
Applying the Team Software Process

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Topics

- **Background**
- **Overview of TSP**
- **Highlights of standard development processes in QuickBooks division of Intuit**
- **Integrating TSP/PSP with Intuit QuickBooks processes**
- **Adoption of PSP by individual engineers**
- **Key successes of the application of TSP**
- **Key challenges to integrating TSP**
- **Planned improvements to be adopted by the pilot team for their next project**

Background

The Team Software Process (TSP) promises

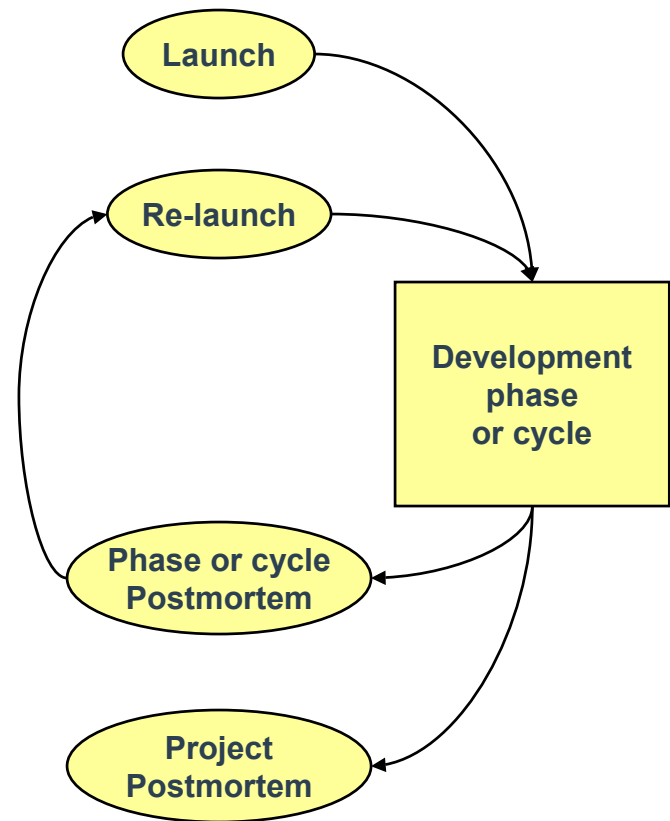
- radical improvements in quality
- superior project status visibility
- predictability
- efficiency
- a framework for continual improvement

Questions

- How does TSP fit into existing culture and processes?
- Can TSP promises be fulfilled when working with a complex code base that has evolved over more than 10 years?

TSP Overview

- The TSP is a framework and a process structure for building and guiding self-directed teams.
- The TSP addresses
 - team-building
 - team-working
- Each phase or cycle of a TSP project starts with a launch or re-launch.
- The standard strategy is to
 - develop in increments
 - use multiple cycles
 - work-ahead



Intuit QuickBooks Process Highlights

- Requirements development
- User Interface design and specification
- Technical designs
- Release Commit
- Implementation
- Code Complete
- Functional test complete/UI freeze
- System test complete
- Beta ready
- Shutdown begins
- Manufacturing Release

Note: Phases overlap as needed. Phases shown here apply to software developers, not to systems testers or other functions in the organization.

Integrating TSP with Intuit QuickBooks Processes

Feature	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	
Feature 1	Implement part 1				Implement part 2				Imp. part 3	Implement part 4				
Feature 2	Requirements							Implement feature 2 framework			Implement feature 2			
Feature 3	Implement part 1			Implement part 2						Imp. part 3	Implement part 4			

Launch ↑

Relaunch ↑

Keys to success:

- Immediate PD start
- Extreme parallelism
- Incremental delivery
- Radically high quality (TSP/PSP)
- Aggressive tracking (TSP)

Integrating PSP with Intuit QuickBooks Processes

Feature	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	
Feature 1	Implement part 1				Implement part 2				Imp. part 3	Implement part 4				
Feature 2	Requirements							Implement feature 2 framework			Implement feature 2			
Feature 3	Implement part 1			Implement part 2						Imp. part 3	Implement part 4			

- PSP applied during implementation
- Design, personal design review, design peer review
 - Code, personal code review, code peer review
 - Unit test

Adoption of PSP by Individual Engineers

- PSP was adopted to varying degrees
- All engineers kept detailed time logs.
- All engineers recorded defects, especially defects detected in inspection and test.
- All engineers kept their task plans up to date.
- All engineers provided weekly status to the team.
- Some engineers embraced the principles of the PSP, while others remained lukewarm.

