Improving the Maturity of the FPA Process

(Getting more 'Bang' for your 'Buck' from Function Point Counters)

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Pam Morris Profile

- Member of the IFPUG Counting Practices Committee 1993 - 2000
- International Workgroup convenor and project editor ISO/IEC 14143 Functional Size Measurement Standards
- Executive Member of the Australian Software Metrics Association (ASMA)
- Core project member COSMIC
- Chief Executive Officer of Total Metrics

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 arent 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"*
- *"Not sure we measuring the same as everyone else"*
- *"No one cared about what we did"*
- *"We did not have any tools"*
- etc.

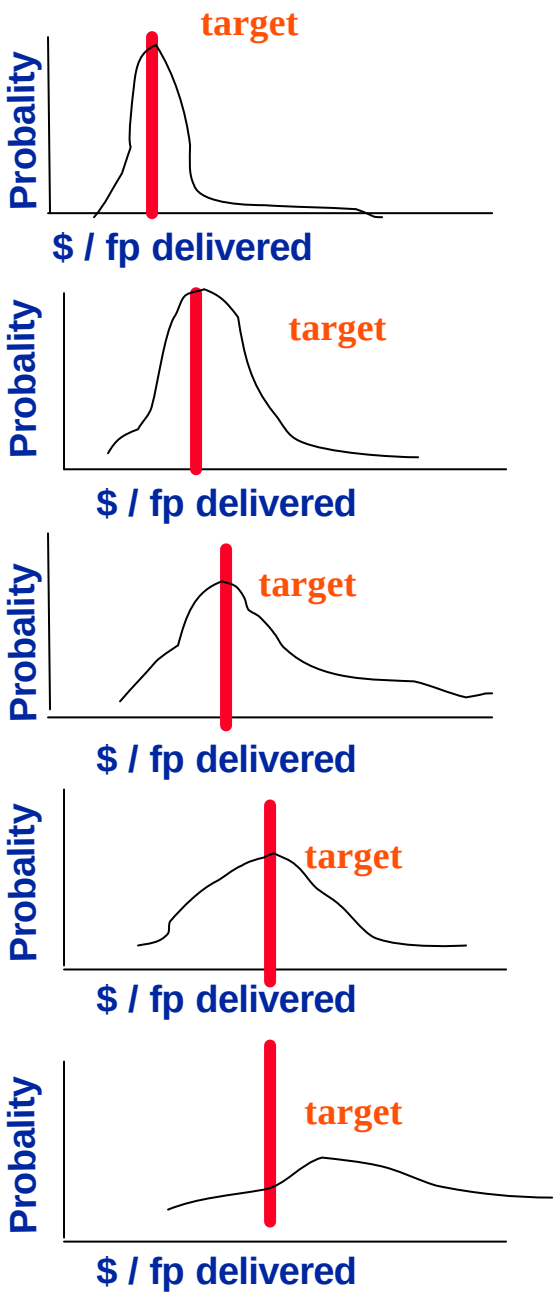
Where did we go wrong?

Other IT Processes

- **The ‘capability’ of an IT organisation is measured by the maturity of its ‘IT processes’**
- **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**

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

2001 - 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 the FPA process**
  - **implement *standards and procedures* for:**
    - collection
    - validation
    - storage
    - analysis
    - reporting
    - use of FPA results
  - **document local interpretation and application of industry rules**
  - **continually measure , monitor and improve 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]

