



The Intelligence behind Successful Software Projects

# Cost Optimization Best Practices for Software and IT Budgeting

Keith Ciocco

Vice President

Quantitative Software Management, Inc.

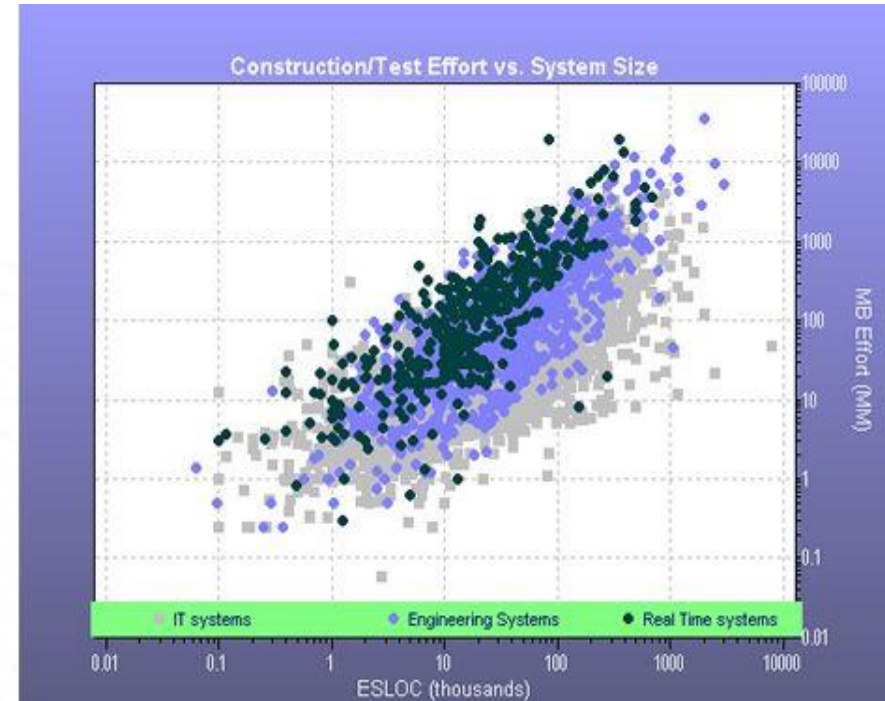
[www.qsm.com](http://www.qsm.com)

[Keith\\_Ciocco@qsm.com](mailto:Keith_Ciocco@qsm.com)

## Experts in Project Estimation, Cost Optimization, and Budgeting

- 43 year track record of innovation and success
- Developers of the SLIM-Suite of estimation and metrics tools
- Leading product & services company, thought leader, and research provider
- We help our clients plan and negotiate their project and portfolio cost, duration, scope, and quality targets more effectively, saving big money and time

- Industry-leading research that validates the SLIM estimation model, over 13,000 completed projects
- Gives us a good understanding of the fundamental relationships
- Provides the latest information on software cost, duration, effort, reliability, team size, and scope, which we leverage to help our clients
- Leveraging the data allows us to help our clients save money and provide value on their project delivery





Delivered  
System  
Size

Is proportional  
to

Effort

over

Time

at some  
level of

Productivity

Value Delivered

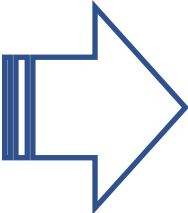
Resources Expended

Duration Required

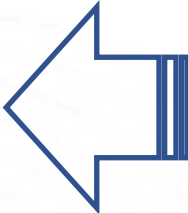
**Influenced by**  
Capability and  
Difficulty of the task

This equation can be re-arranged to solve various estimation problems

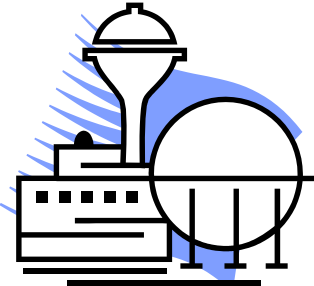
## Business Demand



## Technology & Business Executive Management



## Production Capacity



What are your biggest budgeting challenges?



- Scope not well defined
- Short time frame to make decisions
- Limited risk trade-off analysis
- No data driven approach
- Unrealistic cost, scope and schedule targets
- No “Big Picture” analysis available
- Delivery team, management and stakeholders not on the same page

- Analyze historical data...size, time, effort, quality, productivity
- Analyze current size & resource allocation data
- Leverage the data to generate release estimates
- Aggregate release estimates into a portfolio assessment with demand versus capacity analysis
- Track each delivery
- Perform adaptive forecasting and risk trade-off analysis
- Use analytics to communicate and negotiate
- Capture history for the next time



**SLIM-Collaborate - Project: Customer Service CRM R1**

Welcome Keith P. Ciocco! [Logout]

**Actual Data**

Phases	Start Date	End Date	Phrs
Concept/Planning	(unassigned)	day-month-year	
Requirements & Design	01-Apr-2013	22-Dec-2013	4,750
Development	11-May-2013	10-Feb-2014	19,791
Post Development Sup...	10-Feb-2014	03-Apr-2014	2,776

**Size**

New StPts: 821  
 Modified StPts: 0  
 Unmodified StPts: 0

**Quality**

Defects (SIT - DEL): 181  
 Mean Time to Defect: [ ]

**Project Status**

Status: Unknown

Requirements: [ ]

OK Cancel

**CRM Historical Trends**

Trend: Development Avg Staff

Effective IU

**Historical Trends Trends**

Productivity Index

Effective IU

**Closeout Assessment: Development Avg Staff**

Development Avg Staff

★★★★☆

Project Value: 12.62 FTE  
 Baseline Value: 14.64 FTE  
 Difference: -2.02 FTE or 14% better  
 Deviations: -0.46 sigmas  
 Percentile: Top 32 %

**Productivity Index**

Productivity Index

★★★★☆

Project Value: 20.4  
 Baseline Value: 19.61  
 Difference: 0.79 or 4% better  
 Deviations: 0.61 sigmas  
 Percentile: Top 28 %

# Calculate Productivity Based on Historical Data

Leads All Leads - Dynamics 365 x | LinkedIn Feed | LinkedIn x | Search | Sales Navigator x | Inbox | Sales Navigator x | SLIM-Collaborate - Project: Cust... x

keith.collab.qsm

SLIM-Collaborate Project List Preferences Back Office Contact Us Help Welcome Keith P. Ciocco! [Logout]

Customer Service CRM R1

The Dashboard is modified.

