2006 State of Software Measurement Practice Survey

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Presentation Outline

- Introduction
  - Survey objectives & approach
  - The population being studied
  - Sampling plan

- Results
  - Response rates and outcome
  - Population demographics
  - Attitudes and beliefs about measurement use
  - Measurement guidance used
  - Measures that are reported

- Summary Observations
Survey Objectives

The objectives of this survey are to characterize

• the degree to which software practitioners use measurement when conducting their work

• the perceived value of measurement

• approaches that are used to guide how measures are defined and used

• the most common types of measures used by software practitioners
Characteristics of the Survey

We used a structured, self-administered questionnaire that was available both via the World Wide Web and in paper form.

The questionnaire was designed to be short (17 questions) and easy-to-complete with questions phrased in close-ended format. Several questions allowed for short open-ended responses.

Stratified random sampling was used to select candidate respondents from a population comprised of members from three different subpopulations.

Candidate respondents were offered incentives to participate including

- platinum membership to the Software Engineering Information Repository (SEIR) that provides access to documents otherwise unavailable through regular membership
- early access to the survey results
The Population Being Studied

The population that we would have liked to have studied is the entire existing body of software practitioners in the world. However, such a representative database was unavailable to us.

The population that we did use for this study included individuals who:

1. were entered into the SEI customer relations database during 2004-2005
2. registered to gain access to the SEI’s Software Engineering Repository (SEIR) during 2004-2005
3. became an SEI Member during 2004-2005
## Sampling Plan

<table>
<thead>
<tr>
<th>Subpopulation</th>
<th>Population Size</th>
<th>Sample Size</th>
<th>Adjusted Sample Size</th>
<th>Actual Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Relations</td>
<td>6,398</td>
<td>603</td>
<td>2010</td>
<td>1,670</td>
</tr>
<tr>
<td>SEI Members</td>
<td>1,242</td>
<td>434</td>
<td>1,242</td>
<td>951</td>
</tr>
<tr>
<td>SEIR registrants</td>
<td>7,540</td>
<td>612</td>
<td>2040</td>
<td>1,539</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15,180</strong></td>
<td><strong>1,649</strong></td>
<td><strong>5,292</strong></td>
<td><strong>4,160</strong></td>
</tr>
</tbody>
</table>

- Adjusted based on estimated 30% response outcome.
- Calculated for: precision of ± 2.5% confidence of 95%.

- Invalid email addresses
- Non-responses
- Ineligible respondents
Important to Remember When Interpreting Survey Results

Population used in this study are not the same as the population of all software practitioners. Survey results cannot be generalized beyond the population used in this study.

- SEIR Registrants: 49.7%
- SEI Customer Relations DB: 42.1%
- SEI Members: 8.2%

These are not the same.
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Response Outcome Rates

**Minimum Response Rate**

RR1 = 42.4%

Counts partial interviews as respondents

RR2 = 50.7%

http://www.aapor.org/pdfs/standarddefs_4.pdf
84 Countries Represented
Describe Your Organization

- Custom software development: 27.3% (517 responses)
- In-house or proprietary development or maintenance: 19.1% (362 responses)
- Defense contractor: 13.9% (263 responses)
- Department of Defense or military organization: 11.2% (212 responses)
- Commercial shrink-wrap: 5.9% (112 responses)
- Other government contractor: 5.2% (98 responses)
- Other government agency: 2.8% (53 responses)

Total Responses: 1893
Number of Full Time Employees

- More than 2000: 429 (22.7%)
- 1001-2000: 146
- 501-1000: 145
- 301-500: 152
- 201-300: 128
- 101-200: 229
- 76-100: 101 (5.3%)
- 51-75: 114
- 26-50: 178
- 25 or fewer: 268

Total Responses: 1890
Presentation Outline

Results

- Response rates and outcome
- Were subpopulations different?
- Population demographics

Attitudes and beliefs about measurement use

- How are you involved with measurement?
- Are purposes for measurement understood?
- Does measurement help?
- Is measurement used to understand product/service quality?
- Documented measurement processes?
- Measurement definitions understood and consistent?
- Do measurable criteria exist for products and services?
- Is corrective action taken when thresholds are exceeded?

- Measurement guidance used
- Measures that are reported
Involvement With Measurement

- **Provider**: 290 respondents
- **User**: 324 respondents
- **Both a provider and a user**: 1142 respondents
- **Other**: 136 respondents

- **32.4%**: Both a provider and a user (1142 respondents)
- **60.3%**: Both a provider and a user (1142 respondents)
- **7.1%**: Other (136 respondents)

- Don’t do measurement.
- I set up measurement programs.

1892 Responses
Provides (only) or Uses (only)

- Uses measurement data but does not provide it to someone else.
- Provides measurement data but does not use it.

Exec        Prog. Manager        Project manager        Engineer        Analyst        Programmer        Other

- 289 Provider
- 321 User
Purpose for Measuring Is Understood

- Frequently: 1286 (69.6%)
- Occasionally: 390 (21.1%)
- Rarely: 69 (3.7%)
- Never: 18 (1.0%)
- I don't know: 14 (0.8%)
- N/A: 70 (3.8%)

1847 Responses
Purpose for Measuring Is Understood

1847 Responses

- Occasionally
- Frequently

Significant differences between management and staff.

