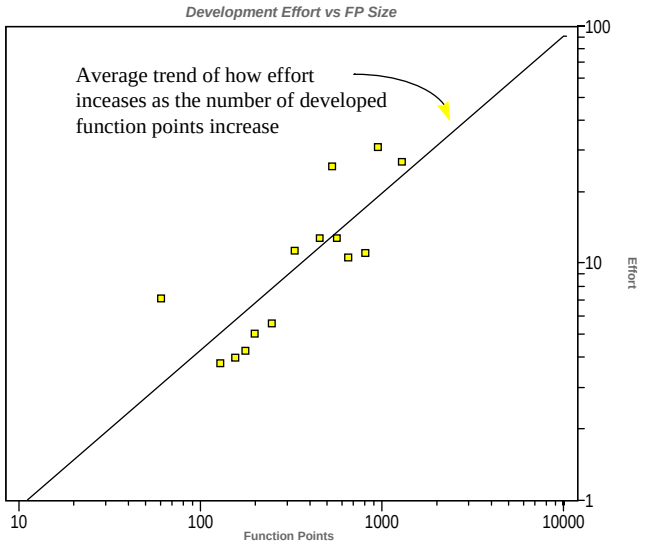
The Benchmark - A Platform for Learning, Comparison and Improvement

How Industry Leaders Approach Measurement

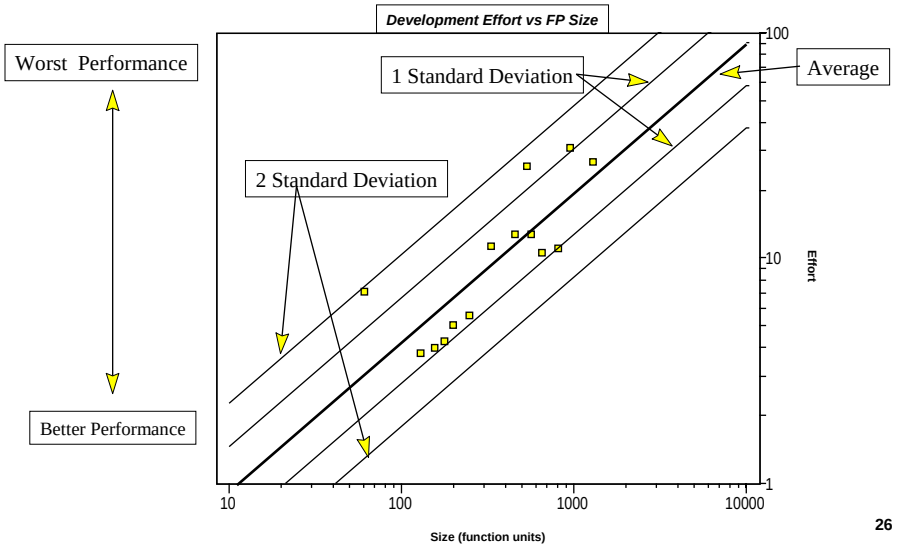


- Measure process, not people
- Start with a minimum data set
- Set realistic goals based on where they are
- Identify strong points & bottlenecks
- Take action to improve the process
- Treat measurement as an ally