\* Staff and Productivity Assessments1

Trend: Development Avg Staff

CRM Historical Trends Trends

Chart Type: Trend Metric: Development Avg Staff

Trend: Productivity Index

CRM Historical Trends Trends

Chart Type: Trend Metric: Productivity Index

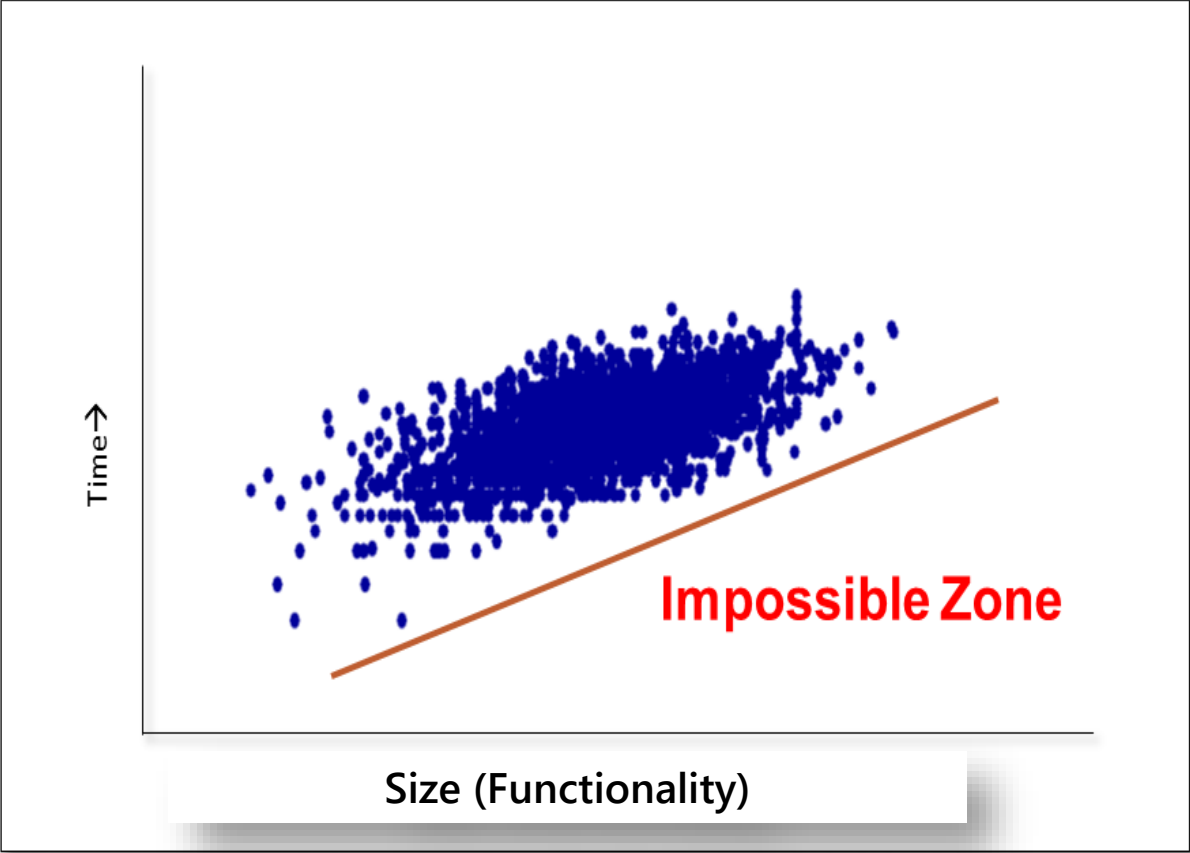
Closeout Assessment: Productivity Index

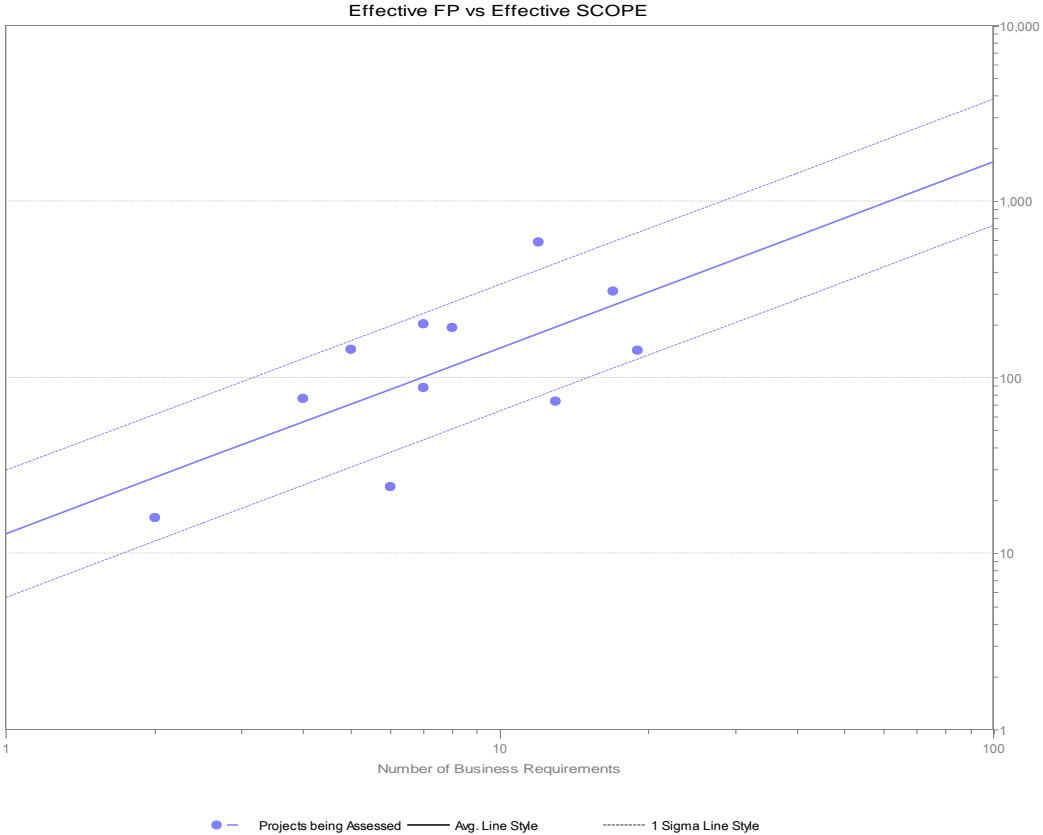
Productivity Index

★★★★☆

Project Value: 20.4  
Baseline Value: 19.61  
Difference: 0.79 or 4% better  
Deviations: 0.61 sigmas  
Percentile: Top 28 %

Chart Type: Assessment Select Metric: Productivity L...

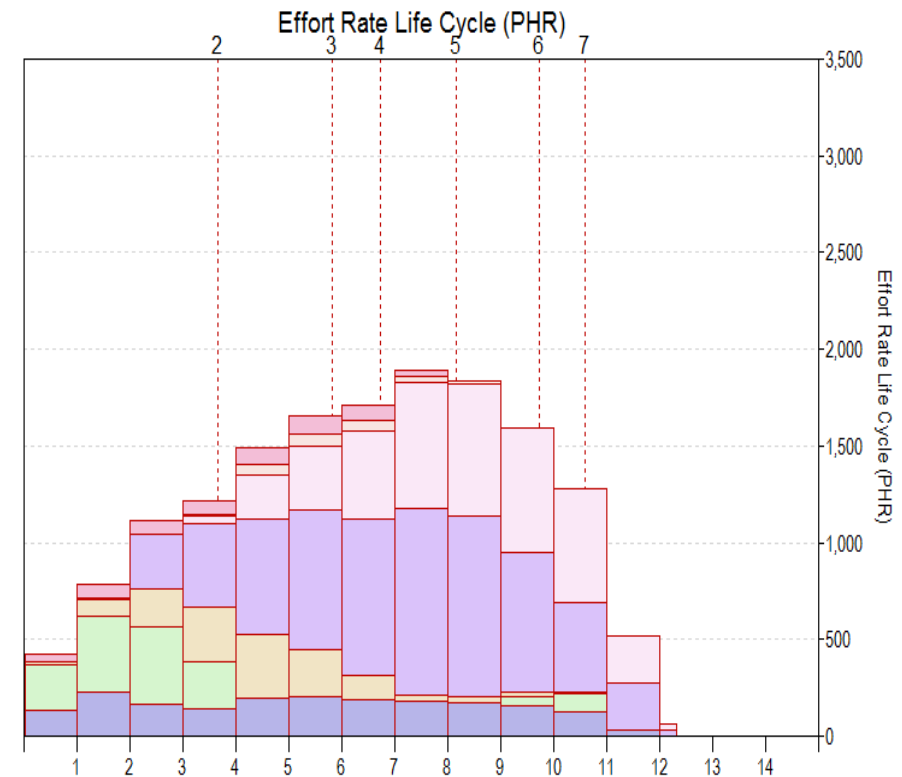
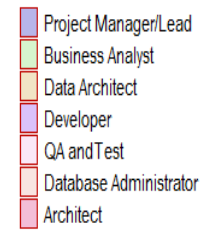




