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COSMIC-FFP and IFPUG 4.1 Similarities and Differences

Presented by : Pam Morris
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IFPUG Fall Conference
Scottsdale Arizona
September 2003

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Agenda

- **History of Functional Size Measurement**

- **14143-1 Definitions of Functional Size**
- **Similarities and Differences**
- **When to use what FSM Method**

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History of Functional Size Measurement

ISO /IEC

FSM Method Standards

ISO 'FSM' Framework Standard

14143-1

MK II

MkII FPA 1.3

3-D FP's

COSMIC FFP V. 2.2

MkII FPA

Full FP's V.1

Feature Points

IFPUG 4.1

IFPUG 4.0

IFPUG 4.1 Unadjusted

Allan Albrecht FPA

IFPUG 3.0

NESMA1.0

NESMA 2.1

1980 1985 1990 1995 2000

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Pam Morris - Profile

- 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
- IFPUG CFPS Certified since 1994
- Australian Representative ISBSG Committee
- 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 COSMIC-FFP Measurement Manual
- Author and Presenter IFPUG Certified Training courses and IFPUG IT Measurement Book
- Executive Member of the Australian Software Metrics Association (ASMA)
- Chief Executive Officer of Total Metrics

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Functional Size Measurement

- ISO/IEC/JTC1/SC7 Standard 14143-1(1998) definitions:
  - **"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." **Eg. IFPUG 4.1 Unadjusted, COSMIC-FFP**

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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

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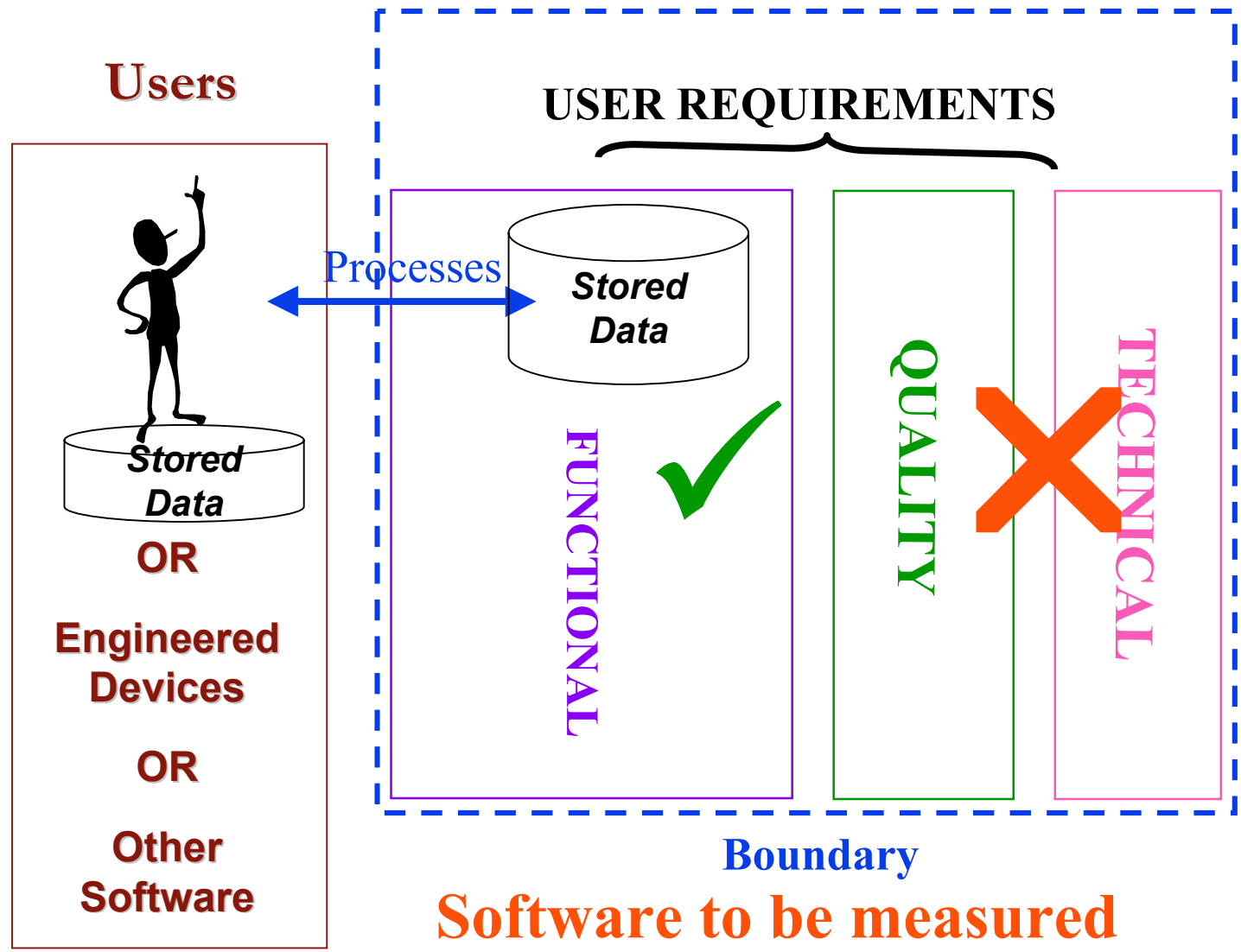
Basic Concepts of FSM



