GALORATH

Parametric Project Monitoring and Control:

Performance-Based Progress Assessment and Prediction

Presented by:

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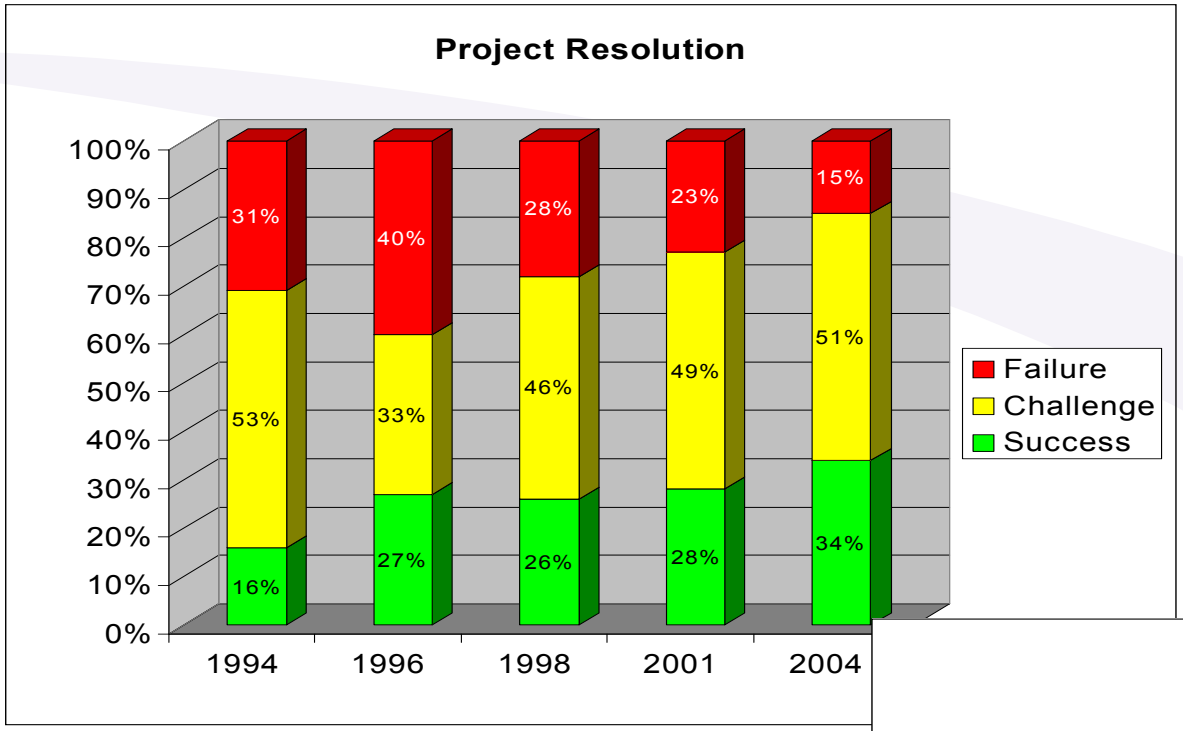
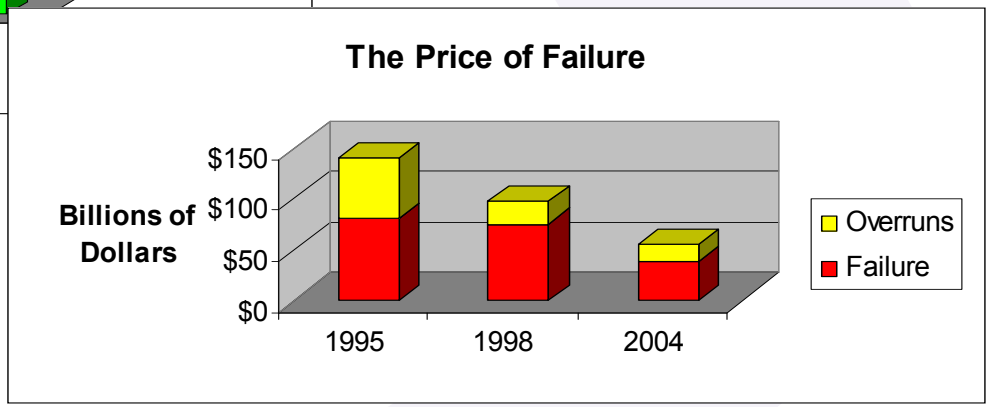
Summary

- **Software projects fail more often than not**
- **Project success ← Good management**
- **Measurement objectifies management**
- **Software projects are governed by dynamic properties**
  - Properties currently accounted for in the Project Planning process
  - ***Properties should also be accounted for in the Project Monitoring and Control process***
- **Project Monitoring ← Performance Measurement**
- **4-D Earned Value objectifies progress**
- **Project Control ← Control Limits**
- **Re-Baselining ← Performance-Based Forecasting**
- ***Communication is essential to successful project management***

Things are Getting Better; however, There's Still Room For Improvement



- **Success**: The project is completed on time and on budget, with all features and functions
- **Challenge**: Over budget, over time, offers fewer features than originally specified
- **Failure**: Project is cancelled prior to completion



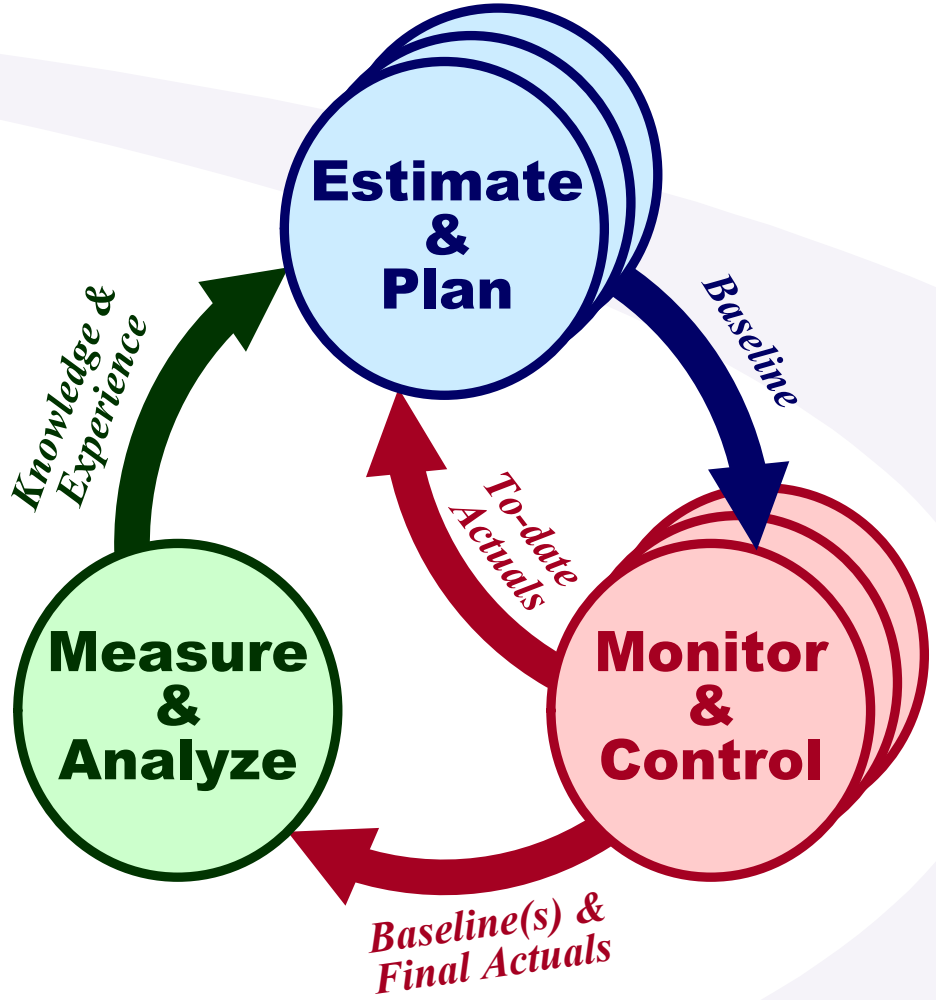
How does ineffective management of resources (people, time, $) contribute to this problem?

Source: Standish Group International, Inc. "CHAOS" studieswww.standishgroup.com

Mnemonic Aid for Software Project Management

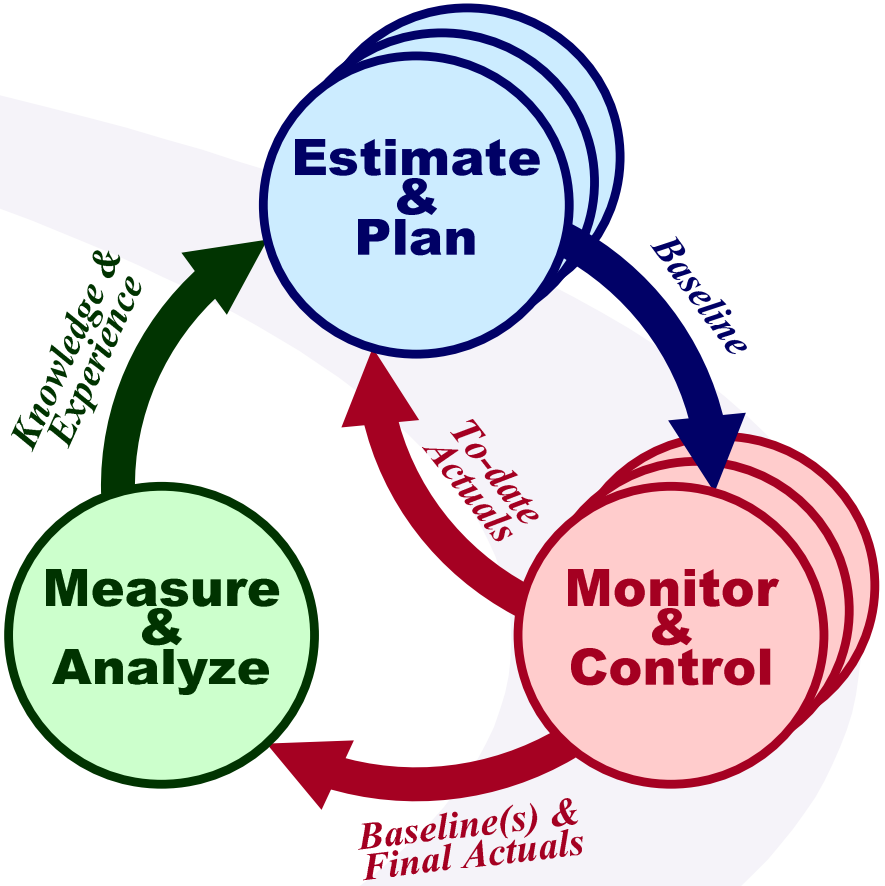
- **P***lanning* – estimating, scheduling
- **R***esourcing* – interviewing, hiring, motivating
- **O***rganizing* – establishing interpersonal communication paths and rules, mapping resources to tasks
- **T***raining* – teaching, mentoring
- **E***quipping* – acquiring and allocating equipment, tools, materials, supplies, products etc.
- **C***ontrolling* – directing, measuring, correcting and/or replanning
- **T***ransitioning* – delivering, reviewing, analyzing, archiving

