

---

# **TSP<sup>SM</sup> / PSP<sup>SM</sup> at Intuit**

**SEI SEPG 2005**

**March 7 - 10, 2005**

---

**Eileen Fagan**

**Software Engineering Process Manager**

**Intuit, Inc.**

**Noopur Davis**

**Software Engineering Institute**

# Agenda

---

- Who is Intuit?
- What is TSP/PSP...and Not?
- TSP/PSP - Why does Intuit Care?
  - Intuit Goals
  - TSP/PSP Goals
- FY 2004 TSP/PSP Pilots
  - Pilot Environment
  - Pilot Data and Results
  - Successes
  - Lessons Learned
- Shareable Best Practices
- FY 2005 TSP/PSP plans
- Elements of Success

# Who is Intuit?

---

## **Intuit's mission:**

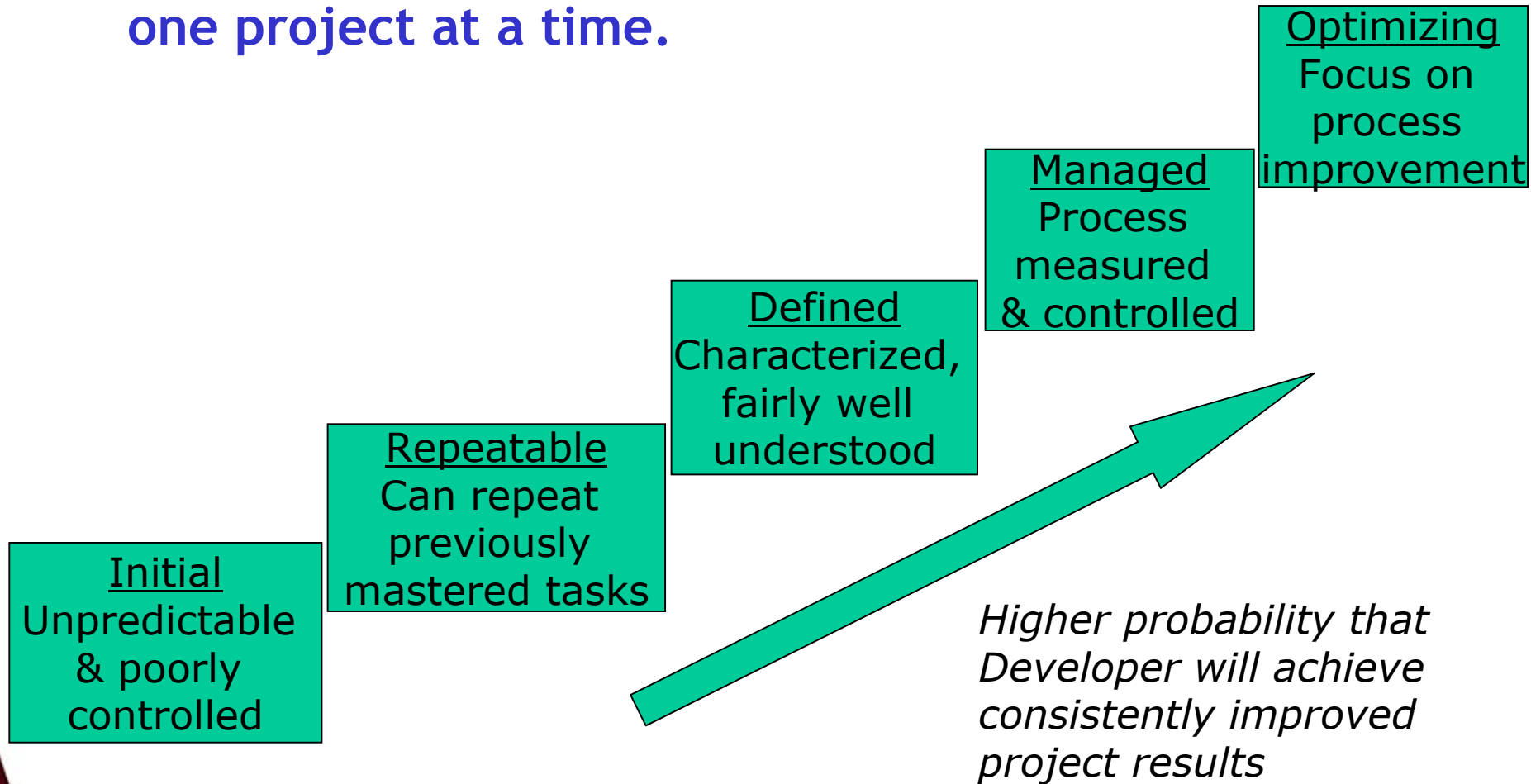
**Transform how people manage their financial lives  
and small businesses manage their businesses**

- **Leading provider of business and financial management solutions for small and mid-sized businesses, consumers and accounting professionals**
- **Makers of TurboTax, Quicken, and QuickBooks**
- **2004 Revenue of \$1.87 billion**
- **Nearly 7000 employees**
- **Fortune™ magazine named Intuit one of the 100 Best Companies to Work for!**

# How is Software Process Quality Measured?

---

TSP/PSP increases maturity  
one project at a time.



