"The Intelligence Behind Sucessful Software Projects"

# Building an Estimation Center of Excellence

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# Estimation Center of Excellence Overview



- Measurement & Estimation Center of Excellence (CoE) - Why Bother – The Value Proposition
- The QSM CoE Defined
  - Business Case
  - Charter
  - Estimation Process Definition
  - Infrastructure Setup
  - CoE Deployment & Rollout
  - Feedback & Continuous Improvement
- Case Studies & Realized Benefits

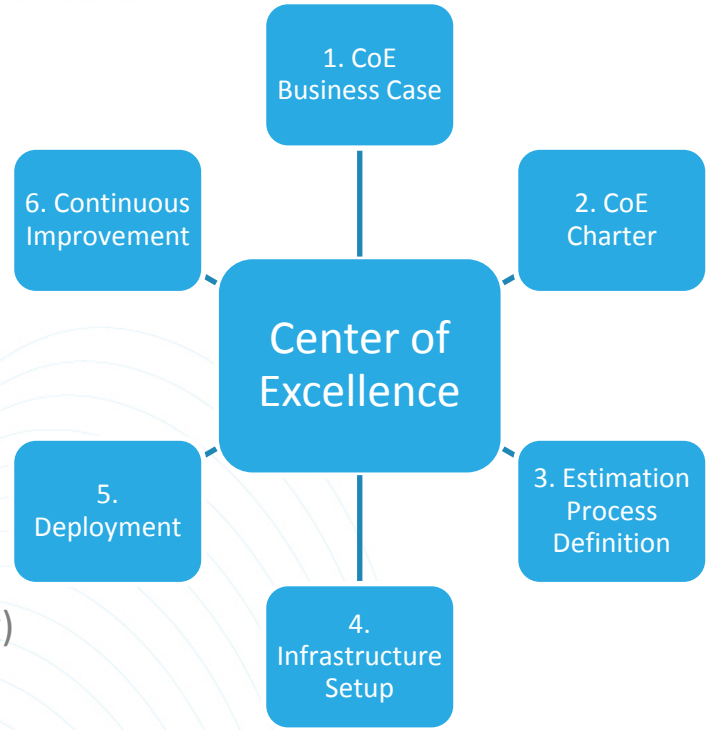
# Why Bother… Because Success is Not an Option

- Software is Virtually Everywhere
- Doing More with Less……Much Faster
- Fierce Global and Domestic Competition
- Time-to-Market Expectations
- You and Your Organization's Reputation


Failure to deliver to expectations is more often an estimation or business decision failure…..not a production or execution issue

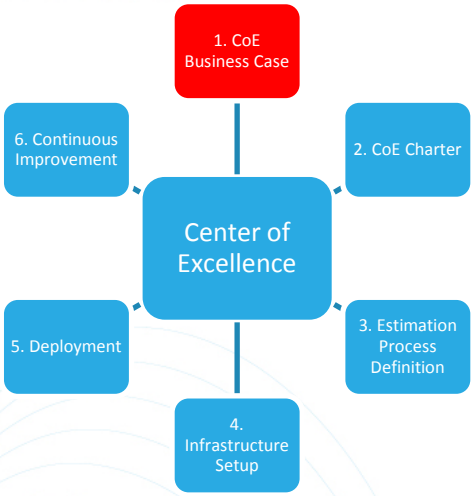
# Setting up a Estimation Center of Excellence

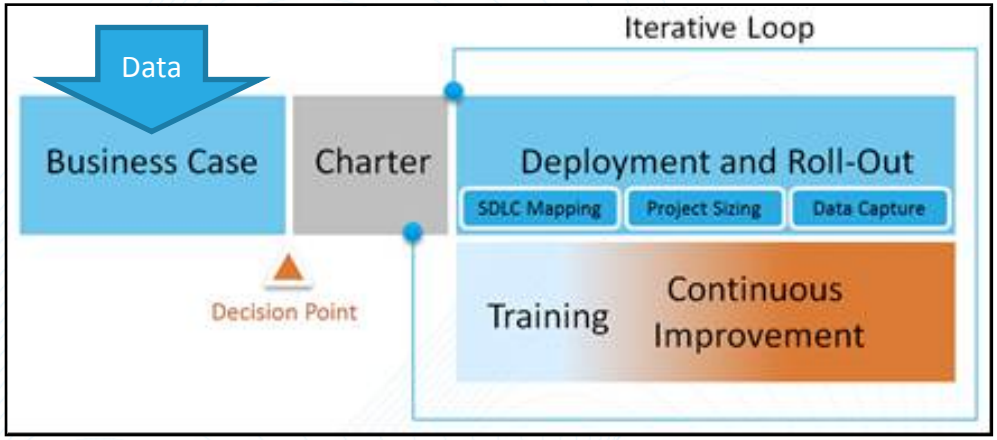
- The Measurement & Estimation CoE Defined
  - Business Case
  - The Charter
  - Estimation Process Definition & Build Out
    - Software development methodologies (SDLC)
    - Tooling & configuration
  - Infrastructure & Integrations
    - Strategy & standards
    - Integrations
      (PPM/Rqmts Mgmt/CM/Test, Tracking & Reporting)
  - Deployment & Rollout
    - Pilot deployment & results
    - Awareness seminars (Change management component)
    - Process & tooling education (expert & casual users)
    - Mentoring for CoE staff
  - Feedback & Continuous Improvement



# 1. CoE Business Case

1. Endorsement from executive management
2. Annual investment to standup & operate
3. Justification for the investment
    1. Current performance baseline (**supported by a quantitative benchmark**)
    2. Expected future state & quantifying the benefits
    3. Expected Return on Investment (ROI)



# Senior Management Support – Critical to Success

- What do we mean by "support"
  - Financial support & **"qualified"** resources
  - Deployment support
    - Mandatory use
      - No project funding without going through estimation process
    - Support data collection
      - At project closeout require history to be collected (no excuses, make time for it)
    - Mandate integration with into enterprise Portfolio, PM and QA processes
  - Set goals for deployment and enforce accountability
    - Require a deployment schedule
      - Include Key milestones (successful organizational group deployments)
    - CoE staff incentives tied to meeting key deployment goals
    - Require regular progress reviews

# Investment to Standup and Operate Estimation CoE



- Staffing resources tied to size of enterprise or scope of deployment
  - Small to medium size enterprise 1-5 people
  - Large enterprise 5-25 people
- Measurement and estimation training & education
  - CoE Staff
  - Other organizational stakeholders
  - Ongoing mentoring
- Measurement and estimation tools
  - CoE Staff (Back office power users)
  - Other organizational stakeholders (occasional users)

# Required Skill Set for Estimation CoE Staff



- Basic development skills
  - Understanding of the software development process
- Analytical skills
  - Comfortable working with data and understanding of business statistics
- Communication skills
  - Both for data gathering and presenting results
- Presentation skills
  - Packaging relevant information into a digestible product or briefing
- Mediation & conflict resolution skills
  - Not always delivering good news, need to be able to help negotiate alternatives
- Planning & execution skills
  - Keeping it on track
- Mentoring  skills
  - Supporting the broader enterprise customers (PMs, business stakeholders, senior management)

# Initial Benchmark & Improvement ROI



- Purpose of initial benchmark
  - Provide a basis against which future improvements can be measured and quantified
  - Identify opportunities for improvement and identify good practices to be emulated
  - Assess internal and external competitive position
  - Assess capability of and negotiate with suppliers
  - Support realistic estimation processes
- Benchmark ROI Analysis
  - Compare “as is” measured state to the “to be” improved state
  - Quantify the benefits of improvement
    - Cost, schedule, quality & productivity
    - Calculate ROI

For more details see: “Using Benchmarking to Quantify the Benefits of Process Improvement” Webinar