Key Successes of the Application of TSP

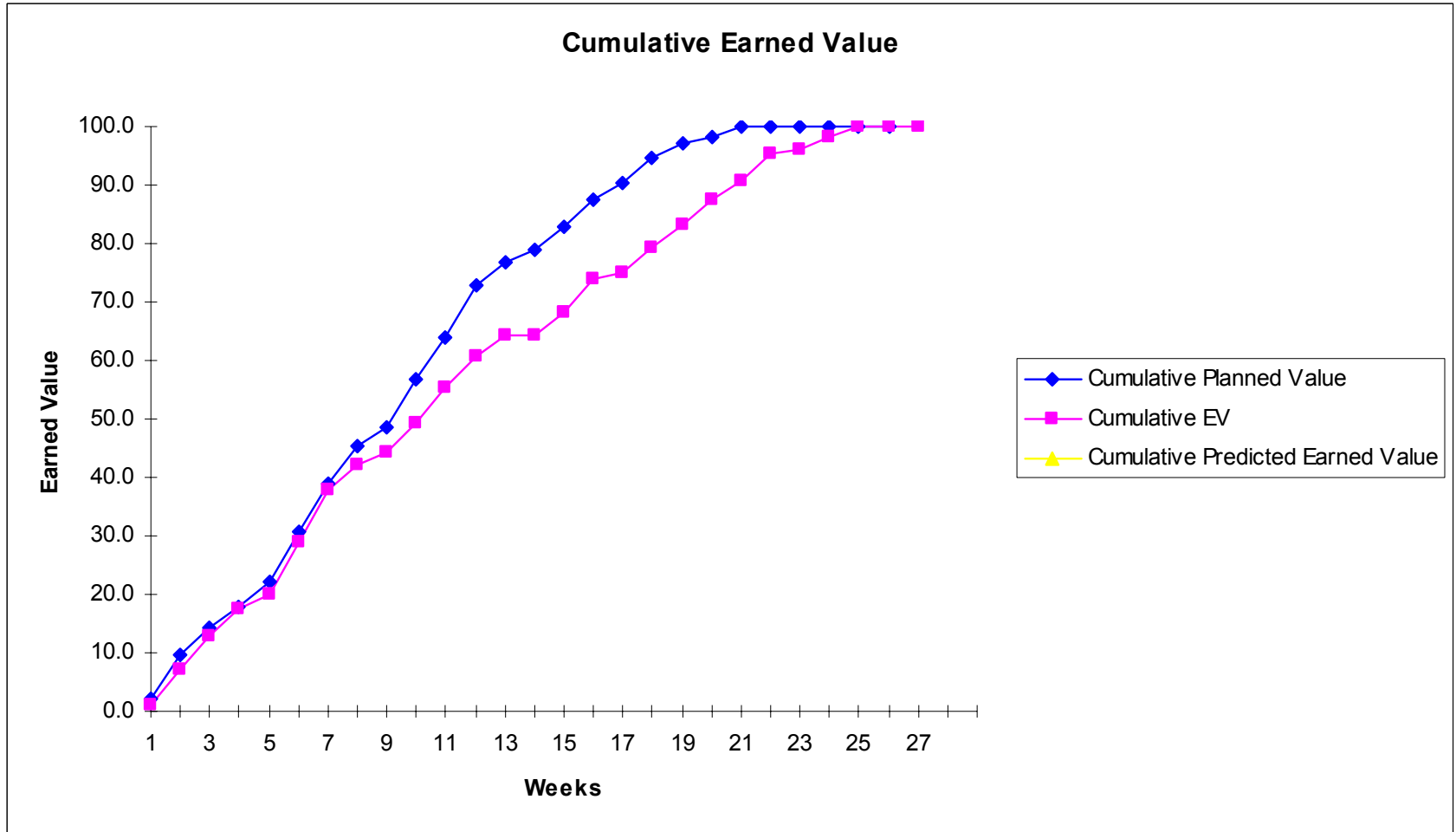
- Increased visibility into project status
- Improved quality
- Longer development cycle
- Team involvement