# What does TSP/PSP Provide?

## Key Process Areas

<b>Requirements Management</b>	<b>Partial - scripts</b>
<b>Project Planning</b>	<b>Yes - detailed to 5-10 task hours</b>
<b>Project Management and Control</b>	<b>Yes - ongoing in prescribed weekly meetings</b>
<b>Measurement and Analysis</b>	<b>Yes - TSP tool enables metrics and analysis</b>
<b>Process and Product QA</b>	<b>Yes - ensures time allocated for engineering best practices</b>
<b>Team Reviews/Inspections</b>	<b>Allocates time explicitly for their use</b>
<b>Configuration Management</b>	<b>Not specifically</b>

# What is TSP/PSP... and Not???

---

- **It is NOT:**

- a Silver Bullet solution
- a radically different approach to development
- a new programming language
- a way to invent more task time

- **It is:**

- a framework that allows detailed planning and tracking of project status
- a vehicle to collect “in process” metrics to provide insight and opportunities for improvement
- a team building approach
- a way to protect development steps needed to “build in” quality

# What does TSP<sup>SM</sup> Provide?

---

## Mindset Change enabled by...

### ▪ **Project Management**

- Detailed planning and tracking
- In process metrics
- Prescribed weekly meetings to review metrics
- Task hour monitoring
- Earned value

### ▪ **Team Building**

- Shared leadership/Roles
- Team coach (project mgmt co-pilot)
- TSP launch (communicate with stakeholders)

The development process is not fundamentally different...  
the mindset (managing by data (and judgment)) is different.

# What does PSP<sup>SM</sup> Provide?

---

## ■ Measurements

- Size
- Time
- Defects

## ■ Best Practices

- Task breakdown -> Detailed planning
- Time allotted to Design (and illustration understanding of its importance)
- Size estimation methods
- Time allotted to Review/Inspection
- Time tracking
- Defect tracking
- Metric analysis
- Coding standards



# Intuit CTO FY 2004 Goals

---

- **Create a vibrant, creative, challenging environment for technical and product management professionals**
- Deliver an exceptional total customer experience to increase the number of promoters and net promoter scores from Intuit customers
- Select and prioritize the right offering and infrastructure initiatives
- **Deliver** and support **offerings** and infrastructure in a **high-quality, predictable, efficient and disciplined manner** enabling both short- and long-term BU/FG success

# Intuit TSP/PSP Goals

---

- **Improve Quality -> Higher Productivity**
- **Predictability**
- **Visibility**
- **Efficiency**
- **Continual Improvement**
- **Self-directed Teams**
- **Mindset Change**

# Intuit TSP/PSP Timeline

September 2003	Watts Humphrey presents at Intuit's annual Tech Forum
November 2003	1 <sup>st</sup> TSP/PSP Executive/Manager Session -> pilot teams selected amongst volunteers
December 2003	1 <sup>st</sup> set of PSP for Engineers classes (Mountain View)
January 2004	Intro to PSP class offered to product management, QA, UI designers and testers
February 2004	2 <sup>nd</sup> set of PSP for Engineers and Intro to PSP classes (San Diego)
March 2004	All 3 pilot teams launch!
November 2004	All projects complete

**Complete TSP/PSP training and implementation in one year!**

# FY 2004 TSP/PSP™ Pilots and Goals

---

## ■ Pilots:

- QuickBooks “flavor” edition (product enhancement)
- BOB Handshake (infrastructure)
- QuickBooks Mac

## ■ Goals:

- < .1 defect/KLOC in shipped product
- On-time delivery of project
- LOC estimation within +/- 5% of actual
- Improved communication with project stakeholders.

# TSP/PSP Support Infrastructure

---

## ■ Training

- All team members and management trained

## ■ Coaches

- SEI provided
- Instructor and coach were consistent for each project
- Support/direction during launch
- Weekly meeting support
- Coaching “as needed”

## ■ Tool

- Used SEI tool
- Crucial element of data collection
- Difficult to learn/easy to use

## ■ Corporate/SEPG Support

- Funded training and pilots
- Observed/monitored pilot progress
- Internal “TSP Users Group”

# BOB Handshake Pilot Environment

---

## ■ The Management

- Project Manager - exceptionally committed
- Director - committed; had to “keep the wolves at bay”
- VP - committed, but also under strong pressure to meet program commitment; swayed by strong team commitment; gave team permission to throw process overboard if it jeopardized project commitments

## ■ The Team

- Very process focused and experienced
- Exceptionally committed
- Large team and then added subcontractors
- Team members had camaraderie and this enhanced their team feeling

## ■ The Project

- “Mission Impossible”
- Part of a large, complex program spanning BUs
- Central component
- Significant time pressure (project started late due to training and launch)

