Performance Measurement of Software Application Development & Maintenance
Measurement Must Consider

Strategic Positioning
(Business & Technical)

Continuous Process Improvement
- Improve Productivity
- Reduce Time to Market
- Increase Quality

Reduce Costs

Improve Margins

Shareholder Value

Deliver Value
- Satisfy Customer
  - Improve Competitive Position
- Increase Market Share

Increase Revenues

Improve Competitive Position
- Increase Market Share
- Improve Margins
- Reduce Time to Market
- Increase Quality

Improve Productivity

Satisfy Customer

Increase Revenues
Presentation Topics

- Measurement for Process Improvement
- Baseline your Performance
- Model Performance Improvements
Measurement for Process Improvement

QUANTITATIVE
- Deliverable Size
- Effort/Cost
- Duration
- Quality

Measures how you are doing

QUALITATIVE
- Process
- Methods
- Skills
- Tools
- Environment

Identifies what you are doing

Measured Performance

Baseline of Performance

Standard of performance
What Gets Measured?

Business Related Measures
- Unit Delivery Cost
- Time To Market
- Customer Satisfaction

Process Related Measures
- Effectiveness
- Integration
- Compliance

Project Related Measures
- Project Tracking
- Estimating
- Change Management

Contribution
- Measures the impact of IT on the business
- Identifies trends and helps to monitor progress
- Effective utilization of measures in a pro-active format
Utilize Results in Decision Making

- Improvements resulting from current and future initiatives must be measured.

- The basis for measuring improvements may include:
  - Industry data
  - Organizational baseline data

- It is necessary for the organization to put a “stake in the ground” relative to current performance level in order to improve development practices.
Presentation Topics

- Measurement for Process Improvement
- Baseline your Performance
- Model Performance Improvements
Baseline Activities

- Identify sample set (typically project oriented)
- Collect baseline data
  - Project measures (e.g., effort, size, cost, duration, defects)
  - Project attributes (e.g., skill levels, tools, process, etc.)
- Analyze data
  - Performance comparisons (identification of process strengths and weaknesses)
  - Industry averages and best practices
  - Performance modeling (identify high impact areas)
- Report results
Identify Sample Set & Collect Data

**Research**

- **MEASURES**
  - Software Size
  - Level of Effort
  - Time to Market
  - Delivered Defects
  - Cost

- **CHARACTERISTICS**
  - Skill Levels
  - Automation
  - Process
  - Management
  - User Involvement
  - Environment

**Analysis**

- **PERFORMANCE LEVELS**
- **PROFILES**

**Results**

- Correlate Performance Levels to Characteristics
- Substantiate Impact of Characteristics
- Identify Best Practices
## Analyze Project Attributes

<table>
<thead>
<tr>
<th>MANAGEMENT</th>
<th>DEFINITION</th>
<th>DESIGN</th>
<th>ENVIRONMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>✚ Team Dynamics</td>
<td>✚ Clearly Stated Requirements</td>
<td>✚ Formal Process</td>
<td>✚ New Technology</td>
</tr>
<tr>
<td>✚ High Morale</td>
<td>✚ Formal Process</td>
<td>✚ Rigorous Reviews</td>
<td>✚ Automated Process</td>
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<tr>
<td>✚ Project Tracking</td>
<td>✚ Customer Involvement</td>
<td>✚ Design Reuse</td>
<td>✚ Adequate Training</td>
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<tr>
<td>✚ Project Planning</td>
<td>✚ Experience Levels</td>
<td>✚ Customer Involvement</td>
<td>✚ Organizational Dynamics</td>
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<tr>
<td>✚ Automation</td>
<td>✚ Business Impact</td>
<td>✚ Experienced Development Staff</td>
<td>✚ Certification</td>
</tr>
<tr>
<td>✚ Management Skills</td>
<td></td>
<td>✚ Automation</td>
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</table>

<table>
<thead>
<tr>
<th>BUILD</th>
<th>TEST</th>
<th>ENVIRONMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>✚ Code Reviews</td>
<td>✚ Formal Testing Methods</td>
<td>✚ New Technology</td>
</tr>
<tr>
<td>✚ Source Code Tracking</td>
<td>✚ Test Plans</td>
<td>✚ Automated Process</td>
</tr>
<tr>
<td>✚ Code Reuse</td>
<td>✚ Development Staff Experience</td>
<td>✚ Adequate Training</td>
</tr>
<tr>
<td>✚ Data Administration</td>
<td>✚ Effective Test Tools</td>
<td>✚ Organizational Dynamics</td>
</tr>
<tr>
<td>✚ Data Administration</td>
<td>✚ Customer Involvement</td>
<td>✚ Certification</td>
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<tr>
<td>✚ Computer Availability</td>
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<tr>
<td>✚ Experienced Staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✚ Automation</td>
<td></td>
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</tr>
</tbody>
</table>
Strengths And Opportunities

(An Example)

Definition

Strengths

- Requirements are clearly stated and stable
- Development and customers are experienced in applications

Opportunities for Improvement

- More formal requirements gathering process on larger projects
- More consistent use of prototyping on larger projects
- A formal review process
Establish A Baseline

Size is expressed in terms of functionality delivered to the user.

