Validating Function Point Counts - a methodology

JFPUG Conference Tokyo

April 2000

Pam Morris - Total Metrics

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Pam Morris

- Member of the IFPUG Counting Practices Committee since 1992
- Workgroup convenor and project editor ISO/IEC 14143 Functional Size Measurement Standards
- Executive Member of the Australian Software Metrics Association (ASMA)
- Chief Executive Officer of Total Metrics

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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

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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**

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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**

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* 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-

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**

Review Report

Validated Count

(4) **Produce Report for Feedback**

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1. Plan Review and Collect Supporting Information

- Steps:
  - **prepare all supporting information**
  - **schedule review process**

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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

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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

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2. Validate FP Process

- **Check the following**
  - **using correct version of FPA Counting Standards**
  - **have followed this organisations 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 knowledgable

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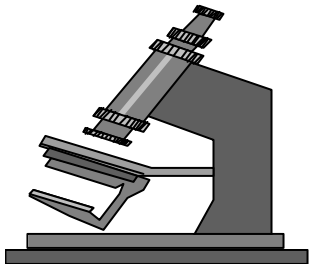
3. Validate FP Results

- **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



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(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.

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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?

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(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

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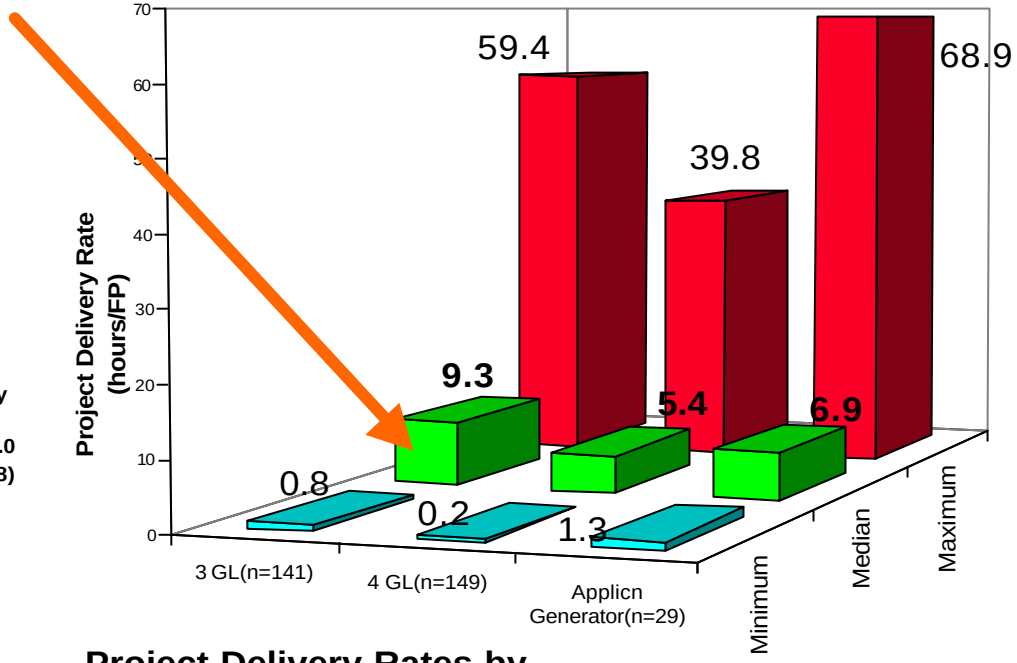
(a) Check Effort to Develop

- 20,000 hours predicts a size of around 2,000 ± 600 function points

ISBSGs Repository Data (Release 5.0 March 1998)