# Best Practices Core Quantitative Metrics

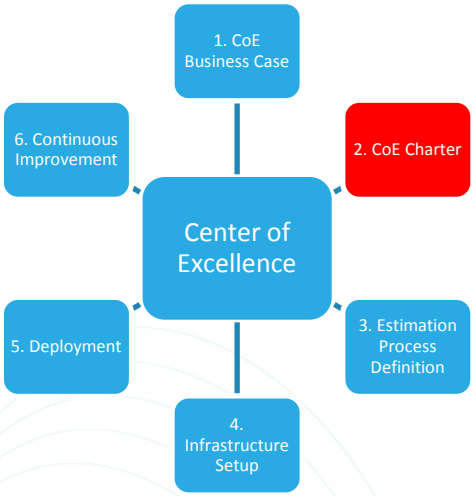
- Size and Scope
  - Abstraction of measurements change depending on where you are in the lifecycle
  - Tells you the overall size of system
  - Tells how much of the product is completed at different points in time
- Schedule
  - Measured in calendar time like days, weeks, months or years
  - Overall duration of the project
  - Tells how much of the overall schedule has been consumed and identifies key task/milestone completion dates
- Effort
  - Measured in labor units like person hours, days, weeks, months or years
  - Proportional to the overall cost
  - Tells how labor/money is being spent
- Defects
  - Deviations from specification usually measured by severity level
  - Tells you how many defects you are likely to find and when
  - Tells how stable the product is at different points in time and helps project when the product will be reliable enough deploy

# Benchmark Qualitative Information

- Project Demographics
  - Application type
  - Development classification (new, enhancement, maintenance, etc…)
  - Industry sector
  - Technology used
- Tools & Methods Used
  - Requirements, design construction, test, PM, etc…
- Technical Complexity
  - Security requirements
  - Data, algorithm, logic & interface complexity
  - Customer interface
  - Documentation requirements
  - Platform stability
- Personnel Profile
  - Overall team skills & experience, cohesion & motivation, management effectiveness

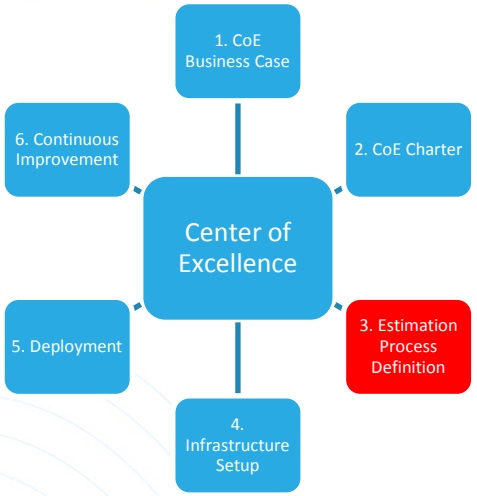
# 2. The CoE Charter Defines the Way Forward

- Provide clarity around the direction & purpose of the effort
  - Defined guiding mandates and incentives
  - Clarify sponsors and champions
  - Stakeholder roles
  - Milestones & decision points
  - Formulate success criteria
  - Establish communication protocols
- Charter confirms the business cases & buy-in from senior management




# 3. Estimation Process – Understanding The Development Process

- Acquire a deep understanding of corporate development process
  - Project lifecycle(s)
  - Application domains (Packages, IT, Engineering, Real Time etc.)
  - Decision making process (who, what & when)
    - Governance & Decision Points (when and how frequently)
      - Artifact availability (scope/productivity/resources)




# Product Development Lifecycles & Phase Mapping

- All software development lifecycles include four primary activities
  - What, How, Do & Deploy/Fix
  - Some SDLCs are more sequential and others include more concurrency in theses activities
- These activities need to be mapped to the different SDLCs

| Methodology | What | How | Do | Deploy/Fix |
|---|---|---|---|---|
| Waterfall | Concept | Rqmts. & Design | Construct & Test | Deploy |
| RUP | Initiation | Elaboration | Construction | Transition |
| Agile | Initiation | Iteration Planning | Iteration Development | Production |
| SAP ASAP | Project Preparation | Business Blueprint | Realization & Final Prep | Go Live |

- Why map these activities
  - Allows us to decide what to include (estimate or historical data)
  - Allows us to compare projects using different development approaches
  - Allows us to talk their language

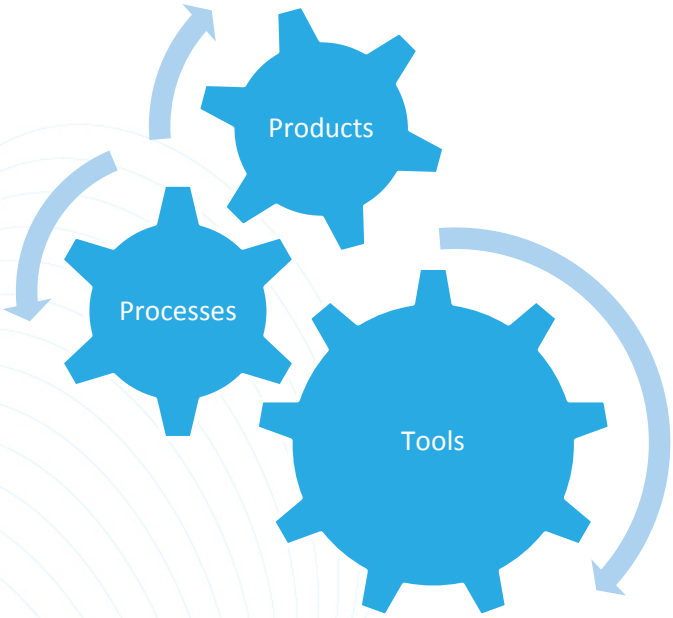
# Application Domains & Project Complexity



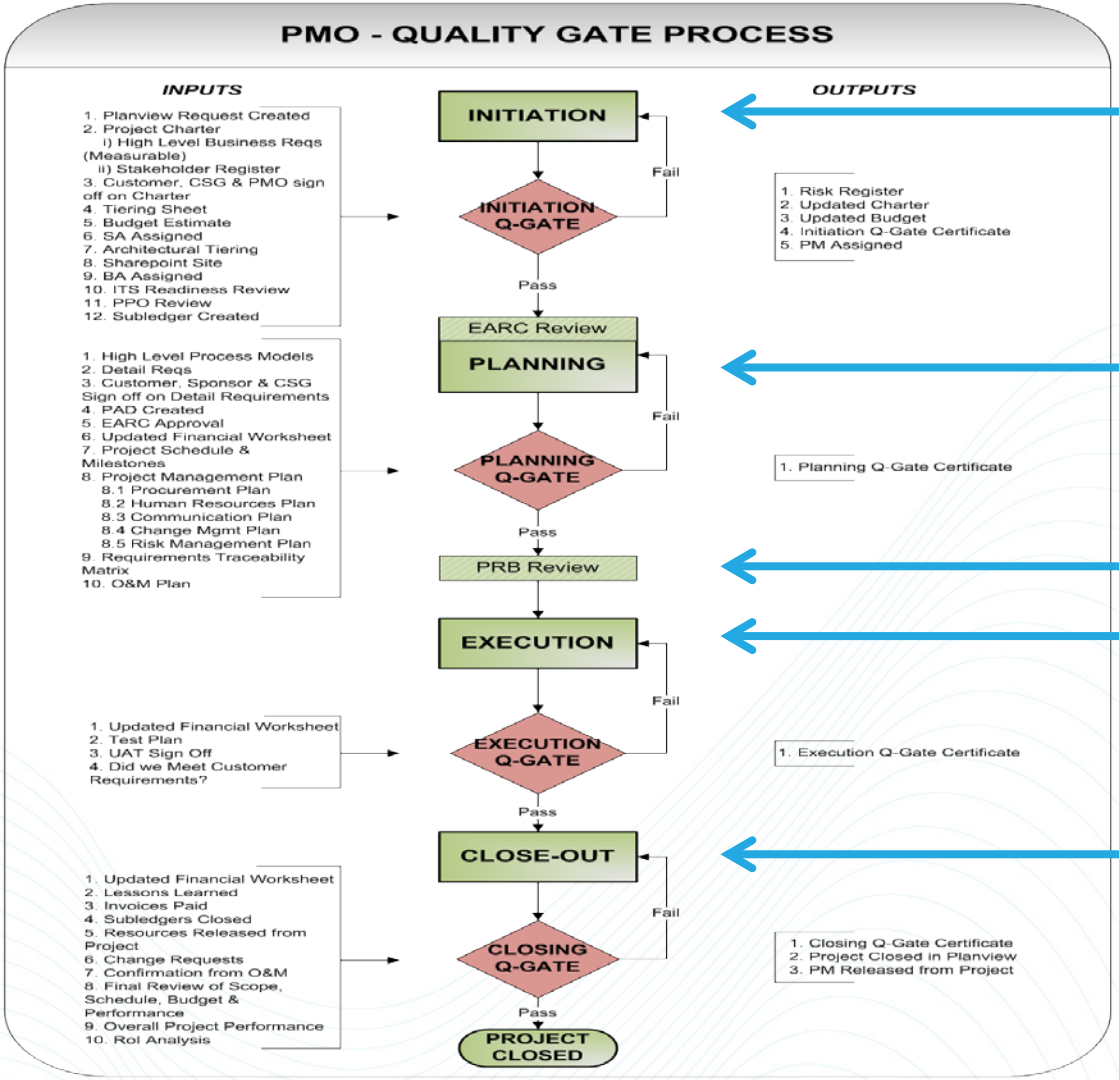
- Not all software is the same
- There are three primary application complexity zones
  - Business IT – lower complexity
    - Financial services, ERP, CRM, etc…
  - Engineering – more complexity
    - C&C, System SW, Communications, Scientific, Process Control, etc…
  - Real Time – Most Complex
    - Firmware, Embedded Controllers, Avionics, etc..
- Relevant historic data should be used to support estimation
- When comparing historic data projects should be grouped according to application complexity