Project Management Context

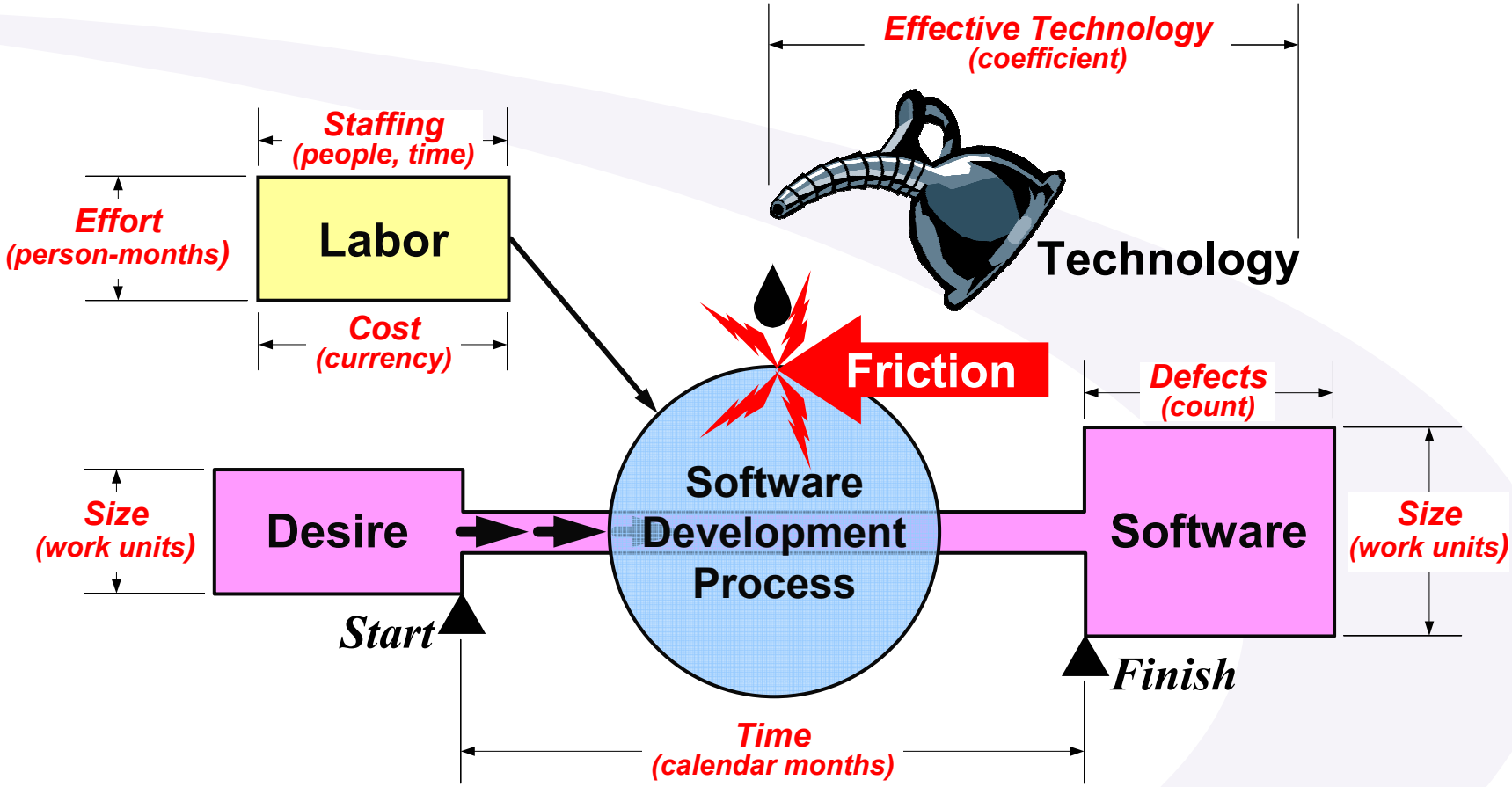


Process Focus (CMMI™)

- **Project Planning**
  - Establish Estimates
  - Develop a Project Plan
  - Obtain Commitment to the Plan
- **Project Monitoring and Control**
  - Monitor Project Against Plan
  - Manage Corrective Action to Closure
- **Measurement and Analysis**
  - Align Measurement and Analysis Activities
  - Provide Measurement Results



Software Development and Measurement



Fundamental Measures

Size

Effective Technology

Time

Effort ➔ Cost, Staffing

Defects

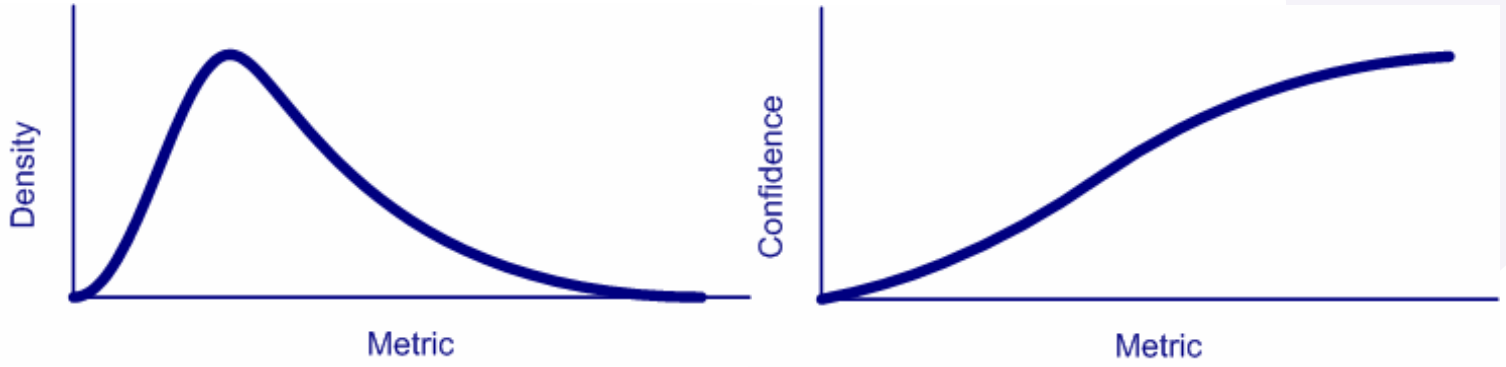
Estimate Defined

es·ti·mate (es′ti mit), *n.*

an approximate *judgment* or *calculation*, as of the value or amount of something

a prediction that is equally likely to be above or below the actual result (Tom DeMarco)

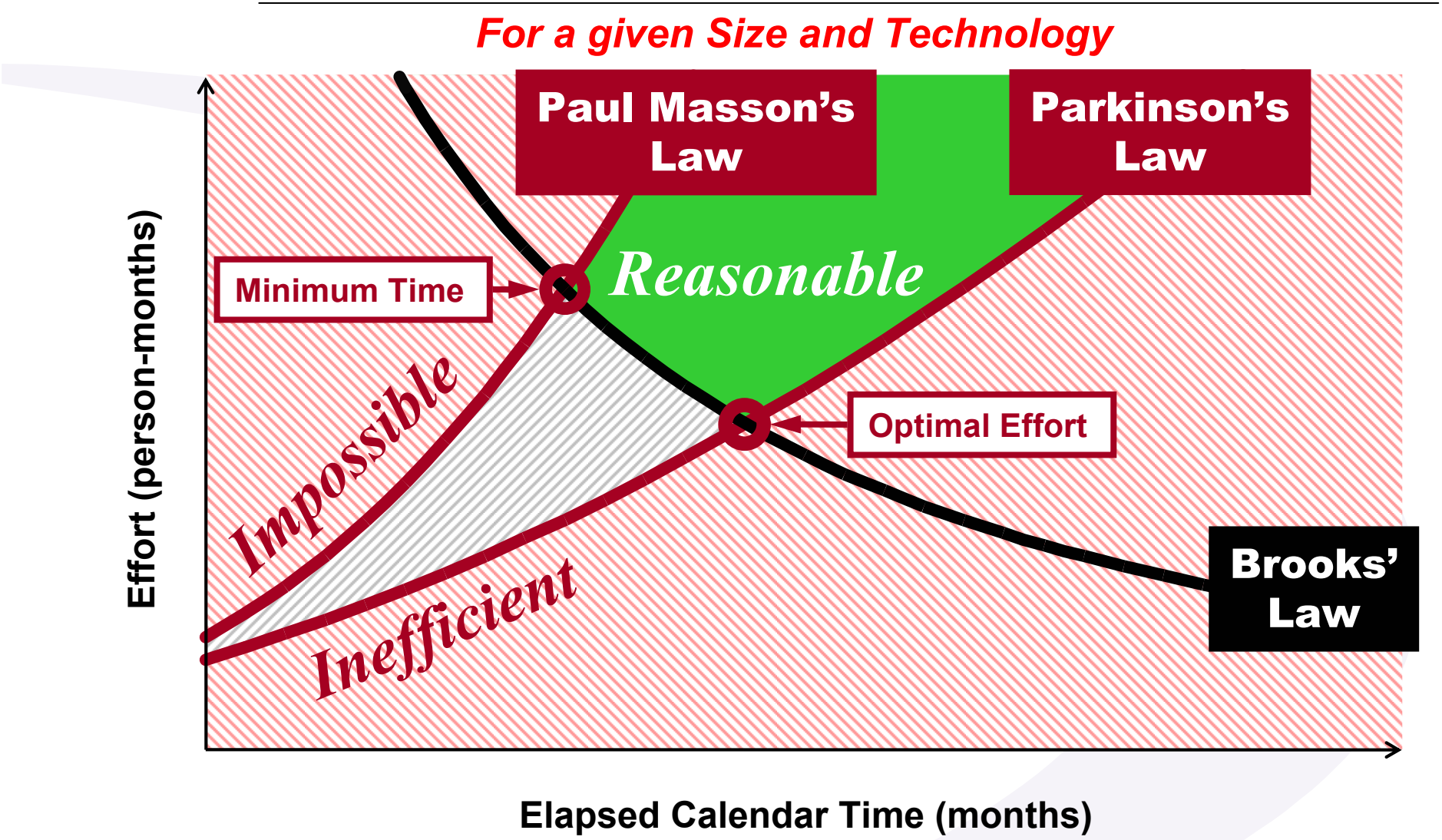
A WELL FORMED ESTIMATE IS A DISTRIBUTION



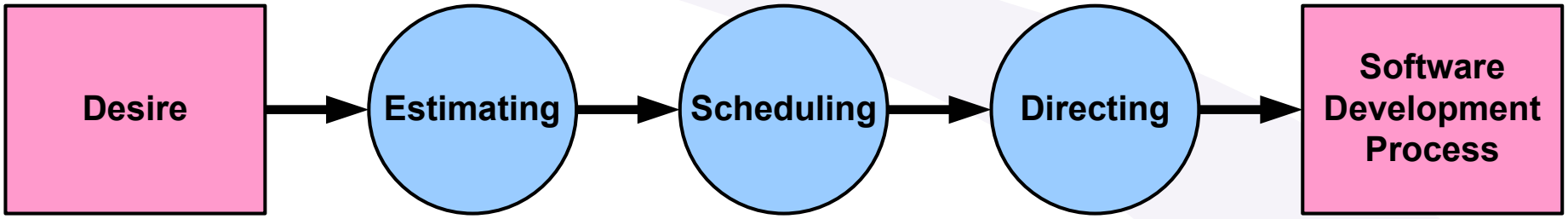
3 Laws of Software Development Dynamics

- **Brooks' Law (Software Equation)**
  - ***Adding people to a late project makes it later.***
  - Development time (duration) and development effort (labor) are not linearly interchangeable.
- **Paul Masson's Law Applied to Software Development (Minimum Time Equation)**
  - ***No [software] before its time.***
  - Each and every project, by its nature (technical difficulty), can effectively handle only so much staffing acceleration; therefore, there exists, for each and every project, some minimum achievable development time.
- **Parkinson's Law (Optimal Effort Equation)**
  - ***Work expands so as to fill the time available for its completion.***
  - There exists, for each and every project, some point of maximum productivity; i.e., some point that represents the most efficient use of labor on the project.