Project Delivery Rates by Development Language

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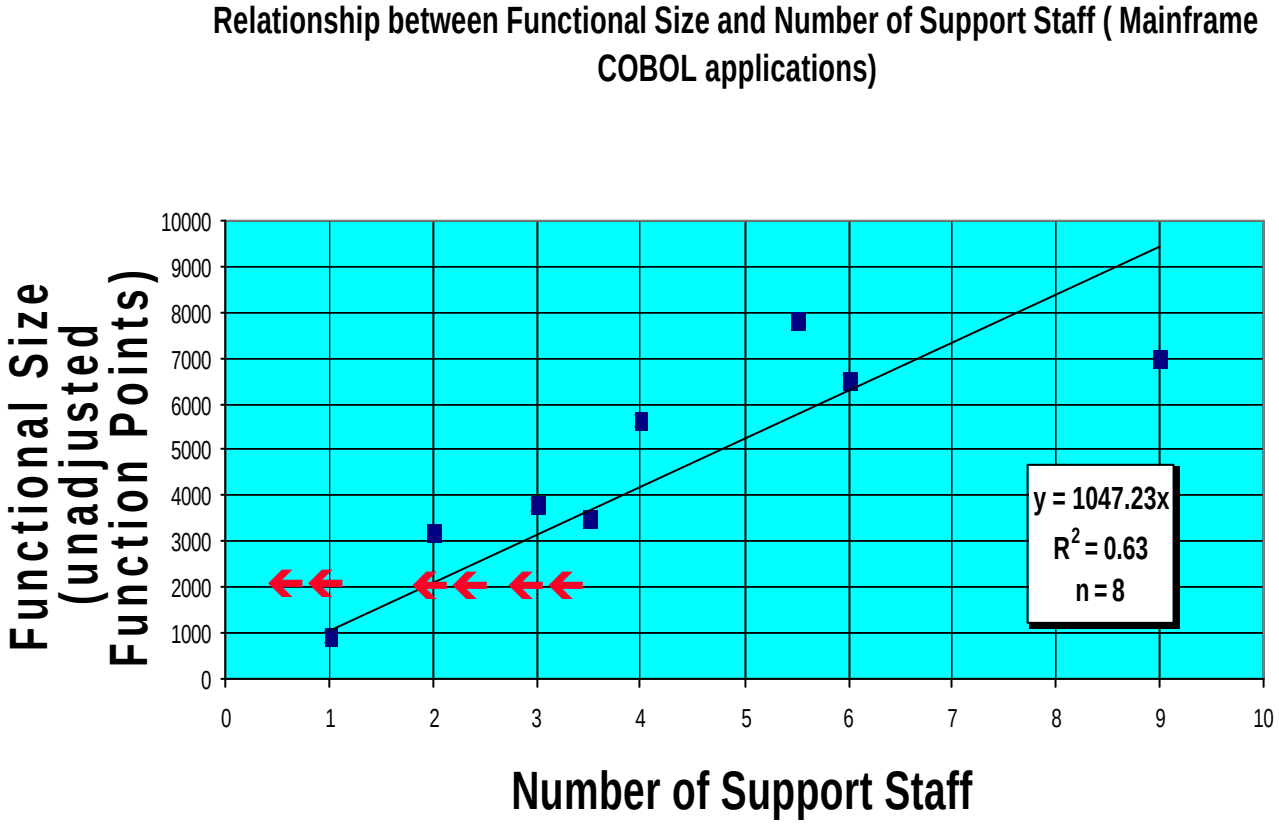
(b) Check Effort to Support

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



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(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**

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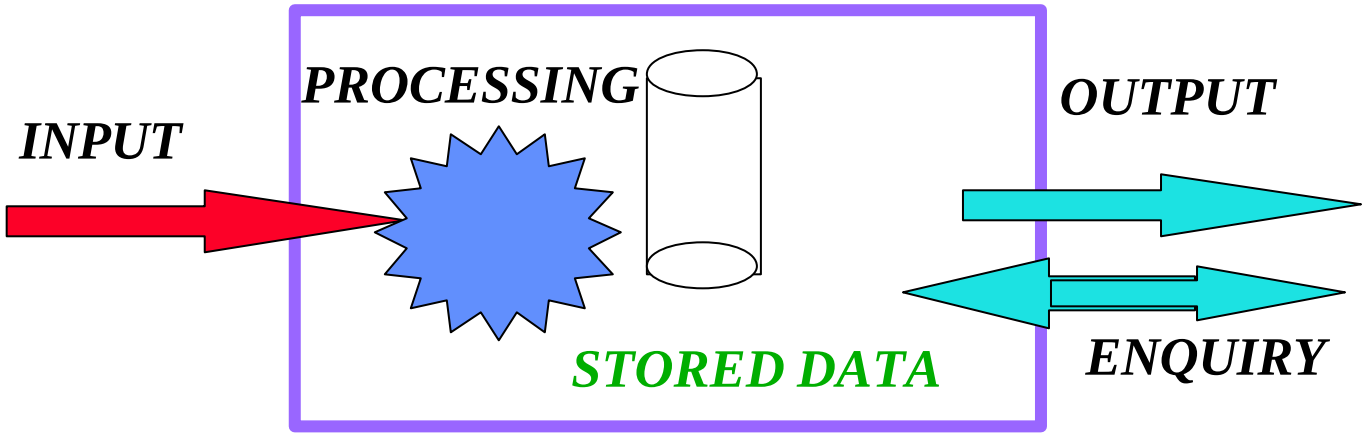
(i) Relationship between Functions

Complete MIS 'systems' have the following characteristics



For each group stored data there is a requirement to :