# Estimation Process – Configured Solution

- Configure estimation solutions
  - Spreadsheet tools /commercial estimation tools/task planning tools
    - WBS tasks & resources
    - Scope- size metrics *not effort*
    - Productivity
      - Metrics Database (Industry & Internal)
  - Define decision making products/deliverables (C Level, project manager)



# Estimation Decision Points




Feasibility Estimate & Risk

Refined Estimate

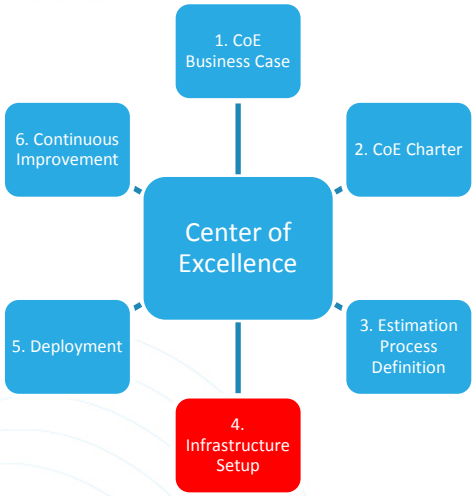
Commitment Estimate

PM & Development Metrics Tracking and Forecasting

Historic Data Collection

# 4. Infrastructure & Integrations

- Estimation Infrastructure
  - Implementation Strategy
    - Centralized
    - Decentralized
    - Hybrid
  - Data collection & storage strategy
  - Standards and estimation templates
  - Linkage to other processes (portfolio, risk, project management)
- Integrations & Automation
  - Enterprise management tools
    - Project Portfolio Management (PPM)
    - Business intelligence/reporting
    - Time and cost accounting
    - Pricing
  - Development tools
    - Configuration Management
    - Defect Tracking
    - Project Management




# Estimation Integration to Project Portfolio Management



- Most enterprise PPM implementations require all projects to adhere to the established PPM process
- Projects usually start out as a proposal in PPM solution
  - Proposals require alignment with enterprise IT strategy
  - Proposals require a business case for approval identifying:
    - Costs & Durations (may be driven by business stakeholder expectations)
    - Benefits
    - ROI
    - Risks
- This is an ideal place to integrate feasibility estimates
  - Mandate is most likely already in place due to established PPM processes
  - Ideal place to trap high risk proposals
    - Ensure stakeholder expectations are aligned with development capability
  - Best chance to re-negotiate cost, schedule and scope

# What is required for a Feasibility Estimate?

- Business Stakeholder desired cost & schedule
- Size & Scope
  - High level business requirements
  - Analogy to previous projects supported by benchmark statistics
- Expected productivity
  - Average empirical performance supported by benchmark statistics
  - Average from applicable industry database

Three pieces of information backed up by historical data is all you need to provide a credible estimate!

# Identify High Risk Projects Before they are Approved

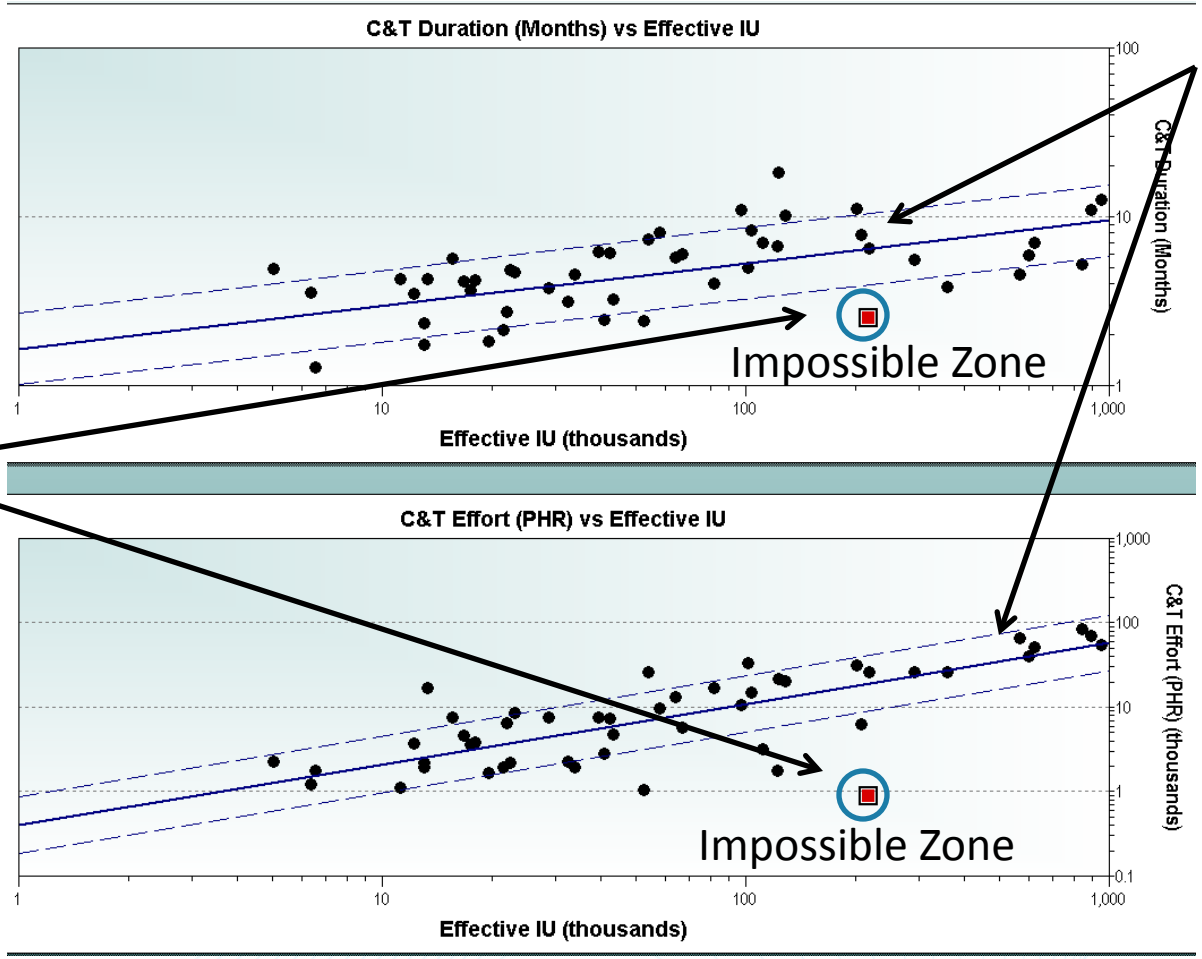
## Claims Rewrite

Risky

**Project Summary**

| | Desired | Feasible |
|---|---|---|
| Start Date: | 4/1/2013 | 4/1/2013 |
| End Date: | 12/1/2013 | 10/30/2014 |
| Total Duration: | 8 Months | 19 Months |
| Total Effort: | 10,000 Phrs | 71,849 Phrs |
| Total Cost: | 1,000,000 USD | 7,184,866 USD |