# TSP/PSP Pilot Goals – How did we do?

---

## BOB Handshake

- **Predictability/Visibility:**

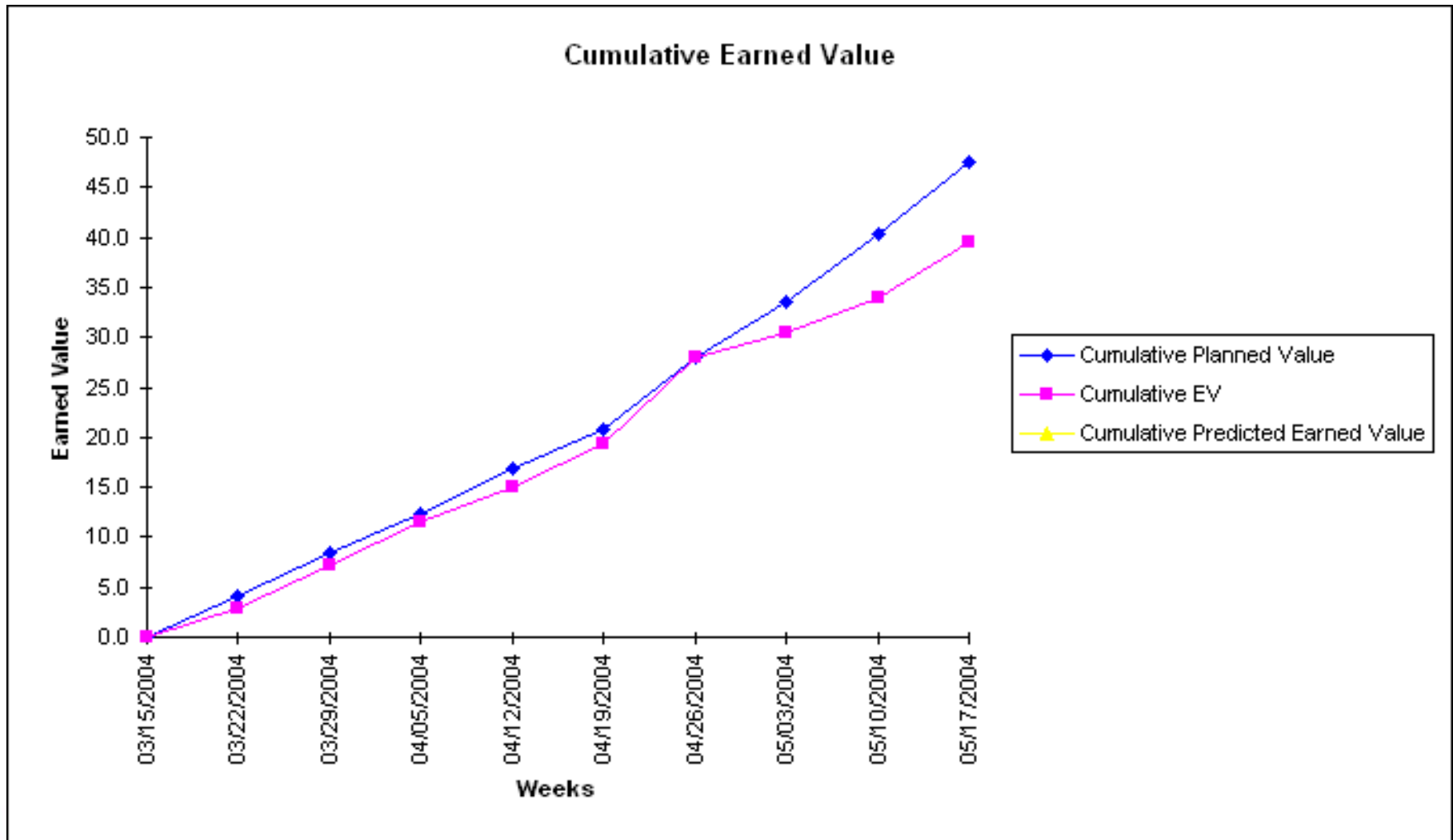
- Phase One: 1 week late
  - De-scoped some function: Team realized early that de-scoping of functionality was necessary to meet schedule
  - Phase Two: on-time

- **Efficiency:**

- Tightly managed load balancing allowed for maximum efficiency
- Caused integration issues across functions ...causing late delivery?

# Uh-oh!

The data show we are heading off course...





