Validating Function Point Counts - a methodology

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Aims of this presentation

- highlight the necessity to validate metrics data - function point counts
- describe a methodology for validating counts
- give some examples of results of audits and typical counting errors
Why Validate? - the Consequences

- Incorrect Count results cause -
  - incorrect estimates
  - incorrect productivity rates
    - low rates - decision to outsource
    - high rates - reduced incentive to improve

- Consequences
  - Cancelled or late projects
  - Poor management decisions
Why Validate? - the Consequences

- **Inconsistent Count results cause** -
  - lack of faith in function points as a useful, objective, repeatable measure
  - contractual disputes as performance results vary

- **Consequences**
  - Cancelled metrics programs
  - Legal action
Validation *Methodology
Checks both Function Point

• **Count Process** (*a priori* validation)
  – Adherence to Counting Procedures
  – Capability of Counters
  – Software Documentation Referenced
  – Applications Experts / Users Interviewed

• **Count Result** (*A posteriori* validation)
  – Function Point Count
  – Notes, Decisions and Assumptions

* Validating Function Point Counts*,
Pam Morris and Jean Marc Desharnais, IFPUG Spring Conference Proceedings April 1996.
Submitted for publication and presentation in IEEE conference Germany October 1996—

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Validation Review Steps

(1) Plan Review and Collect Supporting Information

(2) Validate FP Process

People Documentation

High Level

Intermediate Level

Low Level

(3) Validate FP Results for correctness and completeness

(4) Produce Report for Feedback

Review Report Validated Count
1. Plan Review and Collect Supporting Information

• Steps:
  – prepare all supporting information
  – schedule review process
Collect Supporting Information

A. Count Background
   - type of count
   - version IFPUG used
   - Dates, Names, etc

B. Software Background
   - functional domain
   - project attributes
   - functional specifications etc.

C. Count Results
   - summary data, assumptions, decisions
   - detailed transaction and file count
   - application boundary, data model
Schedule Resources

• Schedule availability of review participants:
  • counter
  • applications expert
  • reviewer

• Organise room and equipment
  • meeting room
  • whiteboard
  • notebook PC

• Allocate responsibility to collect review supporting information

• Allocate time needed for review based on
  • experience of counter
  • size of application
2. Validate FP Process

- Check the following
  - using correct version of FPA Counting Standards
  - have followed this organisation’s FPA procedures
  - count documentation is complete
  - counters training and counting experience is adequate
  - IFPUG FPA suitable for functional domain (type of software) counted
  - adequate complete information available to counter
    - specifications of functional user requirements
    - applications experts knowledgeable
3. Validate FP Results

- Examination of the completed count at various levels of detail
  
  (a) High Level Validation
  - aimed at identifying major strategy errors
  
  (b) Intermediate Level Validation
  - aimed at validating intrinsic relationships that exist between count components against industry data
  
  (c) Low Level Validation
  - a detailed examination of individual business functions
(a ) High Level Validation

- **Objective:**
  - To review count at a high level for correctness before examining it in detail

- **Check:**
  1. Count environment
  2. If the size is seems reasonable.
Count Environment

Check:

(a) purpose - how is the count to be used?

(b) boundary - positioned correctly?

(c) scope - does it reflect the purpose?

(d) type of count - is it correct?
(2) Reasonableness of Size

- Check the following attributes of the software:
  
  (a) Effort to develop
  (b) Effort to support
  (c) Other applications delivering similar functions
  (d) Volume of documentation
(a) Check Effort to Develop

- 20,000 hours predicts a size of around 2,000 + 600 function points
(b) Check Effort to Support

- 2 staff predicts a size of 2,100 + 400 function points

Relationship between Functional Size and Number of Support Staff (Mainframe COBOL applications)

\[ y = 1047.23x \]

- \( R^2 = 0.63 \)
- \( n = 8 \)
Validation Review Steps

(1) Plan Review and Collect Supporting Information

(2) Validate FP Process

High Level

Intermediate Level

Low Level

(3) Validate FP Results for correctness and completeness

(4) Produce Report for Feedback
(b) Intermediate Level Validation

- Objectives:
  - To compare the profile of the count with profiles from an industry data base applications in a similar functional domain.

- Check count profile against Industry data:
  (i) Relationship between Functions
  (ii) Complexity of Functions
Complete MIS ‘systems’ have the following characteristics:

For each group stored data there is a requirement to:

- **Input the data** = (input functions)
- **Retrieve it** = (enquiry + output)

Amount of data stored is very predictive of the **overall total size** in unadjusted function points.
1. Relationship between Files and Total Size

Relationship between Functional Size and Total Number of Files (ILFs only)

Total size = number of ILFs * 30.8

\[ y = 30.8x \]

\[ R^2 = 0.87 \]

\[ n = 161 \]
Relationship between Files and Total Size

Relationship between Functional Size and Total Number of Files (ILFs + EIFs)

\[ y = 22.094x \]

\[ R^2 = 0.7668 \]

\[ n = 161 \]