# Compare Proposed Expectations to Historical Performance

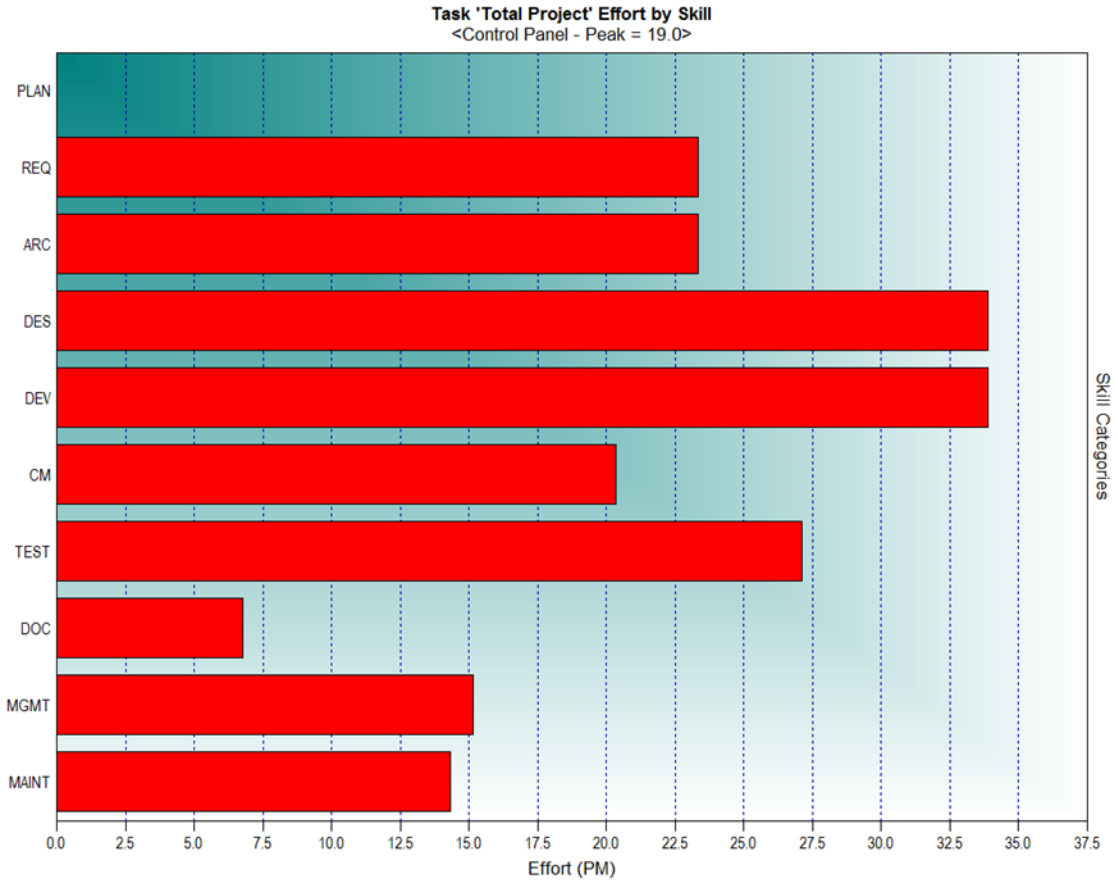



Historical data and benchmark trends

Desired Cost & Schedule

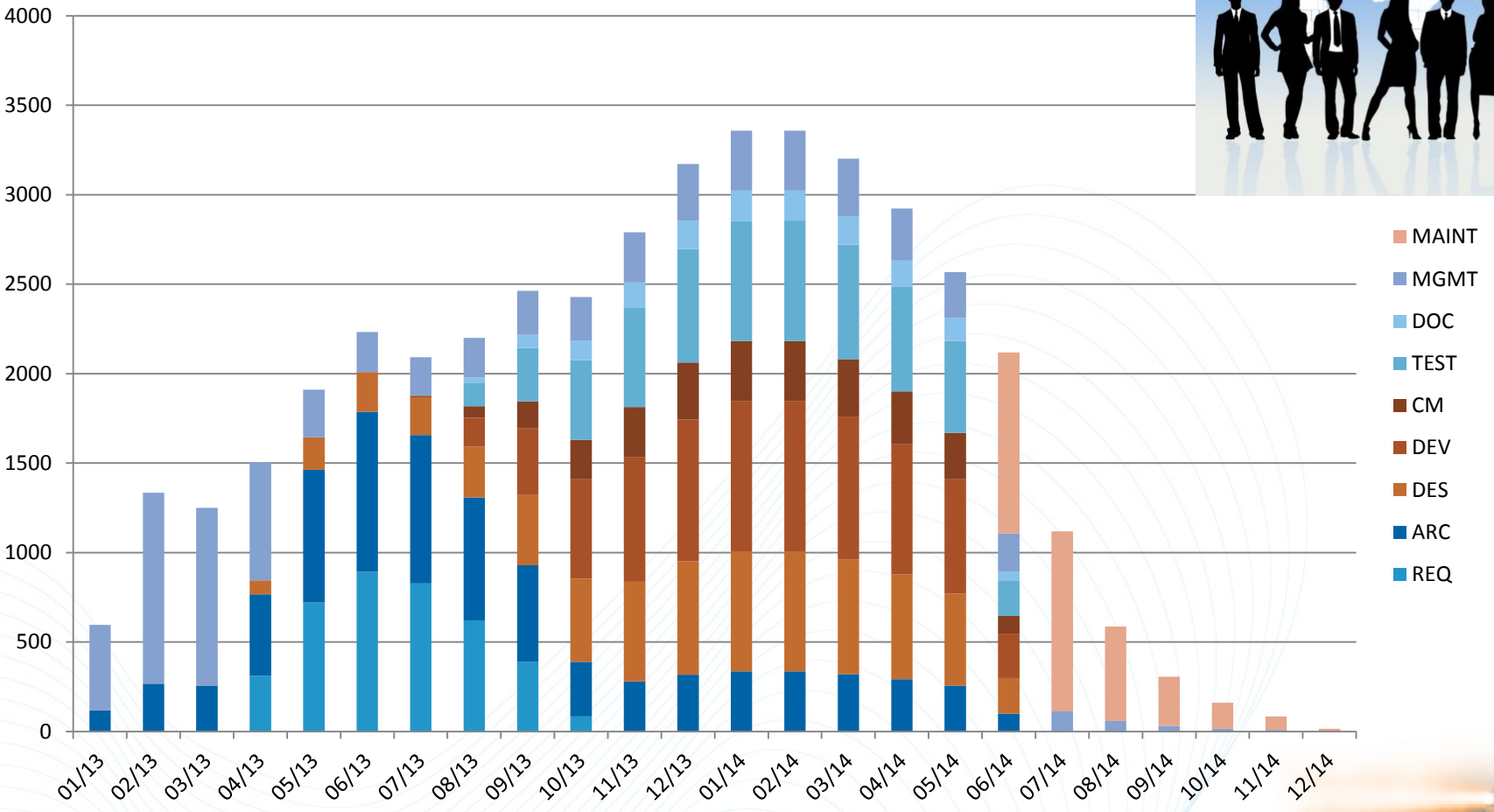
# Estimation Can Support Enterprise Resource Planning