# BOB Handshake: TSP Coach Advice

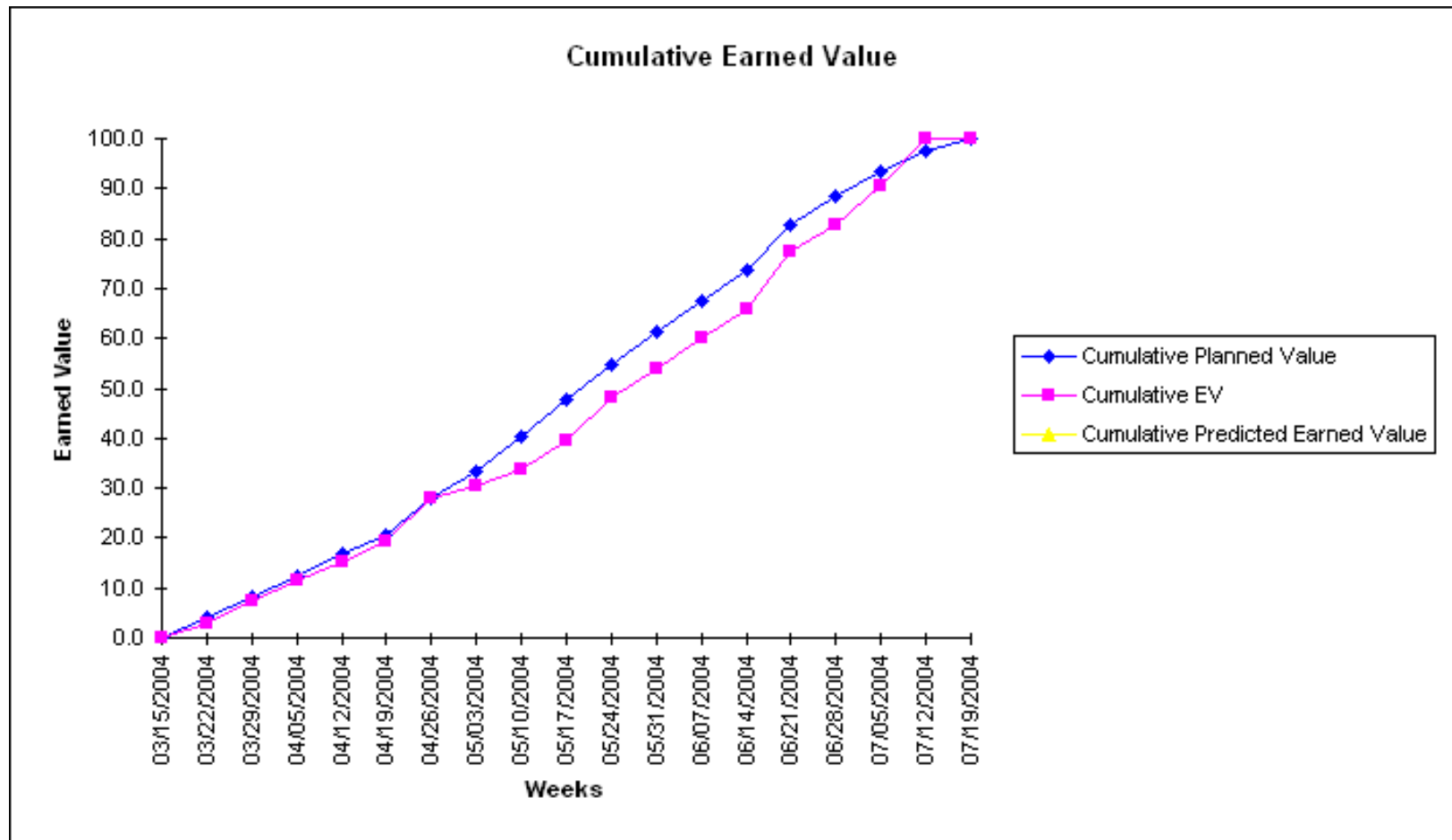
---

- LISTEN TO YOUR DATA
- *Question: If things continue about the way they are, when will the team finish the July 5th content?*  
Answer1: If things continued at exactly the same rate of historical earned value per week, the team would not finish that content until **Mid-November**.
- Answer 2: If indeed the requirements phase is complete and stable, and the rest of the tasks are estimated “perfectly”, and with no extra effort applied, the team would finish about the **end of July**.
- Answer 3: So it is most likely somewhere in the middle of these dates.

What should the team do?

