Implementing a ‘Mature’ FPA Process

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Pam Morris Profile

- CEO of Total Metrics
- Member of the IFPUG Counting Practices Committee 1993 - 2000
- International Workgroup convenor and project editor ISO/IEC 14143 Functional Size Measurement Standards
- President Australian Software Metrics Association (ASMA)
- Australian Representative ISBGS Committee
- Core project member COSMIC
Measurement is a key to successful software development ………

“ You cannot manage what you cannot measure.”

“Without objective data you are just another person with an opinion”

“ If you do not know where you are then a map is no use.”

True?
But … what has history shown us?

- **1993** - “80% of all measurement programs fail”  
  *Source: Howard Ruben Associates 1993*

- **2000** - “Metrics usage continues to decline, with a steeper fall in the U.S. than in Non-U.S” companies.  
  *Source: Howard Rubens IT Performance Trends 2000 (Meta Group)*

Why aren’t we getting better?
Reasons or Excuses?

Functional Size Measurement is a great idea but….

- “It was too hard”
- “We did not have enough resources”
- “No-one used the results”
- “Never had time to do it”
- “Were not sure if we were doing it right”
- “The results were meaningless, looked like random numbers”
- “Not sure we measuring the same as everyone else”
- “No one cared about what we did”
- “We did not have any tools”
- etc.

Where did we go
Other IT Processes

- The ‘capability’ of an IT organisation is measured by the *maturity* of its ‘IT processes’
- IT Processes:
  - Requirements Management
  - Project Planning
  - Configuration Management etc
- *Mature* processes are ones that are:
  - defined
  - repeatable and predictable
  - controlled, measured and monitored
  - optimised for improvement
SEI - CMM Maturity Level

- SEI Capability Maturity Model

  - Initial Level 1
  - Repeattable Level 2
  - Defined Level 3
  - Managed Level 4
  - Optimised Level 5

  Maturity Levels where measurement can start to become effective

  Continuously improving

  Disciplined

  Standard

  Consistent

  Adhoc

  Level 1

  Level 2

  Level 3

  Level 4

  Level 5
Focus for Improvement

- **5 Optimised**
  - Process improvement is institutionalised. Includes Change management and defect prevention

- **4 Managed**
  - Product and processes are quantitatively controlled with detailed measurement

- **3 Defined**
  - Software engineering and management practices defined and integrated, plus training

- **2 Repeatable**
  - Project management system in place; performance is repeatable

- **1 Initial**
  - Process is informal and adhoc; performance is unpredictable
Was failure our fault or the times we lived in?

- Predicting the future by measuring chaos was not viable
- Often the measurement process was as unrepeatable as the process we were measuring - double jeopardy!
- Comparing ‘apples’ and ‘oranges’ was ‘fruitless’
- We did not have a ‘culture’ that supported
  - pro-active improvement
  - acceptance and adherence to standards
  - adoption of a repeatable disciplined approach
  - use of our results for continuous improvement
2002 - Now we can make FPA Work!

- IT development processes are maturing
- IT culture is more accepting of standards and procedures
- IT management needs measurement to support their maturity assessment
- IT performance is being questioned and is becoming accountable

But how do we make it work?
Measurement is also an ‘IT process’ so to treat it like one!

• Purchasing FPA Training and FPA software tools is NOT enough!

• Mature sustainable processes need to:
  – identify and allocate responsibilities for all components of the FPA process
  – implement *standards and procedures* for:
    • collection
    • validation
    • storage
    • analysis
    • reporting
    • use of FPA results
  – document local interpretations and applications of industry rules
  – continually measure, monitor and improve the process
Process Management

1. Define the process
2. Measure the process
3. Control the process
4. Improve the process

Execute the Process
‘Process’ Definitions

**process**

A system of operation or series of actions, changes, or functions, that bring about an end or result including the transition criteria for progressing from one stage or process step to the next. [Reference: IEEE P1220]

**process ownership**

All managed processes must be assigned ownership that includes responsibilities for *design*, for *establishing* and implementing mechanisms for *measuring the process* and taking *corrective action* where necessary.

(Reference: SEI Guidebook HB003 97)

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FPA Measurement as a Process

We as Measurement Professionals need to:

• become as ‘mature’ as the processes we measure
• be able to provide industry standard ‘predictable and repeatable’ results
• be able to provide realistic resource estimates of the *measurement* effort and costs
• document the outcome of measurement to an agreed industry wide standard.
• measure the ‘measurement process’ and optimise our own improvement
Software Process Maturity

– The extent to which a specific process is explicitly defined, managed, measured, controlled, and effective.