Estimation can determine the total effort for each type of resource



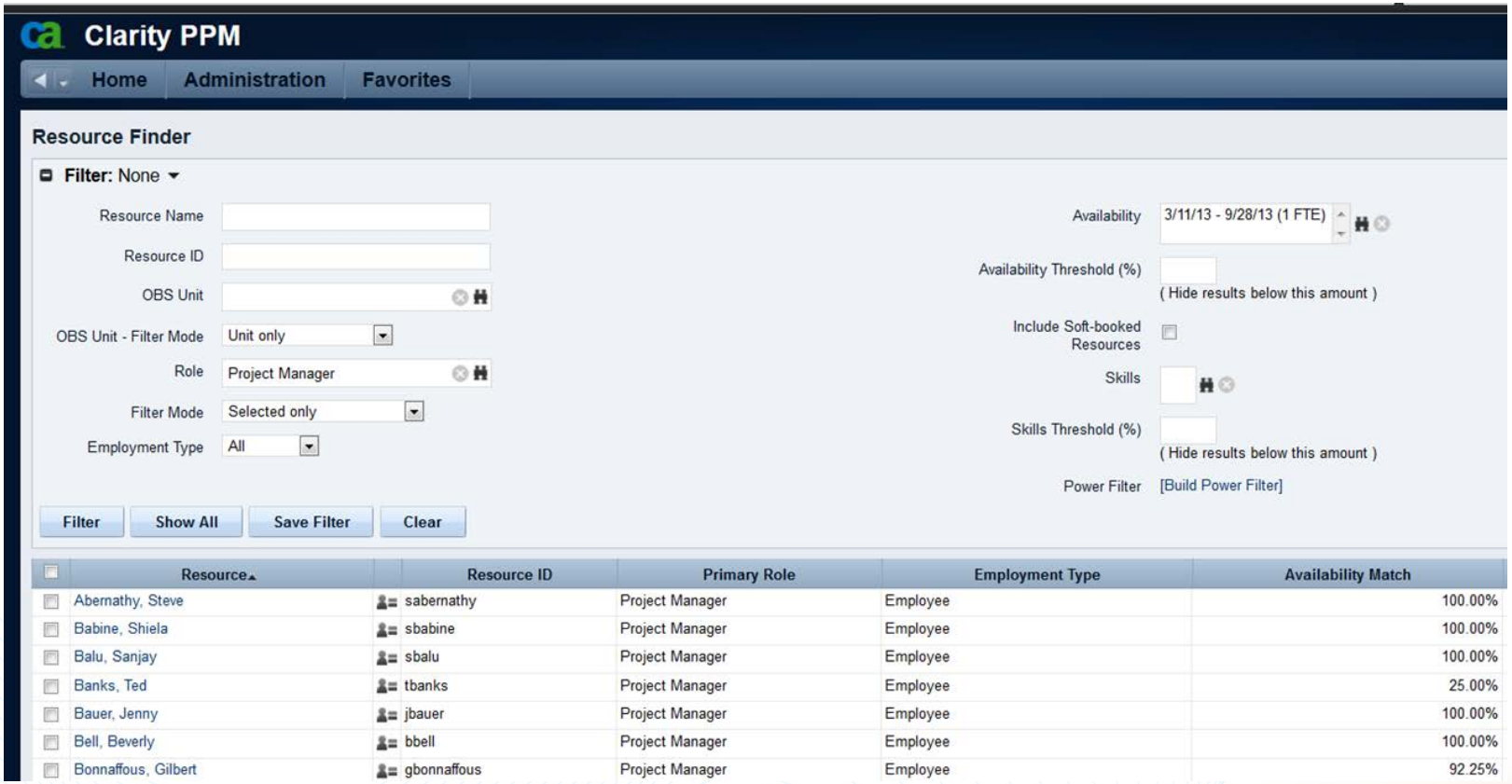

# Estimation Can Support Enterprise Resource Planning

## …and when they will be needed on a the project



# PPM Solution Leverages Estimation for Resource Planning

Find the people to fill roles with the skills and availability you need



# Estimation Integration into PM & QA During Execution

- Most enterprise project risk monitoring revolves around cost and schedule performance

Investments

| Investment | ID | Priority | Idea Category | Goal | Alignment | Risk | Stage | Planned Start | Detailed Budget Cost | Detailed Forecast Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| AC Training Project | PROJ-00131 | 1 | Enhancement | Cost Reduction | | | | 11/1/12 | 48,500.00 | 0.00 |
| Accounts Receivable | AP2001 | 1 | | Maintain the Business | | | | 1/15/07 | 500,000.00 | 500,000.00 |
| BB training project | PROJ-00126 | 3 | | Cost Reduction | | | | 11/12/12 | 0.00 | 0.00 |
| BC training project | PROJ-00128 | 4 | | Cost Reduction | | | | 11/1/12 | 48,500.00 | 0.00 |
| br Course Project | PROJ-00075 | 1 | | Infrastructure Improvement | | | | 5/21/12 | 250,000.00 | 250,000.00 |
| bxr Course Project | PROJ-00097 | 2 | Enhancement | Infrastructure Improvement | | | | 5/21/12 | 250,000.00 | 250,000.00 |
| Clarity Training Project | PROJ-00078 | 1 | Enhancement | Cost Reduction | | | | | 0.00 | 0.00 |
| Clarity Training Project | PROJ-00086 | 1 | | Cost Reduction | | | | | 0.00 | 0.00 |
| CM Course Project | PROJ-00034 | 2 | New Product or Service | Cost Avoidance | | | | 1/1/12 | 0.00 | 0.00 |
| DJF | PROJ-00055 | 2 | | Cost Avoidance | | | | 5/12/12 | 250,000.00 | 250,000.00 |
| DYJ Training Project | PROJ-00134 | 1 | | Cost Reduction | | | | 11/1/12 | 48,500.00 | 0.00 |
| ECommerce Project | PROJ-00153 | 2 | | | | | | | 0.00 | 0.00 |
| FasTest | PROJ-00043 | 4 | | Cost Avoidance | | | | | 0.00 | 0.00 |
| FSD Course Project. | PROJ-00141 | 3 | Compliance/Regulatory | | | | | 11/1/12 | 48,500.00 | 0.00 |
| General Ledger Application | AP2002 | 10 | | Maintain the Business | | | | 1/1/07 | 450,000.00 | 450,000.00 |
| GLE Course Project | PROJ-00031 | 3 | Enhancement | Cost Avoidance | | | | 5/21/12 | 250,000.00 | 250,000.00 |
| GxB Course Project | PROJ-00094 | 2 | | | | | | 5/21/12 | 250,000.00 | 250,000.00 |
| HC Training Project | PROJ-00124 | 1 | | Cost Reduction | | | | 11/1/12 | 0.00 | 0.00 |
| HTX Course Project | PROJ-00096 | 5 | | | | | | 5/21/12 | 250,000.00 | 250,000.00 |
| KCB Course Project | PROJ-00029 | 4 | Enhancement | Cost Avoidance | | | | 5/21/12 | 250,000.00 | 250,000.00 |

Aggregation

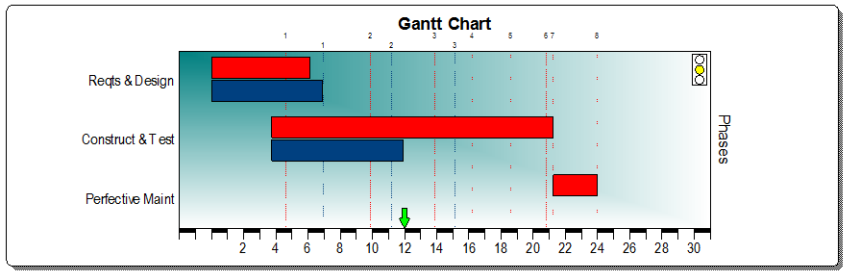
We're missing half of the core metrics and only seeing half the risk picture!