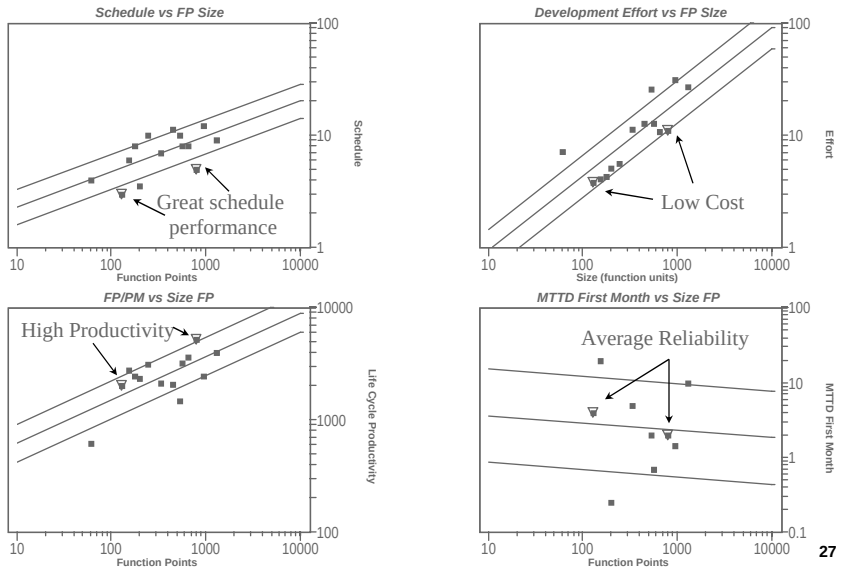
Finding the Average Benchmark



Measuring Variation Around the Average Benchmark



Use Multiple Views to Identifying Exceptional Projects and Understand the Causes



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Identifying Exceptional Projects and Understanding the Causes

- **Best Performers**
  - **Low requirements change**
  - **Modest team sizes with good skills**
  - **Work consists of Extensions to existing architectures**
  - **Stable tools & methods**

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Global Patterns in the Data

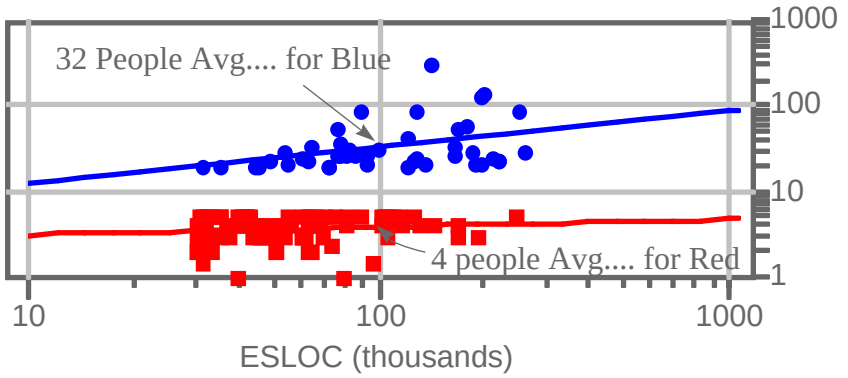
How Staffing Levels Impact Cost, Schedule & Quality

Case Study

Study Objectives

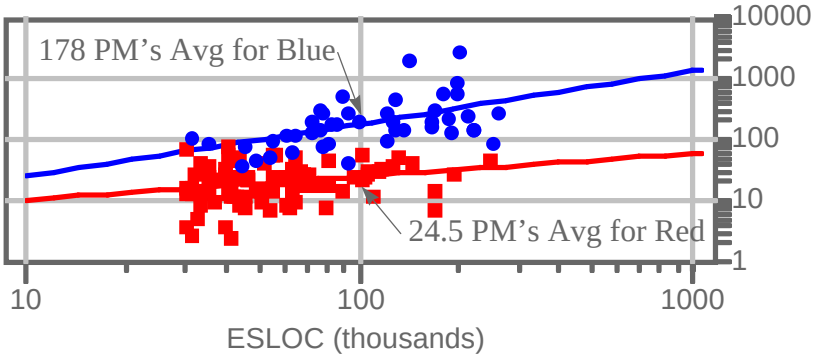
- **Compare products developed by small teams to products built by large teams**
- **Include:**
  - **IS applications recently completed**
  - **Projects that had a size of 30,000 to 300,000 new and modified source code**
  - **Projects that used 5 people or less at peak staffing**
  - **Projects that used 20 people or more**
- **Compare cost, schedule & defect creation at a convenient size (100,000 new and modified source lines of code)**

Peak Staffing vs. Developed SLOC



Blue Circles = Projects that used 20 or more people
Red Squares = Projects that used 5 or less people