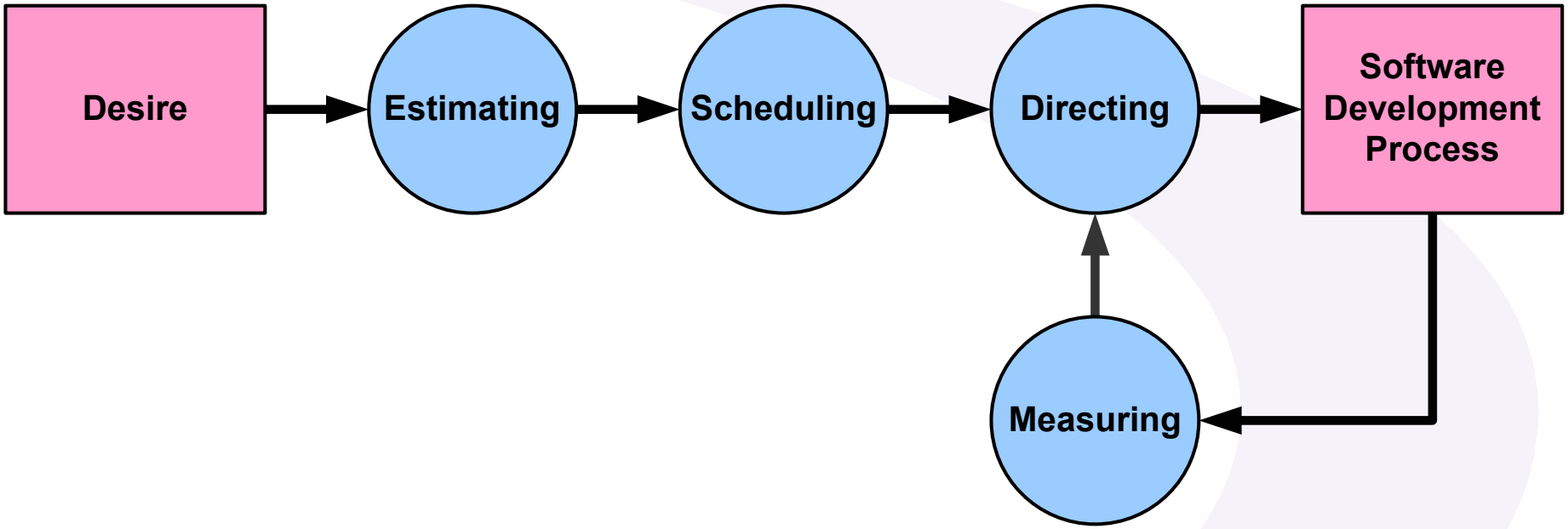
Software Development Dynamics



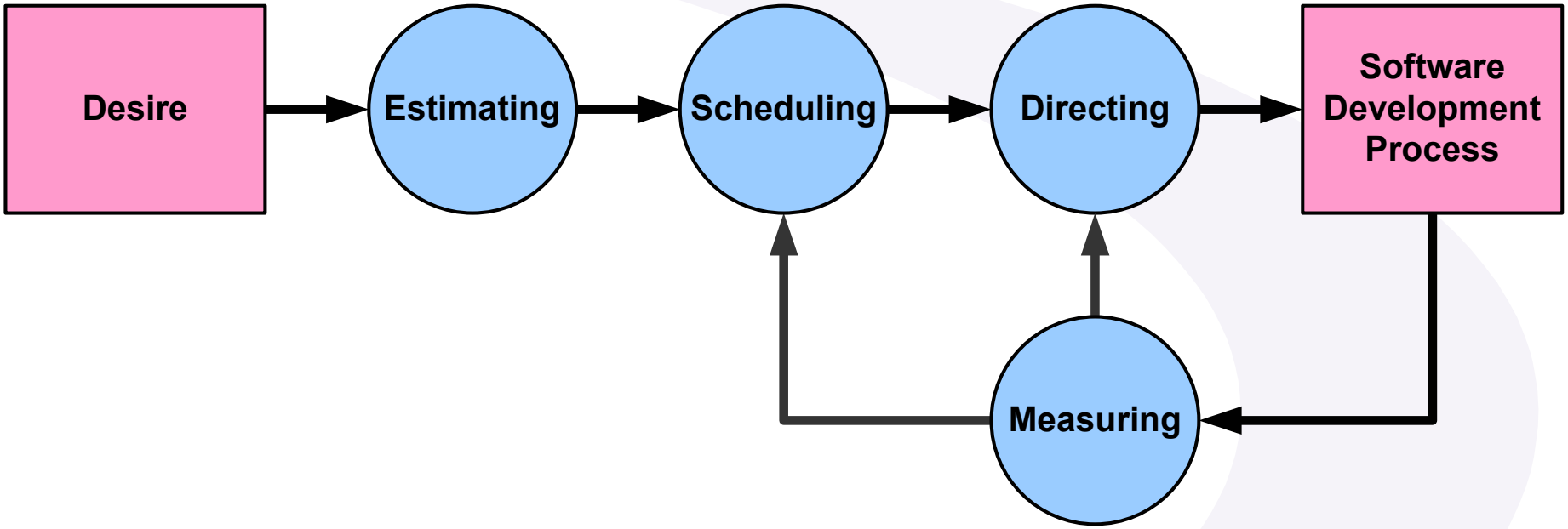
Software Project Management
Out of Control Process



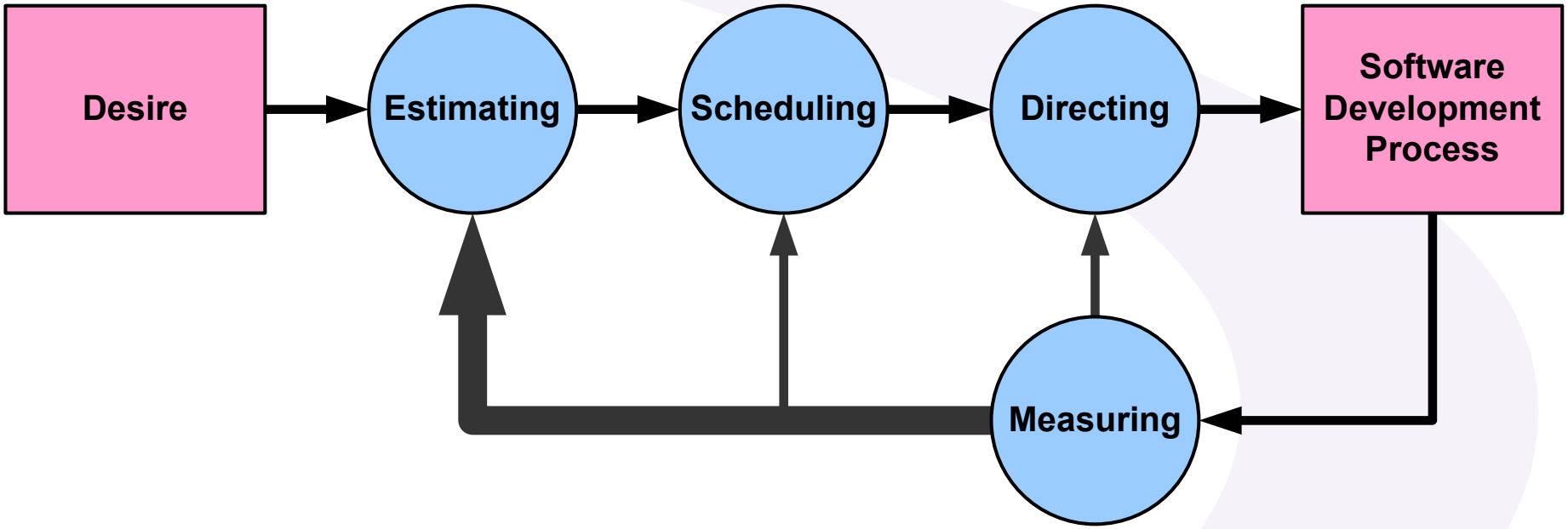
Software Project Management
Ad Hoc Process



Software Project Management
Partially Managed Process



Software Project Management
Fully Managed Project



Performance Measurement: Measures and Metrics

- **Fundamental Cost of Work Measures**
  - ***Baseline Budget*** – Budget at Completion (BAC)
  - ***Planned*** **–** Budgeted Cost of the Work Scheduled (BCWS)
  - ***Earned*** **–** Budgeted Cost of the Work Performed (BCWP)
  - ***Spent*** **–** Actual Cost of the Work Performed (ACWP)
- **Variances (Differences between Cost of Work Measures)**
  - Schedule Variance (SV)
  - Cost Variance (CV)
  - Budget Variance (BV)
  - Time Variance (TV)

Performance Measurement: Measures and Metrics

- **Performance Indices – (Ratios Between Cost of Work Measures)**
  - Schedule Performance Index (SPI)
  - Cost Performance Index (CPI)
  - Budget Performance Index (BPI)
  - Time Performance Index (TPI)
  - Composite Performance Index (XPI)
  - To-Complete Performance Index (TCPI)
- **Status and Forecasting Metrics**
  - Estimate at Completion (EAC)
  - Estimate to Complete (ETC)