We need to ***understand*** the measurement Process

process ownership

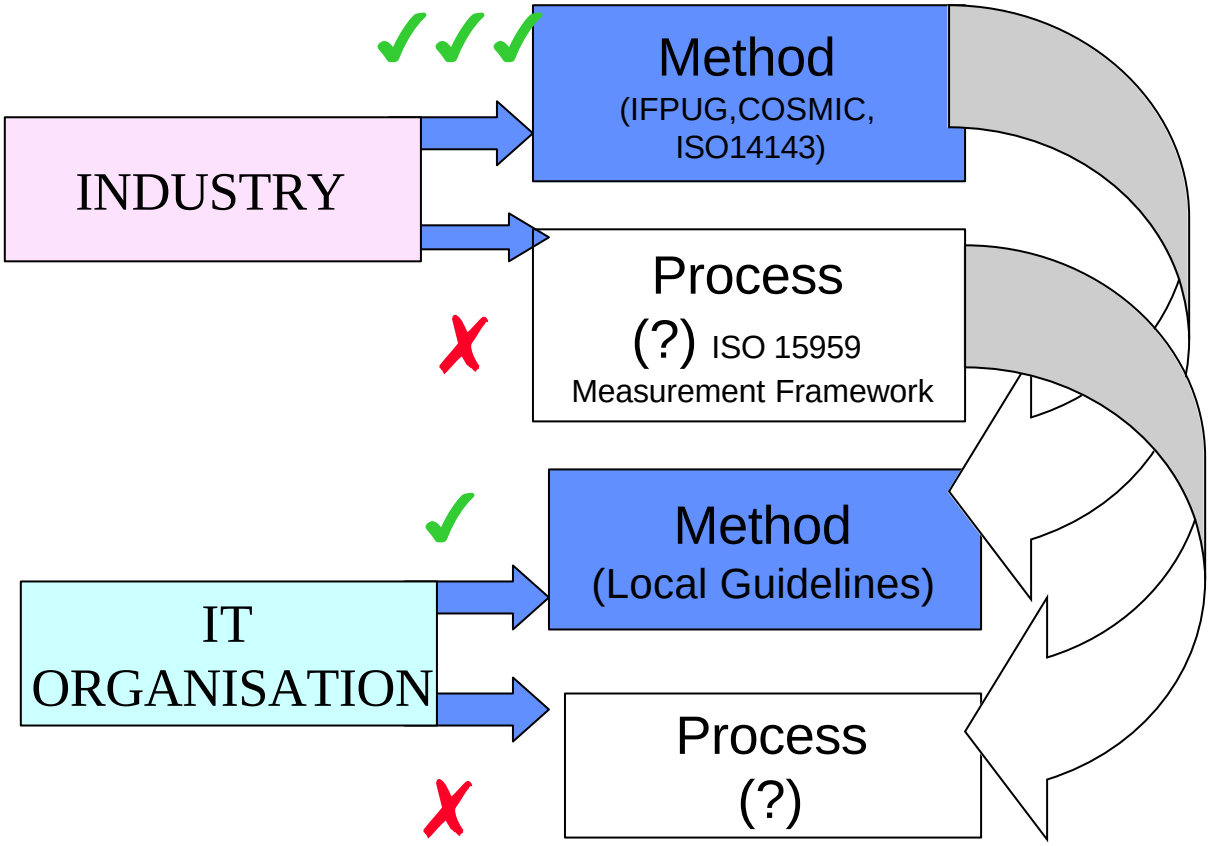
All managed processes must be assigned ownership that includes responsiblities for design, for establishing and ***implementing mechanisms for measuring the process*** and taking corrective action where necessary.
(Reference : SEI Guidebook HB003 97)

We also need to ***measure*** the measurement Process

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
  - document the outcome of measurement to an agreed industry wide standard.
  - measure the ‘measurement process’ and optimise our own improvement

Current Standardisation of FPA Method and Process



ISO - 15939 - Measurement Process

- ***Activities :***
  - ***Establish and Sustain Measurement Commitment***
  - ***Plan Measurement Process***
  - ***Perform the Measurement Process***
  - ***Evaluate Measurement and improve***

Example : Why the Industry and an Organisation needs FPA Process Standards

What is the 'best' answer to the following?

The functional size of the ***Leave Register*** Application is:

1. **236** function points
2. around **250** function points
3. a **small to medium** application (ie between 200 to 500 function points)

Which Counter did the 'best' count?

Three counters counted the *Leave Application*:

1. Peter, documented every counting decision, cross-referenced all files to transactions and counted all DETs and FTRs **(Error range = ±10%)**

   → 2 days counting effort = $2000

2. Susan, counted all the files and transactions using the industry averages for the transaction and file complexity. **(Error range = ±15%)**

   → 1/2 days counting effort = $500

3. David just counted the logical data groups and multiplied by 31. **(Error range = >±20%)**

   → 1 hours counting effort = $125

TOTAL METRICS

The 'quality' of the count *result* (accuracy) and its *documentation* (completeness) is relative to the *purpose* for which the count will be used!

Standardise the process so the count result suits the purpose!

Common 'purposes' for Function Point Counts

- **Strategic Uses**
  - Software Portfolio Assessment & Evaluation
  - Performance Measurement
  - Benchmarking
  - Process Improvement
  - Planning Support Resources & Budgets
- **Tactical Uses**
  - Requirements Evaluation
  - Estimating & Quoting
  - Project Tracking & Control
  - Evaluation of Re-work
  - Evaluation of Packaged Software

What we need vs what we can get!