Establish relationships between size metrics to generate gearing factors so multiple development groups can effectively communicate

Analyze for any given development method how staff builds up and rolls off a project

- Agile
- Waterfall
- Package Implementation
- And many more



Leads All Leads - Dynamics 365 | Feed | LinkedIn | Saved Lead Searches | Sales | Inbox | Sales Navigator | Webinars | QSM SLIM-Estimate | SLIM-Collaborate - Project: P

keith.collab.qsm/qsmcollab/project/current/60/program-increment-3

SLIM-Collaborate Project List Preferences Back Office Contact Us Help Welcome Keith P. Ciocco! [Logout]

Est Program Increment 3 Current Solution

The Dashboard is modified.

\* 00 FEASIBILITY ASSESSMENT

Time Series: Staffing

### Staffing

Chart Type: Time Series Metric: Staffing

Text  Comparison solution  Legend

Solution Summary

	Current	Balanced
Solution Name	Current Solution	Balanced Risk Solution
Solution Workflow Status	Estimate Approved	
Start Date	5/13/2019	5/13/2019
End Date	11/11/2019	1/16/2020
Total Duration	6.01 Months	8.18 Months
Total Effort	25,792 Phrs	44,791 Phrs
Total Cost	3,175,456 USD	5,514,656 USD
Total Avg Staff	24.80 FTE	31.65 FTE
Effective IU	276,903 IU	276,903 IU
Productivity Index	24.5	22.1
Development Duration	6.01 Months	8.18 Months
Development Effort	25,792 Phrs	44,791 Phrs
Development Cost	3,175,456 USD	5,514,656 USD
Development Avg Staff	24.80 FTE	31.65 FTE
Development Constr Rate	46,073.71 IU/Mo	33,851.22 IU/Mo

Chart Type: Summary

Comparison solution

Trend: Total Effort

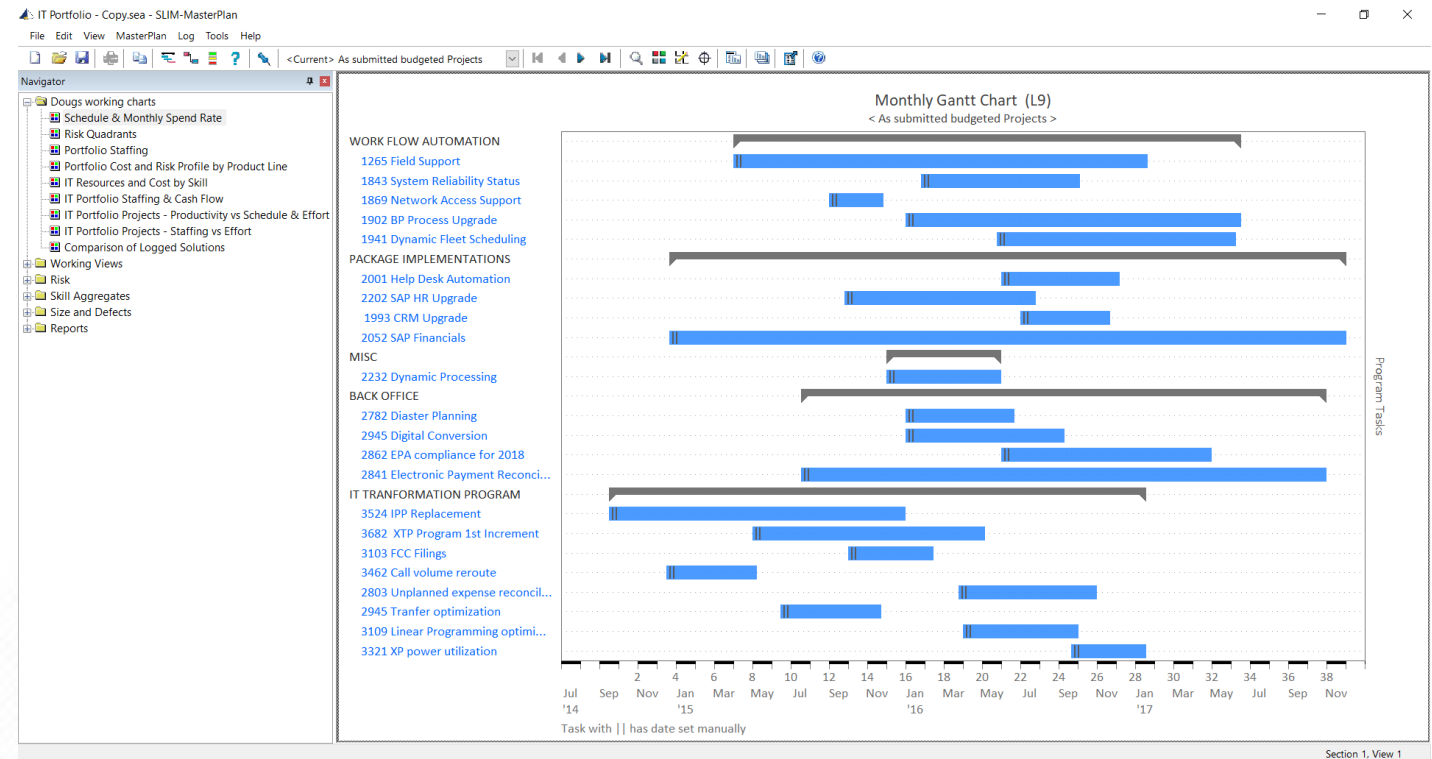
### QSM Business GOVERNMENT Trends

Chart Type: Trend Metric: Total Effort

Text  Comparison solutions



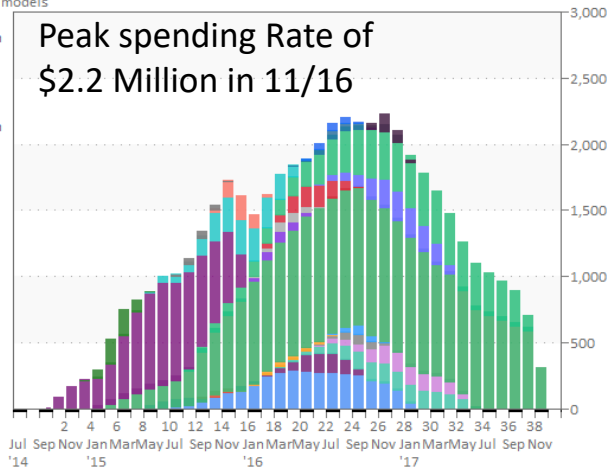
- Aggregate release estimates and assess at the Portfolio level
- During the initial portfolio assessment, look for project estimates that are risky
- Re-plan the individual projects that are outside of the target zone
- Then make changes if needed to optimize for the portfolio, adjust for the enterprise capacity and financial constraints



