COSMIC-FFP and IFPUG 4.1
Similarities and Differences

Presented by: Pam Morris (CEO)
TOTAL METRICS

CAI Presentation
October 14 2009
5:00pm

Copyright: Total Metrics 2009
About Total Metrics

• “We support organisations in their quest to optimize the cost effectiveness and efficiency of their software delivery”

• Internationally based - Certified IFPUG and COSMIC Consultants and Trainers - Europe, UK, USA, Australia

• Provide metrics related tools, procedures, consulting and training

• Thought leader in functional size measurement and developers of:

  - for organizations serious about measuring Functional Size - Multi-lingual Korean, Chinese, Japanese, Portuguese, Spanish, German, Dutch, Italian, French, English etc.

FREE Evaluations see WWW.totalmetrics.com
Agenda

- History of Functional Size Measurement

- 14143-1 Definitions of Functional Size

- Similarities and Differences

- When to use what FSM Method
Pam Morris - IFPUG and COSMIC background

- Member of the IFPUG Counting Practices Committee 1993 - 2000
- Co-author IFPUG 4.0, IFPUG 4.1, Case Study 1, Practical Guidelines for Counting Logical Files, Reviewer IFPUG 4.2 and 4.3
- IFPUG CFPS Certified since 1994
- Vice President ISBSG Executive since 2007
- Reviewer of the NESMA Manual CPM
- International Workgroup convenor and project editor ISO/IEC 14143 Functional Size Measurement Standards
- Core project member COSMIC (1997 - now)
- Co-author/Reviewer COSMIC-FFP Measurement Manual
- Author and Presenter IFPUG Certified Training courses and IFPUG IT Measurement Book
- Executive Member of QESP Australia
- Chief Executive Officer of Total Metrics
  - “Functional Size: A size of the software derived by quantifying the Functional User Requirements.”
  - “Functional Size Measurement (FSM): The process of measuring Functional Size.”
  - “FSM Method: A specific implementation of FSM defined by a set of rules, which conforms to the mandatory features of this part of ISO/IEC 14143.”

E.g. IFPUG 4.3, COSMIC-FFP
Characteristics of Functional Size Measurement

• Measures **Functional User Requirements**
• **Excludes:**
  • physical or **technical** components
  • **quality** features
• derived in terms understood by **users** of the software
• derived **without** reference to:
  • **effort** to develop or support
  • **methods** used
Basic Concepts of FSM

Users

Software Boundary

Processes

USER REQUIREMENTS

Stored Data

FUNCTIONAL

QUALITY

Non - Functional

TECHNICAL

Software to be measured
Basic Concepts of FSM

FUNCTIONAL USER REQUIREMENTS

MEASURED FOR SIZE

BOUNDARY

FUR

BFCs

Stored Data

Processes

Base Functional Components

Engineered devices

other Software

TOTAL METRICS

CAI

World leader in IT process and productivity.
IFPUG BFC Types

5 Base Functional Component Types (BFC Types✓)

INPUT + OUTPUT, + ENQUIRY

Stored Data

EXTERNAL INTERFACE FILE

INTERNAL LOGICAL FILE

Processes
**COSMIC BFC Types**

- **COSMIC = ENTRY**
- **COSMIC = READ**
- **COSMIC = WRITE**
- **COSMIC = EXIT**

4 Base Functional Component Types (BFC Types ✔️)

- Stored Data
- Stored Data

**TOTAL METRICS**

**CAI**

World leader in IT process and productivity.

**COSMIC-FFP**

Column Software Technologies
Sizing example: Create New Order

ORDER HEADER SCREEN

Computer Components Automated Supply System

Order /Reservation Details
- Order Number: __________
- Description: __________
- Contact Name: __________
- Vendor: __________
- Send Invoice To: __________
- Deliver Goods To: __________

Order Header Details
- Reservation Sales Tax Exemption: ________
- Order Date: __/__/____
- Date Required: __/__/____
- Urgent Routine: ________

Options:
- Save
- Items
- Print
- OK
- Cancel
E.g. Create New Order

ORDER ITEM DETAILS SCREEN

**Computer Components Automated Supply System**

**Order Item Details**

**Order /Reservation Details**

- **Order Number:** 10711943
- **Reservation Number:**
- **Order Date:** / / 
- **Description:** Update RRS Computers
- **Order Item Value:** $ 1,387.00
- **Sales Tax:** $ 138.70
- **Order Total:** $ 1,525.70