Development Effort vs. Developed SLOC



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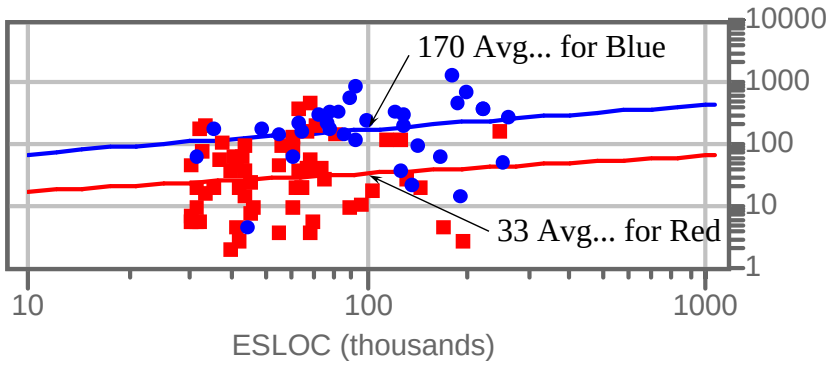
Defects found in System Test vs. Developed SLOC



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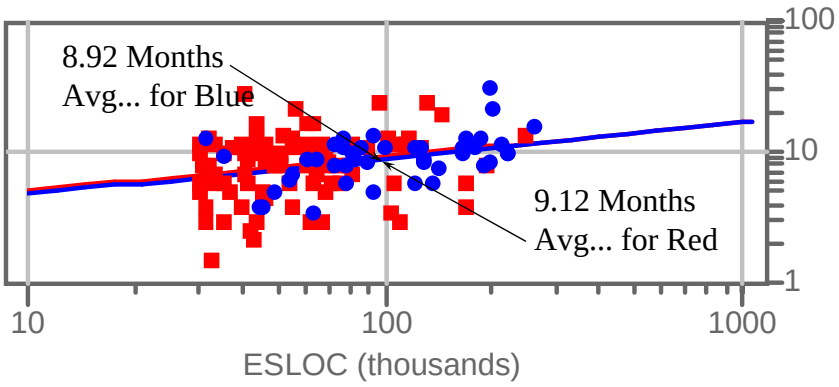
Development Schedule vs Developed SLOC



Blue Circles = Projects that used 20 or more people
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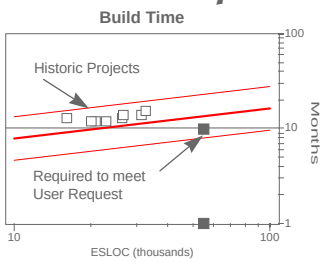
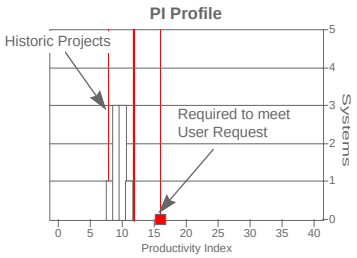
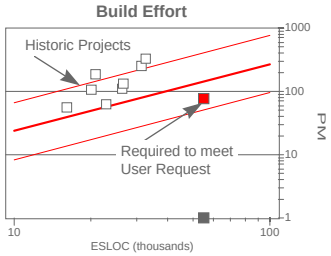
Using Past Performance (Benchmarking) to Set Realistic Expectations on the Next Project

