Industry Metrics for Outsourcing and Vendor Management

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Notes
Metrics in Outsourcing

Agenda

- Overview
- Metrics Classification and Definition
- Establishing and Measuring Improvements
- Summary

Notes
Metrics Need to be Aligned with Outsourcing Goals

- Cost Reduction
- Improve Productivity
- Reduce Time to Market
- Improve Quality
- Improve Software Engineering Processes
- Improve Internal Expertise
- Offshore Development
- Reduce Frustration

Notes
Metrics Should be Established for Each Outsourcing Opportunity

Classifying Outsourcing Options

Opportunities range from single projects to complete organizations
Best Practice is to Establish a Baseline to Determine Opportunities and Negotiate the Deal

Making the Decision

Establish the Baseline

Measure, Audit and Report Results

Assess Goals and Alternatives

Negotiate Performance Levels

Determine Contract Scope and Terms

Identify Measures to Support Terms

Notes
Use of Metrics in Outsourcing

Metrics and payment options are numerous depending on the goals and contract terms

Pay by the Metric
• Payment is based on Function Points delivered
• $700/ Function Point for example

Casual Management Interest
• Identify performance productivity improvement
• Does not impact regular payments

Tool to Manage Performance and Terms
• Provide incentives for achieving goals
• Assessing penalties for poor performance
• Benchmarking built into the agreement
Industry Standard Metrics for Outsourcing

• An Industry Standard for Outsourcing Metrics established by a “standards organization” (such as ISO, IEEE and IFPUG) does not exist

• Common Industry Practices have been developed based on the work and experience of Sourcing Deal Makers, Measurement Consultants and Outsourcers

• The following Metrics are observed to be frequently used in outsourcing agreements, are reasonably well defined and can be compared to industry benchmarks
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Application Development and Maintenance (AD&M) Activities

AD&M activities are typically organized into three categories:

**New Development**
- Work activities that deliver brand new software applications

**Enhancement**
- Work activities that modify existing software applications based on user requirements. This may include adding new functionality, changing existing functionality, or deleting existing functionality

**Maintenance**
- Work activities required to maintain the system through repair of errors, optimization, software upgrades and preventative activities
Other AD&M Activities

Activities that are often included in outsourcing deals but are more difficult to measure and are often pay as you go:

- Infrastructure Projects
- Help Desk
- Operations
- Production Support
- SME Support

Notes
Application Development and Maintenance

Projects
• New Development
• Enhancements
- Development Type
- Platform
- Size Category
- Portfolio Type
- Business Domain

Application Maintenance and Support
- Platform
- Age
- Portfolio Type
- Business Domain
Measuring Portfolios and Business Domains

- Business Domains are occasionally accounted for independently for service and billing purposes

- Portfolios represent major categories of different software types that need to be measured independently
  - Business software (in-house)
  - COTS (installations)
  - Middleware
  - Reusable components

- Different portfolios and business domains may have different:
  - Productivity rates
  - Benchmark comparisons
  - Metrics
Productivity and Cost (Based on Productivity) is the Most Critical Outsourcing Measure

Productivity is defined as the ratio of the volume of output delivered to the resources consumed by the process. This ratio is often referred to as a “productivity rate” or “efficiency rate.”

A process is considered to have improved its productivity if it:

• Delivers more output without increasing the level of one or more categories of resources; or

• Delivers the same volume of output using a lower level of one or more categories of resources; or

• Both delivers more output, and consumes a lower level of one or more categories of resources
Productivity Metrics

**New Development and Enhancement**

- The number of Function Points developed in one hour
- Cost per each Function Point developed/enhanced
- The number of Function Points developed/enhanced for elapsed time period

**Maintenance**

- The number of Function Points supported by one Full Time Equivalent (FTE) during a period
- Cost per each Function Point maintained
Productivity Varies by Development Type, Size and Platform

Project Size can account for a 3 times productivity variation

Notes
Platform

Productivity varies by Platform type and should be carefully classified and measured

Platforms typically include:
- Mainframe/Midrange
- Client Server
- Web
- Standalone Personal Computer/Workstation
- Mixed

Optional platforms in special situations include:
- Data Warehouse
- Middleware
- Components
- System software
- Tools