– **Maturity implies a** potential for growth in capability **and indicates both the richness of an organization's software process and the consistency with which it is applied in projects throughout the organization**

(Reference: SEI:SW-CMM)
Level 2 - CMMI
Key Process Areas
Project Focus

- Requirements Management
- Project Planning
- Project Monitoring and Control
- Supplier Agreement Management
- Measurement and Analysis
- Process and Product Quality Assurance
- Configuration Management
ISO/IEC - 15939

Software Measurement Process Framework

• Defines the activities and tasks that are necessary to successfully:
  – identify
  – define
  – select
  – apply
  – improve
  software measurement within an overall project or organisational measurement structure

• provides standard definitions for measurement
ISO - 15939 Measurement Process

**15939 Activities:**

1. Establish and Sustain Measurement Commitment
2. Plan Measurement Process
3. Perform the Measurement Process
4. Evaluate Measurement and improve

**FPA Process**

- Approve FPA Process
- Set up FPA procedures
- Function Point Counting
- Review and Improve FPA and IT process
1. Establish and Sustain Measurement Commitment

**15939 Activities:**

- Management commitment to support measurement
- Requirements for measurement are accepted
- Competent people are assigned
- Adequate resources are assigned

**FPA Process**

- FPA Process approval
- Requirements, scope, & stakeholders for FPA results are agreed and approved
- FPA Trained Counters, Validators, Analysts assigned
- Budget is allocated to FPA Process
2. Plan Measurement Process

• **15939 Activities:**
  - organisational unit
  - Identify information needs
  - Select measures
  - Define data collection, analysis, and reporting procedures (continued …)

• **FPA Process**
  - Which software to be measured
  - Frequency, Accuracy, type of Counts
  - Documented Rules for selected Version FPA, IFPUG CPM 4.1
  - Levels of counting
  - FPA Count Procedures
What do we Mean by ‘Levels of Counting’

Standardized descriptions of exactly how the count will be conducted and its deliverables.

Defines Count:

- level of detail
- type of count documentation
- extent of comments and notes
- maintainability
- valid uses
- error margin
- counting rates
- benefits and limitations
- input requirements
‘Levels of Counting’

Increases

Count Level

- Count efficiency (fps counted per day)

Increases

- count recording
- accuracy
- quality specifications
- maintainability
- count cost
- count effort
- count usefulness

Decreases

600 - 6,000

100

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TM Definitions of ‘Levels of Counting’

LEVEL 1 = Detailed Linked and Labelled Count
LEVEL 2 = Detailed Linked Count
LEVEL 3 = Detailed Count
LEVEL 4 = Default Complexity Count
LEVEL 5 = Rough Count
LEVEL 6 = Size Approximation.

Need to define and document when each type of Count Level is appropriate for the purpose that the count result will be used

Download full details of Count Levels from Total Metrics WWW Site - WWW.Totalmetrics.com
2. Plan Measurement Process

• **15939 Activities:**
  - organisational unit
  - Identify information needs
  - Select measures
  - Define data collection, analysis, and reporting procedures (continued…)

• **FPA Process**
  - Which software to be measured
  - Frequency, Accuracy, type of Counts
  - Documented Rules for selected Version FPA, Levels of counting
  - **FPA Count Procedures**
FPA Count Procedures

- **Formal documented standardised procedure manuals for:**
  - FPA Count Activity
  - FPA Count Validation Process
  - FPA Count Issues and Resolutions
  - FPA Result Reporting
  - FPA Count Repository Management

- **Each Includes:**
  - Document Configuration Control
  - Roles and responsibilities of participants
  - Deliverables and outcomes
  - References to relevant standards
  - Mapping of FPA process to IT processes
  - Definitions for each task and activity
  - Resource, tools and infrastructure requirements
FPA Result Reporting - standards?

- **Project Productivity Reporting**
  - Project FPA Count = 200 or 2000 fps
  - Total Effort = 2000 or 4000 hours
  - Productivity = 2 or 10 or 20 hrs/ fp

- **Whose hours and which FPs?**
  - is the count adjusted or unadjusted?
  - were the FPs, the ones developed, customised and/or delivered by the package or a combination of all three?
  - does the count include all functionality delivered by the package or just the fps actually required by the business?
  - did the count include re-used functionality from another application not developed by the team?
  - does the count only include the business application functionality or does it include changes to functionality of middleware software?
  - Do the hours include DBA, QA, Users?
Applications and their Users

External Business User

Screen Drivers
Printer Drivers

Business Applications A

Business Applications B

Operating System Software

Users Tools

Utility Software

Developers Tools

Admin User

Developer User

Ops User
TARGET APPLICATION = 1000 fps

External User = primary user

Utility Software = 1200 fps

Users Tools = 400 fps

Operating System Software = 3000 fps

PEER APPLICATION = 700 fps

COMPLETE SYSTEM

MIDDLEWARE APPLICATIONS
External User = primary user

COMPLETE SYSTEM

Project Scope - Project Managers Viewpoint = 720fps

A=500, B=100, C=30, D=40, E=50
Comparisons need to know each of the ‘parameters’ influencing how the size was derived