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Basic Concepts of FSM

FUNCTIONAL USER REQUIREMENTS =FUR

Processes

Stored Data

Stored Data

OR

Engineered devices

OR

other Software

Base Functional Components

=BFCs

BOUNDARY

MEASURED FOR SIZE

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IFPUG BFC Types

INPUT, OUTPUT, ENQUIRY

Processes

Stored Data

Stored Data

INTERNAL LOGICAL FILE

EXTERNAL INTERFACE FILE

5 Base Functional Component Types (BFC Types✓)

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COSMIC BFC Types

COSMIC = **ENTRY** ✓

COSMIC = **READ** ✓

COSMIC = **WRITE** ✓

COSMIC = **EXIT** ✓

4 Base Functional Component Types (BFC Types✓)

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Sizing example:
Create New Order

ORDER HEADER SCREEN

Computer Components Automated Supply System

File Report System Admin Help Utility

Order Header Details

Order /Reservation Details

Order ○ Reservation ●

Number:

Description::

Contact Name:

Vendor

Sales Tax Exemption [X] #

Order Date: / /

Date Required: / /

Urgent ○

Routine ●

OK

Send Invoice To :

Deliver Goods To :

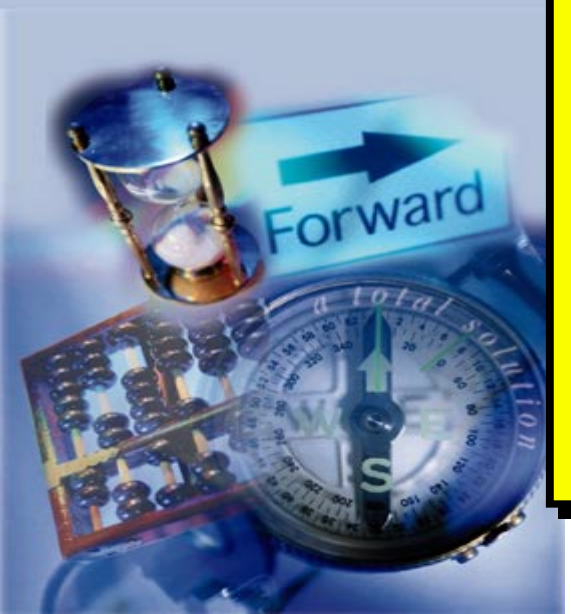
Additional Instructions:

Items

Print

Save

Cancel



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Eg. *Create New Order*

ORDER ITEM DETAILS SCREEN

Computer Components Automated Supply System

File Report System Admin Help Utility

Order ItemDetails

Order /Reservation Details

Order ■ Reservation ○

Number: 10711943 Order Date: / /

Description:: Update RRS Computers

Order Item Value: $ 1,387.00

Sales Tax $ 138.70

Order Total $ 1,525.70

Product Items:

Product #	Description	Brand Name Size	Unit Measure	Qty	Price
DD1235	Hard Disk Drive	Osborne 240 mb	one drive	2	$ 589.00
DD1205	Hard Disk Drive	Osborne 120 mb	one drive	1	$ 209.00
DD1235	Hard Disk Drive	Connor 240 mb	one drive	1	$ 500.00
DD1200	Hard Disk Drive	Seagate 40 mb	one drive	1	$ 89.00

Add Modify Delete Comments GL Codes OK

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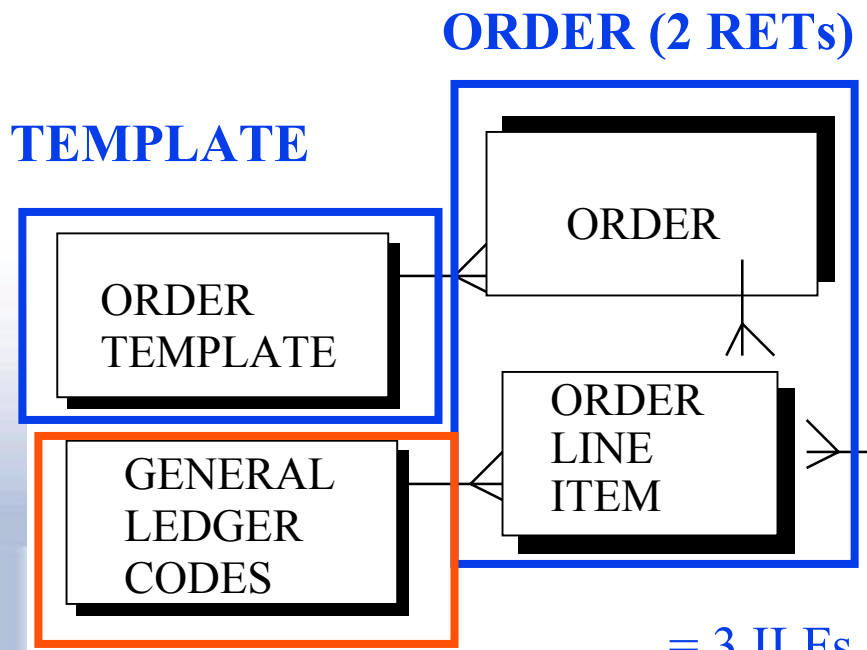
IFPUG Count
Identify Logical Files



= 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

4 FTRs

24 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. GL Ref Code	17. Quantity	18. Product Code
19. Product Description	20. Item Size	21. Item Price
22. Item Order Value	23. Error / confirmation Mge	24. Action /control