# BOB Handshake Pilot

Getting back on track...through a relaunch



# TSP/PSP Pilot Goals – How did we do?

---

## BOB Handshake

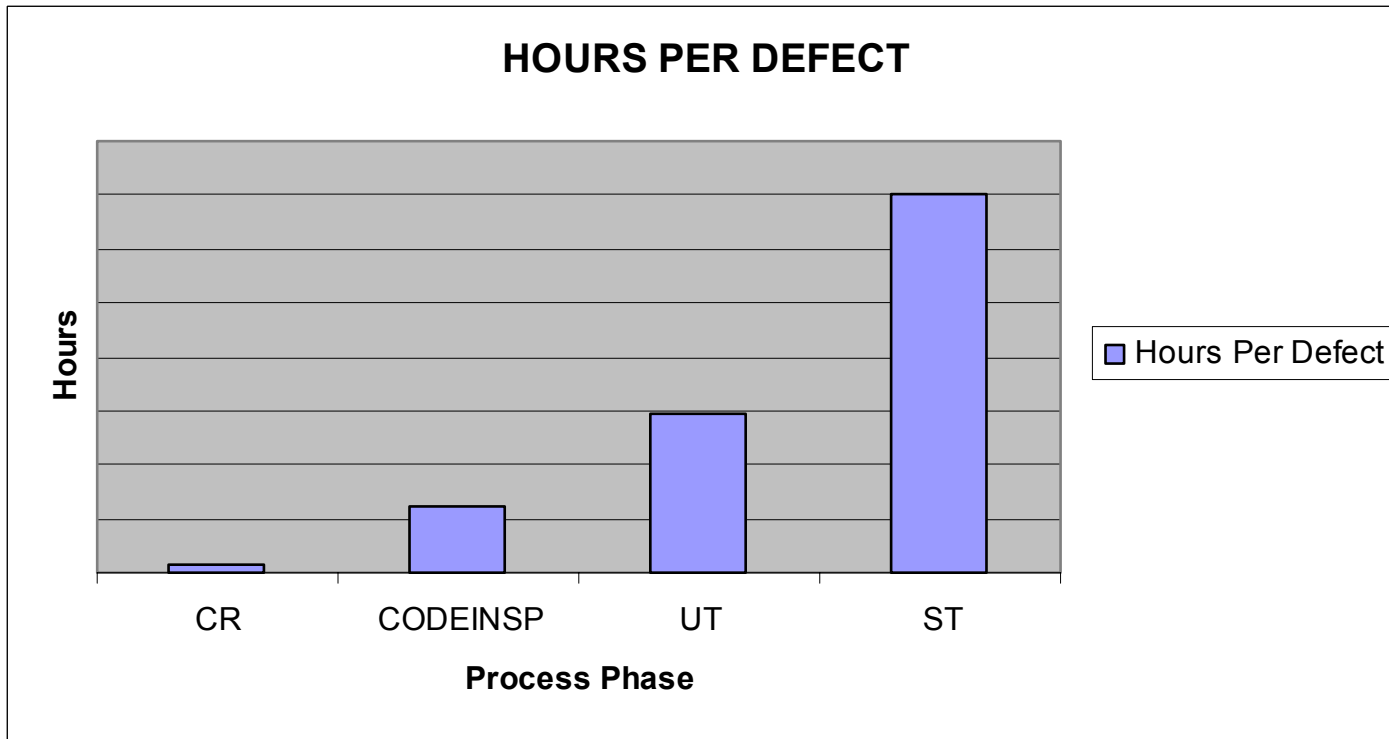
### ▪ **Quality:**

- Met team goal of cutting defects in half (in system test) of known best (Suez)
- Early indicators (120,000 activations), no field defects

### ▪ **Continual Process Improvement**

- Ongoing and Postmortem Evaluation of Data/Processes allows for improvements
- Has data for future planning and process improvements

# SD&S Bob Handshake TSP Data Cost of Defects Found and Fixed



This data was collected during the BOB Handshake TSP project.

# BOB Handshake Pilot Lessons Learned

---

- The team loved it!
- Easy to see project progress on a weekly basis
- Don't ignore or rationalize away what the data is telling you - optimism is not always as appropriate as realism
- The tools and processes involved in TSP/PSP provide insight into defect injection and removal rates
- Data will enable the team to continually improve the overall quality of the products
- TSP team roles are generic in nature and need adaptation to fit into an SD&S development team

# BOB Handshake Pilot Lessons Learned

---

## How to be a TSP Pilot in a large Program

- **Get Program Management Buy-in early**
  - The Handshake Program Office did not have “shared vision” on the timing/importance of this pilot
- **Timing is (almost) everything**
- **Appearance is (almost) everything**
  - Perception is reality
- **Communicate in development terms, not TSP-speak**
  - TSP/PSP is not “Martian” software development

# QBG Pilot Environment

---

## ■ The Management

- Project Manager - committed, but skeptical (will this work in my environment?)
- Director - very committed and convinced of value
- VP - gave the okay, but not very involved early on

## ■ The Team

- Not a lot of process experience
- Skeptical, but willing to wholeheartedly try it out
- Two remote team members
- Team members had camaraderie and this enhanced their team feeling

## ■ The Project

- Four new features
- Fairly self-contained during development
- Adding features to a very large complex code base
- Significant time pressure (project started late due to reprioritization)
- Requirements not well-defined or understood at launch

# TSP/PSP Pilot Goals – How did we do?

---

## QuickBooks “Flavor” Edition

- **Quality:**
  - Highest quality product in QuickBooks release
- **Efficiency:**
  - Able to continue development for several additional months (effectively doubling development time)
    - Initial Code Complete date was set for June
    - Quality Assurance accepted incremental deliveries until very late in development cycle due to high quality
    - Continual Process Improvement



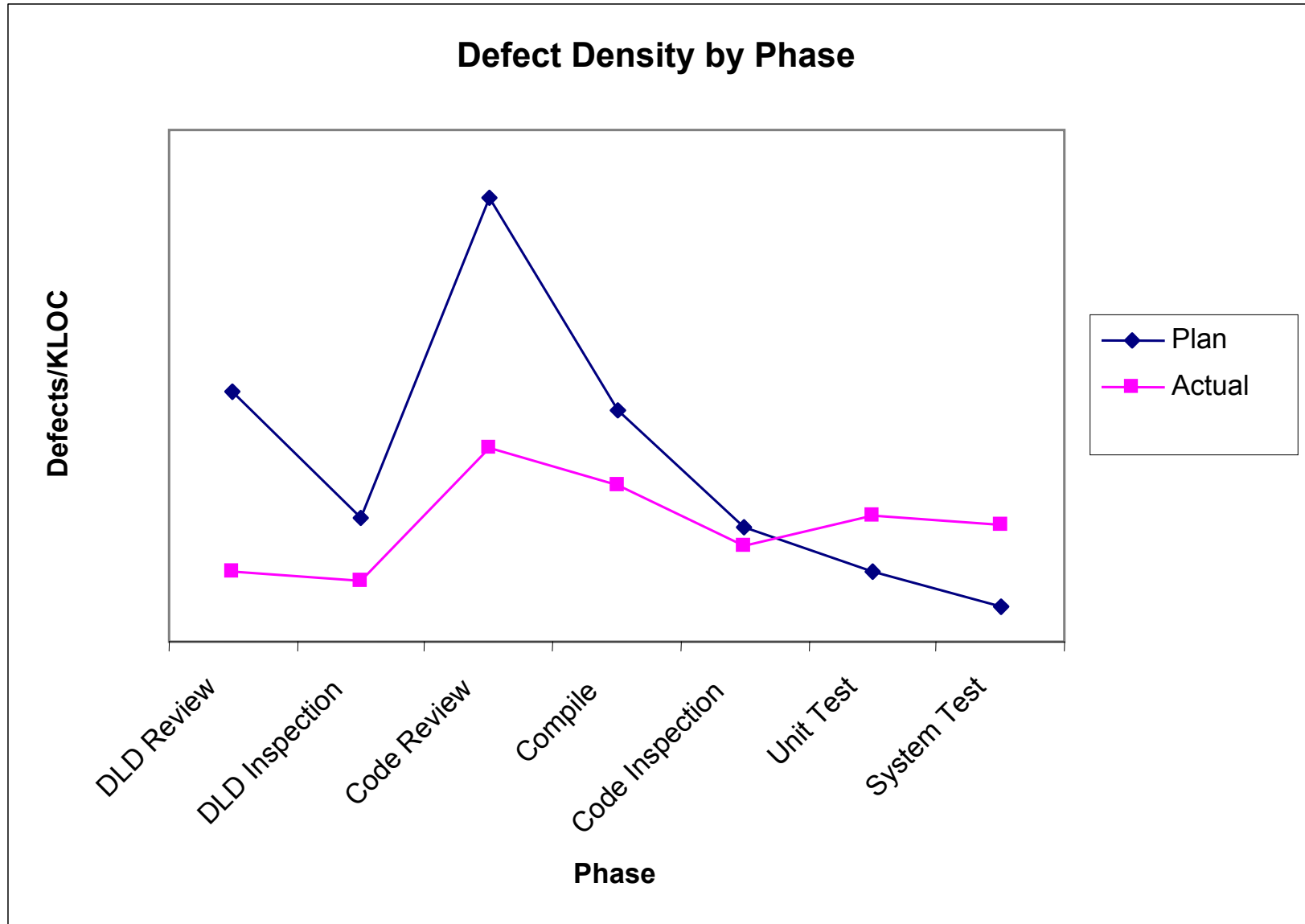
# TSP/PSP Pilot Goals – How did we do?