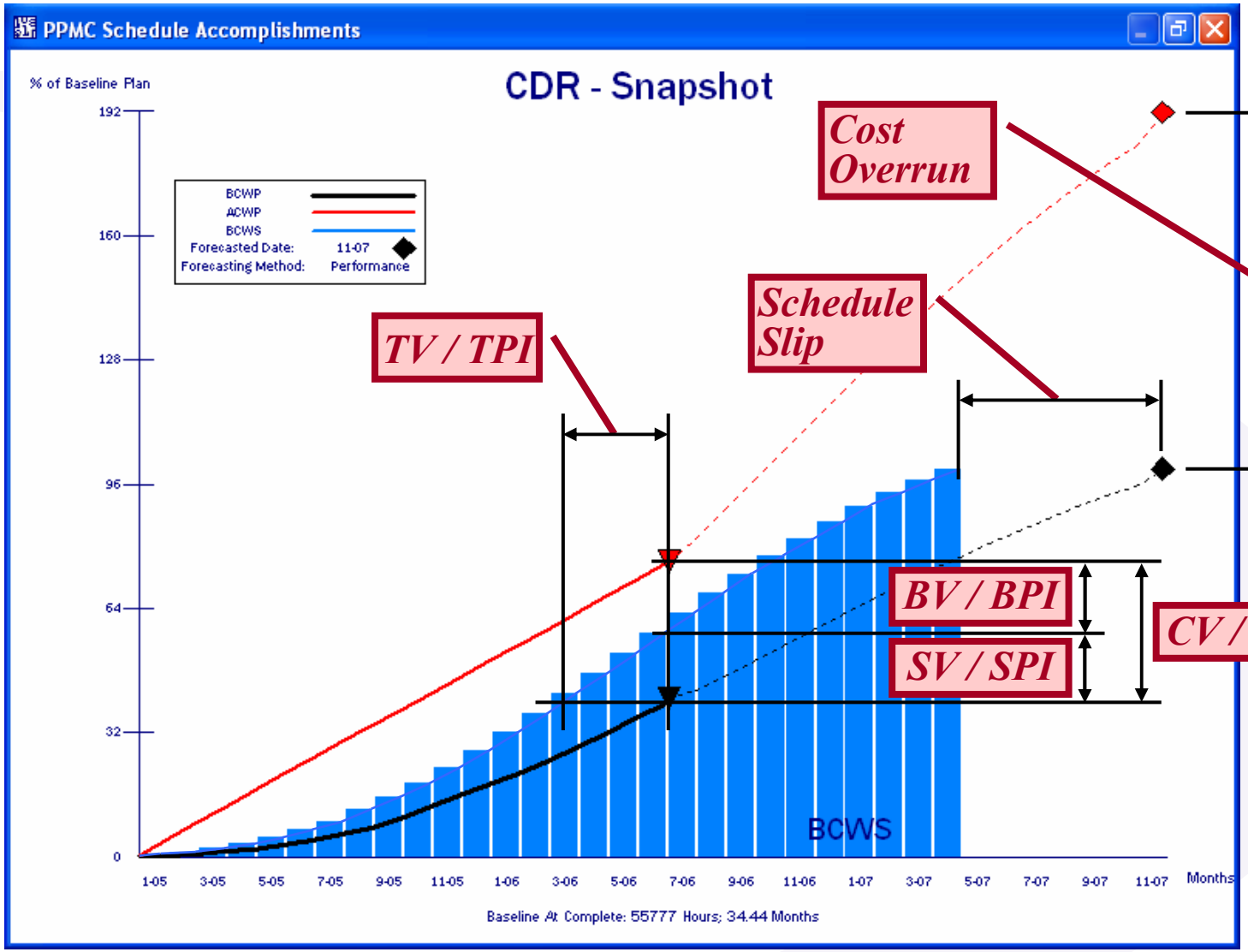
Three Unit Systems for Performance Measurement Values

- **Monitary Value – units of currency; e.g.:**
  - $
  - £
  - €
- **Effort Value – units of labor; e.g.:**
  - person-hours, staff-hours, effort-hours, labor-hours
  - person-months, staff-months, effort-months, labor-months
- **Normalized Value – unitless**
  - % of full scale

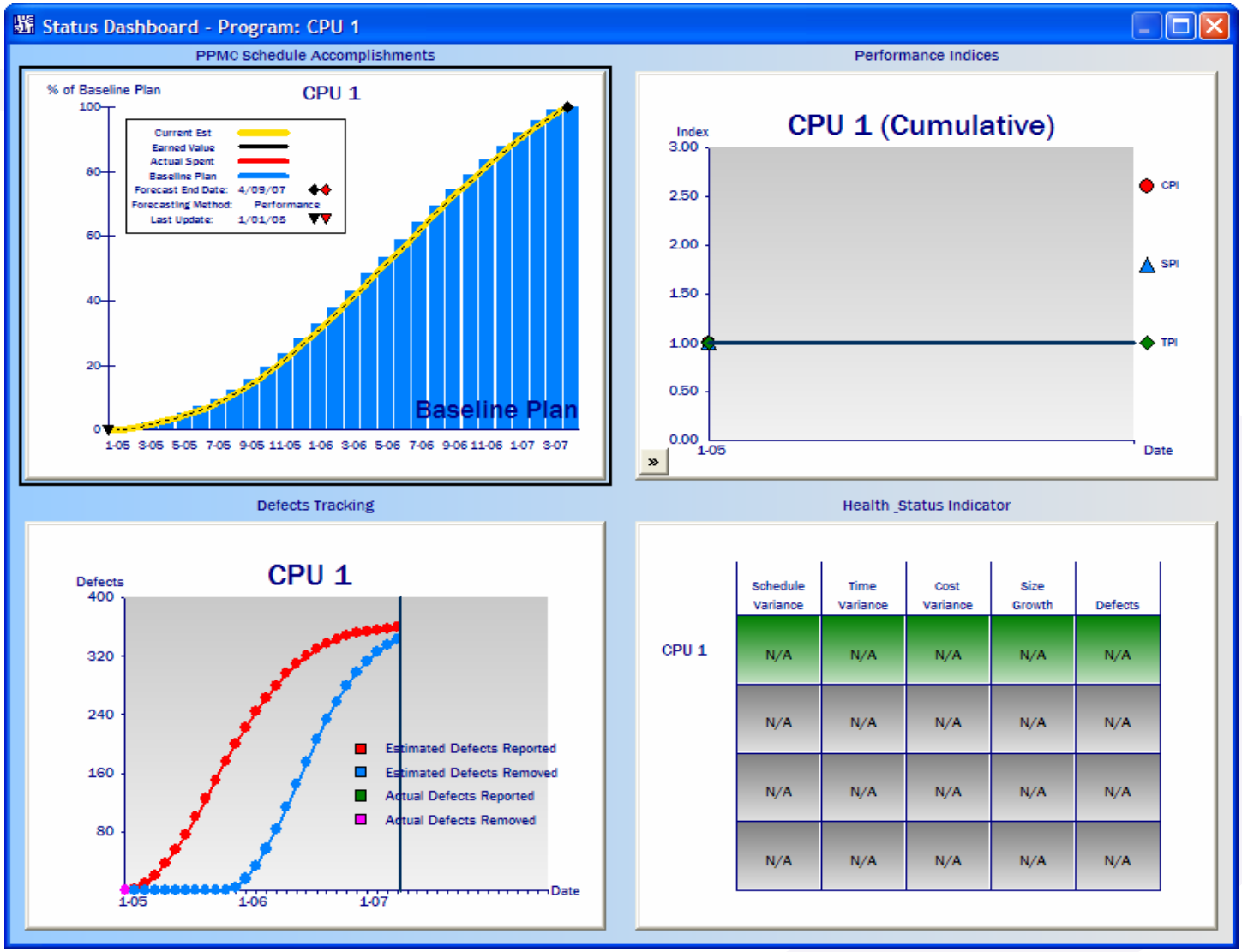
4-D Earned Value

- SDLC Primary Activity Completion
- Artifact Completion
- Milestone Completion
- Defect Discovery / Removal