=High Complexity EI

= 6 function points

Order

Order Template

FTR

FTR

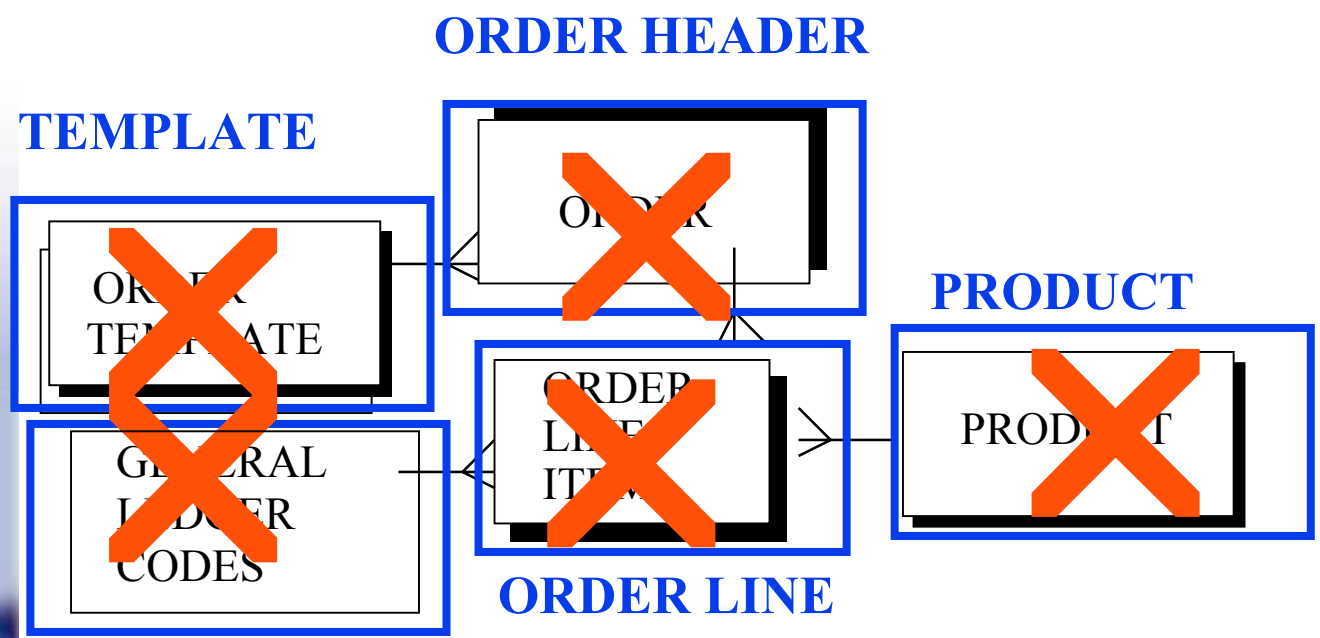
FTR

Product

General Ledger

FTR

COSMIC Count - Group Persistent Data - 3NF



Group Persistent data into 3rd Normal form

= **5** Persistent Data Groups

Not BFC Type

Total = 0 CFSU

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Identify READs from Persistent Data

- **READ** General Ledger Reference Code from *General Ledger*
- **READ** Product Details from *Product*
- **READ** Sales Tax information from *Order Template*

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

= 3 unique READS = **Total =3 CFSU**

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Identify WRITEs 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 WRITES

= 2 unique WRITE = **Total =2 CFSU**

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Group Transient Data ENTERing Process - 3NF

Order Header Details Entered

Entering Process

1. Order Type
2. Date Required
3. Order Description
4. Contact Name
5. Additional Instructions
6. Delivery Address
7. Priority Flag

Order Item Related Details Entered

1. Product Code
2. Quantity

Map data entering to Entities

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

= 2 unique **ENTRIES** = **Total =2 CFSU**

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Group Transient Data EXITing Process - 3NF

Exiting Process

1. Order Number.	2. Division Invoice Address	3. Sales Tax
4. Order Description	5. Order Total	6. Order Date
7. Sales Tax Exemption Number		

1. Product Description	2. GL Ref Code	3. Item Size
4. Unit of Measure	5. Price	6. Item Order Value

1. Error / confirmation Message

Map data exiting to Entities

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

= 3 unique EXITS = **Total =3 CFSU**

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Comparison of Functional Size Process Level

Size of Process

IFPUG	BFC Type	FP	COSMIC		BFC Type	CFSU
Process			**Process**	**Sub-Process**		
Create Order Process	EI	6	**Create Order Process**	**Enter Order Header Details**	ENTRY	1
				Enter Order Item Details	ENTRY	1
				Read Product Details	READ	1
				Read Template	READ	1
Order	ILF	10		**Read General Ledger**	READ	1
Order Template	ILF	7		**Display Order Header Details**	EXIT	1
Product	ILF	7		**Display Order Item Details**	EXIT	1
General Ledger	EIF	5		**Display Message**	EXIT	1
				Write Order Header	WRITE	1
				Write Order Item details	WRITE	1
		35				10

Data is shared over all processes

Influence of data is incorporated into each process

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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
- **DO NOT specifically measure:**
  - algorithms, processing logic, data transformations, calculations etc.