## Portfolio Cost, Risk Quadrant

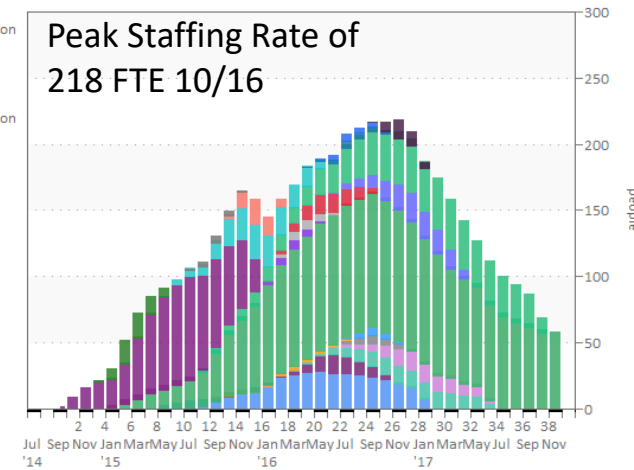
- 3321 XP power utilization
- 3109 Linear Programming optimization models
- 2945 Transfer optimization
- 2803 Unplanned expense reconciliation
- 3462 Call volume reroute
- 3103 FCC Filings
- 3682 XTP Program 1st Increment
- 3524 IPP Replacement
- 2841 Electronic Payment Reconciliation
- 2862 EPA compliance for 2018
- 2945 Digital Conversion
- 2782 Disaster Planning
- 2232 Dynamic Processing
- 2052 SAP Financials
- 1993 CRM Upgrade
- 2202 SAP HR Upgrade
- 2001 Help Desk Automation
- 1941 Dynamic Fleet Scheduling
- 1902 BP Process Upgrade
- 1869 Network Access Support
- 1843 System Reliability Status
- 1265 Field Support

Monthly Spending Rate by Project (L2)



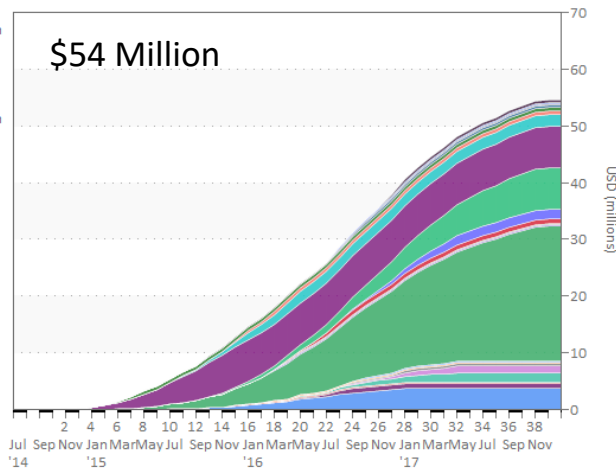
- 3321 XP power utilization
- 3109 Linear Programming optimization models
- 2945 Transfer optimization
- 2803 Unplanned expense reconciliation
- 3462 Call volume reroute
- 3103 FCC Filings
- 3682 XTP Program 1st Increment
- 3524 IPP Replacement
- 2841 Electronic Payment Reconciliation
- 2862 EPA compliance for 2018
- 2945 Digital Conversion
- 2782 Disaster Planning
- 2232 Dynamic Processing
- 2052 SAP Financials
- 1993 CRM Upgrade
- 2202 SAP HR Upgrade
- 2001 Help Desk Automation
- 1941 Dynamic Fleet Scheduling
- 1902 BP Process Upgrade
- 1869 Network Access Support
- 1843 System Reliability Status
- 1265 Field Support

Monthly Staffing by Project (L2)



- 3321 XP power utilization
- 3109 Linear Programming optimization models
- 2945 Transfer optimization
- 2803 Unplanned expense reconciliation
- 3462 Call volume reroute
- 3103 FCC Filings
- 3682 XTP Program 1st Increment
- 3524 IPP Replacement
- 2841 Electronic Payment Reconciliation
- 2862 EPA compliance for 2018
- 2945 Digital Conversion
- 2782 Disaster Planning
- 2232 Dynamic Processing
- 2052 SAP Financials
- 1993 CRM Upgrade
- 2202 SAP HR Upgrade
- 2001 Help Desk Automation
- 1941 Dynamic Fleet Scheduling
- 1902 BP Process Upgrade
- 1869 Network Access Support
- 1843 System Reliability Status
- 1265 Field Support

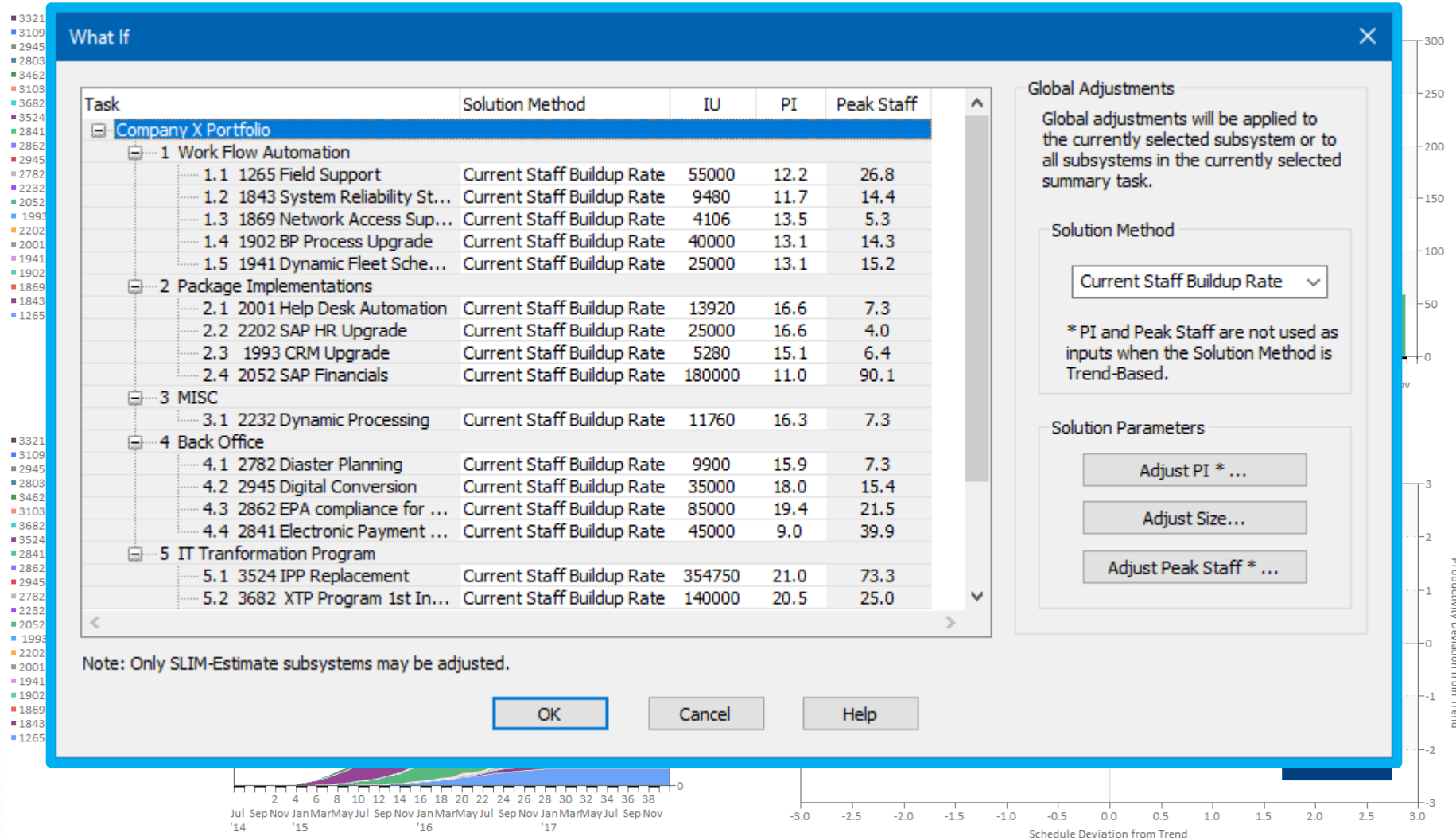
Cumulative Cost by Project (L2)