---

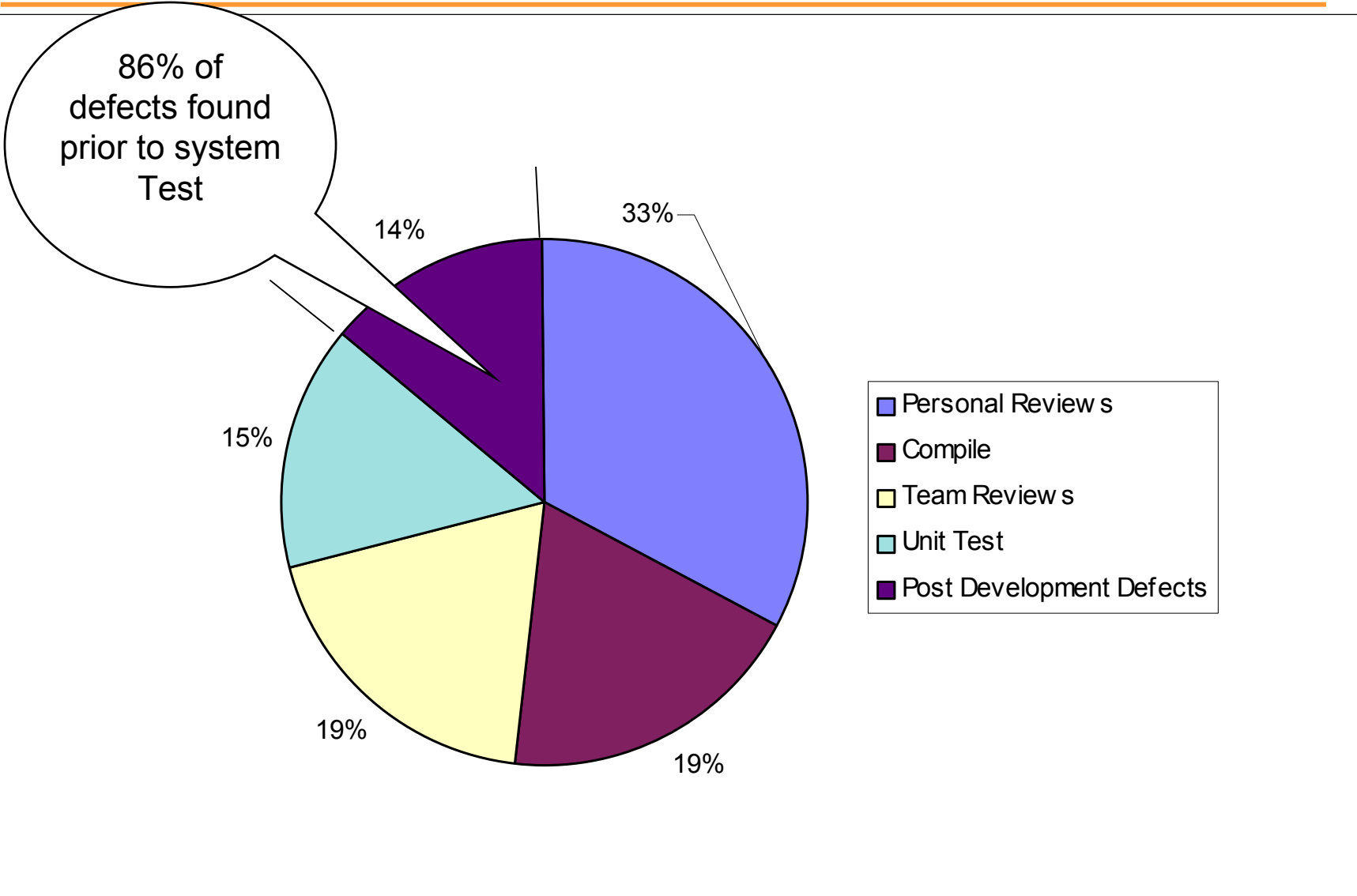
## QuickBooks “Flavor” Edition

- **Predictability/Visibility:**
  - Making a number of small “drops” to system test allowed test team to judge high quality and continue to accept features until very late in cycle
- **Continual Improvement**
  - Performed significant data analysis
  - Team now has own data showing areas of improvement and for planning purposes
    - Convinced themselves of the value of:
      - Differentiating HLD and DLD
      - Greater explicit detail in design
      - Personal and team reviews/inspections