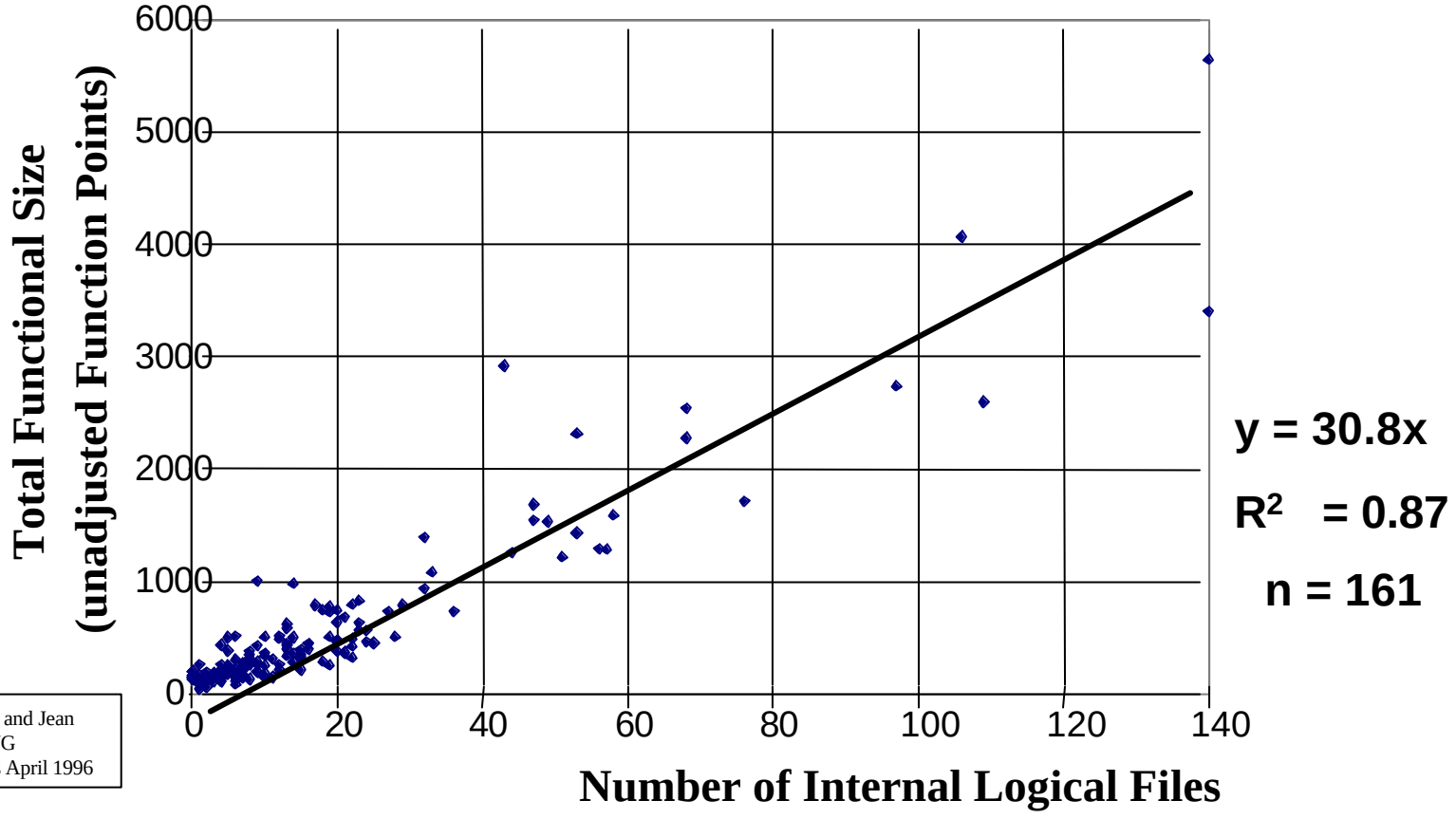
- input the data = (input functions)
- retrieve it = (enquiry + output)

Amount of data stored is very predictive of the **overall total size** in unadjusted function points