Purpose for Count

Count Size

Count Documentation

Input Resources

Count Process

Output Results

Software Specification

Subject Matter Expertise

Function Point Counter

FPA Tools

TOTAL METRICS

The 'quality' of the count *result* is driven by the *purpose* of the count but ultimately controlled by the 'quality' and 'quantity' of the *Input Information, counting tools and personnel used*

Provide resources to a count and perform the activities that are consistent with the outcome required!

FPA Process - Planning Activity

- Assess
  - Budget and Schedule constraints for count
  - Purpose for which the outcome will be used
  - Quality of Input resources to the Count
    - software documentation
    - applications experts
    - counters
    - tools
- Predict the approximate size of the software
- Determine Quality of ‘desired’ Outcome versus ‘likely’ Outcome
- Get agreement from Sponsors on Count Strategy that will produce the planned outcome
- Map the strategy to the appropriate **‘Count Level’**

What do we Mean by 'Levels of Counting'

Standardized descriptions the FPA Process Defines Count:

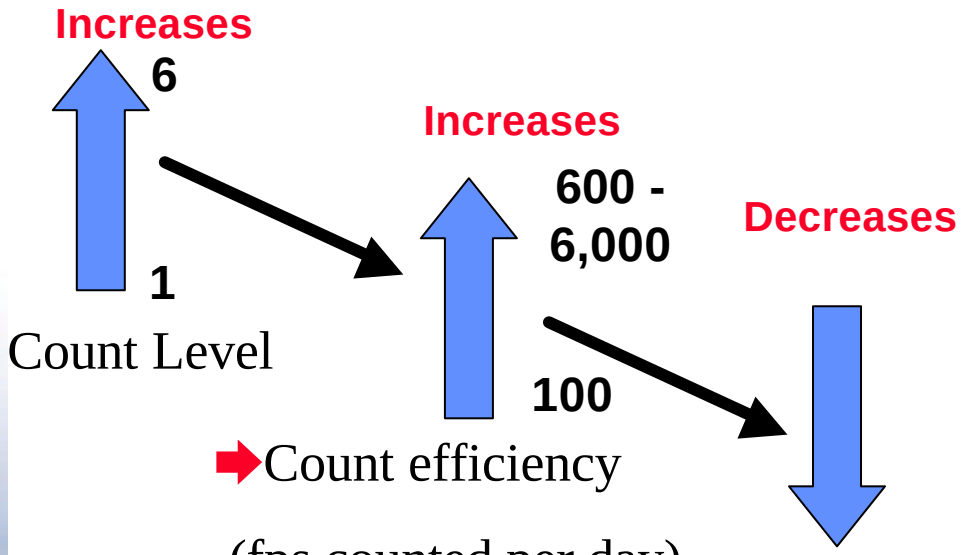
- level of detail
- type of count documentation
- extent of comments and notes
- maintainability
- valid uses
- error margin
- counting rates
- benefits and limitations
- input requirements

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.

Download full details of Count Levels from Total Metrics WWW Site - WWW.Totalmetrics.com

‘Levels of Counting’



➡ Count efficiency

(fps counted per day)

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

LEVEL 1 - Detailed Linked and Labelled Count

- ✓ application boundary
- ✓ all files and transactions uniquely identified, classified into type
- ✓ complexity (*actual numbers of DETs and FTRs are identified*)
- ✓ files and transactions are cross-referenced
- ✓ explanatory notes
- ✓ physical files and the logical files cross-referenced
- ✓ explanatory notes also link files and transactions to relevant documentation
- ✓ all agreed labels are attached
- ✓ uses *FPA* software repository tool.

LEVEL 1 - Detailed Linked and Labelled Count

Level 1 Count Attributes

- ✓ very detailed
- ✓ easily auditable
- ✓ accurate (within the limits of the FPA technique +/- 10%)
- ✓ very well documented
- ✓ easily maintained.

LEVEL 1 - Detailed Linked and Labelled Count

Best suited for Purposes of:

- ✓ benchmarking projects (new development and enhancement)
- ✓ detailed estimates
- ✓ project tracking
- ✓ baseline model for enhancement project counting
- ✓ Metrics reporting

LEVEL 1 - Detailed Linked and Labelled Count

Limitations:

- ✓ very time intensive – counting rates around 100 to 200 fps per day
- ✓ requires very skilled counters
- ✓ few counters are willing to invest the effort
- ✓ rarely cost effective for large, legacy application baseline counts.