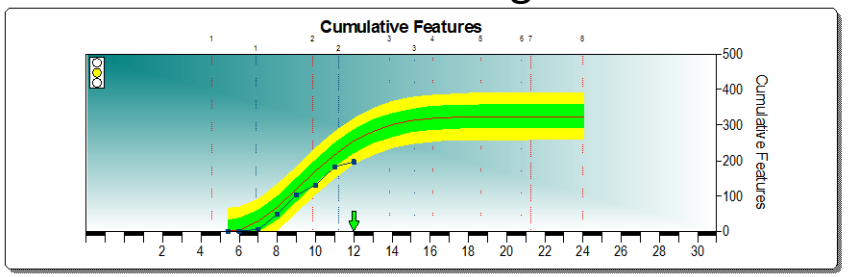
# Project Risk Dashboard – All Core Metrics

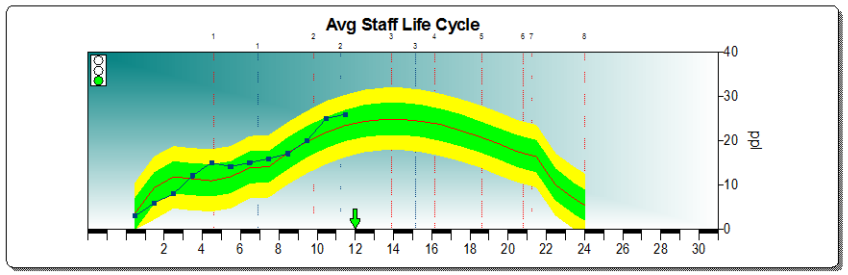
Looks mostly OK here

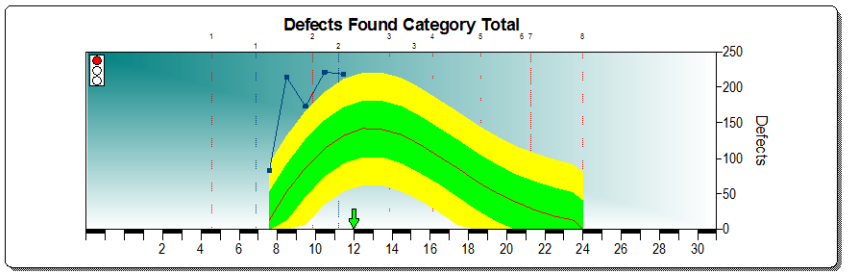
Core Metric Variance Analysis - Net Portal Gateway

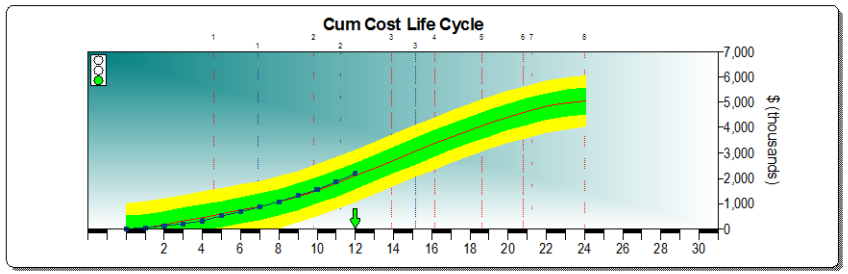
Not so good here



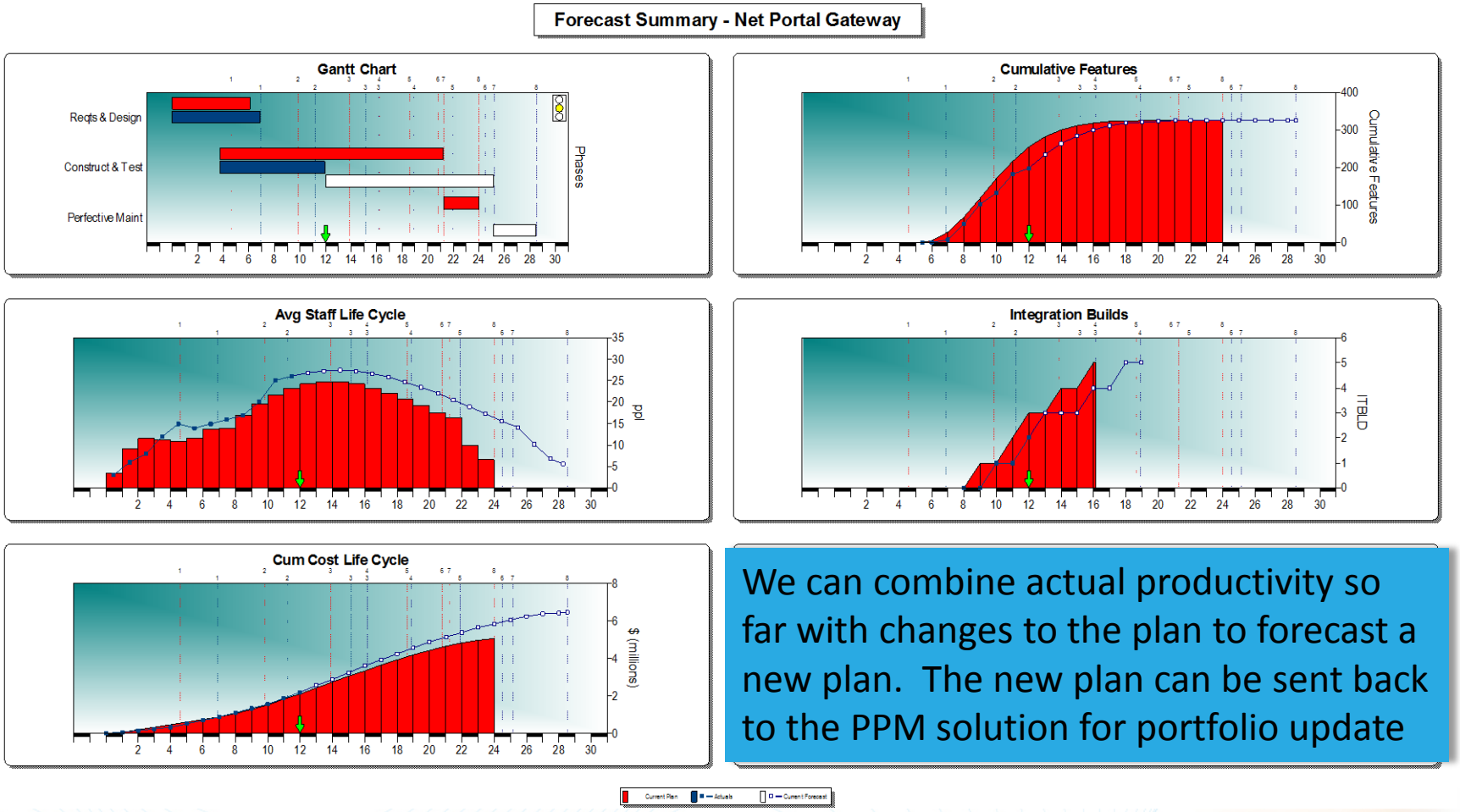




Here we have our typical enterprise risk indicators on the left of the dashboard and our key process indicators from Development on the left all on the same timeline. Control bounds are used to assess acceptable variation.