Know When Expectations are in the Impossible Zone



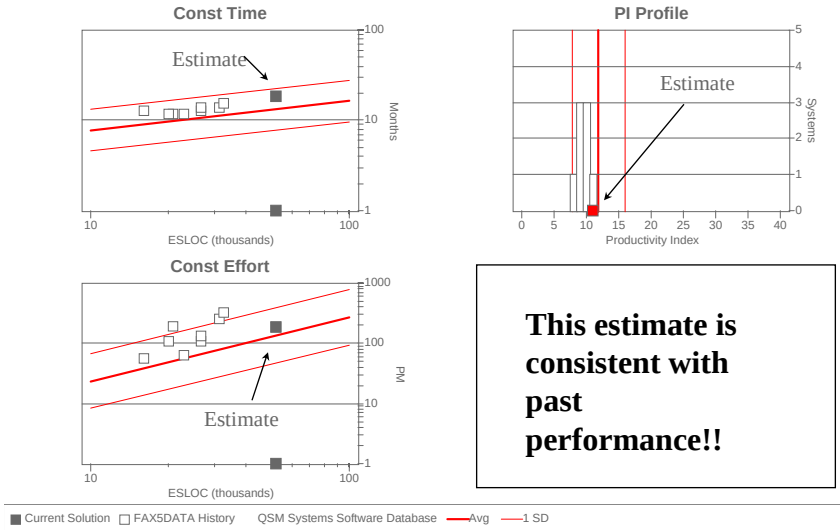




How is it possible that we are going to build a product that is 100% larger than any of our historic projects and it is going to be completed in less time and effort than projects half its size?

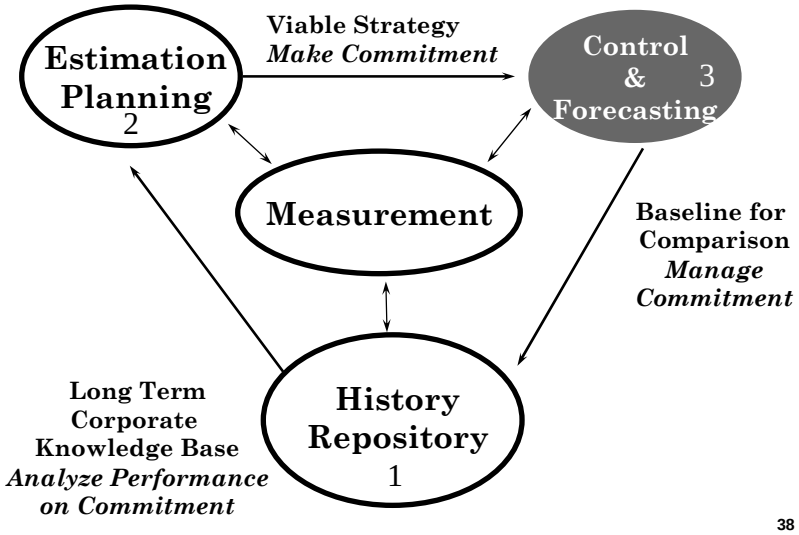
Current Solution FAXCORP History QSM Systems Software Database Avg 1 SD

Sanity Checking the Estimate



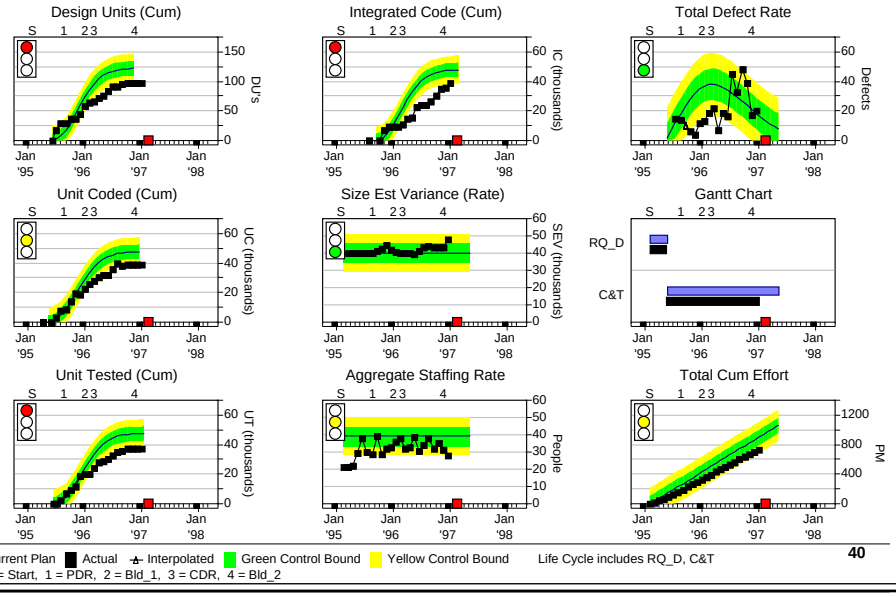
This estimate is consistent with past performance!!