Performance Productivity

A representative selection of projects is measured.

Software Size

Organizational Baseline

Rate of delivery is a measure of productivity.

Rate of Delivery
Function Points per Person Month
Compare to Industry Benchmarks

Industry baseline performance

Rate of Delivery
Function Points per Person Month

Software Size

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36

200 400 600 800 1000 1200 1400 1600 1800 2000 2200
Function Points Per Person Month

Average of Recent Projects Across
Different Platforms

Client Server 17
Main Frame 13
Web 25
e-business Web 15
Vendor Packages 18
Data Warehouse 9
Function Points Supported By One FTE

Average of Support Provided for Corrective Maintenance by One FTE

<table>
<thead>
<tr>
<th>System</th>
<th>Support Provided</th>
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</thead>
<tbody>
<tr>
<td>Client Server</td>
<td>642</td>
</tr>
<tr>
<td>Main Frame</td>
<td>978</td>
</tr>
<tr>
<td>Web</td>
<td>756</td>
</tr>
<tr>
<td>e-business Web</td>
<td>438</td>
</tr>
<tr>
<td>Vendor Packages</td>
<td>740</td>
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<tr>
<td>Data Warehouse</td>
<td>392</td>
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</table>
Track Improvements

Track Progress

Software Size

Rate of Delivery
Function Points per Person Month

Year 2 grouping of projects
Presentation Topics

- Measurement for Process Improvement
- Baseline your Performance
- Model Performance Improvements
Model Improvements

- Model the impact of implementing selected process improvements
- Evaluate the impact on productivity
- Modeling is performed from several perspectives: Management Improvements, Design Improvements, Definition Improvements, Build Improvements, Test Improvements, Environment Improvements and SEI CMM Specific Improvements

EXAMPLE: Improvements are measured from the following baseline --

- Average Project Size: 133 Function Points (FPs)
- Average Productivity: 10.7 FP/Effort Month (EM)
- Average Time-to-Market: 7.3 Months
- Average Cost/FP: $934.58
- Projected Delivered Defects/FP: .0301
## Modeled Improvements

Current improvement initiatives (SEI) are appropriately targeted at the majority of “weak spots” revealed by the baseline results.

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Productivity</th>
<th>Time-To-Market</th>
<th>Defects/FP</th>
<th>Cost/FP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>8.10%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>-7.44%</td>
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<tr>
<td>Definition</td>
<td>16.20%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>-15.70%</td>
</tr>
<tr>
<td>Design</td>
<td>30.80%</td>
<td>-25.00%</td>
<td>-25.00%</td>
<td>-23.55%</td>
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<tr>
<td>Build</td>
<td>10.70%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>-9.67%</td>
</tr>
<tr>
<td>Test</td>
<td>24.40%</td>
<td>-25.00%</td>
<td>-25.00%</td>
<td>-20.25%</td>
</tr>
<tr>
<td>Environment</td>
<td>5.30%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>-5.04%</td>
</tr>
<tr>
<td>SEI CMM Specific</td>
<td>131.50%</td>
<td>-50.00%</td>
<td>-75.00%</td>
<td>-56.78%</td>
</tr>
<tr>
<td>All</td>
<td>169.20%</td>
<td>-50.00%</td>
<td>-75.00%</td>
<td>-62.89%</td>
</tr>
</tbody>
</table>

### Baseline Productivity vs. SEI Productivity Improvements

<table>
<thead>
<tr>
<th>Metric</th>
<th>Baseline Productivity</th>
<th>SEI Productivity Improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Project Size</td>
<td>133</td>
<td>133</td>
</tr>
<tr>
<td>Average FP/EM</td>
<td>10.7</td>
<td>24.8</td>
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<tr>
<td>Average Time-To-Market (Months)</td>
<td>7.3</td>
<td>3.7</td>
</tr>
<tr>
<td>Average Cost/FP</td>
<td>$934.58</td>
<td>$467.29</td>
</tr>
<tr>
<td>Projected Delivered Defects/FP</td>
<td>0.0301</td>
<td>0.0075</td>
</tr>
</tbody>
</table>
Strive for Continuous Improvement

PERFORMANCE
PRODUCTIVITY
DEFECTS
RESOURCES
COSTS
TIME TO MARKET

CAPABILITIES
BUSINESS VALUE
DELIVERABLES
SKILL LEVELS
TECHNOLOGY
PROCESS

MEASURED BASELINE

PERFORMANCE

RISKS

SOFTWARE
PROCESS

IMPROVEMENT INITIATIVES / BEST PRACTICES

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