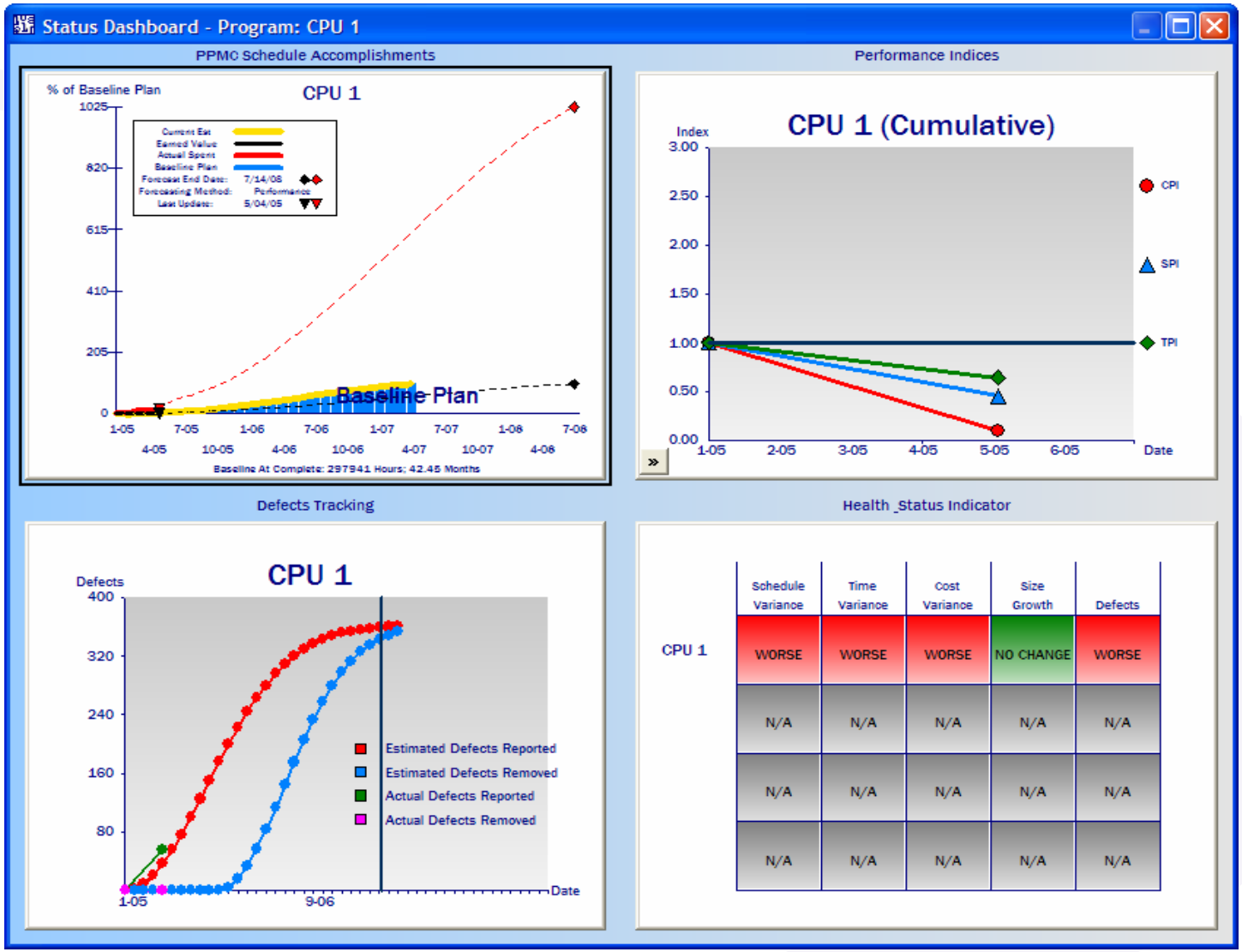
Schedule Accomplishments Chart



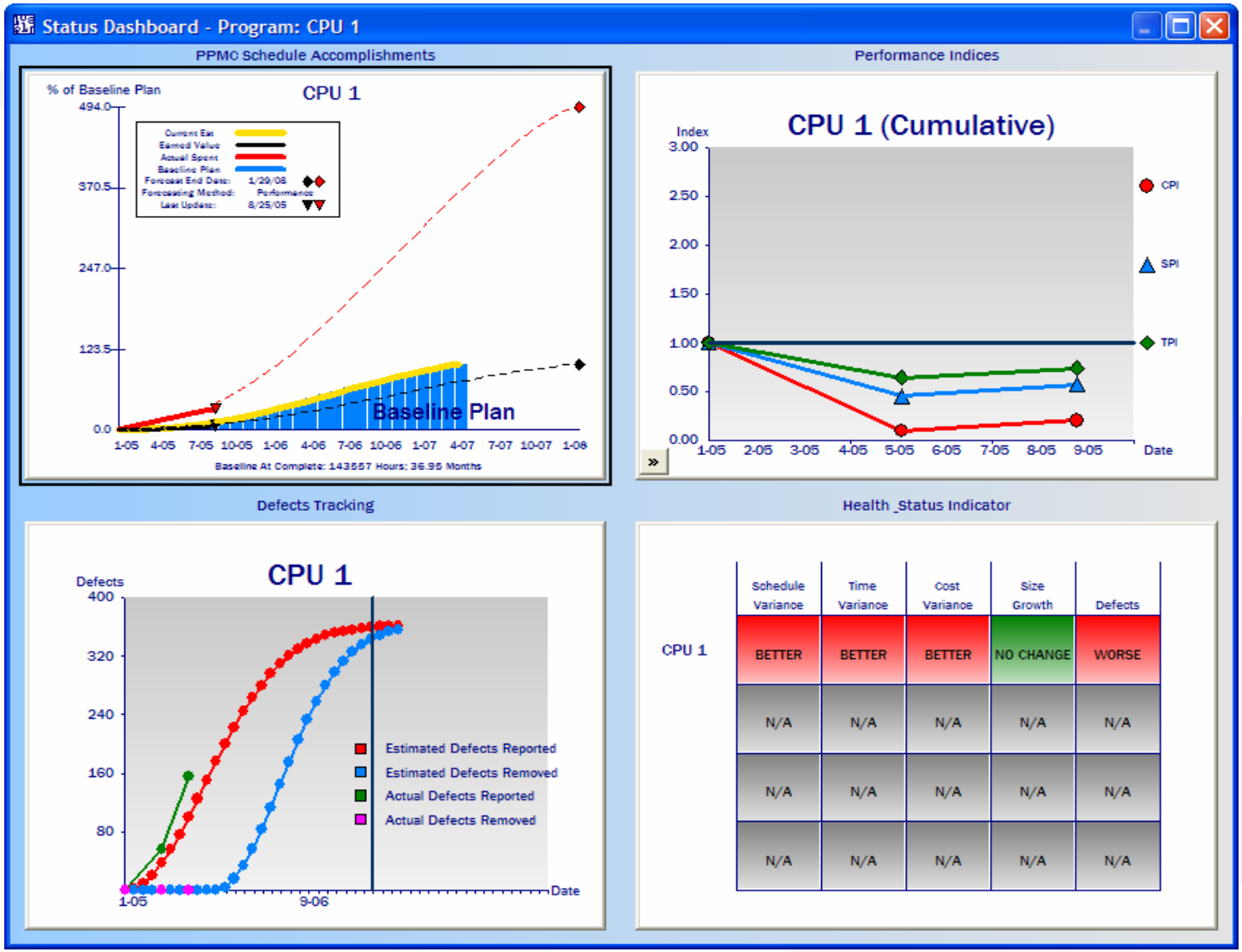
Example Project: Metrics Charts at Project Start (Initial Plan)



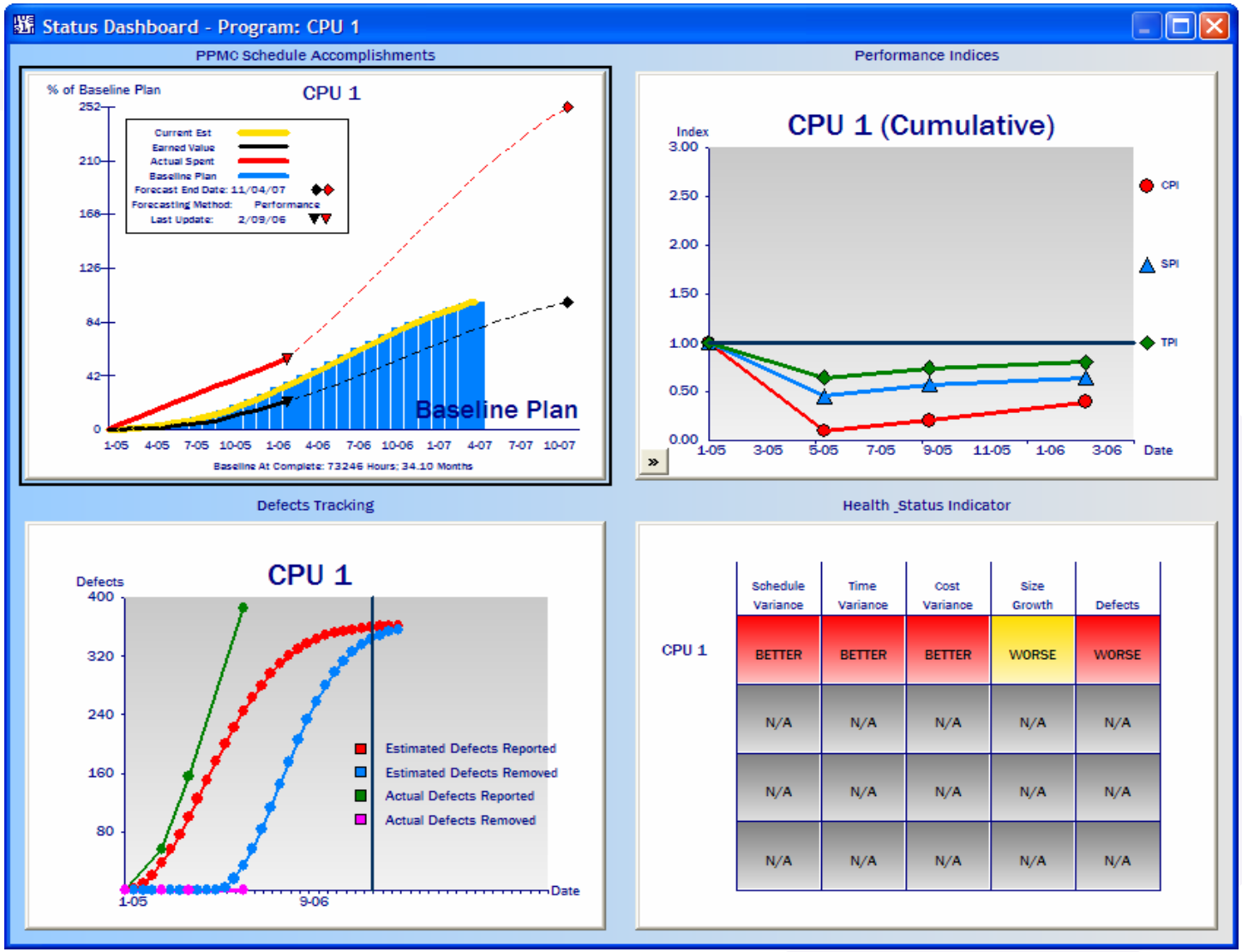
Example Project: Metrics Charts at System Design Review



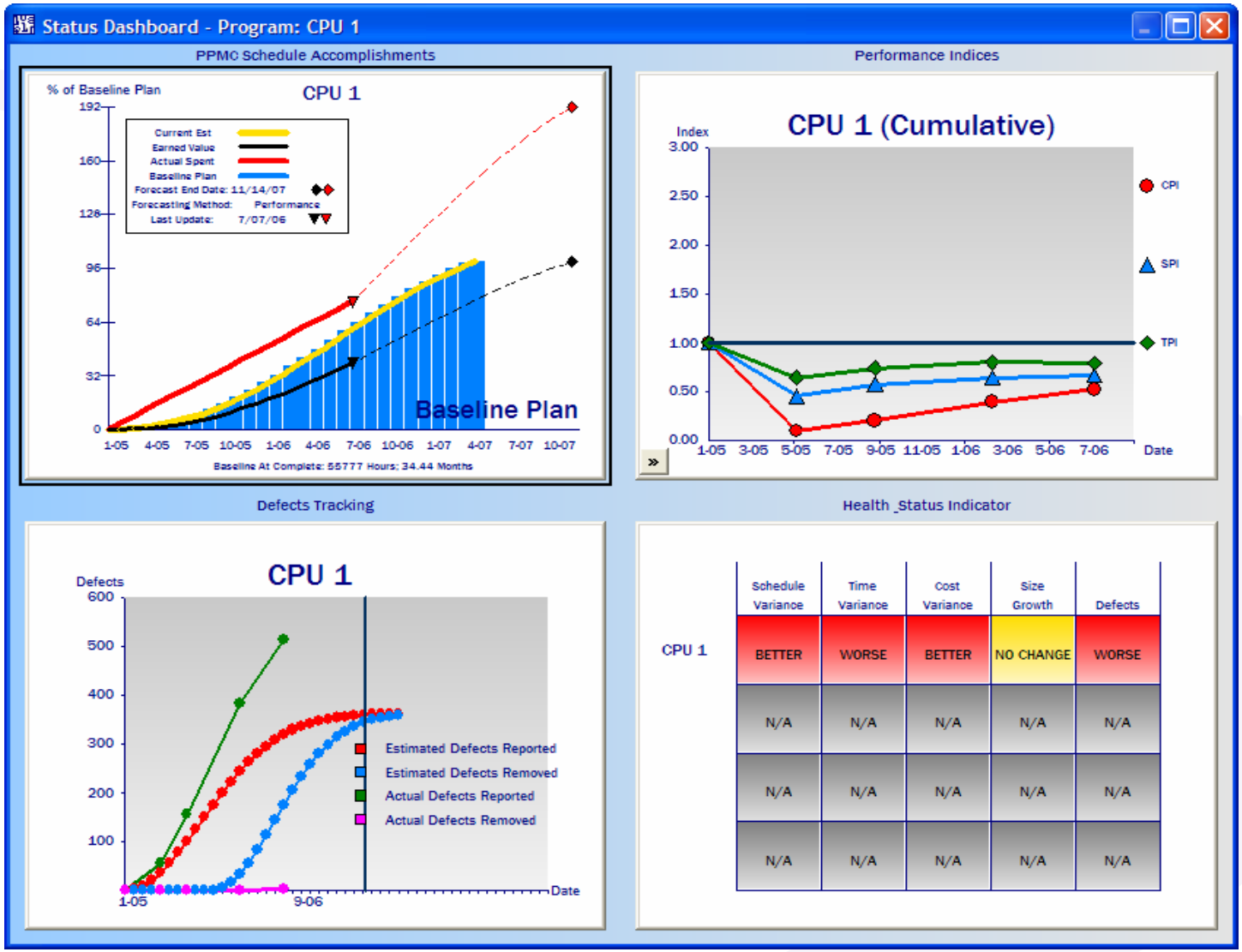
Example Project: Metrics Charts at Software Requirements Review