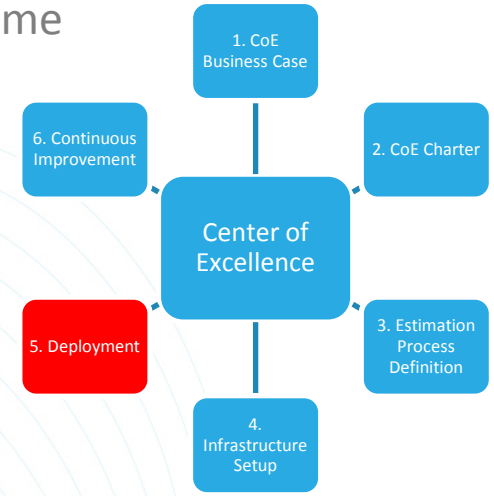
# Replanning: Forecast to Completion




We can combine actual productivity so far with changes to the plan to forecast a new plan. The new plan can be sent back to the PPM solution for portfolio update

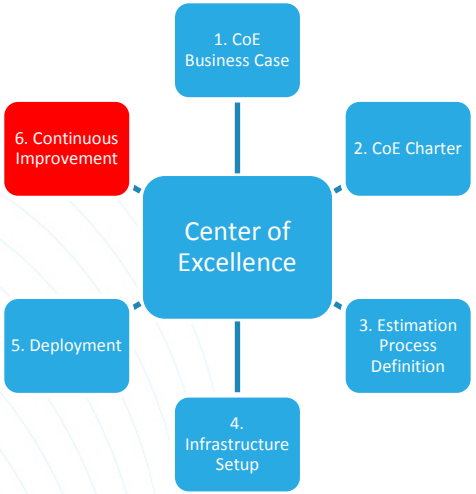
# 5. Deployment

- Pilot Implementation
  - Limit scope to something achievable in designated timeframe
  - Find willing internal partners
  - Fine tune processes based on feedback
  - Document pilot results
- Adoption
  - Conduct awareness seminars for stakeholders
  - Advertise pilot results
- Training & Education
  - Conduct management seminars
  - Train and mentor CoE staff
    - Develop estimation experts (back office)
    - Provide mentoring & advise on practical application



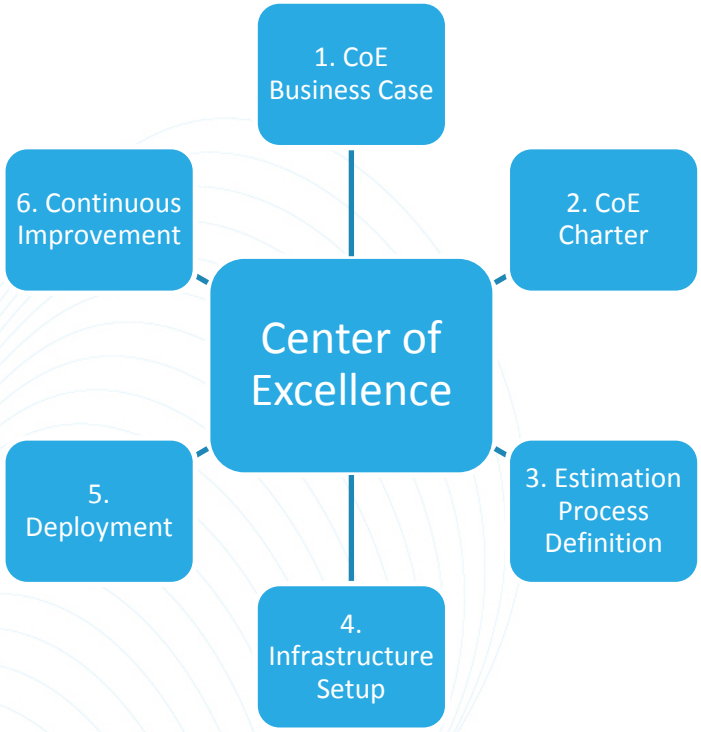
# 6. Continuous Improvement

- On-going Process Refinement
  - Lesson learned feedback (surveys, interviews, suggestion box)
  - Adjust tooling, process & products as needed
  - Strive for continuous improvement
- Document successes to justify investment
- Continue to collect data!
  - Keeps our estimation assumptions up to date
  - Confirms the initial business case

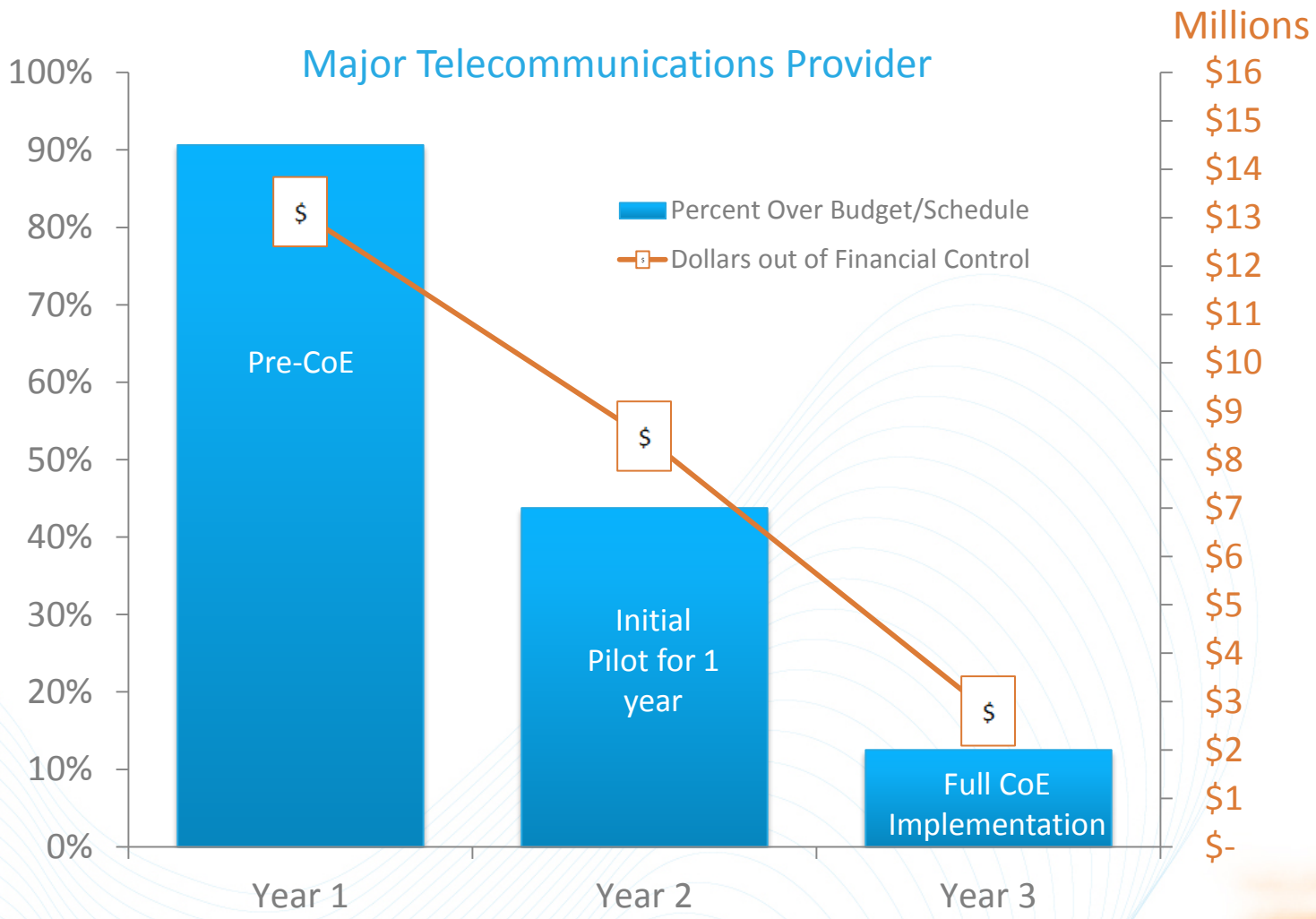


# Stakeholder Benefits

- C-Level
  - Performance benchmarks & dashboards
  - Strategic program risk assessment
  - Portfolio performance optimization
- Project Managers
  - Realistic schedules, budgets, resource optimization
  - Negotiation tools
  - Risk assessment
- Business Stakeholders
  - Transparency
  - Partner relationship with development organization
- Acquisition
  - Visibility into supplier capability and performance
  - Best price & value