Reference: Pam Morris and Jean Marc Desharnais - IFPUG Conference Proceedings April 1996
2. Ratio of Types of Functions

Number Inputs = number of ILFs * 2.7
Number Outputs = number of ILFs * 1.18
Number Enquiries = number of ILFs * 1.18

Reference: Pam Morris and Jean Marc Desharnais - IFPUG Conference Proceedings April 1996
3. Percentage Contribution to Size New Development

Comparison of Function Points Contributed by Each Function Type ISBSG

Release 6.0 April 2000

- Outputs: 24%
- Inputs: 33%
- Enquiries: 16%
- Internal File: 22%
- External File: 5%

Number of projects = 363

Check the percentage contribution in FPs of the different types of functions to the overall size compared industry profiles.
(ii) **Complexity of Functions**

- assess complexity and compare to industry averages
  - (Transactions = average, files= low with some average)
- complexity of transactions should reflect the overall complexity of the application

*Warning: If complexity does not correspond then check the way logical files were grouped.*

<table>
<thead>
<tr>
<th>Function Type</th>
<th>Mean Function Points Awarded (Total number FPs / Total number functions)</th>
<th>Corresponding IFPUG Complexity Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ISBSG Data Release 5 (n=238)</td>
<td>JDM, PM Data (n = 161)</td>
</tr>
<tr>
<td>Inputs</td>
<td>4.3</td>
<td>4.2</td>
</tr>
<tr>
<td>Outputs</td>
<td>5.4</td>
<td>5.8</td>
</tr>
<tr>
<td>Inquiries</td>
<td>3.8</td>
<td>4.0</td>
</tr>
<tr>
<td>Internal Logical Files</td>
<td>7.4</td>
<td>7.8</td>
</tr>
<tr>
<td>External Interface Files</td>
<td>5.5</td>
<td>5.2</td>
</tr>
</tbody>
</table>
Validation Review Steps

(1) Plan Review and Collect Supporting Information

(2) Validate FP Process

(3) Validate FP Results for correctness and completeness

(4) Produce Report for Feedback
(c) Low Level Validation

- Objectives:
  - To check the details of how each of the functions were counted within a sample set of functions.

- Check count decisions for a sample set of functions
  1. Files
  2. Transactions
(i) Data Functions

- check the following:
  - not based on physical or technical files
  - not just data model tables
  - complexity of all “high” and “average” complexity files is correct
  - for matching ILFs and EIFs ie same file name, different file type
  - if there is a corresponding file for maintenance transactions
  - codes tables conform to local rules
  - have not counted transaction load files as ILFs
(ii) Transaction Functions

• check for incorrect counting of:
  • duplicate functions
  • menus as transactions
  • physical screens not logical functions
  • technical transactions
    – re-organize indexes
  • counting variations of functions
    – different media used (e.g. display or print report)
  • Technical or quality functions
Validation Review Steps

(1) Plan Review and Collect Supporting Information

(2) Validate FP Process

(3) Validate FP Results for correctness and completeness

(4) Produce Report for Feedback
4. Produce Validation Review Report

- Objectives:
  - document the review results for input into process improvement initiatives

- Steps
  1. Produce a Review Report
  2. Make Recommendations for improvement
     - Software Specification process
     - FPA process
     - Validation process
(ii) Make recommendations

- Identify areas of weakness for input into:
  - targeted workshops for issues found
  - FPA training courses
  - focus for future reviews
  - clarification of issues in local counting standards
  - queries for IFPUG CPC
  - process improvement strategies
  - allocation of resources - assignment scope
- Use review opportunity for skills transfer
- Schedule second review after identified errors are corrected (if necessary)
Plan the Count
Define Purpose for Counting
Establish Application Boundary
Establish Count Scope
Identify functions and assign points
Calculate Value Adjustment Factor

Function Point 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

FPA Procedure

FP Count Process

FP Count Result

Resources Input
People
Management
Application Experts
User
Counter

Documentation
• Local Count Standards
• IFPUG CPM 4.1
• Counting Procedures
• FPA Training Notes
• Software Product Functional User Requirements

Recommendations
Example: Audit Results - Error % for Applications <1000 fps

(Difference Actual - original value) minimum = −18%, maximum = +50%, standard deviation = 18.6%)
Audit Results - % of Functions Counted Incorrectly

Results by Assessed Quality of Count
ei.counted the number of functions counted incorrectly compared to total number of functions

Only 19% had less than 10% of functions incorrect = industry acceptable error range

37% had more than 50% of functions incorrect = recount recommended

44% had between 11% and 49% functions incorrect
Summary Observations

• the following will assist in improving the reliability of the validation methodology and your Function Point counts:
  – continual observation, collection and documentation of count results and validation results
  – only using counters who are *trained* and *experienced* in FPA
  – only using reviewers who are *highly* knowledgable and experienced in FPA
  – ensure you have a complete up to date set of local counting standards (FPA rules)
  – a formal FPA Procedure Manual
Thank You and Good Luck with your Validation

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