TSP\textsuperscript{SM}/PSP\textsuperscript{SM} at Intuit

SEI SEPG 2005
March 7 - 10, 2005

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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.

Initial
Unpredictable & poorly controlled

Repeatable
Can repeat previously mastered tasks

Defined
Characterized, fairly well understood

Managed
Process measured & controlled

Optimizing
Focus on process improvement

Higher probability that Developer will achieve consistently improved project results
## What does TSP/PSP Provide?

### Key Process Areas

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

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

Cumulative Earned Value

- Cumulative Planned Value
- Cumulative EV
- Cumulative Predicted Earned Value
**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?*

  **Answer 1:** 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
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
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

Defect Density by Phase

Phase

Defects/KLOC

Plan
Actual

DLD Review
DLD Inspection
Code Review
Compile
Code Inspection
Unit Test
System Test
Percent Defects Removed by Activity

86% of defects found prior to system Test

- Personal Reviews: 33%
- Compile: 14%
- Team Reviews: 19%
- Unit Test: 19%
- Post Development Defects: 15%

86% of defects found prior to system Test
Time spent fixing defects based upon injection phase

Percent Defects Injected by Activity

- Requirements: 9%
- Detailed Design: 29%
- Code: 1%
- Code Review: 1%
- System Test: 59%

Requirements were only 9% of defects injected,
but took 38% of time to fix.

Percent Defect Fix Time by Phase Injected

- Requirements (REQ): 24%
- Detailed Design (DLD): 36%
- Code (CODE): 38%
- Code Review (Other): 2%

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

- 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!
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