# Documented Benefits of Estimation CoE



# Case Study: Large International Logistics Company

A major technology division of this $40B corporation provides expansive planning and technology support for all of its global operating subsidiaries and components. This division maintains the software (thousands of discrete applications) that enables worldwide operations in over 200 countries.

| Customer Challenges | QSM Solution | Customer Outcomes |
|---|---|---|
| ▪ Fragmented, inconsistent estimation model based on spreadsheets, excessive contingency allowance and "gut-feel" recommendations<br>▪ With application updates, enhancements, new releases or program installations potentially impacting a wide range of interrelated, mission-essential systems, this particular client needed a structured and more uniform, cost effective way of performing accurate estimations. | ▪ QSM provided custom software estimation training, mentoring, process consulting and SLIM tools:<br>▪ QSM consultants assisted with the conception and launch of an Estimation Center of Excellence, including drafting a guiding Charter<br>▪ Trained 70+ end users in estimation<br>▪ Collected, validated and normalized data for 50+ historical projects that were systematically vetted and entered into SLIM-DataManager<br>▪ Constructed Estimation Templates for each primary application domain<br>▪ Optimized the estimation business process to support key management decision points | ▪ This organization has since institutionalized a metrics-based oversight process using QSM tools and methods that are quantitative, objective and uniform.<br>▪ The cost of re-base lining out of scope projects has gone down by 90%<br>▪ Estimate accuracy regarding the demand for internal and external resources has improved dramatically<br>▪ Greater precision in early estimation stages has improved both budget and program predictability<br>▪ Noticeable reduction in disruptions to stakeholders from late delivery |

# Case Study: Top 10 Global IT Service Company

This company is one of the world's largest business and technology services providers with over 190,000 employees working in 160 countries and an annual revenue of $20B. A QSM customer for the last 12 years, this company has designated SLIM® as one of its preferred estimation validation tools.

| Customer Challenges | QSM Solution | Customer Outcomes |
|---|---|---|
| ▪ Very typical of a large Systems Integrator, significant gross margin was being lost each year due to inaccurate software estimates for projects on which they were competing for or executing on behalf of clients<br>▪ Further, the estimation process was inconsistent and did not adequately leverage estimation tools or process | ▪ QSM provided custom software estimation training, mentoring, process consulting and tools:<br>▪ Designed and delivered a custom "train the trainer" class for their corporate Estimation Center of Excellence<br>▪ Assisted in development of a specialized estimation template and training materials for all project types including complex systems integration projects<br>▪ Well over 2,000 users across the globe trained in software estimation using SLIM | ▪ Since 2009, client has institutionalized a centralized estimation, tracking and benchmarking process using QSM tools and methods that are quantitative, objective and uniform.<br>▪ To date, metrics for well over 2,500 projects have been captured in a historical data repository supplied by QSM.<br>▪ Improved estimates have saved the company millions of dollars. A formal ROI case study from just one account reported a cost savings of $11M. |

# Case Study: Large Life Insurance Company

One of the nation's largest direct providers of individual life insurance with approximately 5,000 employees and annual revenue of $23B, it has approximately 1,200 employees that work directly in an IT department responsible for software development projects. This company has been a QSM customer since 2007.

| Customer Challenges | QSM Solution | Customer Outcomes |
|---|---|---|
| ▪ Fragmented, inconsistent estimation process with no ability to learn from experience (i.e. use project actuals to drive future estimates).<br>▪ Software projects were planned with no insights into the likelihood of probable success.<br>▪ Significant variability - many projects did not deliver to planned functionality, schedule and/or budget<br>▪ Opportunity cost of not getting planned capabilities delivered on plan | ▪ QSM provided custom software estimation training, mentoring and tools<br>▪ Developed and delivered custom executive workshop on the use of quantitative methods to improve decision making<br>▪ Trained a centralized Estimation Center of Excellence (CoE) in SLIM.<br>▪ Provided support to CoE on sizing approach and benchmarking techniques. | ▪ Project actuals for budget and schedule are now usually within +/-5% of SLIM estimate<br>▪ Time required to prepare project estimates has been reduced from months to days<br>▪ Quantitative estimation using SLIM is now a department-wide standard.<br>▪ Opportunity to save millions of dollars. Cost savings to date have been modeled across the entire portfolio.<br>▪ Internal benchmarking identified need for and justified investment in formal process improvement initiatives. |

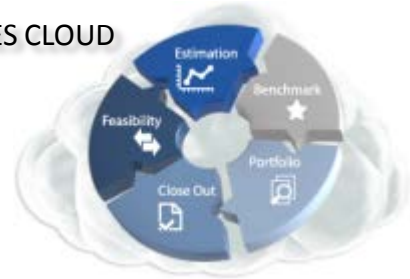
# Case Study: Large International Bank

This Bank is the second oldest and one of the largest financial institutions in the U.S. with over 30,000 employees and approximately $9B in annual revenue. This Bank has been a QSM customer since 2010.

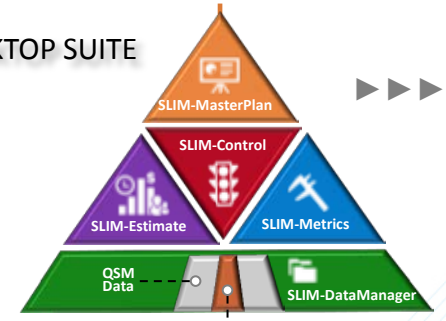
| Customer Challenges | QSM Solution | Customer Outcomes |
|---|---|---|
| ▪ Many projects in the IT department had significant cost overruns – some larger projects had cost variance in the millions.<br>▪ Inability to perform sufficient and timely alternative and "what-if" analysis as quickly as required when negotiating schedule, cost and functionality with business stakeholders. | QSM provided custom software estimation training, mentoring and tools:<br>▪ Trained a centralized Estimation Center of Excellence on the use of and customization of the SLIM tool suite.<br>▪ Supported creation of custom API interface between a Microsoft Excel front end and the SLIM tool which enabled the capability to perform "quick look" risk analysis of schedule and cost for entire project portfolio | ▪ Project actuals for budget and schedule now within 5-10% of SLIM estimate<br>▪ Internal ROI case study of a small sampling of three projects identified cost avoidance of $1.2M.<br>▪ The IT department now has the ability to quantify how much functionality can be completed in a fixed timeframe.<br>▪ Successfully performed "quick look" risk analysis of schedule and cost for 152 projects across an entire division<br>▪ Quantitative analysis of cloud projects vs. industry identified opportunity for significant cost savings |

# How Can QSM Support Setting of an Estimation CoE

SLIM-WEBSERVICES CLOUD




SLIM-DESKTOP SUITE




Client Data

Software Application Development
ERP Package Implementations
Infrastructure Projects
Operations Maintenance Projects

STAKEHOLDERS

**OCCASIONAL USERS**

- Executive Management
- IT Management
- Project Managers
- Business Development
- Other Stakeholders

**POWER USERS**

- Project Estimators
- Procurement Officials
- Process Improvement Specialists
- Quality Assurance Managers
- Metrics Specialists

SUCCESSFUL PROJECTS

**BENEFITS**

- More accurate estimates
- Fact-based negotiations
- Predictable project outcomes
- Increased productivity
- Reduced project risk
- Improved reliability and quality
- Industry and peer comparisons
- Informed decision making
- Quantified benefits of improvement
- Higher utilization of staff
- Rapid project alternative analysis
- Reduction of cancelled, in-progress projects

## Training, Product Support and Research Division

Estimation Training | SLIM Help Desk | Client Ramp-up Sessions | QSM Research | SLIM Certification | 10,000 + Project Data Base | Custom Industry Trends

## Consulting Division

Estimation Process Maturity Consulting | SLIM Deployment Services | Function Point Analysis and Counting | Acquisition & Program Management Support

Benchmarking Assessments | Objective Bid Assessment & Alternative Analysis | Independent Validation and Verification (V&V) | Customized Mentoring

Project Health Checks and Forecasting | SLIM API Programming | Expert Witness Support

# Questions?

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