1. Relationship between Files and Total Size

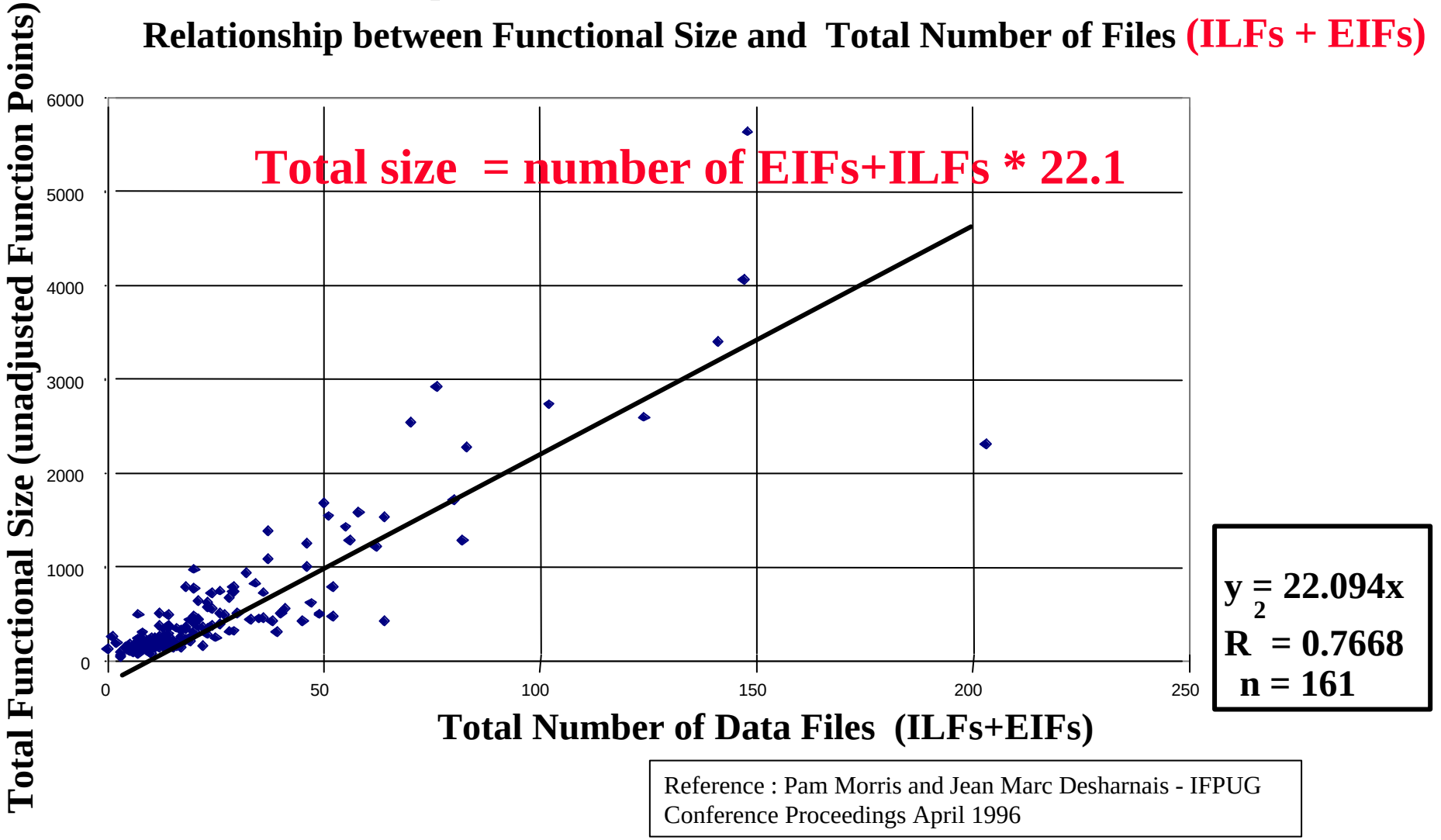
Relationship between Functional Size and Total Number of Files (ILFs only)

Total size = number of ILFs * 30.8



Reference : Pam Morris and Jean Marc Desharnais - IFPUG Conference Proceedings April 1996