IT Projects Productivity Assumptions versus Schedule Months  
Deviations from Average Customer Trend



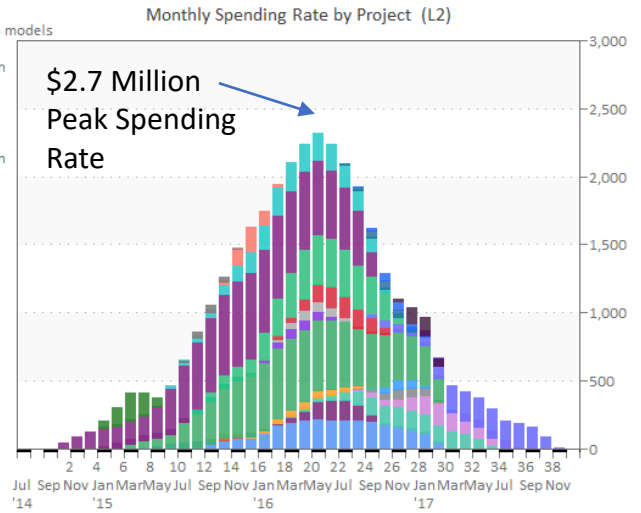
Portfolio Cost, Risk Quadrant



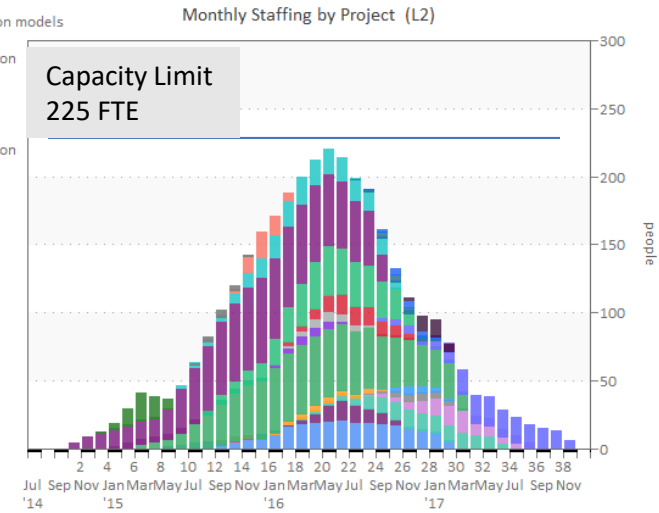
# Adjustments for Risk and Waste Drives Spending Past our Capacity

## Portfolio Cost, Risk Quadrant

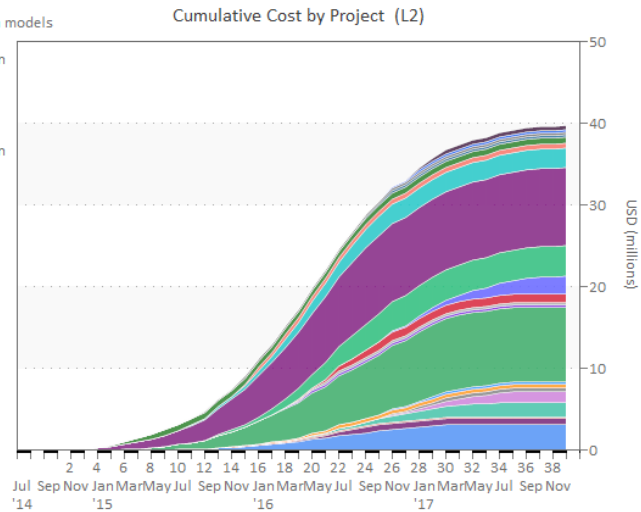
- 3321 XP power utilization
- 3109 Linear Programming optimization models
- 2945 Tranfer optimization
- 2803 Unplanned expense reconciliation
- 3462 Call volume reroute
- 3103 FCC Filings
- 3682 XTP Program 1st Increment
- 3524 IPP Replacement
- 2841 Electronic Payment Reconciliation
- 2862 EPA compliance for 2018
- 2945 Digital Conversion
- 2782 Diaster Planning
- 2232 Dynamic Processing
- 2052 SAP Financials
- 1993 CRM Upgrade
- 2202 SAP HR Upgrade
- 2001 Help Desk Automation
- 1941 Dynamic Fleet Scheduling
- 1902 BP Process Upgrade
- 1869 Network Access Support
- 1843 System Reliability Status
- 1265 Field Support



- 3321 XP power utilization
- 3109 Linear Programming optimization models
- 2945 Tranfer optimization
- 2803 Unplanned expense reconciliation
- 3462 Call volume reroute
- 3103 FCC Filings
- 3682 XTP Program 1st Increment
- 3524 IPP Replacement
- 2841 Electronic Payment Reconciliation
- 2862 EPA compliance for 2018
- 2945 Digital Conversion
- 2782 Diaster Planning
- 2232 Dynamic Processing
- 2052 SAP Financials
- 1993 CRM Upgrade
- 2202 SAP HR Upgrade
- 2001 Help Desk Automation
- 1941 Dynamic Fleet Scheduling
- 1902 BP Process Upgrade
- 1869 Network Access Support
- 1843 System Reliability Status
- 1265 Field Support

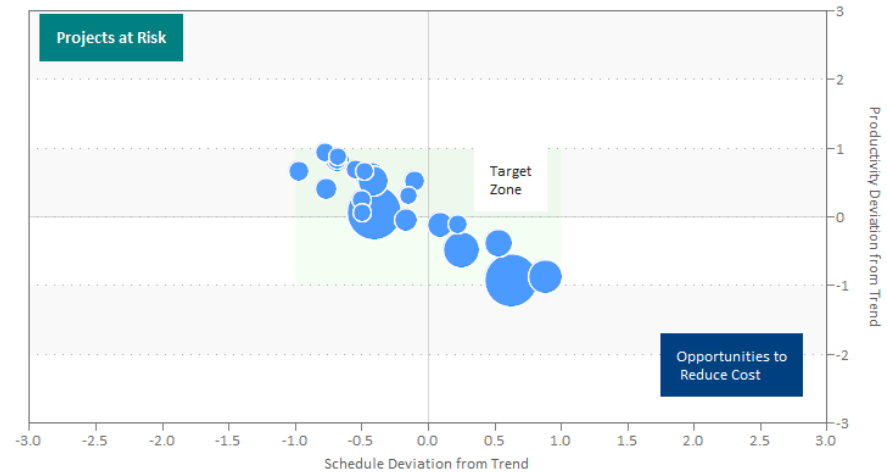


- 3321 XP power utilization
- 3109 Linear Programming optimization models
- 2945 Tranfer optimization
- 2803 Unplanned expense reconciliation
- 3462 Call volume reroute
- 3103 FCC Filings
- 3682 XTP Program 1st Increment
- 3524 IPP Replacement
- 2841 Electronic Payment Reconciliation
- 2862 EPA compliance for 2018
- 2945 Digital Conversion
- 2782 Diaster Planning
- 2232 Dynamic Processing
- 2052 SAP Financials
- 1993 CRM Upgrade
- 2202 SAP HR Upgrade
- 2001 Help Desk Automation
- 1941 Dynamic Fleet Scheduling
- 1902 BP Process Upgrade
- 1869 Network Access Support
- 1843 System Reliability Status
- 1265 Field Support