LEVEL 1 - Detailed Linked and Labelled Count

Prerequisites:

- ✓ high quality system documentation
- ✓ logical data model
- ✓ available experienced system experts.

Level 1 - Detailed Linked Labelled Count

Example: Government contract based on fixed price dollars per function point contract *For details see: www.mmv.vic.gov.au/southernscope*

Step 1 - Requirements Specification - Level 4

- suppliers to bid based on $/fp

Step 2 - Functional Specification - Level 1

- auditability and mutual agreement on size
- enables measurement of scope changes

- **Result = a count that is verifiable, auditable, traceable and able to be used as a basis for fixed pricing.**

LEVEL 3 - Detailed Count

- ✓ application boundary
- ✓ all files and transactions uniquely identified, classified into type
- ✓ complexity (*ranges within matrices are recorded*)
- ✗ files and transactions are cross-referenced
- ✓ explanatory notes
- ✓ physical files and the logical files is documented. cross-reference
- ✗ labels are attached to relevant transactions
- ✓ uses a FPA software repository tool.

LEVEL 3 - Detailed Count

Level 3 Count Attributes

- ✓ very detailed
- ✓ easily auditable
- ✓ accurate (within the limits of the FPA technique +/- 10%)
- ✓ very well documented
- ✓ easily maintained.

LEVEL 3 - Detailed Count

Best suited for Purposes of:

- ✓ benchmarking projects (new development and enhancement)
- ✓ detailed estimates
- ✓ project tracking
- ✓ as detailed baseline model for future detailed enhancement project counting
- ✓ Metrics reporting

LEVEL 3 - Detailed Count

Limitations:

- ✗ time intensive – counting rates from 200 to 300 fps per day
- ✗ not really cost effective for large, legacy application baseline counts

LEVEL 3 - Detailed Count

Prerequisites:

- ✓ good system documentation
- ✓ data model if possible
- ✓ access to system experts.

Level 3 - Detailed Count

Example: Evaluation of supplier quotation for planned project that exceed clients estimated budget by 300%

Reason for NOT doing a detailed Level 1-2 count

- not cost effective
- time constraints

Result

- Estimates confirmed suppliers quotation

LEVEL 6 - Size Approximation

- ✓ size estimate reported in unadjusted and / or adjusted function points
- ✓ assumptions documented in report.

LEVEL 6 - Size Approximation

Level 6 Count Attributes

- ✓ very little detail –size results only
- ✓ accuracy historically has been demonstrated to be within (usually ± 20% may be up to ±200%)
- ✓ completed questionnaire plus brief report on result
- ✓ not maintainable, snapshot of size only (needs to be redone if anything changes)

LEVEL 6 - Size Approximation

Best suited for Purposes of:

- ✓ portfolio baseline assessment
- ✓ benchmarking support ratios
- ✓ asset valuation
- ✓ estimates of counting effort
- ✓ project scoping
- ✓ most cost effective for large, legacy applications, which do not need their counts maintained

LEVEL 6 - Size Approximation

Benefits

- ✓ very efficient – most applications can have their size estimated within half a day
- ✓ very cost effective for large, legacy application baseline counts which have very little enhancement

Limitations

- ✗ not very accurate
- ✗ non-maintainable

LEVEL 6 - Size Approximation

Prerequisites:

- ✓ summarised system documentation
- ✓ full-time access to system experts (for the duration of count)