Relationship between Files and Total Size



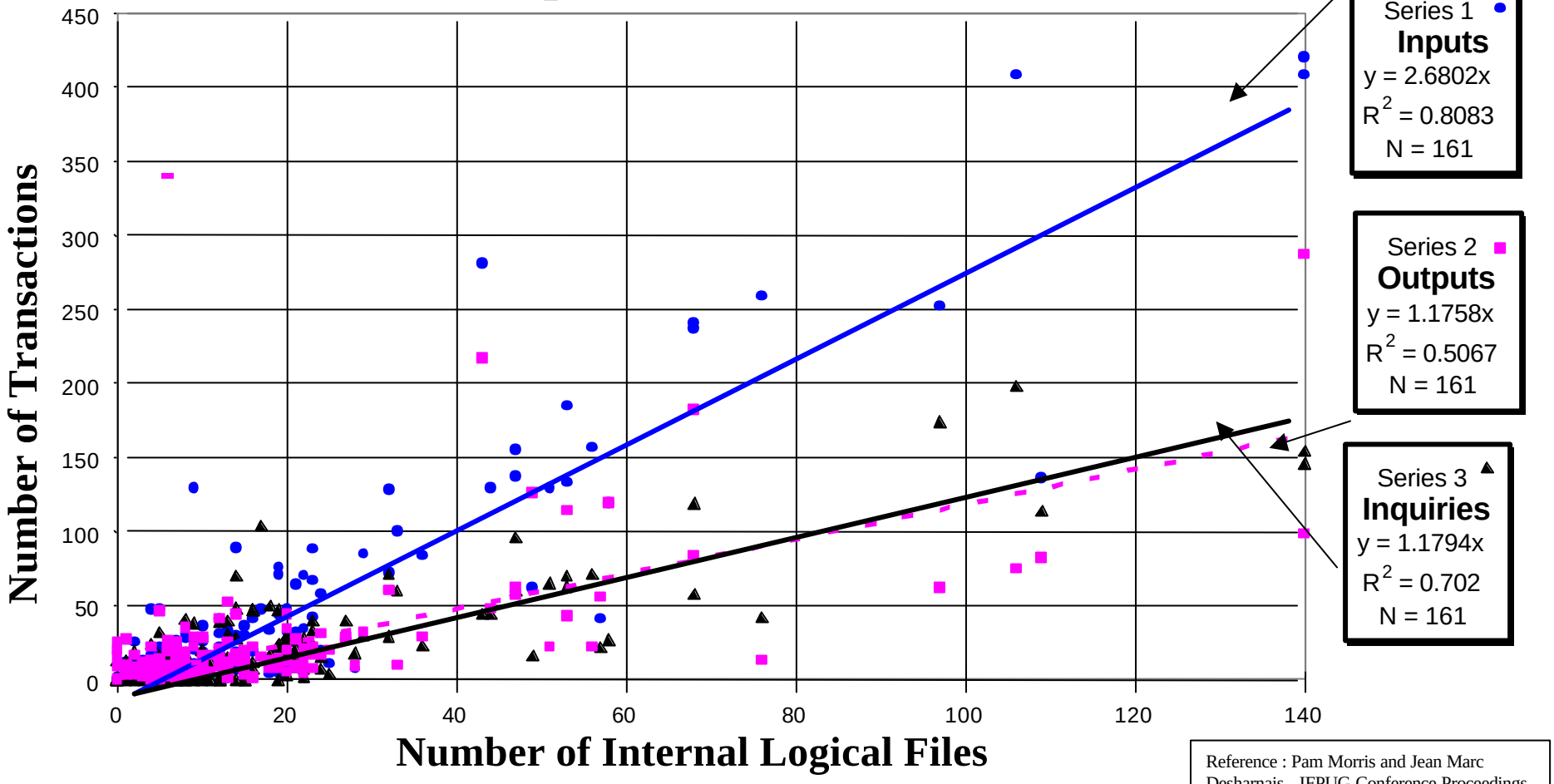
Reference : Pam Morris and Jean Marc Desharnais - IFPUG Conference Proceedings April 1996

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



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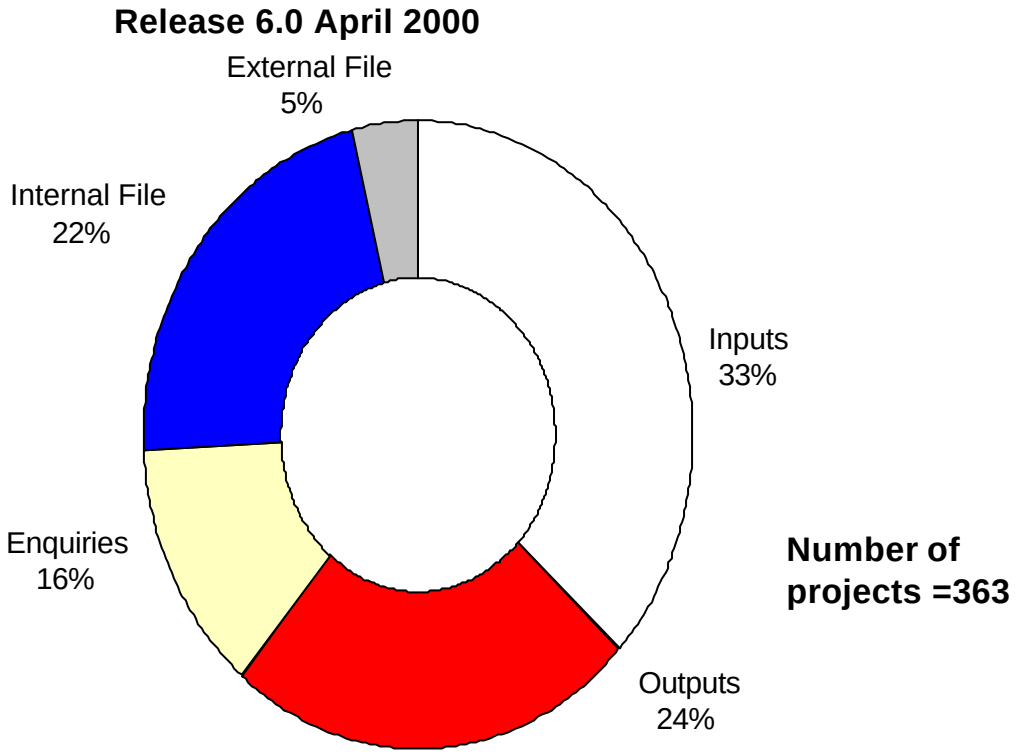
3. Percentage Contribution to Size New Development