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Comparison of Functional Size Application Level "*Order Processing System*"

IFPUG	FPs	COSMIC	CFSU
Processes	**115**	**Processes**	**156**
Data	**48**	**(-)**	0
	163		**156**

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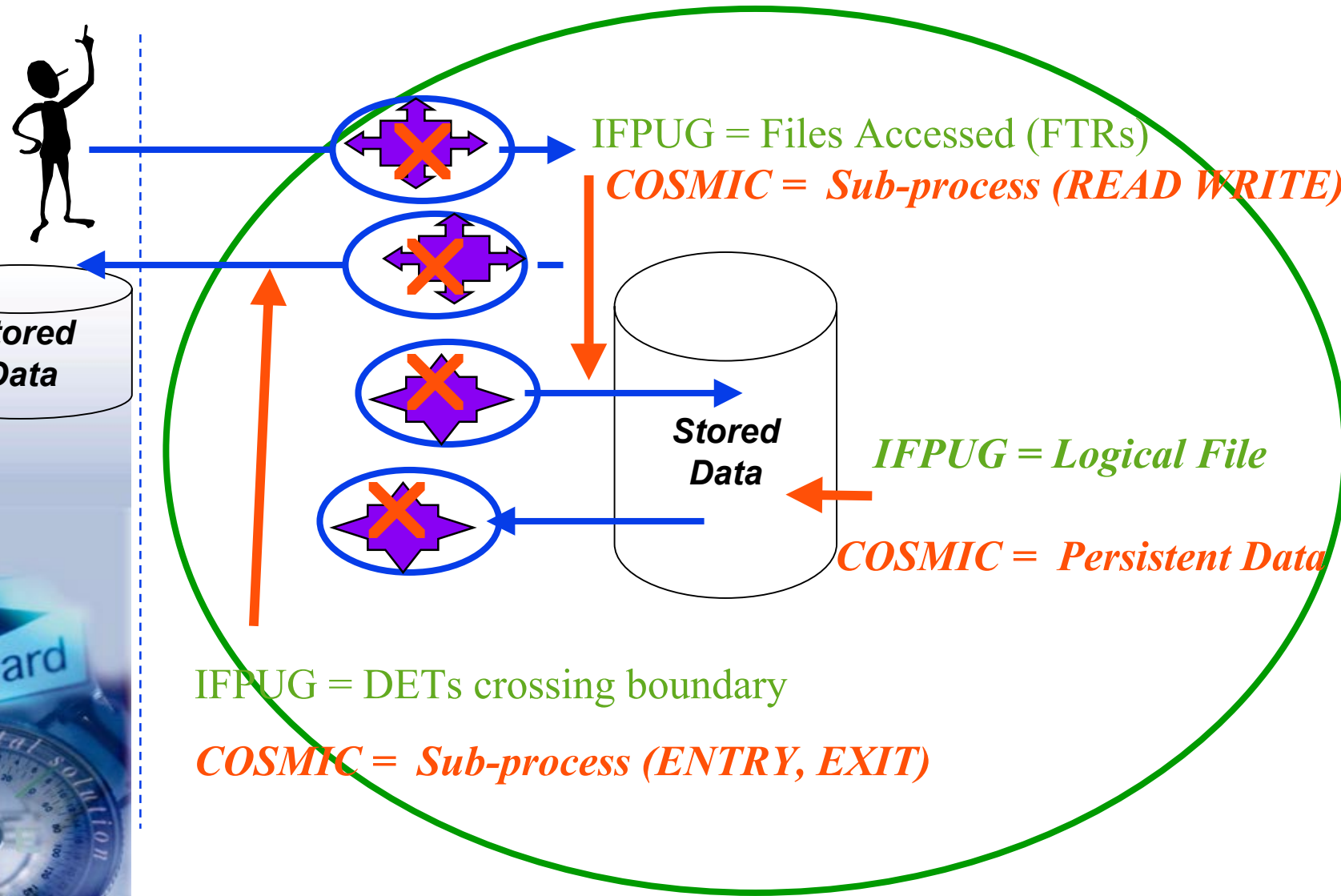
PROCESS



IFPUG = Files Accessed (FTRs)

COSMIC = Sub-process (READ WRITE)