## IT Projects Productivity Assumptions versus Schedule Months

Deviations from Average Customer Trend



## Typical Adjustments

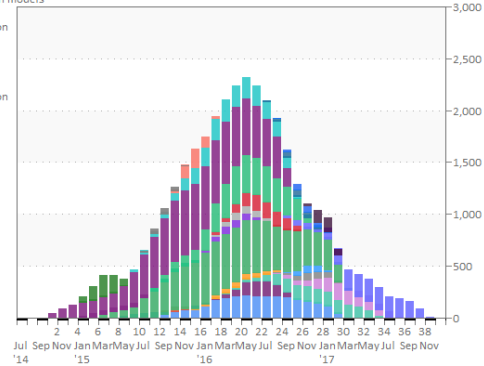
- Eliminate Projects (usually not an option)
- Slip start date
- Reduce the scope
- Adjust staffing up or down to accelerate/decelerate



Portfolio Cost, Risk Quadrant

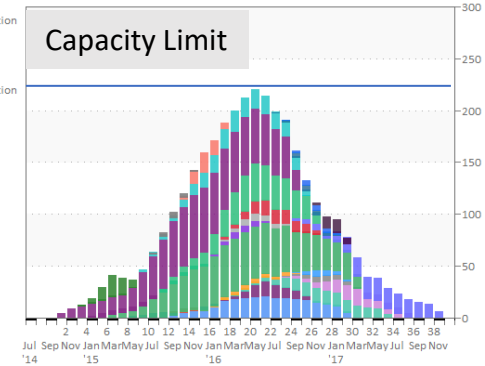
- 3321 XP power utilization
- 3109 Linear Programming optimization models
- 2945 Transfer optimization
- 2803 Unplanned expense reconciliation
- 8462 Call volume reroute
- 3103 FCC Filings
- 3682 XTP Program 1st Increment
- 3524 IPP Replacement
- 2841 Electronic Payment Reconciliation
- 2862 EPA compliance for 2018
- 2945 Digital Conversion
- 2782 Disaster Planning
- 2232 Dynamic Processing
- 2052 SAP Financials
- 1993 CRM Upgrade
- 2202 SAP HR Upgrade
- 2001 Help Desk Automation
- 1941 Dynamic Fleet Scheduling
- 1902 BP Process Upgrade
- 1869 Network Access Support
- 1843 System Reliability Status
- 1265 Field Support

Monthly Spending Rate by Project (L2)



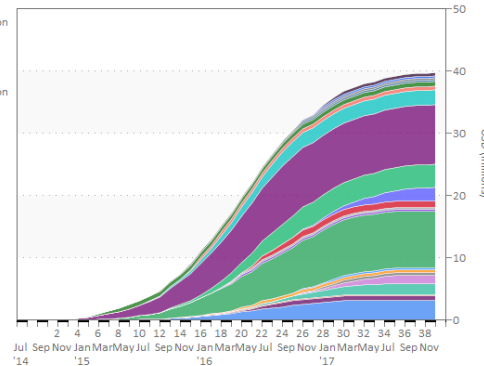
- 3321 XP power utilization
- 3109 Linear Programming optimization models
- 2945 Transfer optimization
- 2803 Unplanned expense reconciliation
- 8462 Call volume reroute
- 3103 FCC Filings
- 3682 XTP Program 1st Increment
- 3524 IPP Replacement
- 2841 Electronic Payment Reconciliation
- 2862 EPA compliance for 2018
- 2945 Digital Conversion
- 2782 Disaster Planning
- 2232 Dynamic Processing
- 2052 SAP Financials
- 1993 CRM Upgrade
- 2202 SAP HR Upgrade
- 2001 Help Desk Automation
- 1941 Dynamic Fleet Scheduling
- 1902 BP Process Upgrade
- 1869 Network Access Support
- 1843 System Reliability Status
- 1265 Field Support

Monthly Staffing by Project (L2)

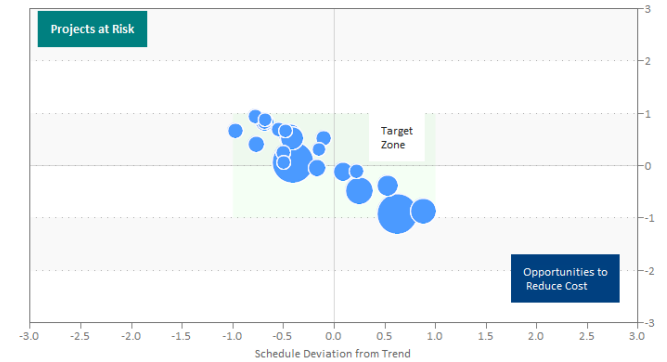


- 3321 XP power utilization
- 3109 Linear Programming optimization models
- 2945 Transfer optimization
- 2803 Unplanned expense reconciliation
- 8462 Call volume reroute
- 3103 FCC Filings
- 3682 XTP Program 1st Increment
- 3524 IPP Replacement
- 2841 Electronic Payment Reconciliation
- 2862 EPA compliance for 2018
- 2945 Digital Conversion
- 2782 Disaster Planning
- 2232 Dynamic Processing
- 2052 SAP Financials
- 1993 CRM Upgrade
- 2202 SAP HR Upgrade
- 2001 Help Desk Automation
- 1941 Dynamic Fleet Scheduling
- 1902 BP Process Upgrade
- 1869 Network Access Support
- 1843 System Reliability Status
- 1265 Field Support

Cumulative Cost by Project (L2)



IT Projects Productivity Assumptions versus Schedule Months  
Deviations from Average Customer Trend

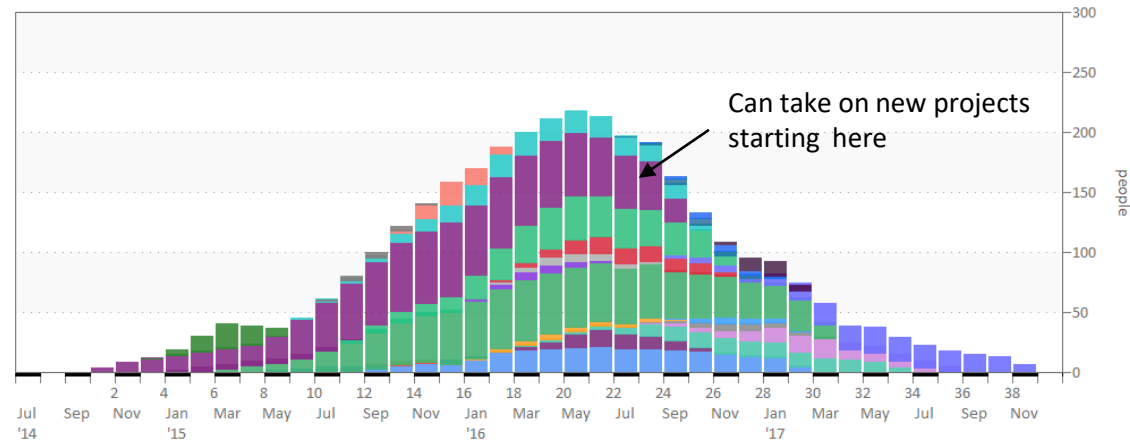


To meet the capacity limit  
 - 5 projects were delayed by 3 months  
 - 3 projects required staff modest reductions