Example Project: Metrics Charts at Preliminary Design Review



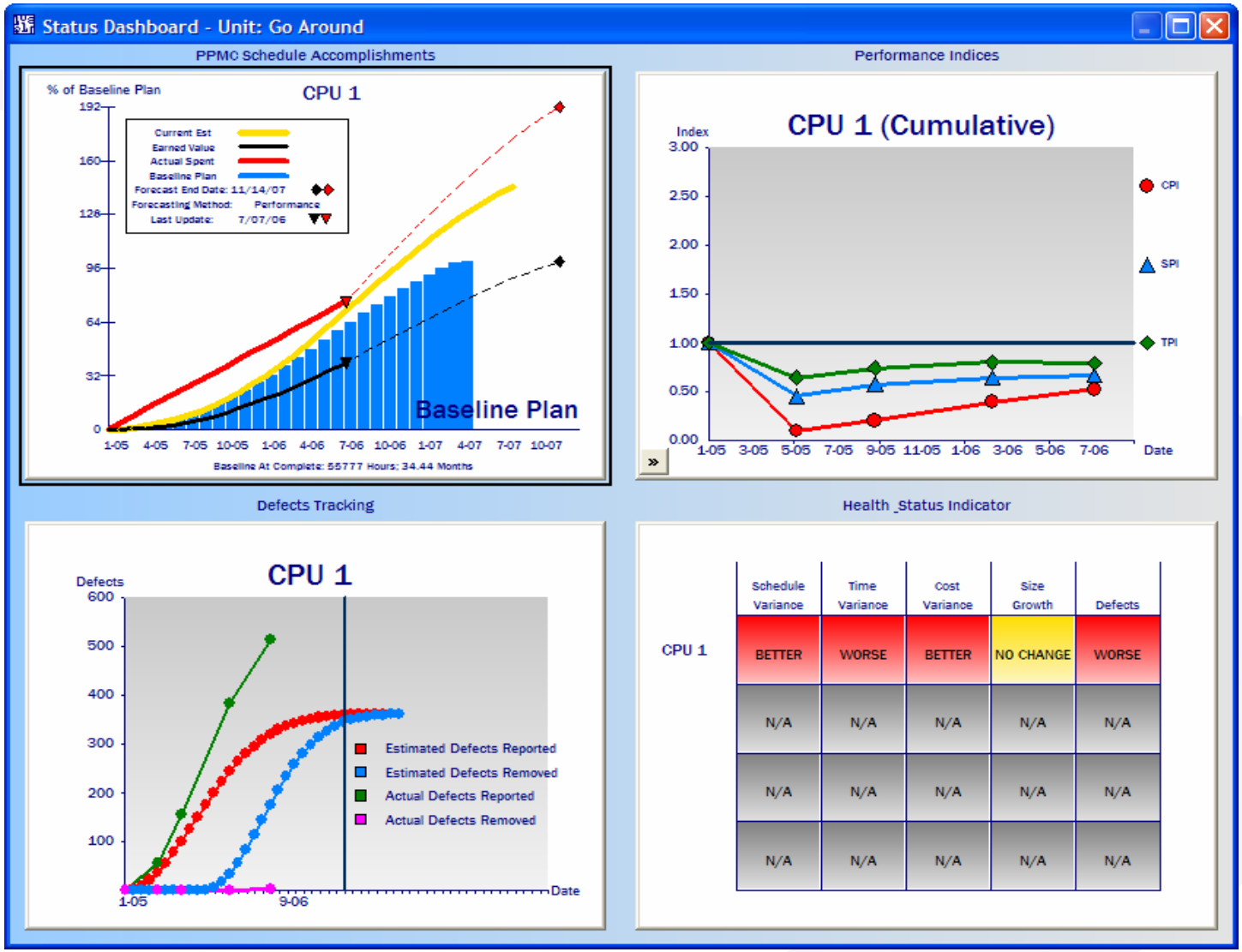
Example Project: Metrics Charts at Critical Design Review



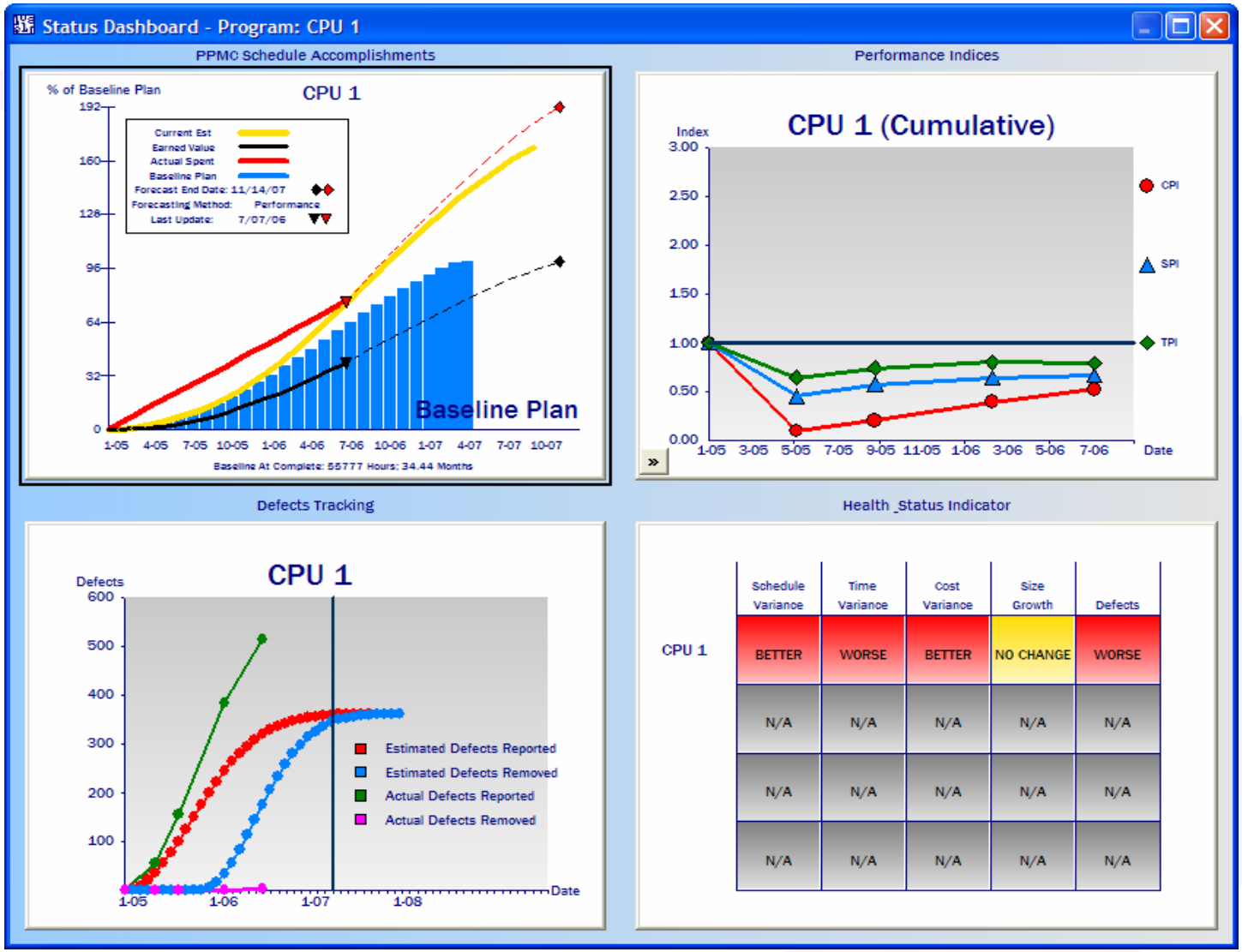
Performance-Based Forecasting and Re-Baselining

1. Start a new estimate
2. Update size estimate
3. Update technology assumptions
4. Update schedule assumptions
5. Update staffing assumptions
6. Update labor rate and FTE assumptions
7. Time now calibration
8. Communicate the results
9. Re-Baseline the project

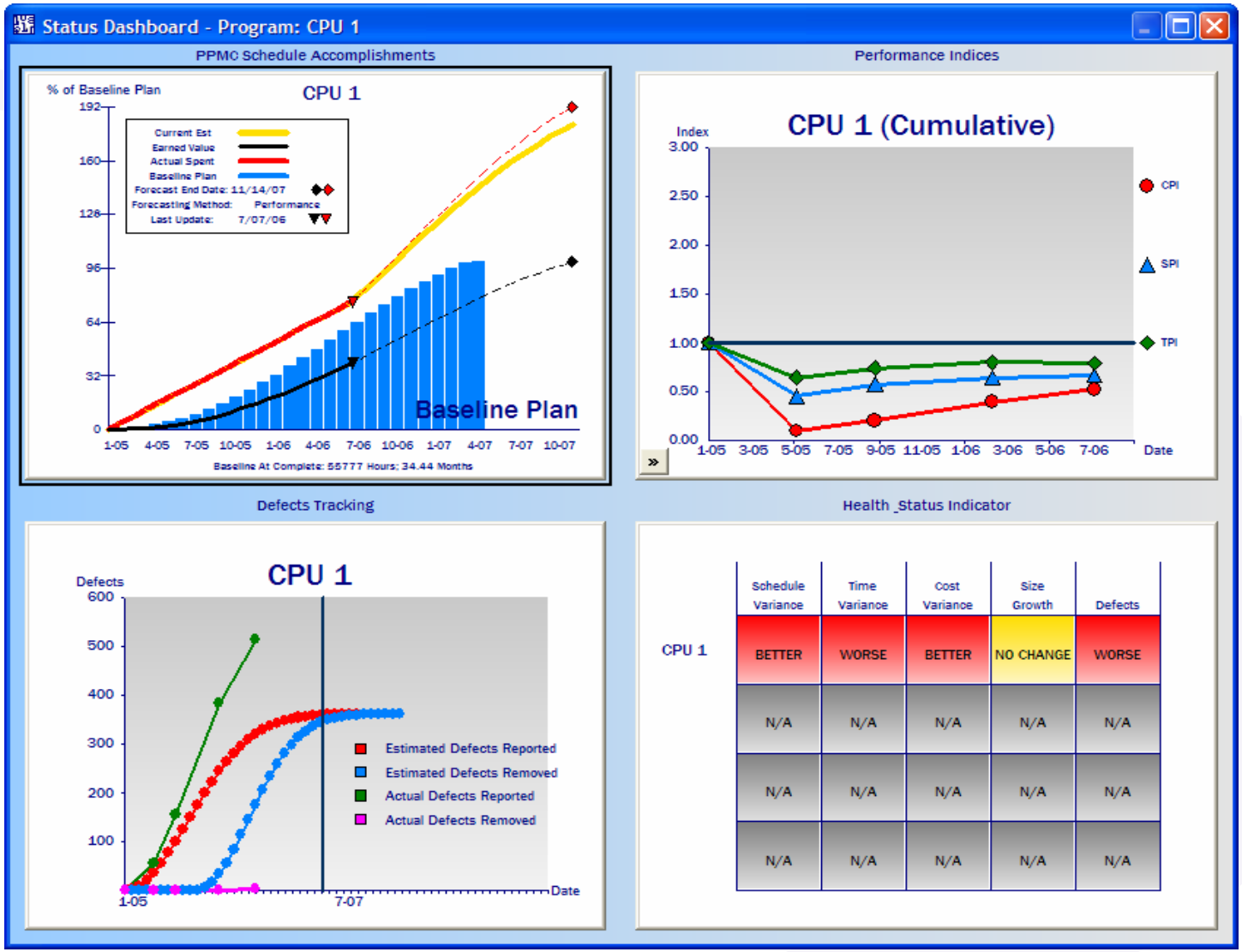
Example Project: Metrics Charts Update Size Estimate