# Defect Density – Plan vs. Actual

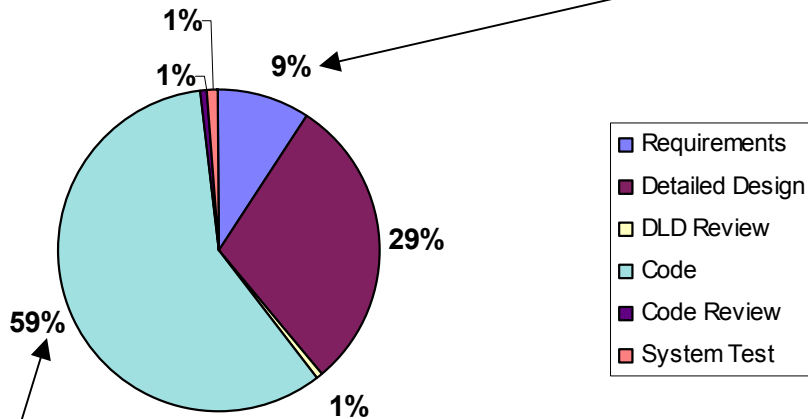


# Percent Defects Removed by Activity



# Time spent fixing defects based upon injection phase

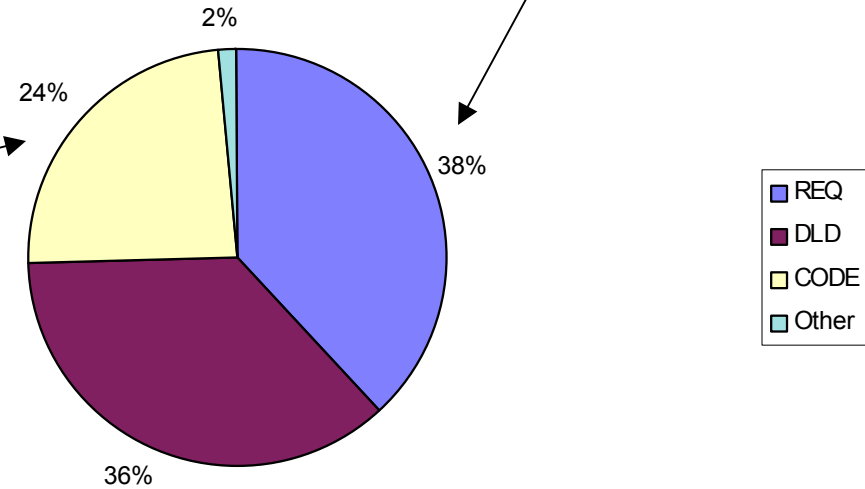
Percent Defects Injected by Activity



**Requirements were only 9% of defects injected,**

**but took 38% of time to fix**

Percent Defect Fix Time by Phase Injected

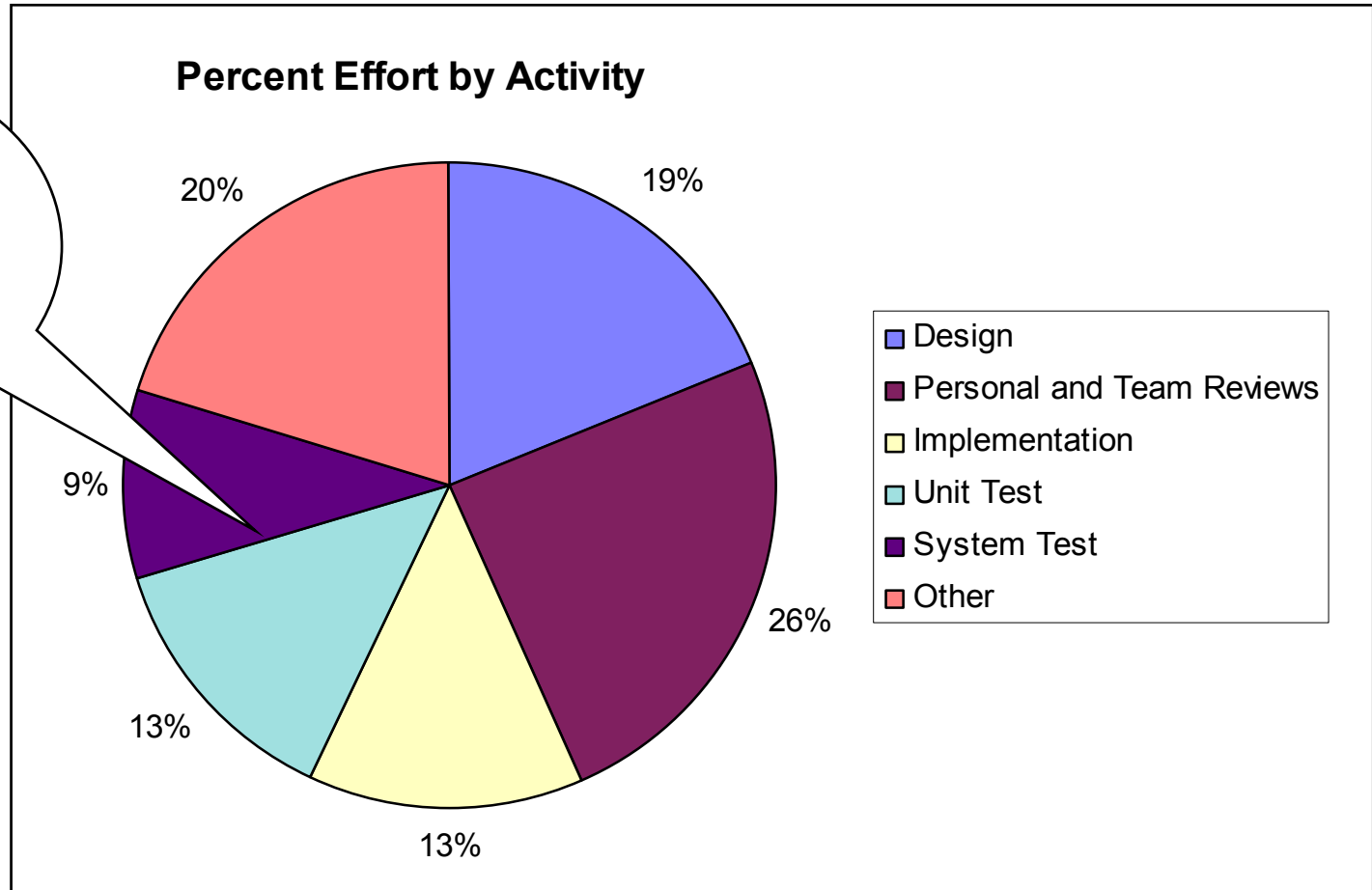


**59% of Defects Injected During Coding**

**But took only 24% of time To fix**

# Effort Distribution

Compare to typical non-TSP teams who spend 50% in system test!



# QuickBooks “flavor” edition

## Lessons Learned

---

- **Task Hours really *are* difficult to get**
- **Easier to handle schedule changes due to requirements changes**
  - Actual LOC was double the initial estimate, but requirements were unknown/unclear at launch
  - Without requirements, assumptions made during conceptual design can be very wrong...need to anticipate this
- **Able to plan, predict and respond to change more effectively**
- **Will include Product Management in future launches**
  - Preparing detailed estimates causes discussion of requirements specifics early
  - Product Managers can make more informed choices regarding features due to earlier size estimates
- **Using industry data was useful for planning purposes**
- **Focus on finding and removing defects early in the lifecycle is significantly less expensive**

# QB Mac Environment

---

## ■ The Management

- Project Manager - ambivalent and swayed by team
- Product Dev Leader - very committed and enthusiastic
- Business Unit Leader - committed and supportive

## ■ The Team

- Not enthusiastic about TSP/PSP
- Very skeptical about this working in their environment
- Team lead was new to the company
- Little process experience or interest
- This was a huge leap for them
- Almost all team members were remote
- Some of the remote team members and subcontractors treated as dependencies because they were untrained
- Team grew significantly after launch through subcontractors

## ■ The Project

- Requirements were not well understood early enough