Increased Visibility Into Project Status

Each team member, as well as the team as a whole, has detailed insight into project status

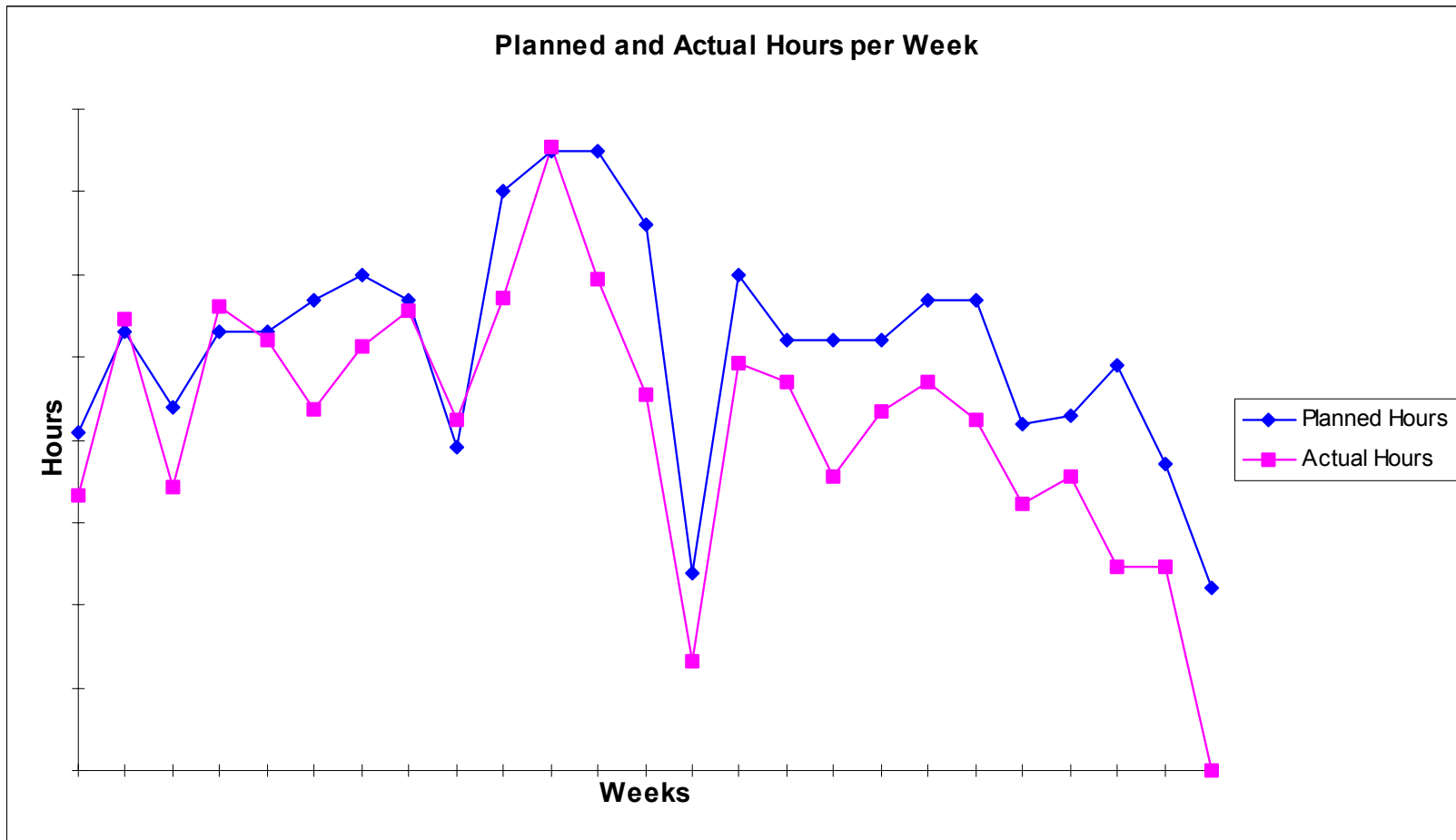
- Earned value
- Quality information from early phases
- Task hours
- Tasks completed
- Tasks remaining