Comparison of Function Points Contributed by Each Function Type ISBSG



Check the percentage contribution in FPs of the different types of functions to the overall size compared industry profiles

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(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.

Function Type	Mean Function Points Awarded (Total number FPs /Total number functions)		Corresponding IFPUG Complexity Rating	
	ISBSG Data Release 5 (n=238)	JDM, PM Data (n = 161)	Average	Low
Inputs	4.3	4.2	**4**	3
Outputs	5.4	5.8	**5**	4
Inquiries	3.8	4.0	**4**	3
Internal Logical Files	7.4	7.8	10	**7**
External Interface Files	5.5	5.2	7	**5**

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(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
  - **(i) Files**
  - **(ii) Transactions**

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(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**

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(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

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4. Produce Validation Review Report

- Objectives:
  - **document the review results for input into process improvement initiatives**
- Steps
  - **(i) Produce a Review Report**
  - **(ii) 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)**

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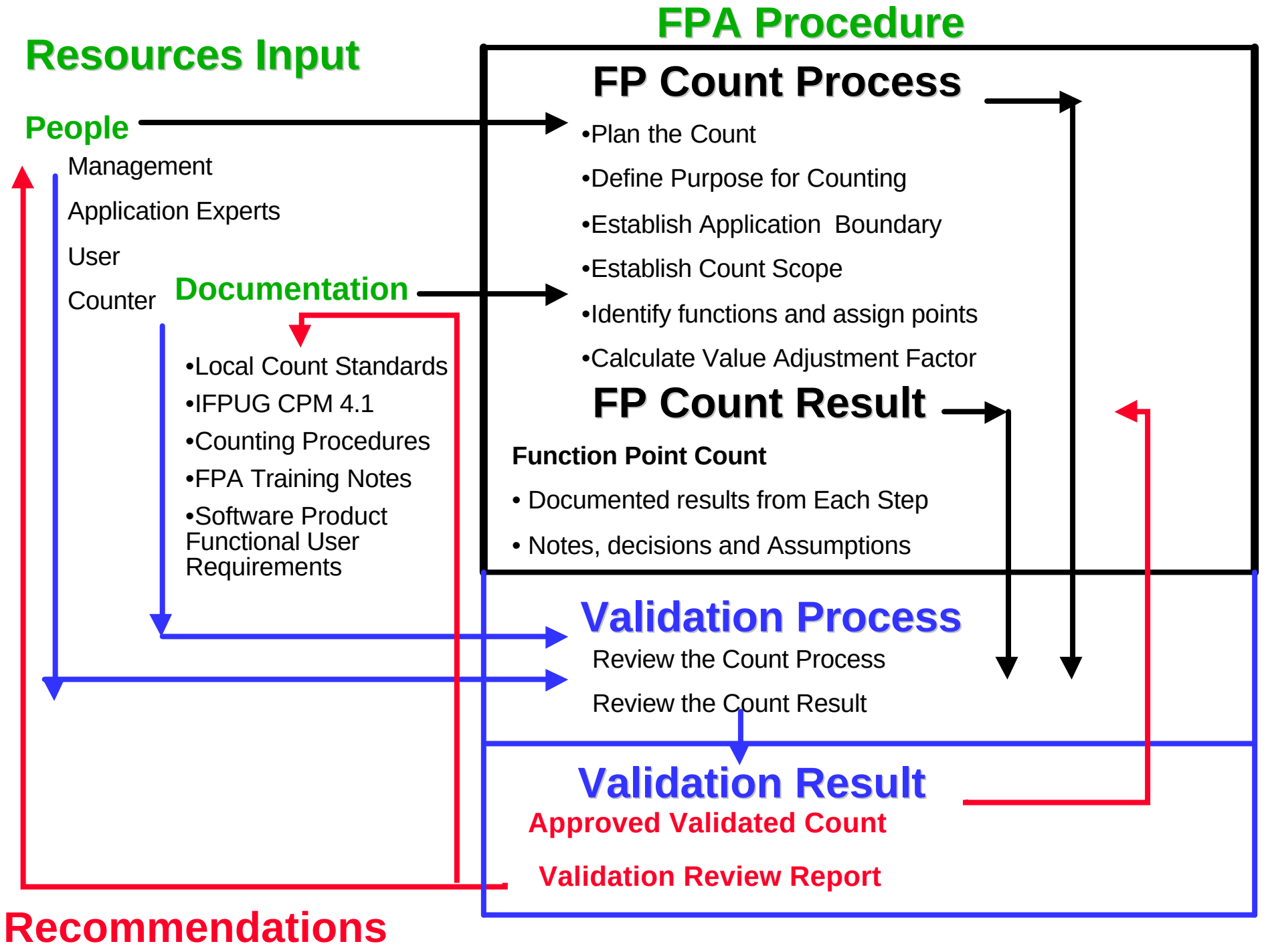
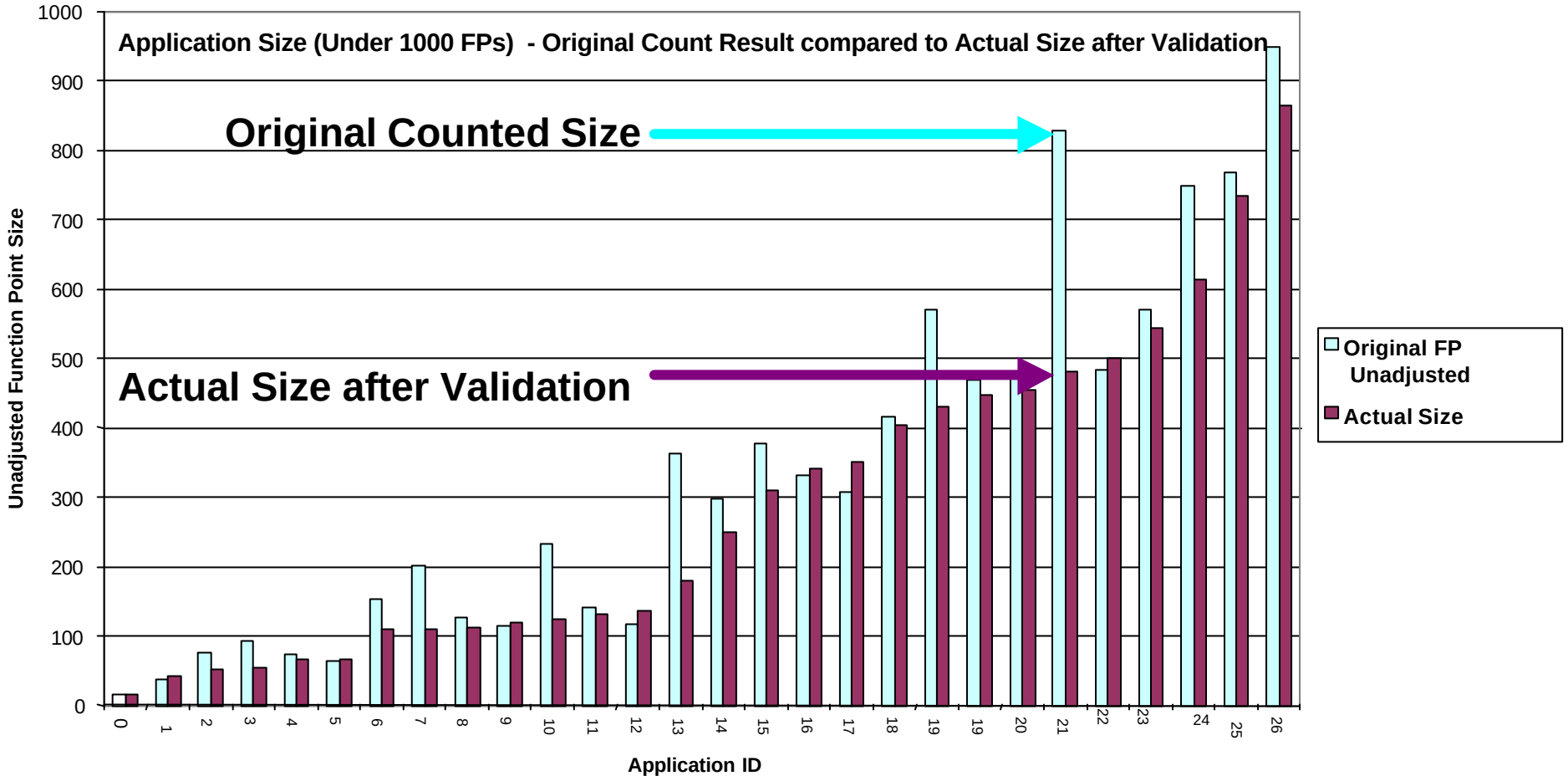