- Large platform conversion
- Changes to very large, complex code base

# TSP/PSP Pilot Goals – How did we do?

---

## QB Mac

- **Pilot aborted**
  - Both project and middle management of pilot team changed midstream
  - Due to large increase of scope, team added subcontractors
    - => 3 of 8 engineers were trained

(TSP requires whole team to be trained)
- **QA continued to use process until project changed direction**
  - Found planning and tracking useful



# PSP/TSP™ Shareable Best Practices

---

- **Project Launch**
  - Enhanced communication with stakeholders
  - Team building
- **Detailed project planning**
  - Task level (5 - 15 hours per task)
  - Inspections (participants, conference room, dates)
  - Specific dependencies noted
  - Rolling integration drops
  - Load Balancing
- **Defect tracking**
  - “In process” and system test and production
- **Time tracking**
  - Where is development time spent
    - i.e., design vs. test (defect removal)
- **Size tracking**
  - Easily measurable
  - Correlated to effort
  - LOC is a best fit for this measurement

# Elements for TSP Pilot Success

---

- **Focused and willing team**
- **Some experience with process or willingness to experiment**
  - No built in antibodies to process and change
- **Capable and committed project manager**
- **Committed and protective senior management**
  - Willing to support change in the context of current practices
- **Experienced and enthusiastic Coach**
- **Tools in place**
- **Training at all levels**

# FY 2005 Plans for TSP/PSP<sup>SM</sup>

---

- Further rollout in QuickBooks organization
- Sustain pilot in Shared Development and Services organization
- New pilots in Tax group
- New pilots in Personal Finance group

**Spread shareable best practices throughout Intuit!**

# Contact Information

---

**Eileen Fagan**

**Intuit, Software Engineering Process Manager**

**[eileen\\_fagan@intuit.com](mailto:eileen_fagan@intuit.com)**

**Noopur Davis**

**SEI, Senior Member of Technical Staff**

**[nd@sei.cmu.edu](mailto:nd@sei.cmu.edu)**

**[ndavis@davissys.com](mailto:ndavis@davissys.com)**