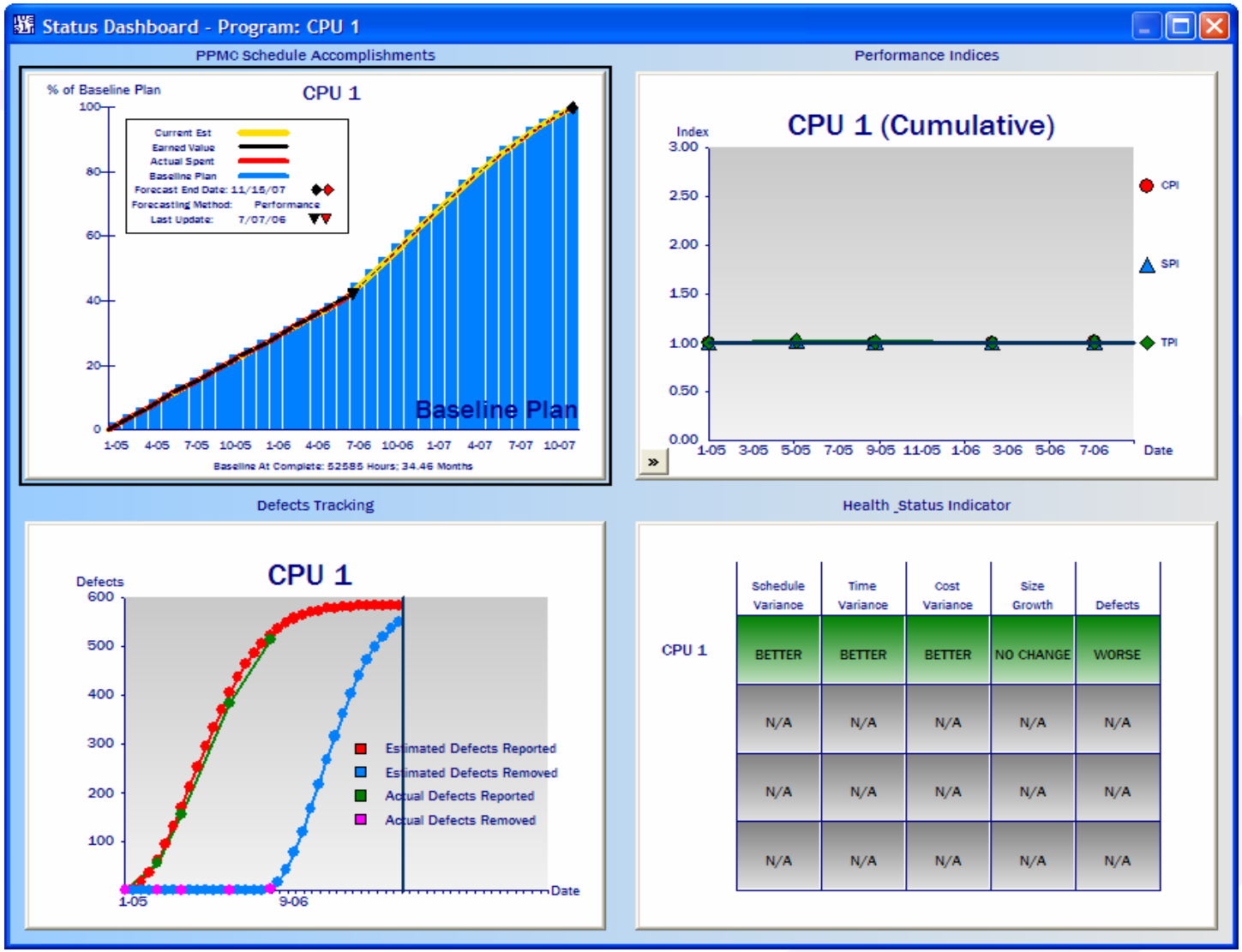
Example Project: Metrics Charts Update Technology Assumptions



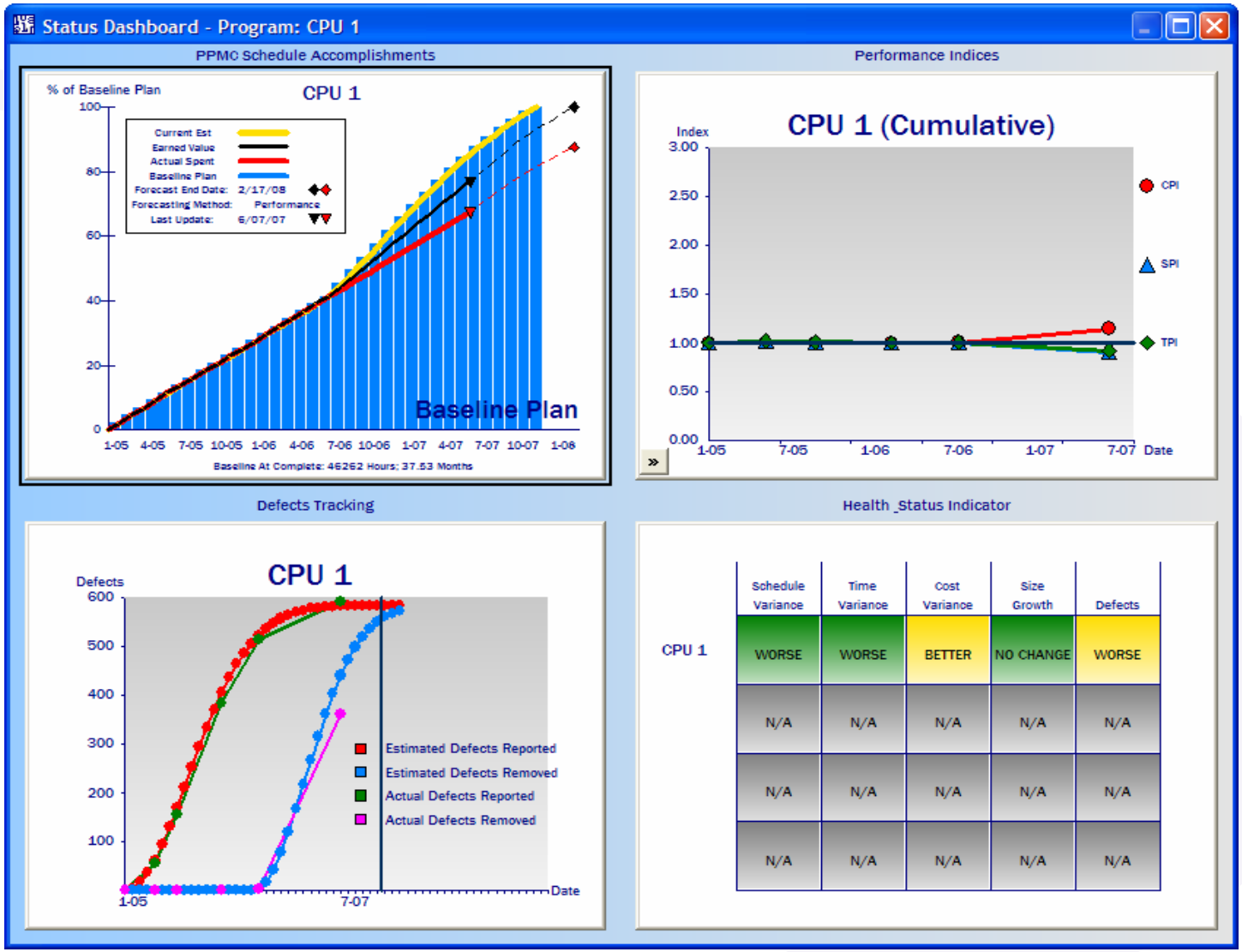
Example Project: Metrics Charts Update Staffing Assumptions