Earned Value At Project Completion

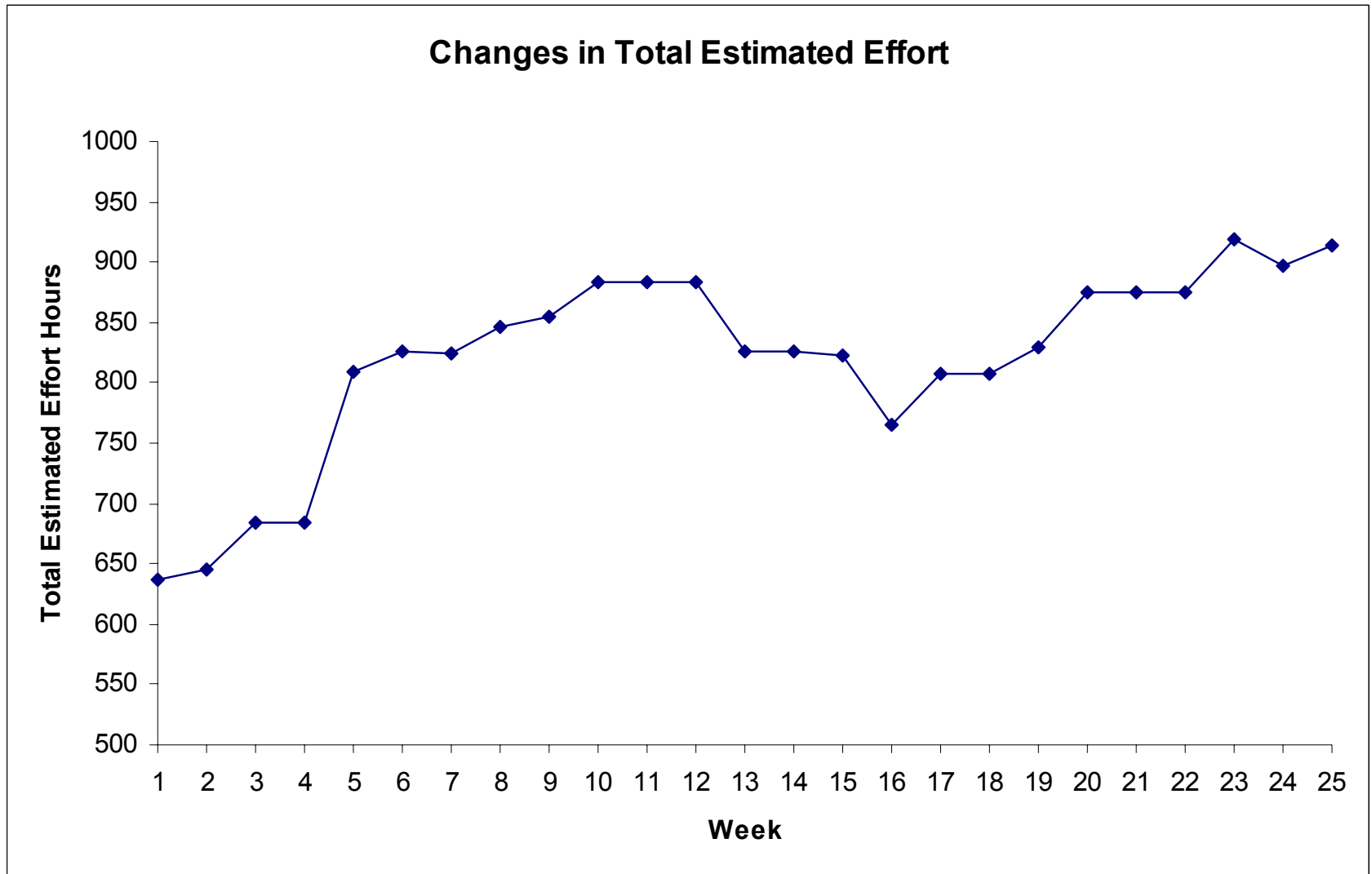


Task Hours

Mid-way through the project, people started rolling off.



Importance Of Re-Planning



Weekly Status -1

Some weeks were better...

Weekly Data	Plan	Actual	Plan / Actual
Schedule hours for this week	60.0	51.3	1.17
Schedule hours this cycle to date	361.0	325.0	1.11
Earned value for this week	8.1	8.8	0.92
Earned value this cycle to date	38.8	37.7	1.03
To-date hours for tasks completed	344.4	326.5	1.06
To-date average hours per week	51.6	46.4	1.11
EV per completed task hour to date	0.113	0.116	

Weekly Status -2

...than other weeks!