Notes
Function Point Size Group

Productivity varies by size and requires size categories for proper measurement

<table>
<thead>
<tr>
<th></th>
<th>New Development Size Groups</th>
<th>Enhancement Size Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Small</strong></td>
<td>1 – 300 FPs</td>
<td>1 – 50 FPs</td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td>301 – 1,000 FPs</td>
<td>51 – 500 FPs</td>
</tr>
<tr>
<td><strong>Large</strong></td>
<td>1,001 – 4,000 FPs</td>
<td>501 – 2,000 FPs</td>
</tr>
<tr>
<td><strong>Very Large</strong></td>
<td>Greater than 4,000 FPs</td>
<td>Greater than 2,000 FPs</td>
</tr>
</tbody>
</table>
Maintenance Productivity is Highly Dependent on Application Age and Platform

![Graph showing maintenance FPs per FTP across different age groups.](image)

Applications less than 5 years old and greater than 15 years old are the most costly to maintain.

Notes
## Metrics in Outsourcing

### ADM Work Type: New Development and Enhancement

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Productivity Rate</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort</td>
<td>The number of Function Points delivered per resources consumed</td>
<td>5 FPs per person month</td>
</tr>
<tr>
<td>Cost</td>
<td>Cost per each Function Point developed/enhanced</td>
<td>$1000/FP</td>
</tr>
<tr>
<td>Time-to-Delivery (schedule duration)</td>
<td>The number of days to deliver the developed/enhanced xx FPs for the size category</td>
<td>100 Days for 100-200 FP size category</td>
</tr>
</tbody>
</table>

**Notes**
ADM Work Type: Maintenance

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Productivity Rate</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort</td>
<td>The number of Function Points supported by one Full Time Equivalent (FTE) during a period of time</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Note: FTE needs to be defined in terms of productive hours per month</em></td>
<td>700 FPs/FTE</td>
</tr>
<tr>
<td>Cost</td>
<td>Cost per each Function Point developed/enhanced</td>
<td>$100/FP</td>
</tr>
</tbody>
</table>

Notes
Measuring Resources Consumed - Effort

For AD&M activities, labor effort consumed is a critical input that needs careful definition and accounting.

- Roles included in time accounting for major categories of AD&M activities
- Specific activities included/excluded
- Definition of FTE
- Trends in time spent

Notes
Metrics in Outsourcing

Roles in ADM Activities

Include

- All non-overhead effort expended directly by the core development or maintenance team such as:
  - Project managers
  - Analysts
  - Programmers
  - Testers

- Shared resources who work directly on the project/application such as:
  - Database analyst
  - QA
  - Configuration management personnel

Notes
Roles in ADM Activities (Continued)

Exclude

- In general, roles that do not expend effort directly such as:
  - Users
  - Senior management
  - Administration
  - Operations personnel
Specific Activities Need to be Defined for New Development and Enhancement

*Include*

- Planning and management
- Requirements definition
- Design
- Coding
- Testing
- Performance tuning (specific to the project)
- Installation and training (through first implementation)
Specific Activities Need to be Defined for New Development and Enhancement (Continued)

Exclude

- Feasibility or business case studies
- Maintenance activities not associated with the project
Specific Activities Need to be Defined for Maintenance

Include

• Corrective maintenance
• Perfective
• Preventative maintenance
• Technical adaptive maintenance
• Cosmetic and data maintenance
Specific Activities Need to be Defined for Maintenance (Continued)

Exclude

- Effort that cannot be associated with a specific application such as operating system upgrades not specific to an application
- Work classified as New Development or Enhancement
- Operations and production support activities

Notes
Measuring Labor and Cost

The cost of the outsourcing agreement is generally based on the annual or monthly FTP labor rate and needs to be carefully calculated and measured.

- The labor rate needs to be carefully negotiated, measured and benchmarked.
- The outsourcer will charge a price to develop and maintain applications within scope. That price will include labor costs, overhead costs, and profit.
- Understanding the terms and conditions related to other contract cost is critical to the understanding of labor rates:
  - Facility cost
  - Hardware/software costs
  - Desk top support
  - Telecommunications
Time to Market (Schedule Duration) is another Critical Measure

Schedule Duration by Project Size Category and Platform

Actual project schedules (days) should be compared against baselines, targets or benchmarks by size category and platform.
Special Situations

The following situations require special consideration:

• Application decommissioning (retirement)
• Package implementation and installation of upgrades
• Cancelled projects
• Ad hoc reports
• Reusable software components
• Infrastructure support
• Changes to FP Counting Rules (CPM Version)

Notes
Quality Metrics

Quality typically takes on two perspectives

• Defects

• Customer satisfaction
Quality Defect Metrics

New Development and Enhancement Projects

• The number of defects per project Function Point discovered in the first 90 days after implementation
• 30 days, 60 days or 365 days are used but are less common
• All severity levels if possible

Applications

• The number of defects per application Function Point discovered per year
• Per quarter or per month are used but are less common
• All severity levels if possible

Notes
“Defect” Needs to be Well Defined

- A defect is defined as a problem or an error that, uncorrected, will produce unsatisfactory results
- Unsatisfactory results range from cosmetics to inoperable systems (typically all severity levels)

<table>
<thead>
<tr>
<th>Level</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severity 1</td>
<td><strong>Disastrous</strong> – system cannot be used without corrective action being taken</td>
</tr>
<tr>
<td>Severity 2</td>
<td><strong>Major</strong> – system can be used with major functional restrictions</td>
</tr>
<tr>
<td>Severity 3</td>
<td><strong>Minor</strong> – system can be used with minor functional restrictions</td>
</tr>
<tr>
<td>Severity 4</td>
<td><strong>Cosmetic</strong> – system can be used with full functionality</td>
</tr>
</tbody>
</table>

Notes
Quality Defect Metrics

The following items are collected for quality measurement:

- **Work Type Category**: New Development, Enhancement or maintenance
- **Defects**: Number and severity (optional)
- **Size**: Function Points
- **Attributes**: Application age, platform

Notes
## Constructing Defect Rates

<table>
<thead>
<tr>
<th>Defect Ratios</th>
<th>Example</th>
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<tbody>
<tr>
<td>The number of defects per Project Function Point (first 90 days in production)</td>
<td>.05 defects/Function Point</td>
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<tr>
<td>The number of defects per Application Function Points (annual)</td>
<td>50 defects/1,000 FPs</td>
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</table>

### Notes
Customer Satisfaction Metrics

AD&M contracts often include one or more Customer Satisfaction service level agreements (SLAs).

- The contract requires the vendor to maintain a satisfaction level above a defined threshold
- Periodically the customer organization is asked to evaluate their level of satisfaction with one or more of the outsourced services
- There are challenges in measuring customer satisfaction
  - The Customer Satisfaction score is an opinion about opinions
  - Vendors do not always have control
  - Benchmarking is difficult
- Regardless of the challenges, Customer Satisfaction adds a missing perspective not captured by other quality and productivity measures

Notes
Outsourcing Agreements Often Include Requirements for Process Maturity

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<th>Level 4</th>
<th>Level 3</th>
<th>Level 2</th>
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Legend:
- Not satisfied
- Partially satisfied
- Fully satisfied
- Not applicable

CMMI or other Proprietary Assessment are Conducted

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Summary Measures for Contract Negotiation and Performance Management

Software Development and Support Activities

$/FP

Development Enhancement Maintenance

Quality Thresholds

Quality Rates

Defects/FP User Satisfaction

Labor Rates by Activity/Location

$/Hour

A B C D E

Activities/Locations

Performance Improvements and Incentives

• Processes
• Current Performance Rates
• Industry Averages and Best in Class

% Improvement

Notes
### Improvements are Typically Based on Percent Increases or Decreases

<table>
<thead>
<tr>
<th>Pay by the Metric</th>
<th>Deliver &amp; Maintain Fixed Output for a Fixed Annual Price</th>
<th>Metrics for Performance Management (Incentives, Penalties, Renegotiation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Pay $n for each newly developed FP delivered</td>
<td>• Deliver n FP’s of newly developed software</td>
<td>• n FP’s per hour for new development</td>
</tr>
<tr>
<td>• Pay $n for each enhanced FP delivered</td>
<td>• Deliver n FP’s of enhancements to existing software</td>
<td>• n FP’s per hour for enhancements</td>
</tr>
<tr>
<td>• Pay $n for each application FP maintained</td>
<td>• Maintain the portfolio of n FP’s</td>
<td>• n Cost per FP for new development</td>
</tr>
<tr>
<td></td>
<td>• Adjustments &amp; credits are used for growth in the portfolio or trade-off between work types</td>
<td>• n Cost per FP for enhancements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Maintain n FP’s per FTE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• n Cost per FP maintained</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• n Defects per FP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Customer satisfaction rating</td>
</tr>
</tbody>
</table>
Baselines and Benchmarks are Useful Tools for Establishing Improvement Targets