**Product Items:**

<table>
<thead>
<tr>
<th>Product #</th>
<th>Description</th>
<th>Brand Name</th>
<th>Size</th>
<th>Unit Measure</th>
<th>Qty</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD1235</td>
<td>Hard Disk Drive</td>
<td>Osborne</td>
<td>240 mb</td>
<td>one drive</td>
<td>2</td>
<td>$ 589.00</td>
</tr>
<tr>
<td>DD1205</td>
<td>Hard Disk Drive</td>
<td>Osborne</td>
<td>120 mb</td>
<td>one drive</td>
<td>1</td>
<td>$ 209.00</td>
</tr>
<tr>
<td>DD1235</td>
<td>Hard Disk Drive</td>
<td>Connor</td>
<td>240 mb</td>
<td>one drive</td>
<td>1</td>
<td>$ 500.00</td>
</tr>
<tr>
<td>DD1200</td>
<td>Hard Disk Drive</td>
<td>Seagate</td>
<td>40 mb</td>
<td>one drive</td>
<td>1</td>
<td>$ 89.00</td>
</tr>
</tbody>
</table>

**Add**  **Modify**  **Delete**  **Comments**  **GL Codes**  **OK**
IFPUG - Identify Logical Files

CUSTOMER

ORDER (2 RETs)

PRODUCT

SALES TAX Reference Rates

CUSTOMER Details

ORDER

ORDER LINE ITEM

PRODUCT

TAX RATES

= 3 ILFs (1 average, 2 low complexity) = 24 function points

= 1 EIF (low) = 5 function points

Total Data Groups = 29 function points
IFPUG Count - Identify DETs and FTRs

EXTERNAL INPUT

DETS Entering / Exiting Process

1. Order Type  
2. Division Invoice Address  
3. Reservation Number  
4. Date Required  
5. Additional Instructions  
6. Order Description  
7. Contact Name  
8. Priority Flag  
9. Delivery Address  
10. Reservation Number  
11. Order Number  
12. Sales Tax Exemption #  
13. Order Date  
14. Order Total  
15. Sales Tax  
16. Sales tax rate  
17. Quantity  
18. Product Code  
19. Product Description  
20. Item Size  
21. Item Price  
22. Item Order Value  
23. Error / confirmation Message  
24. Action / control

= High Complexity EI  
= 6 function points

Order  
Customer  
Product  
Tax Rates

24 DETs  
4 FTRs
COSMIC - Group Persistent Data - 3NF

- Group Persistent data into 3rd Normal form

= 5 Persistent Data Groups

Total = 0 CFP
Identify **READs** from Persistent Data

- **READ** Sales Tax Reference Rates from **TAX RATES**
- **READ** Product Details from **PRODUCT**
- **READ** Customer Discount Category information from **CUSTOMER**

Map data being retrieved (READ) from Persistent data to determine unique READS

\[
= 3 \text{ unique READS} = \text{Total} = 3 \text{ CFP}
\]
Identify **WRITE**s to Persistent Data

- **WRITE** Order Header details to Order Header
- **WRITE** Order Item Details to Order Line

Map data being written (WRITE) to Persistent data to determine unique **WRITE**S

= 2 unique WRITE = **Total** =2 CFP
### Group Transient Data ENTERing Process - 3NF

#### Order Header Details Entered

<table>
<thead>
<tr>
<th>Details Entered</th>
<th>Entering Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Order Type</td>
<td>2. Date Required</td>
</tr>
<tr>
<td>3. Order Description</td>
<td></td>
</tr>
<tr>
<td>4. Contact Name</td>
<td>5. Additional Instructions</td>
</tr>
<tr>
<td>6. Delivery Address</td>
<td></td>
</tr>
<tr>
<td>7. Priority Flag</td>
<td></td>
</tr>
</tbody>
</table>

#### Order Item Related Details Entered

<table>
<thead>
<tr>
<th>Details Entered</th>
<th>Entering Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Product Code</td>
<td>2. Quantity</td>
</tr>
</tbody>
</table>

Map data entering to Entities

Group Data entered into 3rd Normal form to get unique data movement ENTRIES

= 2 unique ENTRIES = **Total** = 2 CFP
# Group Transient Data EXITing Process - 3NF

**Exiting Process**

|-----|------------------------------------|----------------|-----------------------------|--------------|----------------------|----------------|--------------|

**Map data exiting to Entities**

**Group Data exiting into 3rd Normal form to get 3 unique data movement EXITS**

= 3 unique EXITS = **Total =3 CFP**

---

**Group Data exiting into 3rd Normal form to get 3 unique data movement EXITS**

= 3 unique EXITS = **Total =3 CFP**
## Comparison of Functional Size Process Level