## Sample ResourceViews

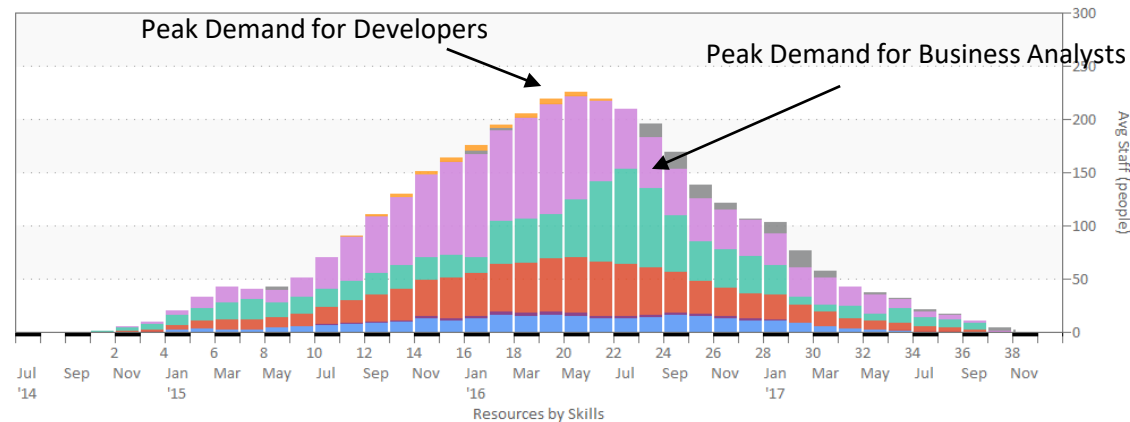
- 3321 XP power utilization
- 3109 Linear Programming optimization models
- 2945 Tranfer optimization
- 2803 Unplanned expense reconciliation
- 3462 Call volume reroute
- 3103 FCC Filings
- 3682 XTP Program 1st Increment
- 3524 IPP Replacement
- 2841 Electronic Payment Reconciliation
- 2862 EPA compliance for 2018
- 2945 Digital Conversion
- 2782 Diaster Planning
- 2232 Dynamic Processing
- 2052 SAP Financials
- 1993 CRM Upgrade
- 2202 SAP HR Upgrade
- 2001 Help Desk Automation
- 1941 Dynamic Fleet Scheduling
- 1902 BP Process Upgrade
- 1869 Network Access Support
- 1843 System Reliability Status
- 1265 Field Support

Project Level Staffing (L2)



- Enterprise Services
- Application Support
- Developer
- Business Analyst
- Technical Lead
- Architect
- Project Management

Avg Staff (people)  
Aggregated Skills




Actual Data Properties

Phases Milestones Metrics Actual Data

Metric Name	11/13	12/13	01/14	02/14	03/14	04/14	05/14
Avg Staff (R&D)							
Avg Staff (C&T)	25.00	26.00					
Avg Staff (P_Mnt)							
Cum Eff Feat	365	394					
Defects Found (Moderate)	155	150					
Defects Found (Serious)	52	50					
Defects Found (Critical)	15	19					
Earned Tasks	104	112					
Defects Fixed (Moderate)	144	128					

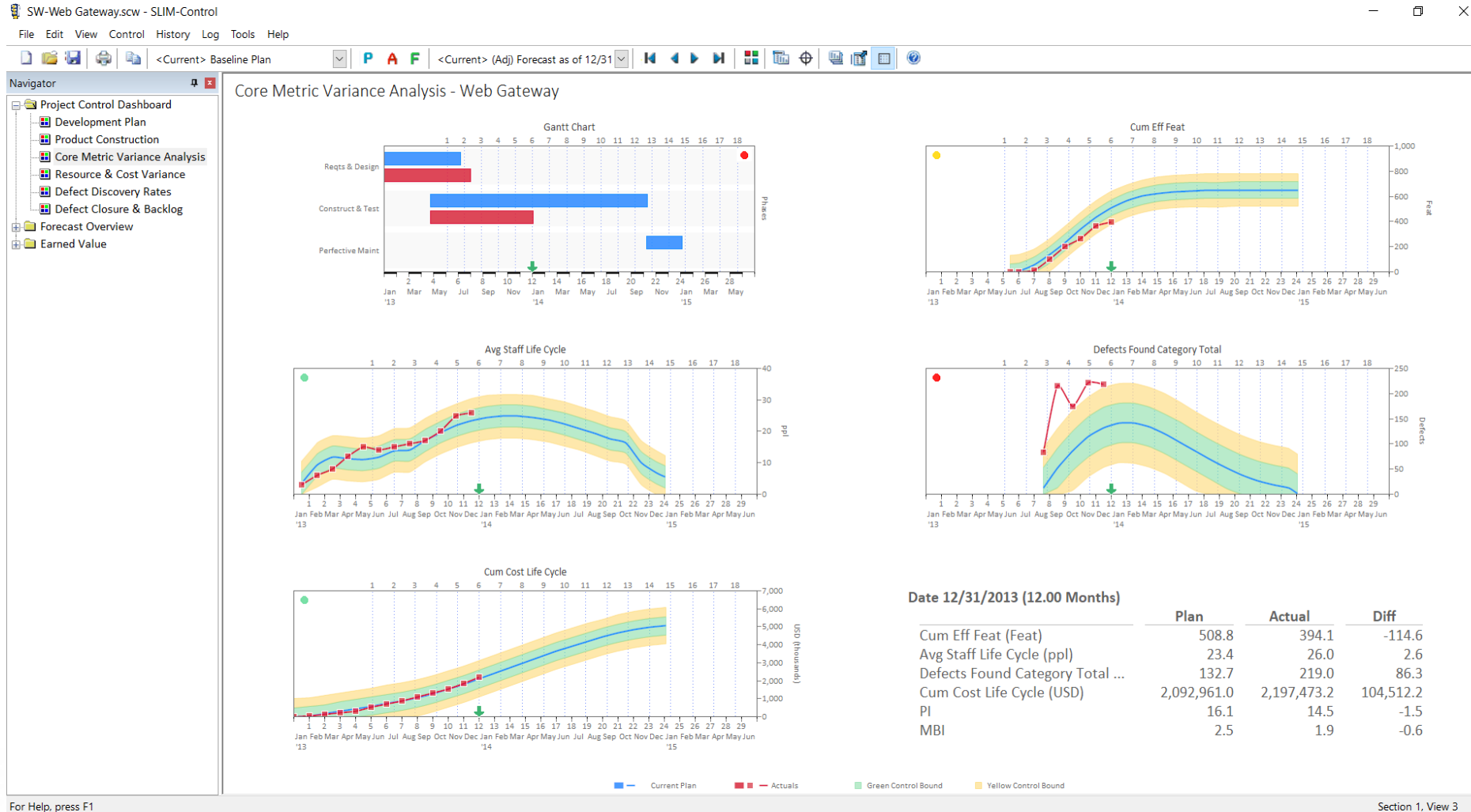
Plan value of Avg Staff (C&T) for 01/14 is 24.37, Forecast value is 26.24.