- Future targets should be based on current performance
- Improvement targets should be realistically set and not be based on marketing promises
- The degree of improvement should consider
  - The current baseline versus industry benchmarks
  - The goals for outsourcing
  - The outsourcer capabilities
  - The level of process maturity
  - The degree of organizational change including offshoring
  - Industry trends
- Improvement percents generally range from 3% to 15%
- Some situations dictate improvement ranges from -10% to +30%
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Notes
Summary of Outsourcing Metrics

The following summarizes common measures used in Outsourcing:

**Work Type**
- New Development or Enhancement
- Maintenance

**Resources Consumed**
- Cost
- Effort
- Elapsed time

**Quality**
- Defects
- Customer survey

**Output**
- Function points
Detailed Definitions and Guidelines are Needed

Carefully define and document the metrics used and the standards for accounting

- Define each metric in detail
  - Description
  - Calculation
  - How collected
  - How used and reported
- Establish details for resource accounting
  - Roles and activities to be included/excluded
  - Cost items to be included/excluded
  - Definition for resources and calculations (FTE, productive month, etc.)
- Base measurement analysis on the factors that impact productivity and quality (platform, size, age, etc.)
- Establish appropriate service level and improvement targets
  - Based on baseline and benchmark data
  - Establish reasonable targets
**Cost/FP or FP/Effort Matrices**

Matrices are often established by project size and platform

<table>
<thead>
<tr>
<th>Project Size (FP)</th>
<th>Web</th>
<th>Mainframe</th>
<th>Client Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 300</td>
<td>19</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>300 – 1,000</td>
<td>28</td>
<td>21</td>
<td>17</td>
</tr>
<tr>
<td>&gt; 1,000</td>
<td>22</td>
<td>19</td>
<td>13</td>
</tr>
</tbody>
</table>

- Matrices can be used to set price or performance target

**Notes**
Evaluating COTS with Function Fit Analysis

- Requirements Function Point Analysis
- Functional GAP Analysis
- Project Estimates
- Make/Buy Analysis
- COTS Functional Evaluation

Notes
Benefits of COTS Function Fit Analysis

- Documents functional requirements in terms understandable to users and technicians
- Identifies the functional gap of the COTS products
- Quantifies development effort of COTS usage
- Provides information to the COTS vs. Development decision making process

Example:

Navy – 2 COTS, both low fit
- 95% new development, 3% enhancement, 2% “use as is out of box”
- Chose to customize

Notes
Future Trends

• Price Models
  – Based on historical data and agreed criteria
  – Price is established by entering information into the model

• Independent Benchmarking
  – Requires a credible source of benchmark information and predefined process mutually agreed upon
  – Similar delivered projects are identified, industry average or “best in class” price is established

• Service provider and customer accepts Price Model or Benchmark price terms

Notes
Cost per Function Point Contracting

- Can be based on Baseline, Benchmark or combination
- Often based on productivity rate and negotiated labor rate
- Cost per FP can either set the price (fixed price or forward pricing) or as performance target
- When used as performance target, penalties and incentives are established
- Incentives can be “split the benefits”
- Penalties can be refunds or cost reductions
- “At Risk” amount can be 10% of total revenues
Example – Transformation Project via COTS

1. Understand requirements
   – Old system
   – New functions

2. Perform function fit analysis

3. Function point count COTS enhancement

4. Establish price per function point for enhancement(s) based on baseline or benchmark
   – Use for contract price
   – Use to evaluate bids

Notes
Example – Maintain and Enhance Existing Application(s)

1. Understand size and age
2. Baseline current
   - Maintenance baseline
   - Enhancement baseline
3. Establish current cost per function point
   - Maintenance
   - Enhancement projects
4. Establish price per function point for maintenance and enhancements
5. Establish performance targets and/or cost reductions

Notes
Other Considerations for Contracting

- Time and material activities versus FP priced work
- Insource/Outsource options and flexibility
- Termination clauses
- Impact of offshoring
- Other non-development costs

Notes