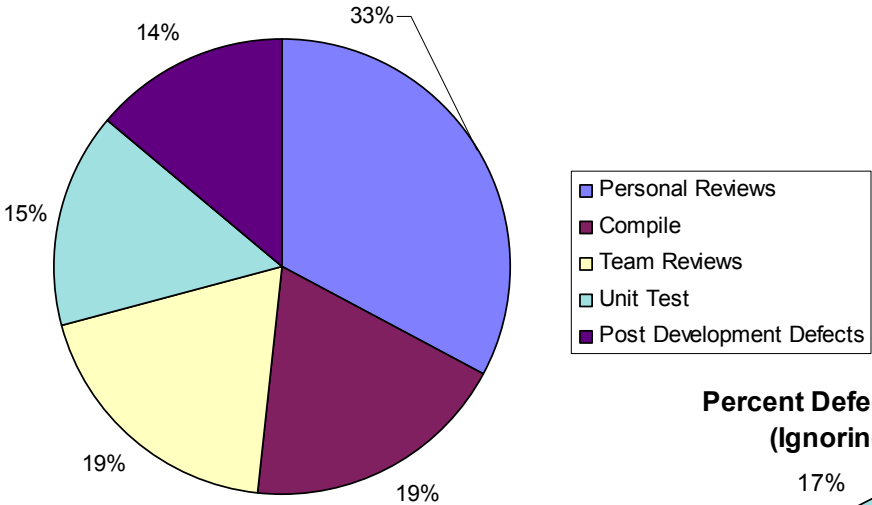
Weekly Data	Plan	Actual	Plan / Actual
Schedule hours for this week	70.0	57.1	1.23
Schedule hours this cycle to date	527.0	480.2	1.10
Earned value for this week	8.1	4.8	1.69
Earned value this cycle to date	56.6	49.2	1.15
To-date hours for tasks completed	449.2	463.3	0.97
To-date average hours per week	52.7	48.0	1.10
EV per completed task hour to date	0.126	0.106	

Plan vs. Actual

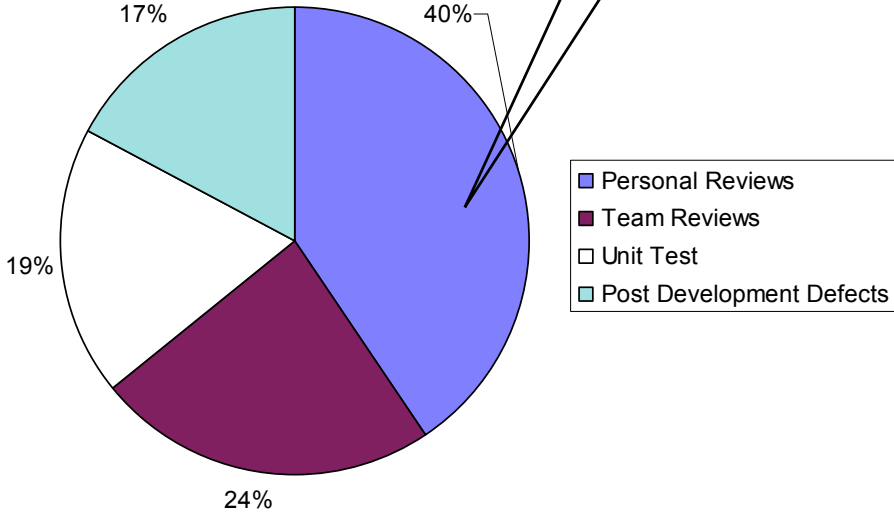
	Actual/Plan (Final/Re-launch)
Size (N&C LOC)	1.58
Effort (hours)	1.27
Schedule	1.22
Productivity (N&C LOC/Hr)	1.24