Notes for 01/14



OK Cancel Help





SW-Web Gateway.scw - SLIM-Control

File Edit View Control History Log Tools Help

<Current> Baseline Plan

<Current> (Adj) Forecast as of 12/31

Forecast Summary - Web Gateway

Navigator

- Project Control Dashboard
- Development Plan
- Product Construction
- Core Metric Variance Analysis
- Resource & Cost Variance
- Defect Discovery Rates
- Defect Closure & Backlog
- Forecast Overview
- Curve Fit Analysis
- Forecast Summary**
- Project Detail
- Delivery Time and Cost
- Quality at Delivery
- Replanning Report
- Compare Plan to Forecast
- Compare Forecasts
- Plan & Forecast Log
- Size & PI Comparison
- Compare to History
- Earned Value

	Plan	Actual/ Forecast	Diff
Cum Eff Feat (Feat)	508.8	394.1	-114.6
Avg Staff Life Cycle (ppl)	23.4	26.0	2.6
Integration Builds (Blds)	3.0	2.0	-1.0
Cum Cost Life Cycle (USD)	2,092,961.0	2,197,473.2	104,512.2
PI	16.1	14.5	-1.5
MBI	2.5	1.9	-0.6

Date 12/31/2013 (12.00 Months)

Legend: Current Plan (blue square), Actuals (red square), Current Forecast (green circle)

Anchor at 12/31/2013

Section 2, View 8

### Tradeoff Forecasting

Forecast Name: (Adj) Forecast as of 12/31/2013

New Phase 3 Staffing Profile

Enter a peak value and a staffing shape for the remainder of phase 3.

Peak: 36      Staffing Shape: **Rayleigh Med Front Load**      **Apply**

Smooth staffing between phases 3 and 4.

Construct & Test Results

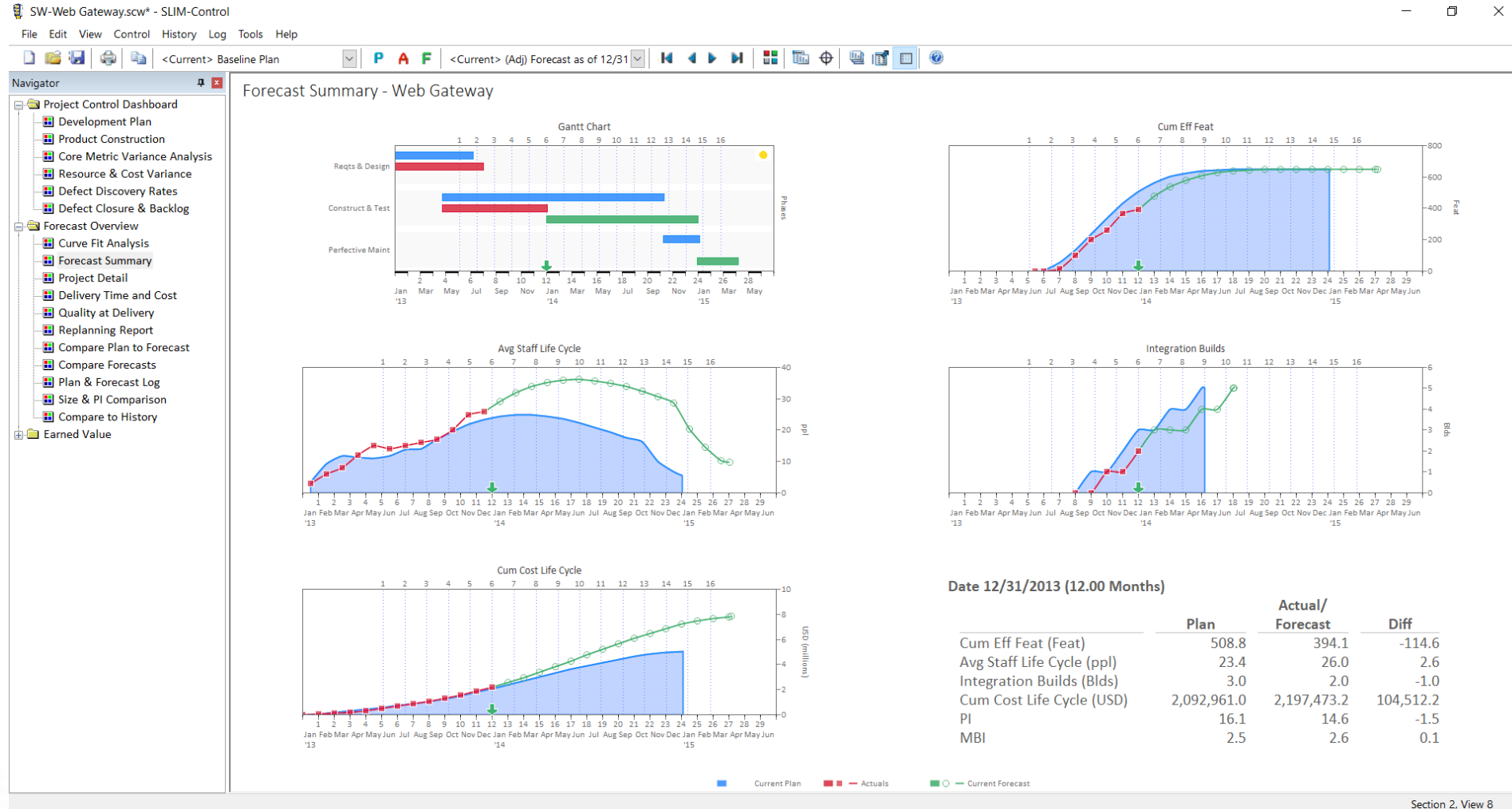
	Curve Fit	Tradeoff
Actual Peak:	27.4	36.1
Effort (PHR):	76654.1	92743.4
Cost (USD 1000):	5596	6770
Time (Mos):	21.4	20.2
End Date:	2/3/2015	12/29/2014
Implied PI:	14.5	14.6

A 21 % increase in cost and effort over the default staffing projection will result in a 5.0 week reduction in phase 3 time.

**FORECAST**

OK      Cancel      Help







**SLIM-Collaborate** Project List Preference Edit Closeout Project: Customer Service CRM R1

Project Settings | Actual Data | Sizing Unit | Description | Access

Phases

Phase	Start Date	End Date	Phrs
Concept/Planning	(unassigned)	day-month-year	
Requirements & Design	01-Apr-2013	22-Dec-2013	4,750
Development	11-May-2013	10-Feb-2014	19,791
Post Development Sup...	10-Feb-2014	03-Apr-2014	2,776

Size

New StPts	821
Modified StPts	0
Unmodified StPts	0

Quality

Defects (SIT - DEL):	181
Mean Time to Defect:	

Project Status

Status: Unknown

Requirements:

OK Cancel

Historical Trends Trends

Effective IU

Productivity Index

Chart Type: Trend

Metric: Development Avg Staff

Closeout Assessment: Development Avg Staff

Development Avg Staff

★★★★☆

Project Value: 12.62 FTE  
Baseline Value: 14.64 FTE  
Difference: -2.02 FTE or 14% better  
Deviations: -0.46 sigmas  
Percentile: Top 32 %

SLIM-Collaborate Trend Chart

CRM Historical Trends Trends - Productivity Index

Life Cycle includes Requirements & Design, Development, Post Development Support

Productivity Index

Effective IU

Chart Type: Trend

Closeout Ass

ChartZoom.aspx?stratqy=project&type=Trend&metric=1&chartOptions=4&height=603&width=1229



- Provides “Big Picture” for reliable early decisions
- Helps to plan realistic delivery targets
- Improves the ability to manage uncertainty
- Allows for rapid risk analysis of alternative project and portfolio scenarios
- Generates a data driven, objective process which allows for better negotiation capability
- Provides transparency with stakeholders



Please feel free to contact me with any questions. Thank you!

Keith Ciocco

Vice President

QSM Inc.

[Keith\\_Ciocco@qsm.com](mailto:Keith_Ciocco@qsm.com)

703-749-3812

[www.qsm.com](http://www.qsm.com)