Level 6 - Estimated Count

Example: Establishing whether supplier was providing value for money

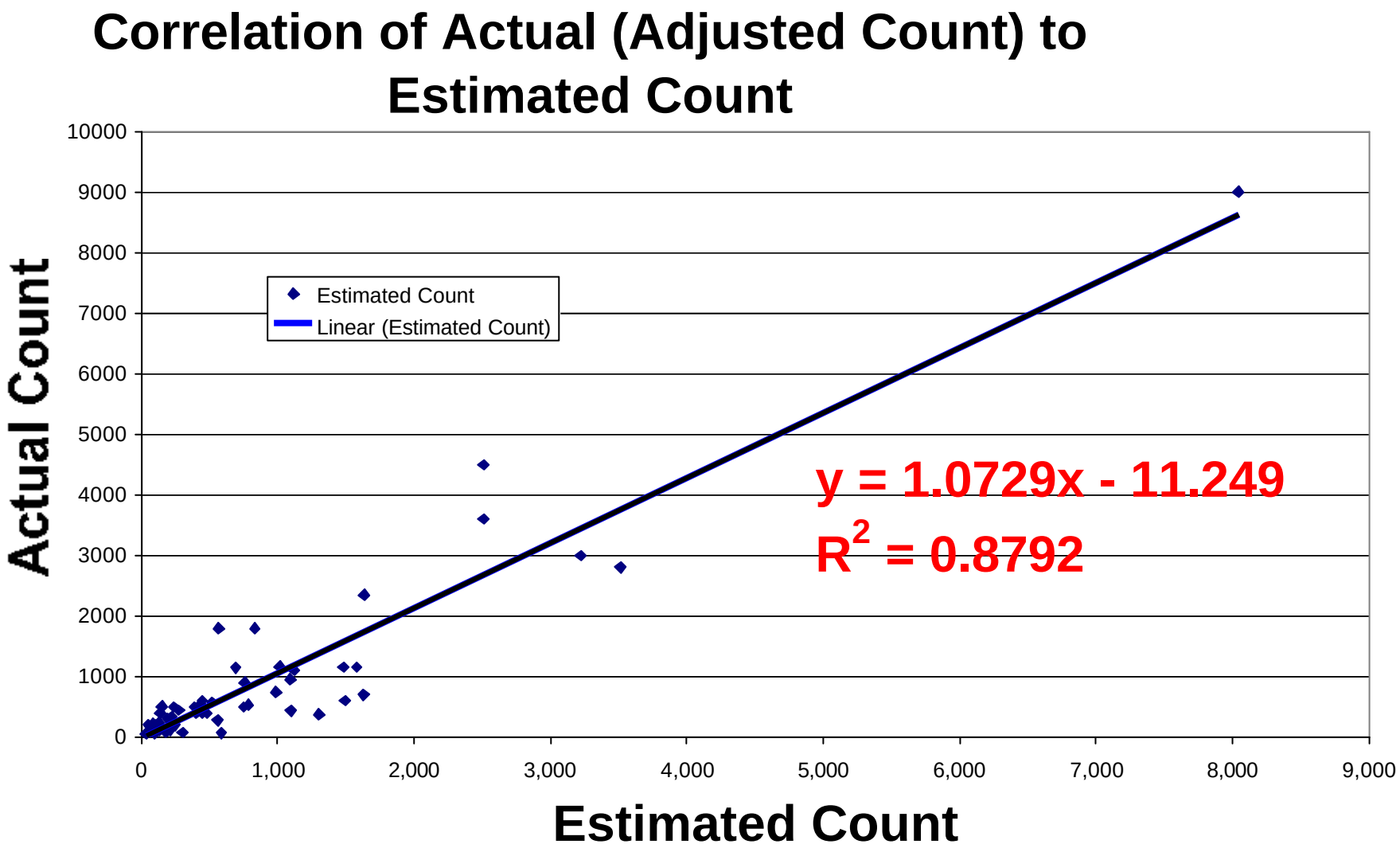
Reason for NOT doing a Level 1-5 count

- severe time constraints
- budget constraints

Results

- Size and productivity comparison report - 4 hours
- productivity 5 times worse than industry rates and cost was 10 times higher.

Estimates Vs Actuals



Benefits of Defining Standard 'Levels of Counting'

- Simplicity and consistency in describing count deliverables
- Improves management of customer expectations
- Basis for contract deliverables
- Easy comparison of competitive quotations for counting activity
- Simplicity in directing counters to perform counts
- Improved capability in estimating count duration
- Consistency in collecting metrics data on effort and costs of counting
- Formalizes the counting process
- Facilitates the count validation process

Recommendations for Future Success in FPA Measurement

- Industry wide need to standardise the FPA Process
- Organisational need to adopt Industry Standard process and adapt for local needs
- Example of Process standarisation needed is standard definitions of 'Count Levels'
  - Ideally documented in FPA counting procedures
  - Used as a standard basis for agreement on count deliverables by :
    - clients requiring counts
    - suppliers quoting counts
    - benchmarking companies collecting and reporting data
    - count auditors

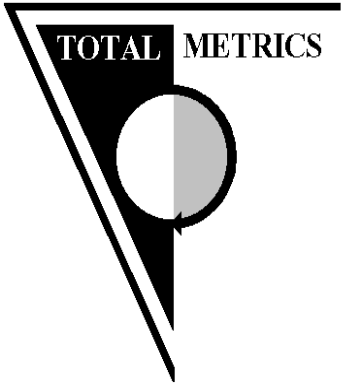
Thank You

Good Luck with your Measurement Process !

Download full details from : WWW.Totalmetrics.com

1. Article - Count Levels

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



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