<table>
<thead>
<tr>
<th>IFPUG</th>
<th>BFC Type</th>
<th>FP s</th>
<th>COSMIC</th>
<th>BFC Type</th>
<th>CFSU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process</td>
<td></td>
<td></td>
<td>Sub-Process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create Order Process</td>
<td>EI</td>
<td>6</td>
<td>Create Order Process</td>
<td>ENTRY</td>
<td>1</td>
</tr>
<tr>
<td>Order</td>
<td>ILF</td>
<td>10</td>
<td>Enter Order Header Details</td>
<td>ENTRY</td>
<td>1</td>
</tr>
<tr>
<td>Customer</td>
<td>ILF</td>
<td>7</td>
<td>Enter Order Item Details</td>
<td>ENTRY</td>
<td>1</td>
</tr>
<tr>
<td>Product</td>
<td>ILF</td>
<td>7</td>
<td>Read Product Details</td>
<td>READ</td>
<td>1</td>
</tr>
<tr>
<td>Tax Rates</td>
<td>EIF</td>
<td>5</td>
<td>Read Customer</td>
<td>READ</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Read Tax Rates</td>
<td>READ</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Display Order Header Details</td>
<td>EXIT</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Display Order Item Details</td>
<td>EXIT</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Display Message</td>
<td>EXIT</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Write Order Header</td>
<td>WRITE</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Write Order Item details</td>
<td>WRITE</td>
<td>1</td>
</tr>
</tbody>
</table>

- **Size of Process**:
  - IFPUG: 6
  - COSMIC: 10

- **Data is shared over all processes**
- **Influence of data is incorporated into each process**

**Notes**:
- Data is shared over all processes.
- Influence of data is incorporated into each process.

**CAI**: World leader in process and productivity.
Similarities IFPUG and COSMIC

• **Both** recognise:
  - Elementary processes as a functional unit to be measured
  - data moving in/out of a process as contributing to functional size
  - data accesses to persistent data as contributing to functional size

• **Both DO NOT** specifically measure:
  - algorithms, processing logic, data transformations, calculations etc.
Comparison of Functional Size Application Level

“Order Processing System”

<table>
<thead>
<tr>
<th>IFPUG</th>
<th>FPs</th>
<th>COSMIC</th>
<th>CFSU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processes</td>
<td>115</td>
<td>Processes</td>
<td>156</td>
</tr>
<tr>
<td>Data</td>
<td>48</td>
<td>(-)</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>163</strong></td>
<td><strong>156</strong></td>
<td></td>
</tr>
</tbody>
</table>
**Process**

- **COSMIC**: Data Movement (READ WRITE)
- **IFPUG**: Files Accessed (FTRs)
- **COSMIC**: Data Movement (ENTRY, EXIT)
- **IFPUG**: DETs crossing boundary
- **COSMIC**: Persistent Data
- **IFPUG**: Logical File
Agenda

◆ History of Functional Size Measurement

◆ 14143-1 Definitions of Functional Size

◆ Similarities and Differences

◆ When to use what FSM Method
## Concept Comparisons

<table>
<thead>
<tr>
<th>Concept</th>
<th>IFPUG</th>
<th>COSMIC</th>
</tr>
</thead>
</table>
| Methods for dealing with Multi-layered Software | - Not explicit in CPM  
- see New Environments white papers | - Explicit in rules for counting multi-layered architectures |
| User View                | - Measures from External User View         | - Measures functional users view                           |
| Quality and Technical Requirements | - Optionally measured as VAF in IFPUG 4.2  
- not measured in ISO 20926 or 4.3 | - Considered in other layers if implemented as  
- No VAF                                                      |
## Process Comparisons

<table>
<thead>
<tr>
<th>Process</th>
<th>IFPUG</th>
<th>COSMIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Count DETs</td>
<td>- No - just need to know ‘ranges’ of DETs</td>
<td>- No - counts ‘logical groups’ of DETs</td>
</tr>
<tr>
<td>- Industry default complexity data</td>
<td>- Yes, default EPs to average, DGs to low</td>
<td>- Industry data available, - error% not established</td>
</tr>
<tr>
<td></td>
<td>- +15% error</td>
<td></td>
</tr>
<tr>
<td>Rules for determining Complexity</td>
<td>- Different rules for each type of process</td>
<td>- Same Rules for all processes</td>
</tr>
</tbody>
</table>
## Process Comparisons

<table>
<thead>
<tr>
<th>Process</th>
<th>IFPUG</th>
<th>COSMIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Repeatability of grouping Logical Data Groups</td>
<td>- Requires counting experience to ensure repeatability</td>
<td>- Requires Data Modelling experience to ensure repeatability</td>
</tr>
<tr>
<td>- Level of Detail required in functional Specifications</td>
<td>- not a lot of detail required since can select ‘ranges’ for complexity</td>
<td>- More detail required to identify each data movement and file access</td>
</tr>
</tbody>
</table>
### Result Comparisons