IFPUG = Logical File

COSMIC = Persistent Data

IFPUG = DETs crossing boundary

COSMIC = Sub-process (ENTRY, EXIT)

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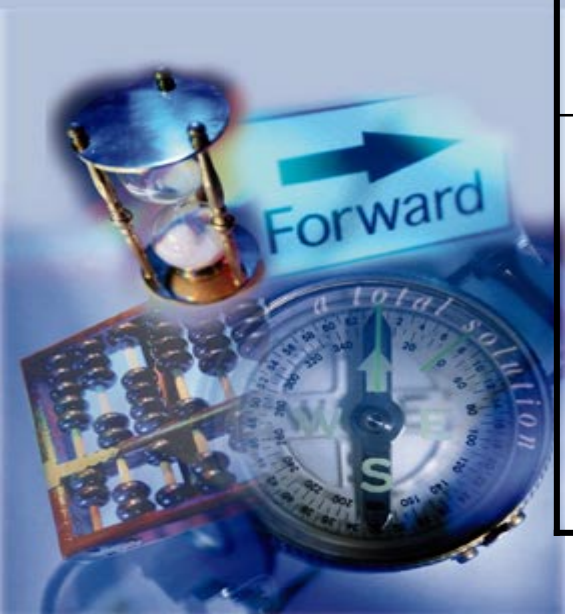
Concept Comparisons

Concept	IFPUG	COSMIC
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 from different Viewpoints
Quality and Technical Requirements	-not explicitly measured in ISO 20926 -VAF - IFPUG CPM 4.1	-Considered in other layers if software implementation - No VAF



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Process Comparisons

Process	IFPUG	COSMIC
- Count DETs	-No - just need to know 'ranges' of DETs	-No - counts 'logical groups' of DETs
- Industry default complexity data	-Yes, default EPs to average, DGs to low - ± 15% error	-Industry data available, - error% not established
Rules for determining Complexity	-Different rules for each *type* of process	- Same Rules for *all* processes

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Process Comparisons

Process	IFPUG	COSMIC
- Repeatability of grouping Logical Data Groups	-Requires counting experience to ensure repeatability	-Requires Data Modelling experience to ensure repeatability
- Level of Detail required in functional Specifications	- not a lot of detail required since can select 'ranges' for complexity	-More detail required to identify each data movement and file access

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Result Comparisons

Process	IFPUG	COSMIC
- Correlation to effort across all functional domains	-MIS – significant supporting industry evidence -Limited– Realtime, scientific software data	-Realtime – preliminary industry and research evidence ~100 projects -Limited - MIS data
- Industry Data	-public domain and private -ISBSG ~2000 projects	-Mostly private or research -ISBSG – ~50 projects
-International Certification	-Practitioners via IFPUG CFPS	- ISO Testing Labs planned

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Result Comparisons

Process	IFPUG	COSMIC
-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** CFSU ➢Max Size = **α** (infinite) CFSU
-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.
Data contribution to overall size	-Persistent Data contributes around 30% of total size in addition to contribution from process data accesses	- Persistent data only contributes to size via process accesses

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Result Comparisons

Process	IFPUG	COSMIC
-Counts multiple accesses to DG	- No - includes access to a persistent data group once only per process -Unique FTR	- Yes, includes access to a persistent data group up to twice per process (Read and/or Write)

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Resource Comparisons

Resource	IFPUG	COSMIC
- Manuals	-Purchase from IFPUG -Purchase from ISO -~390 pages	-Download free from WWW -Purchase from ISO -~75 pages
- Training	-Many vendor courses worldwide -Certification	-Several Courses available worldwide -No certification
- Tools	-Variety Vendors -Certification	-Very limited -No Certification
- Case Studies	-2 different FUR Case Studies, -Purchase from IFPUG	-5 different FUR Case Studies -Download free

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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

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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 Pty Ltd
Suite 1, 667 Burke Road
Camberwell
Victoria 3124 Australia
Ph +613 9882 7611
Fax +613 9882 7633
Pam.Morris@Totalmetrics.com

"To measure is to know!"

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