Quality Measures

Percent Defects Removed by Activity



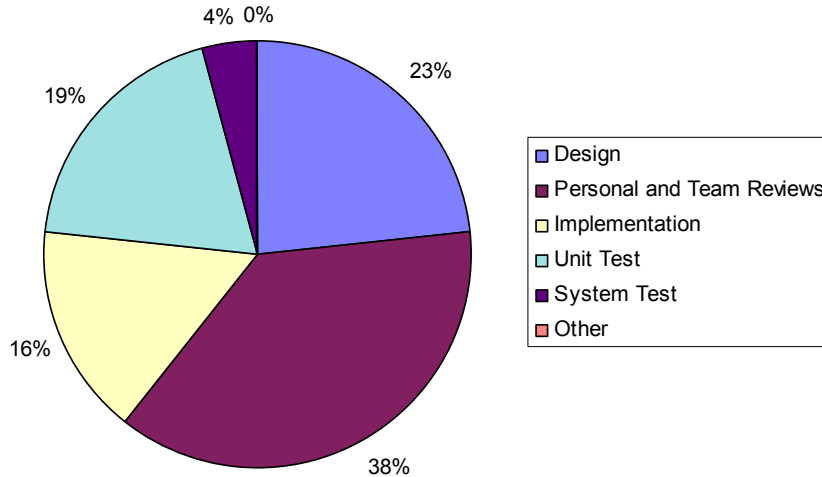
Percent Defects Removed by Activity (Ignoring Compile Defects)



Most defects removed during personal reviews

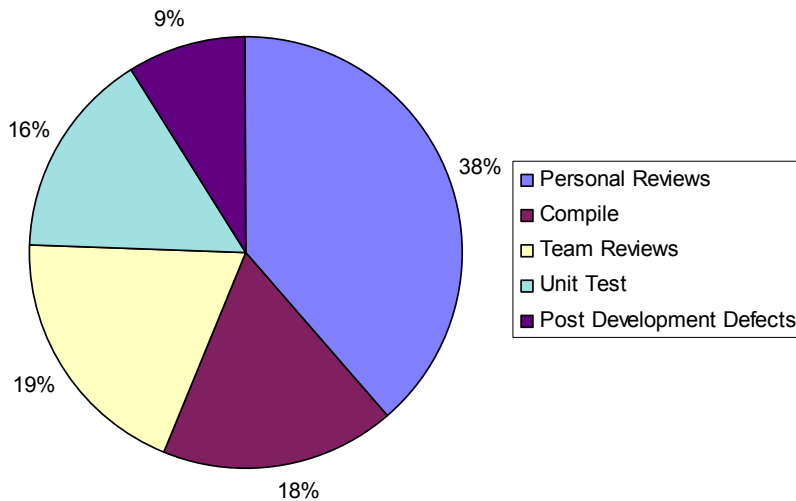
Component Analysis

Percent Effort by Activity

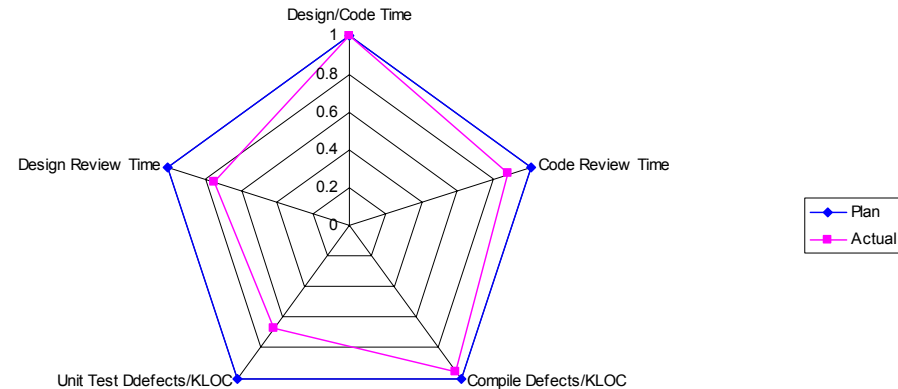


Program Size	Plan	Actual
Total Requirements Pages (SRS)	0	0
Total HLD Pages (SDS)		
Total Detailed Design Lines		
Base LOC (B)	0	0
Deleted LOC (D)	0	2
Modified LOC (M)	0	24
Added LOC (A)	862	892
Reused LOC (R)	0	0
New and Changed LOC (N)	862	916
Total LOC (T)	862	890
Total New Reuse LOC	0	92