Resources Input
People
Management
Application Experts
User
Counter
Documentation
•Local Count Standards
•IFPUG CPM 4.1
•Counting Procedures
•FPA Training Notes
•Software Product Functional User Requirements
FPA Procedure
FP Count Process
•Plan the Count
•Define Purpose for Counting
•Establish Application Boundary
•Establish Count Scope
•Identify functions and assign points
•Calculate Value Adjustment Factor
FP Count Result
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
Recommendations

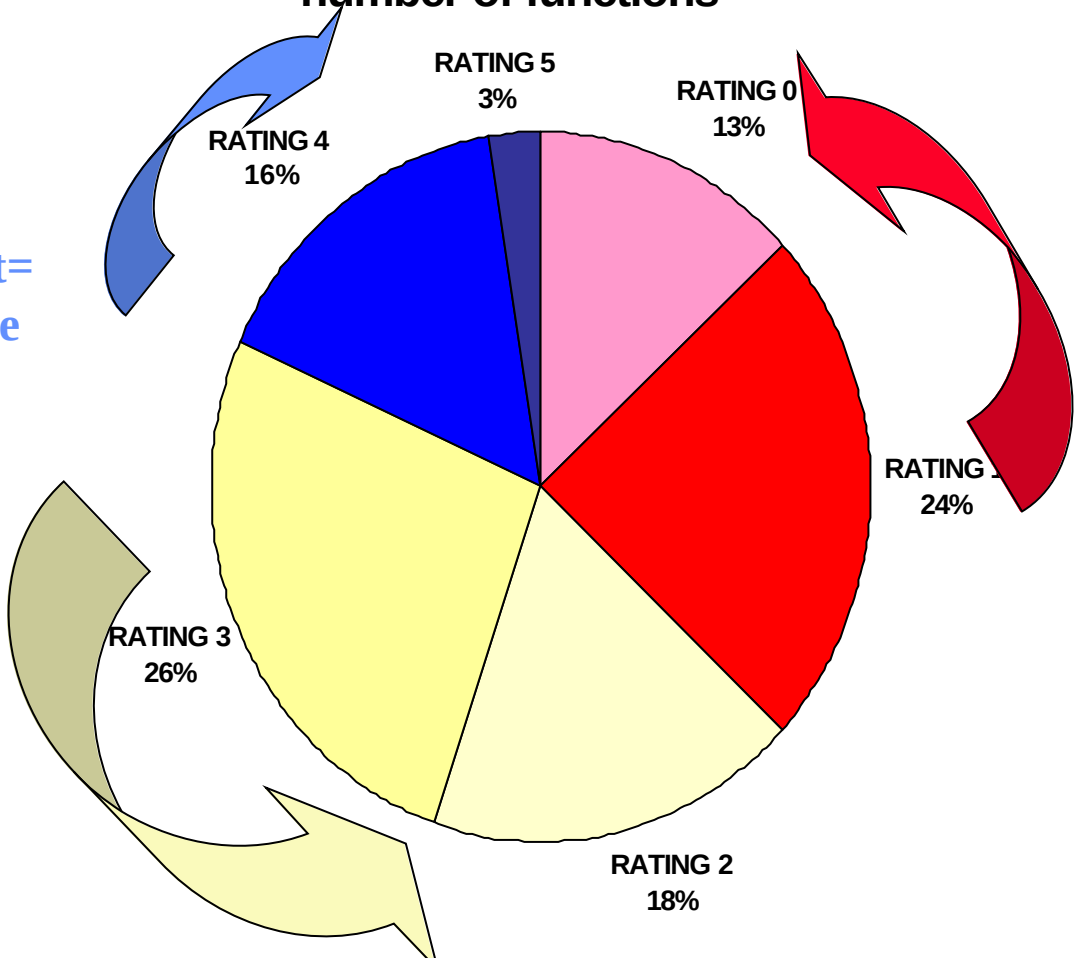
Example : Audit Results - Error % for Applications <1000 fps

(Difference Actual - original value) minimum = –18%, maximum = +50%, standard deviation = 18.6%),



Audit Results - % of Functions Counted Incorrectly

Results by Assessed Quality of Count
ie.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

44% had between 11% and 49% functions incorrect

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

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**

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Thank You and Good Luck with your Validation

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