The Productivity Pendulum

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Agenda

- Productivity Trends
- Sources of Productivity Problems
- Productivity Solutions
Productivity

**Economic Definition:**

Unit of Output / Unit of Labor

**Examples:**

Business Output / Employee Hours based on dollars (GNP)

Output / Hours of All Persons

Function Points / Developer Hour
Productivity Solutions

Manufacturing

- Die casting
- Prefabrication
- Assembly line
- Robotics
- QA / Testing tools
- CAD / CAM
- Manufacturing systems
- Just In Time
The rate of productivity improvement is doubling every decade.
Productivity Solutions

**Software**

- Design tools
- Higher level languages
- Code tools
- Process improvements
- Test tools
- Technology
- Development / Programming techniques
Over the Decades, Numerous Factors Have Impacted Software Productivity

Recently, some companies have experienced productivity decreases.

- Anticipated Gains

- Productivity Impact

1970’s 1980’s 1990’s 2000’s

- WYBO/OT - Tool Focus - Assess/Measure - Process Improvement I - Technology Focus - Measure - Process Improvement II, Outsourcing, Offshore - Process Overkill - Process Streamlining

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Reliance on Productivity Tools and Programming Methods Have Been Disappointing

Anticipated Gains

Productivity Impact

CASE
Reuse
X Gen Language
JAD
Code Generators

PC Tools
X Gen Language
RAD

Design Tools
Web Tools
Reuse
X Gen Language

X Programming Methods
Tools & Methods

1970’s 1980’s 1990’s 2000’s
Recent Process Improvements Have Had Mixed Results

Anticipated Gains

Productivity Impact

1970’s 1980’s 1990’s 2000’s

Process Improvement I (TQM)
Process Improvement II (CMM)
Process Overkill

Productivity Gap
Even Measurement Has Swung the Pendulum
Agenda

• Productivity Trends

• Sources of Productivity Problems

• Productivity Solutions
Sources of Productivity Problems

The quest for process maturity, high quality and reduced cycle time have had a major impact on productivity.

- Process overhead can be very high
- Newly implemented processes are not always effective
- The learning curve can mask effectiveness
- Tradeoffs exist between schedule and productivity
- Quality can hit a point of diminishing return
- Measurement misuse can distort the true picture
Measurement Analysis Can Help Identify the Problems

• Methods and techniques need to be analyzed in terms of flexibility and effectiveness
  – Project management
  – Systems Development Methodologies
  – Quality Assurance and control
  – Contract/vendor management
  – Configuration management
  – Funding and estimating
  – Release management
Measurement Analysis Can Help Identify the Problems

- Project schedules by size category should be compared
- Estimating accuracy should be calculated
- Service level and performance goals should be evaluated
- Measurement and governance activities should be reviewed
- The level of user involvement and the degree of requirements churn should be evaluated
Measurement Analysis Can Help Identify the Problems

• Time accounting should be analyzed in detail
  – Project management time and tasks
  – Quality reviews, inspections and testing activities
  – Design time
  – Documentation time and pages
  – Process overhead on projects
  – Productive versus non-productive time
  – Number of individuals charging time to projects
The Quality Tradeoff Needs to be Evaluated

Better than Best in Class quality and mature processes (with overhead) may result in low productivity.
The Schedule Tradeoff Needs to be Evaluated

Severely compressed or extended schedules can significantly reduce productivity and increase cost.
Small Unproductive Projects Have Increased with Process Improvement and Outsourcing

Process improvement and outsourcing demands tighter management control and funding.
Process Improvement Can Create Overhead

Symptoms of Process Overhead

<table>
<thead>
<tr>
<th>Activity</th>
<th>% Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Management</td>
<td>&gt; 15 %</td>
</tr>
<tr>
<td>Requirements/Design</td>
<td>&gt; 40 %</td>
</tr>
<tr>
<td>Testing</td>
<td>&gt; 30 %</td>
</tr>
<tr>
<td>Installation</td>
<td>&gt; 10 %</td>
</tr>
<tr>
<td>Reviews/Inspections</td>
<td>&gt; 15 %</td>
</tr>
</tbody>
</table>

Project effort should be analyzed at the phase level to raise red flags and at the task level to determine root cause.
Process Improvement in Estimating Accuracy

- The quest for accurate estimates has had a negative impact on productivity
- Reasonable goals and service levels need to be developed
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If Not Too Late, Avoid the Productivity Gap

- Don’t rush to maturity
- Essential and incremental process improvement
- Streamline first, implement second
- Put an appropriate price on quality
- Trade schedule for productivity based on business case
- Define balanced service levels
- Establish reasonable goals for estimating accuracy
If Too Late, Eliminate the Productivity Gap

- Streamline, Streamline, Streamline (see details)
- Focus streamlining on processes consuming significant resources (based on measurement analysis)
- Eliminate non-essential or ineffective processes
- Relax service level agreements where appropriate in order to better balance service performance with cost considerations
- Revisit measurement and governance activities and eliminate those without meaning or benefit
- Reduce test cycles where possible by analyzing defect removal statistics versus the cost of quality
- Use measurement to estimate based on good productivity
- Determine project sizes and schedules to optimize productivity
Focus on Process Streamlining

• Streamline project management and systems development methodologies
  – Reduce “required” tasks, deliverables and management checkpoints
  – Establish different paths for different project sizes and types
  – Reduce the guidelines and criteria for selecting quick path approaches
  – Make it easy to waive unneeded activities and deliverables

• Reduce the time associated with quality assurance activities
  – Establish inspection guidelines to eliminate unproductive staff and activities
  – Reduce/eliminate Quality Standards Reviews based on project type and size
Use, Not Abuse Measurement

• Ensure measurement data is accurate, consistent and complete
  – Time accounting details should be at the phase and task level
  – Account for all time
  – Separate non-productive from productive time
  – Charge overtime and undertime accurately
  – Account for reuse and middleware separately
  – Validate Function Point counts
  – Analyze by size, type and platform (age for applications)

• Consistency rules should address:
  – Definition of Development, Enhancement and Maintenance
  – What tasks are chargeable to projects, support, and administration
  – What personnel are chargeable (PMs, administrators, management)
  – How an FTP, month and day are calculated
  – How defects are defined (type, severity, time period)
  – The different accounting needs for COTS, vendor and in-house
Closing the Gap and Beyond

- Establish Reasonable Goals
- Achieve Excellent Quality not Impracticable Quality
- Streamline Processes
- Establish Reasonable Service Levels
- Do Not Depend Heavily on Tools, Technology and the next X
- Size and schedule Projects for Optimum Productivity
- Make Productivity a Priority
- Measure Honestly and Accurately