Program Manager: 75% (Occasionally), 19% (Frequently)
Executive: 76% (Occasionally), 18% (Frequently)
Project Manager: 66% (Occasionally), 26% (Frequently)
Other: 74% (Occasionally), 17% (Frequently)
Analyst: 22% (Occasionally), 35% (Frequently)
Programmer: 35% (Occasionally), 26% (Frequently)
Engineer: 26% (Occasionally), 26% (Frequently)
Believe That Measurement Helps (To Some Degree)

- Agree: 92%
- Disagree: 2%
- N/A: 2%
- Not sure: 4%

1868 Responses
Measurement Used to Understand Quality of Products & Services

- **Frequently**: 825 responses (44.5%)
- **Occasionally**: 723 responses (39%)
- **Rarely**: 210 responses (11.3%)
- **Never**: 39 responses (2.1%)
- **I don’t know**: 17 responses (0.9%)
- **N/A**: 38 responses (2.1%)

Total responses: 1852
Documented Process for Collecting Measurement Data

1852 Responses

Percent

0% 20% 40% 60% 80% 100%

Program Manager  Other  Executive  Project Manager  Analyst  Engineer  Programmer

Occasionally
Frequently

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Measurement Definitions Are Understood & Consistent

- Agree: 70%
- Disagree: 24%
- Not sure: 4%
- N/A: 2%

1868 Responses
Measurable Criteria Exist for Products & Services

- Frequently: 799 responses (43.1%)
- Occasionally: 711 responses (38.4%)
- Rarely: 233 responses (12.6%)
- Never: 31 responses (1.7%)
- I don’t know: 30 responses (1.6%)
- N/A: 48 responses (2.6%)

Total responses: 1852
Corrective Action Taken When Measurement Threshold Exceeded

- Frequently: 745 responses (40.3%)
- Occasionally: 644 responses (34.9%)
- Rarely: 259 responses (14.0%)
- Never: 86 responses (4.7%)
- I don't know: 52 responses (2.8%)
- N/A: 61 responses (3.3%)

Total Responses: 1847
**Action-Oriented Response to Measurement Information**

- Measurable criteria established (frequently)
- Corrective action taken when threshold met (frequently)

1847 Responses
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Measurement Methods Used

- **CMMI M&A Process Area**: 1045 responses (55.9%)
- **I do not use a defined method**: 432 responses (21.1%)
- **Goal-Driven Software Measurement**: 383 responses (20.5%)
- **GQM**: 354 responses (19%)
- **Other**: 219 responses (11.7%)
- **PSP/TSP**: 210 responses (11.2%)
- **PSM**: 171 responses (9.2%)
- **ISO 15939**: 139 responses (7.4%)

The percentages do not add to 100% because some individuals use more than one method.

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“Other” Methods Used

- Home-Grown: 39
- No Metrics (comment): 32
- Proprietary: 25
- Other: 25
- Customized from Other: 20
- CMM: 19
- Standards (IEEE, ISO, etc.): 17
- Six-Sigma: 15
- ITIL: 7
- Balanced Scorecard: 7
- By Mandate: 5
- SPC: 5
- Function Points: 3

Frequency

219 Responses
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Measurements that Are Reported

- Risks identified: 156 do not report, 1461 do report, 90.4%
- Schedule progress: 50 do not report, 1639 do report, 97.0%
- Code growth: 490 do not report, 822 do report, 62.7%
- Defects removed: 217 do not report, 1329 do report, 86.0%
- Defects identified: 158 do not report, 1435 do report, 90.0%
- Effort applied to tasks: 115 do not report, 1535 do report, 93.0%
- Capability/requirements stability: 401 do not report, 1117 do report, 73.6%

1796 Responses
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Summary Observations
Summary Observations - 1

In general, there were significant differences in response patterns when comparing management versus staff.

<table>
<thead>
<tr>
<th>Management</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive</td>
<td>Engineer</td>
</tr>
<tr>
<td>Program Manager</td>
<td>Analyst</td>
</tr>
<tr>
<td>Project Manager</td>
<td>Programmer</td>
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Statistical tests of significance demonstrated that the differences were significant with confidence of at least 99% in all cases and 99.9% in some cases.

- Hypothesis test for equality of proportions
- Chi-Square test for significance
Summary Observations - 2

When compared to staff, management responded more strongly that

- they understand the purposes for measurement
- measurement helps their team perform better than without it
- they use measurement more often to understand the quality of their products and services
- they follow a documented process more often for collecting and reporting measurement data
- measurement definitions are commonly understood and consistent in their organization
- measurable criteria exist for their products and services
- corrective action is taken when a measurement-based threshold has been exceed

In general, the differences are statistically significant.
Summary Observations - 3

It is notable and a bit alarming that only 40.3% of all respondents reported that corrective action is taken when a measurement threshold has been exceeded.

Close to 20% of respondents reported that corrective action is rarely or never taken when a measurement threshold is exceeded.

Measurement doesn’t help much unless the information is acted upon.
Summary Observations - 4

The CMMI M&A Process Area was identified as a measurement method used most often to identify, collect, and analyze measurement data.

- Approximately 56% of respondents reported using the CMMI M&A Process Area.
- 27.4% of all respondents reported that the CMMI M&A Process Area was the only method that they used.

41% of all respondents stated that they used only a single method for identifying, collecting, and analyzing measurement data. (59% use two or more methods).

⚠️ 21.1% (432 respondents) reported that they do not use any measurement method.
Schedule and time-on-task measures are most often reported.

- 97% of respondents indicated that schedule progress was a measure most often reported.
- 93% indicated that effort applied to task was reported.
- In addition, some respondents listed other measures that they report and 19.2% of these were related to time tracking.
Summary Observations - 6

Measures Reported, continued

Code growth and Capability & Requirements Stability are measurements least reported by respondents.

- 27.3% do not report Code Growth
- 22.3% do not report Capability & Requirements Stability

Frequency of reporting measurement information varied depending on the measurement. However, most are reported on a weekly, monthly, or daily basis.
Acknowledgements

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