Size Parameters:
- type of count
- purpose for count
- scope of count
- users
- viewpoint

Need a standard set of ‘types’ of reports that include a standard ‘set’ of parameters for external benchmarking
# FPA Result Reporting
## Standard Set of Report Types

### Financial Reporting (dollars)
- Gross Sales = $1,000,000
- Gross Profit = $100,000
- Net Profit = $55,000

### FPA Reporting (fps)
- End User Impacted Size = 600 fps
- Project Impact Size = 720 fps
- End User Delivered Size = 2050 fps

### Table: SIZE PARAMETERS & METRICS REPORTING

<table>
<thead>
<tr>
<th>REPORT TYPE</th>
<th>Viewpoint</th>
<th>Users</th>
<th>Purpose</th>
<th>Scope</th>
<th>Count Type</th>
<th>METRICS REPORTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>End-user Impacted size</td>
<td>Project Sponsor</td>
<td>Business User</td>
<td>Measure functionality delivered for use</td>
<td>Impacted End User functions</td>
<td>Enhancement Project</td>
<td>Project Size 600 fps (A+B) 6000 hrs *ISBGS L4 10 hrs/fp</td>
</tr>
<tr>
<td>Project Impact Size</td>
<td>Software Developer</td>
<td>Business User Developers Administration Operations</td>
<td>Estimate total project Effort</td>
<td>All impacted functions</td>
<td>Enhancement Project</td>
<td>Project Size 720 fps (A+B+C+D+E) 4000 hrs *ISBGS L1 5.6 hrs/fp</td>
</tr>
<tr>
<td>End-user Delivered Size</td>
<td>Accountant</td>
<td>Business User</td>
<td>New Business Software Asset Size</td>
<td>Net size of end user functions</td>
<td>Application Baseline</td>
<td>2050 fps (A+B) N/A N/A</td>
</tr>
<tr>
<td>Supported Net Size</td>
<td>Support Manager</td>
<td>Business User Developers Administration Operations</td>
<td>Total portfolio size supported</td>
<td>Net size of all functions</td>
<td>Application Baseline</td>
<td>5920 fps (A+B+C+D+E) N/A N/A</td>
</tr>
</tbody>
</table>
2 Plan Measurement Process (continued)

• **15939 Activities:**
  - Define criteria for evaluating the information products and the measurement process
  - Review, approve, and staff measurement task
  - Acquire and deploy supporting technologies

• **FPA Process:**
  - define criteria for repeatability and accuracy of counts, counting rates, resource costs
  - Review procedures and standards. Plan and allocate FPA resources
  - Schedule training, select FPA recording, repository, analysis and reporting tools
3. Perform Measurement Process

**15939 Activities:**

- **Integrate**
  - Measurement procedures into current processes

- **Collect data**

- **Analyse data**

- **Communicate the results**

**FPA Process**

- Integrate FPA into Project process, Map requirements documentation to FPA

- Identify count Size Parameters

- Perform and validate count

- Interpret and Analyse FPA results for Metrics reporting

- Formally document FPA metrics results and report

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4. Evaluate Measurement Process

• **15939 Activities:**
  - Evaluate Measures and Measurement process

• **FPA Process**
  - Measure FPA:
    - efficiency
    - effectiveness
    - accuracy
    - repeatability against defined criteria

  Identify
  - strengths and weaknesses
  - strategies for improvement FPA & IT
  - feedback to process and stakeholders
1. Establish

People
Management
Application Experts
User
Counter

Training

2. Plan

- Plan the Count
- Define Size Parameters
- Establish Application Boundary
- Identify functions and assign points
- Calculate Value Adjustment Factor

3. Perform FPA Measurement

Count

- Documented results from Each Step
- Notes, decisions and Assumptions

Validation Process

- Review the Count Process
- Review the Count Result

Validation Result

Approved Validated Count

Validation Review Report

4. Measure and Evaluate Process

Function Point Count

- Local Count Standards
- IFPUG CPM 4.1
- Counting Procedures
- Validation Methodology
- Issues and Resolutions
- Reporting Standards
- FPA Training Notes
- Software Product Functional User Requirements

Recommendations
Recommendations for Maturing your FPA Process

- Perform a ‘gap analysis’ - FPA Process versus activities in ISO 15939
- Review ‘Planning Activity’- develop standards for
  - count process
  - count validation
  - count issues and resolutions
  - count reporting
- Review ‘Evaluation’ (analysis and feedback) activities in your FPA process
  - measure FPA process
  - implement process improvement strategies
FPA Measurement without a Mature Process

Reporting Standards  FPA Procedures  Feedback Evaluation

Planning

Successful FPA Process
Thank You Good Luck with your FPA Measurement Process!

Download full details from : WWW.Totalmetrics.com

1. Article - Implementing a ‘Mature’ FPA Process

2. Article - Infrastructure and Resources required for the FPA Process

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