A Mature Applications Measurement Process

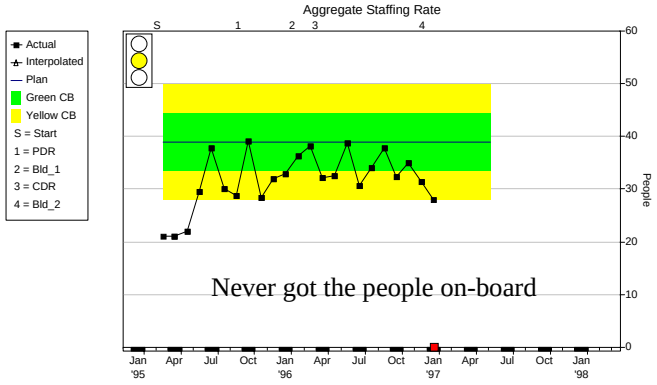


Using Measurement as a Monthly Project Health check

A Dashboard Makes it Easier to Get the Real Picture



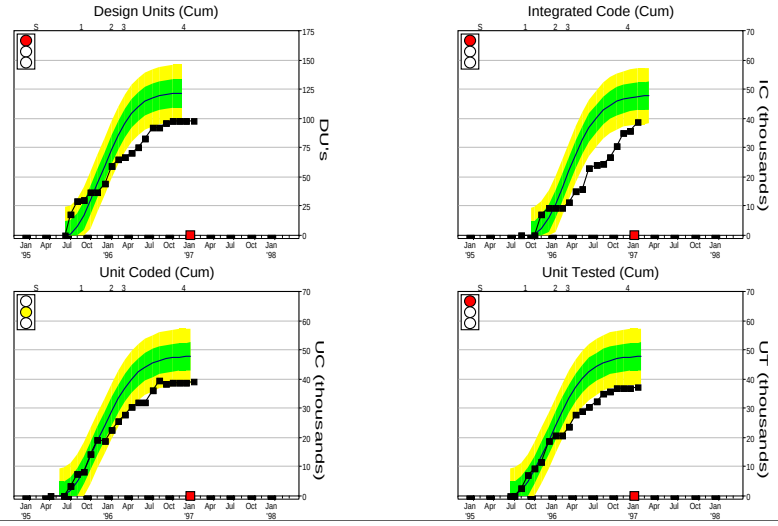
Staffing Plan vs Actual



Date 1/18/97 (22.59 mos)

	Plan	Actual	Diff
Agg. Staff	39.00	28.00	-11.00
PI	7.0		
MBI	2.8		

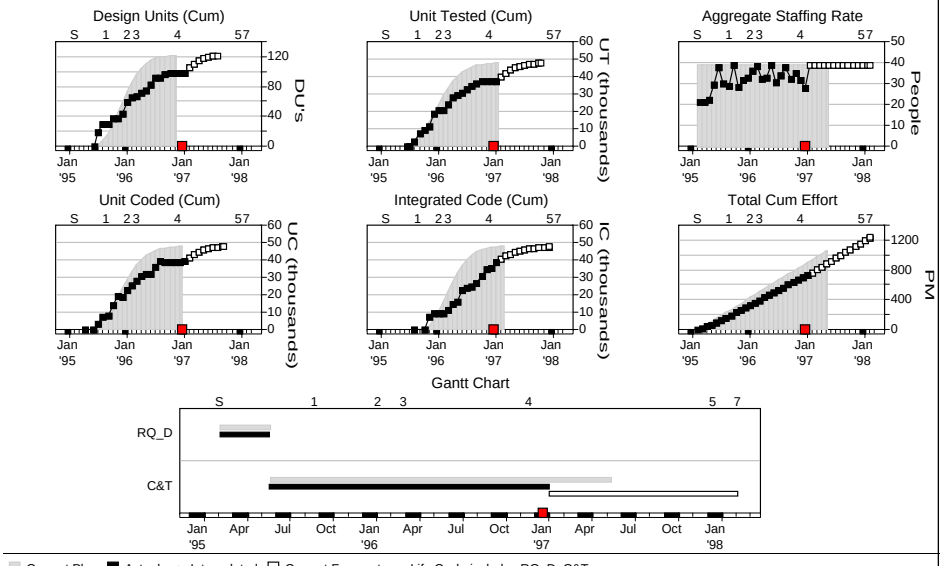
Product Construction Metrics (behind early & staying there)