Percent Defects Removed by Activity

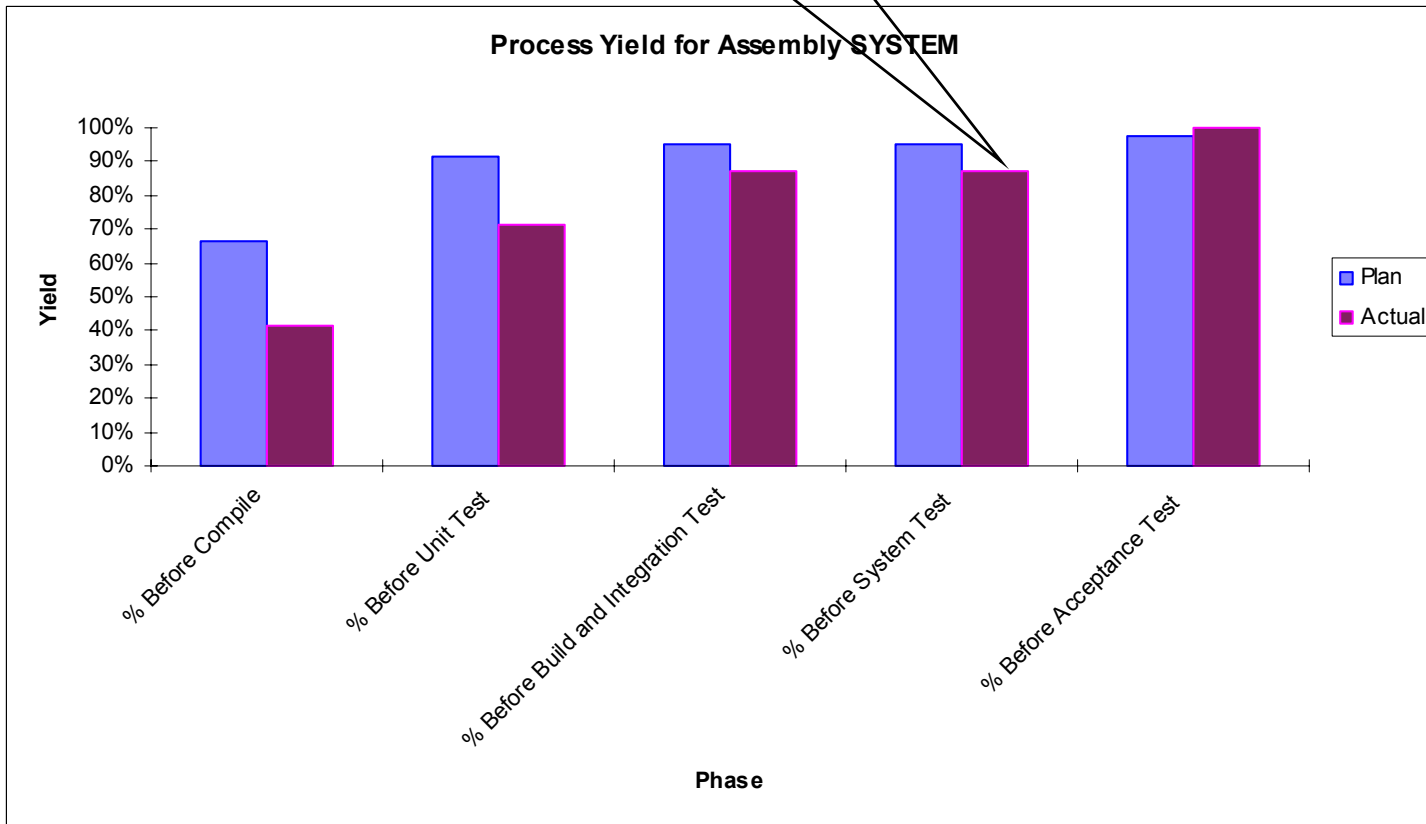


Quality Profile for Assembly JobCostsByVendor Reports



Process Yields

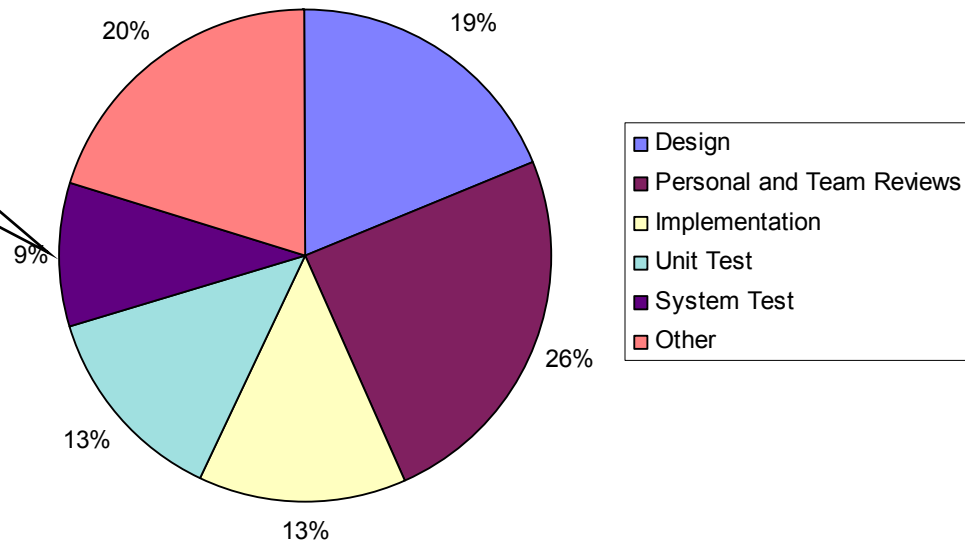
87% of known defects removed before system test



Longer Development Cycle

Compare to non-TSP teams who typically spend 50% supporting system test!¹

Percent Effort by Activity



¹ Source: *The Team Software Process in Practice: A Summary of Recent Results*, Davis and Mullaney, SEI Technical Report CMU/SEI-2003-TR-014, <http://www.sei.cmu.edu/publications/documents/03.reports/03tr014.html>

Team Member Involvement -1

- **Team member comments during the project postmortem**
 - *“Beginning to like the process. Makes interaction with people more efficient. You know what other team members are doing.”*
 - *“Liked clear definition of what people are responsible for. Promotes ownership of tasks.”*
 - *“Lots of things I liked. The power it gives us at getting better at estimating and planning. All the fun data it gives us to see how we can improve. There is a shift in the mental sense to accept the fact that there are defects, and where we can improve is what to do about the defects.”*

Team Member Involvement -2

- **Team member comments (continued)**
 - *“It protects us from ourselves. The task plan includes the things that we always say we will do...and it helps us feel good about them when we do them.”*
 - *“Wish requirements were better expressed. Very little guidance exists for requirements (in the TSP).”*
 - *“Logging defects early gives an indication of remaining defects.”*

Team Member Involvement -3

- Team member comments (continued)
 - *“The tool is not flexible enough.”*
 - *“The tool was my main complaint.”*
 - *“The TSP creates a lot of interdependencies, but the tool does not help you track them.”*
 - *“Logging every little change I made as a defect was difficult.”*