<table>
<thead>
<tr>
<th>Process</th>
<th>IFPUG</th>
<th>COSMIC</th>
</tr>
</thead>
</table>
| - Correlation to effort across all functional domains | -MIS – significant supporting industry evidence  
- Limited – Realtime, scientific software data  
- ISBSG Special Reports | - Realtime – preliminary industry and research evidence ~100 projects  
- Limited – MIS data  
- ISBSG Special Report |
| - Industry Data                 | - Public domain and private  
- ISBSG ~5000 projects        | - Public domain and private  
- ISBSG ~334 projects          |
| - International Certification   | - yes, 3 year renewal  
- high cost 3 years  
IFPUG membership plus fee  
- ($185*3) +$250 = $805 USD | - yes, only needs reviewing if Version changes  
- Low fee $100 USD |
## Result Comparisons

<table>
<thead>
<tr>
<th>Process</th>
<th>IFPUG</th>
<th>COSMIC</th>
</tr>
</thead>
</table>
| - Sensitivity to large variations in process complexity | - maximum sensitivity is two fold variation  
  - Min size = 3 FPs  
  - Max Size = 7 FPs | - Allows infinite order of magnitude  
  - Min size = 2 CFP  
  - Max Size = $\alpha$ (infinite) CFP |
| - Sensitivity to processes which move a lot of data without accessing DGs | - highest size measure requires data movements AND data accesses | - highest size measure does not require process to have DG accesses. |
### Result Comparisons

<table>
<thead>
<tr>
<th>Process</th>
<th>IFPUG</th>
<th>COSMIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data contribution to overall size</strong></td>
<td>- Persistent Data contributes around 30% of total size in addition to contribution from process data accesses</td>
<td>- Persistent data only contributes to size via process accesses</td>
</tr>
<tr>
<td><strong>-Counts multiple accesses to DG</strong></td>
<td>- No - includes access to a persistent data group once only per process - Unique FTR</td>
<td>- Yes, includes access to a persistent data group up to twice per process (READ and/or WRITE)</td>
</tr>
</tbody>
</table>
# Resource Comparisons

<table>
<thead>
<tr>
<th>Resource</th>
<th>IFPUG</th>
<th>COSMIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>- Manuals</strong></td>
<td>- Purchase from IFPUG</td>
<td>- Download free from WWW</td>
</tr>
<tr>
<td></td>
<td>- ~390 pages</td>
<td>- Purchase from ISO</td>
</tr>
<tr>
<td></td>
<td>- Purchase from ISO</td>
<td>- ~80 pages</td>
</tr>
<tr>
<td><strong>- Training</strong></td>
<td>- Many vendor courses worldwide</td>
<td>- Several Courses available worldwide</td>
</tr>
<tr>
<td></td>
<td>- Certification</td>
<td>- No certification</td>
</tr>
<tr>
<td><strong>- Tools</strong></td>
<td>- Variety Vendors</td>
<td>- Few Vendors</td>
</tr>
<tr>
<td></td>
<td>- Certification</td>
<td>- No Certification</td>
</tr>
<tr>
<td><strong>- Case Studies</strong></td>
<td>- 2 different FUR Case Studies,</td>
<td>- 5 different FUR Case Studies</td>
</tr>
<tr>
<td></td>
<td>- Purchase from IFPUG</td>
<td>- Download free</td>
</tr>
</tbody>
</table>
SO WHICH METHOD TO CHOOSE?

Consider

- need and availability of **support services**
- **training**
- **tools** historical data
- skilled functional size **analysts**
- how the size result will be **used**
- Industry **profile**, recognition
- **functional domain** of software to be measured (embedded process rich or data rich MIS?)
- capability **maturity** of your organisation
- **FSM Used** by other parts of your organisation
REMEMBER

• BOTH METHODS
  - Used internationally
  - ISO/IEC FSM standards
  - Collected by ISBSG Repository
  - ‘work’ in most environments
  - developed and refined by international experts (sometimes the same ones!)
MORE INFORMATION

• IFPUG
  www.ifpug.org/

• COSMIC-FFP
  www.cosmicon.com/

• TOTAL METRICS
  www.totalmetrics.com/
THANK YOU

Total Metrics
667 Burke Road
Camberwell
Victoria 3124 Australia
Ph  +613 9882 7611
Fax  +613 9882 7633
Pam.Morris@Totalmetrics.com

“To measure is to know!”

This presentation is available from DOWNLOADS at:

WWW.totalmetrics.com