Adaptive Forecasting Technique

- **Independent Metrics confirm progress**
- **Curve fit actual performance to determine "Real Productivity"**
- **Use "Real Productivity" to forecast completion targets**
- **Evaluate management alternatives -- tactical & strategic**

Forecast to Complete

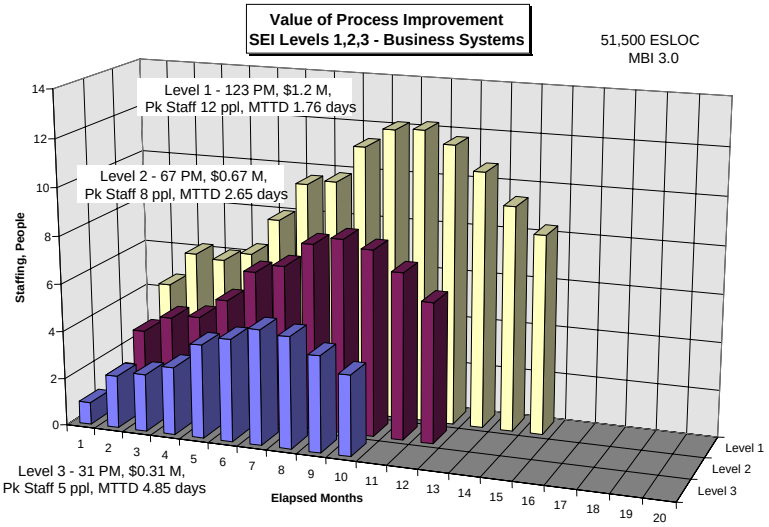


Quantitative Methods Enables Top Management to:

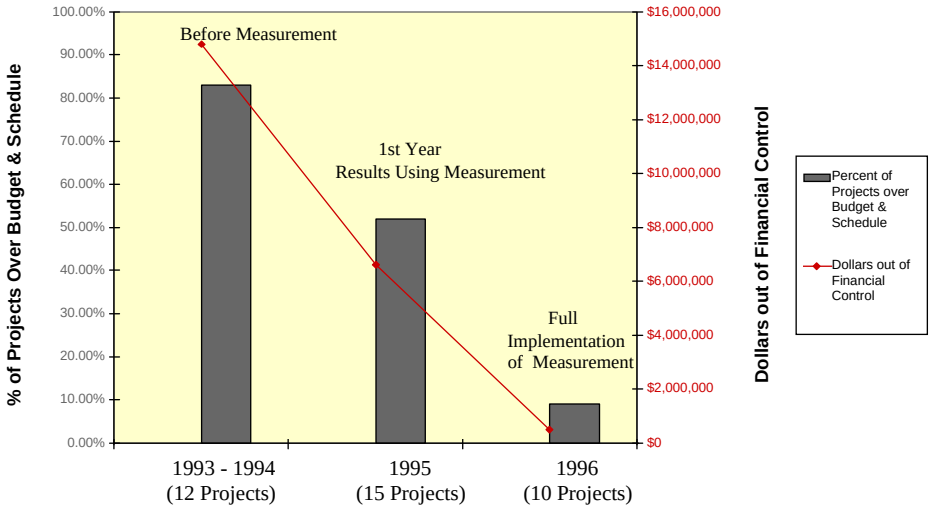
- Measure and Understand Process Productivity
- Assess Developers and Proposals
- Estimate and Risk-Protect Software Development
- Control In-Progress Developments
- Improve Product and Process Quality
- Make informed commercial decisions
- All this says, "Process Improvement"

Using High Level Management Measures

What is Process Improvement Worth?



Experience of a Large Telecommunications Supplier



Application Measurement

Benchmarking, Estimation & Control

There are No Simple Solutions

but...

There are Intelligent Choices