 - *“Almost an overbearing importance on system test defects. Some system test defects were not very important at all.”*

Key Challenges to Integrating TSP

- **The TSP tool could improve for**
 - managing dependencies
 - managing milestones
- **PSP training**
- **Communication**
 - with non-TSP teams
 - with Release Management
- **Launching using industry data rather than your own**
- **Balancing roles**
 - Manager/Team Lead/Coach/Planning Manager
 - Team Roles (Planning Manager, Quality Manager...)

Planned Improvements -1

- **Apply TSP to requirements phase.**
 - include personal review
 - include team inspection
 - develop specific checklists
 - log time spent and defects found
- **Include architects in all design inspections.**
- **Include code champions in code inspections.**
- **Separate our high-level and detailed designs, with personal reviews and inspections for both.**
- **Develop list of QuickBooks-specific assumed behaviors. Use this checklist to help review and inspect designs.**

Planned Improvements -2

- During initial launch, focus on getting detail for requirements and plan for requirements activities.
- Investigate conceptual design before the launch. Let architects review conceptual design during the launch.
- Manage expectations so organization understands that re-planning will occur.
- Full cross-functional participation in the launch.

Conclusion

- **What worked well**
 - Team commitment to trying the processes
 - Earned value tracking focused us on our task plans, and protected our quality assessment activities
- **What did not work well**
 - Should have had Product Manager more involved during launch
 - Need to separate our high-level and detailed designs
 - Want to apply to requirements phase to reduce downstream defects

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- <http://www.sei.cmu.edu/tsp>