Example Project: Metrics Charts
Re-Baseline the Project

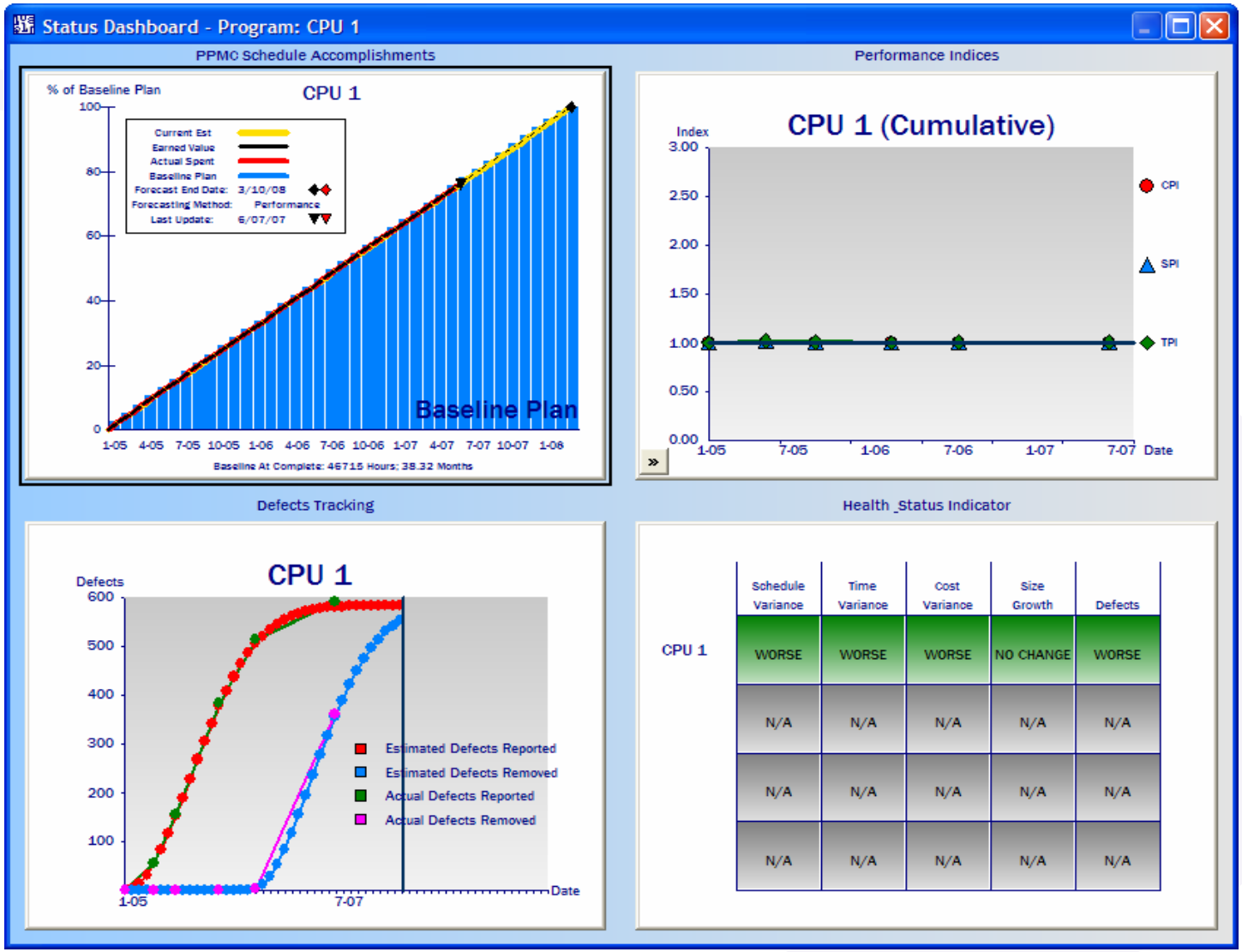


Example Project: Metrics Charts at Code & Unit Test Complete

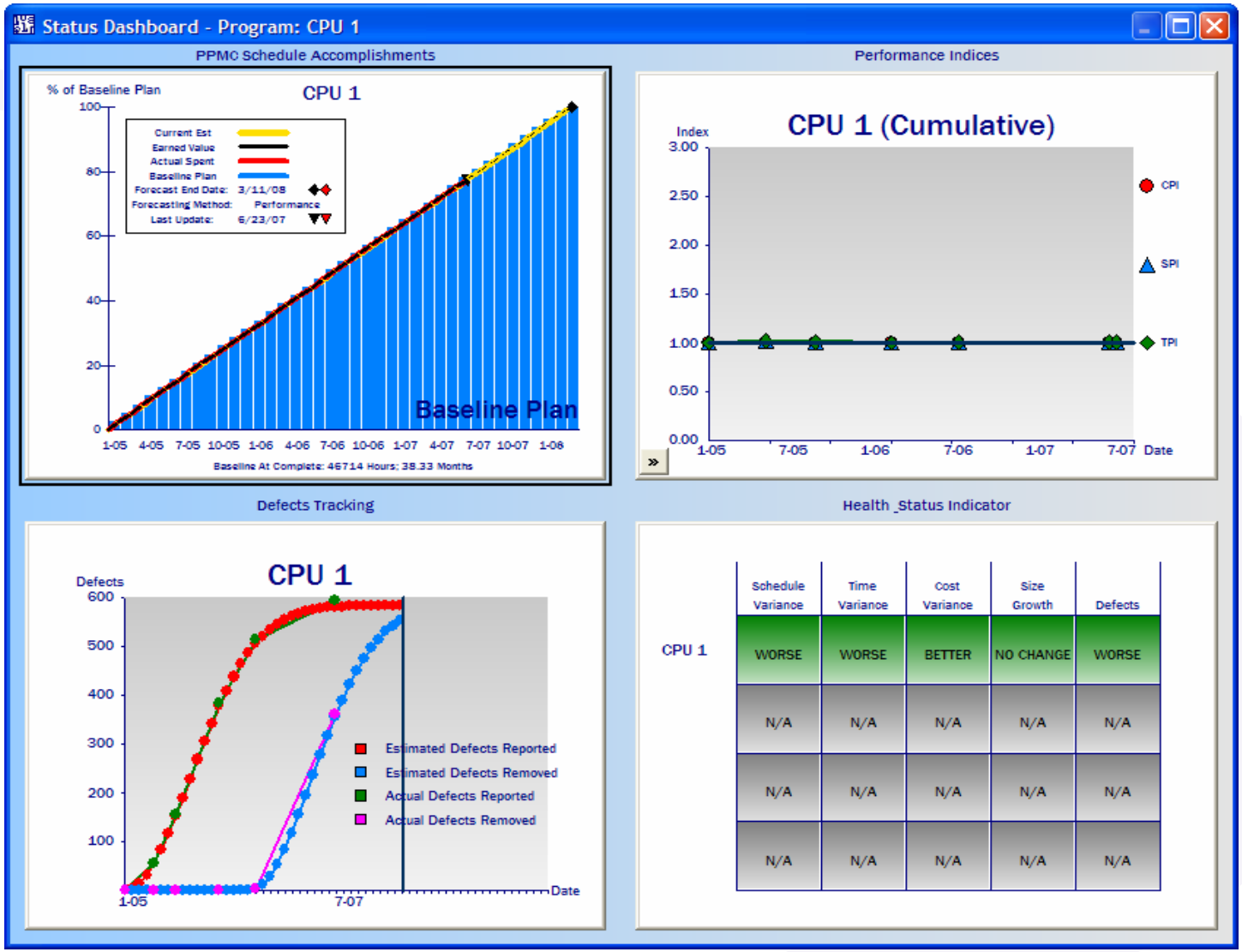


Example Project: Metrics Charts Update Staffing Assumptions

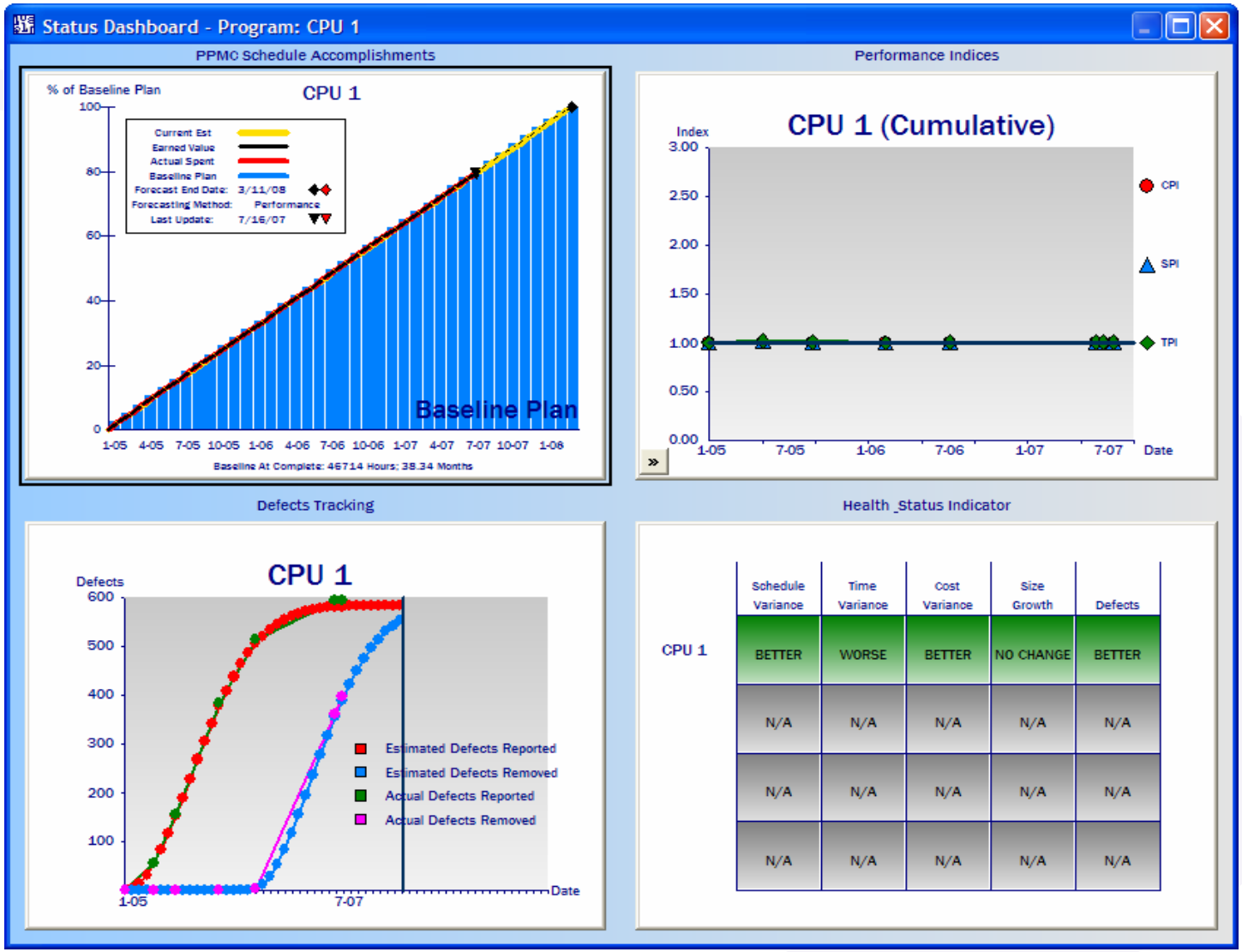
Example Project: Metrics Charts
Re-Baseline the Project



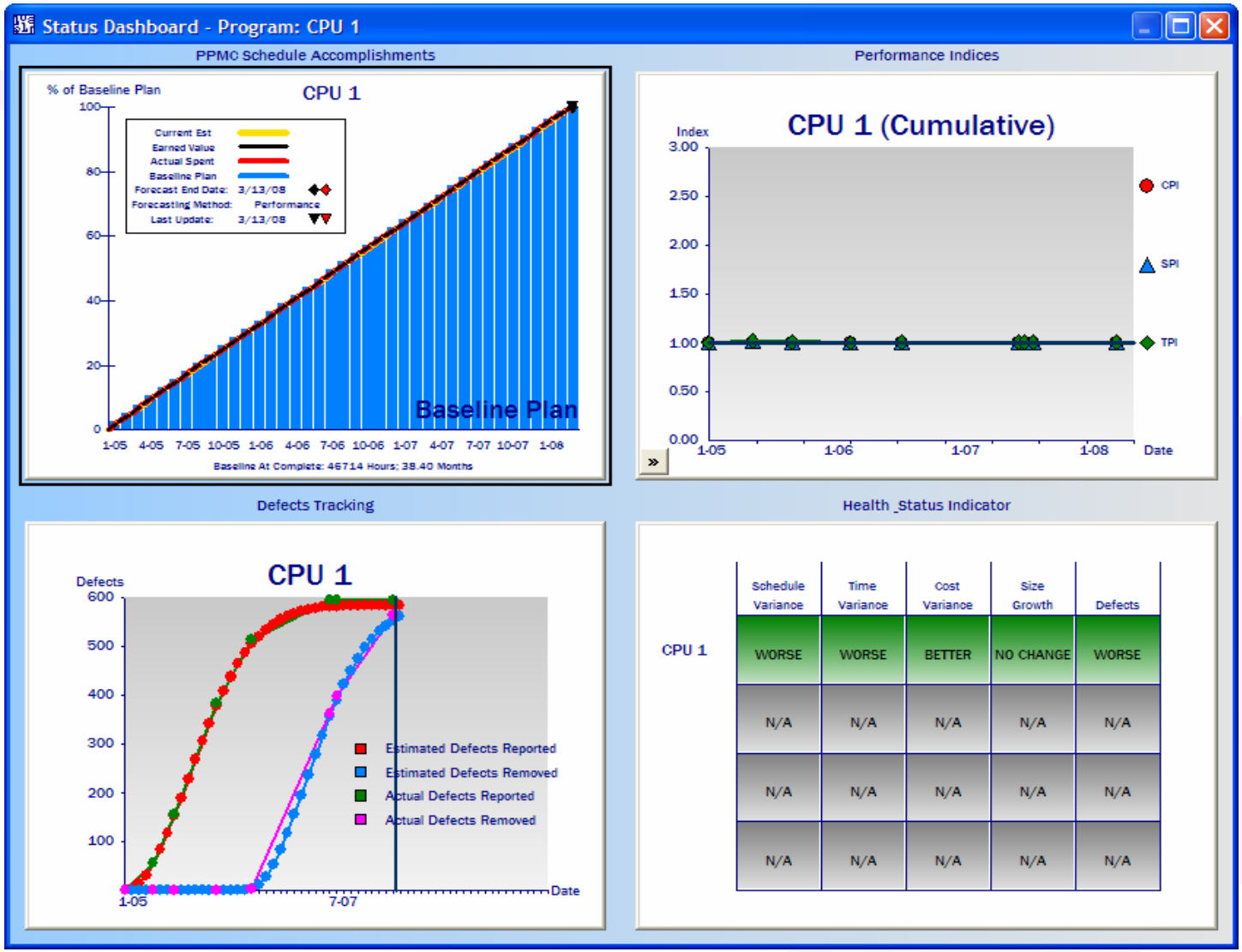
Example Project: Metrics Charts at Component Int. & Test Complete



Example Project: Metrics Charts at Program Test Complete



Example Project: Metrics Charts at Project Finish (Initial Delivery)



Review

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