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COSMIC-FFP and IFPUG 4.1 Similarities and Differences

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ACOSM
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Agenda

- **Background of Functional Size Measurement**
- **14143-1 definitions of Functional Size**
- **Similarities and Differences**
- **When to use what Method**

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Pam Morris - Profile

- Member of the IFPUG Counting Practices Committee 1993 - 2000
- Co-author IFPUG 4.0, IFPUG 4.1, Casestudy 1
- IFPUG CFPS Certified since 1994
- Author and Presenter IFPUG Certified Training courses and IFPUG IT Measurement
- 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 (1997 - now)
- Chief Executive Officer of Total Metrics

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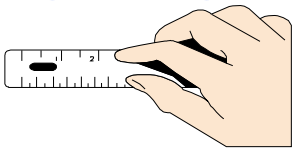
Functional Size Measurement



- 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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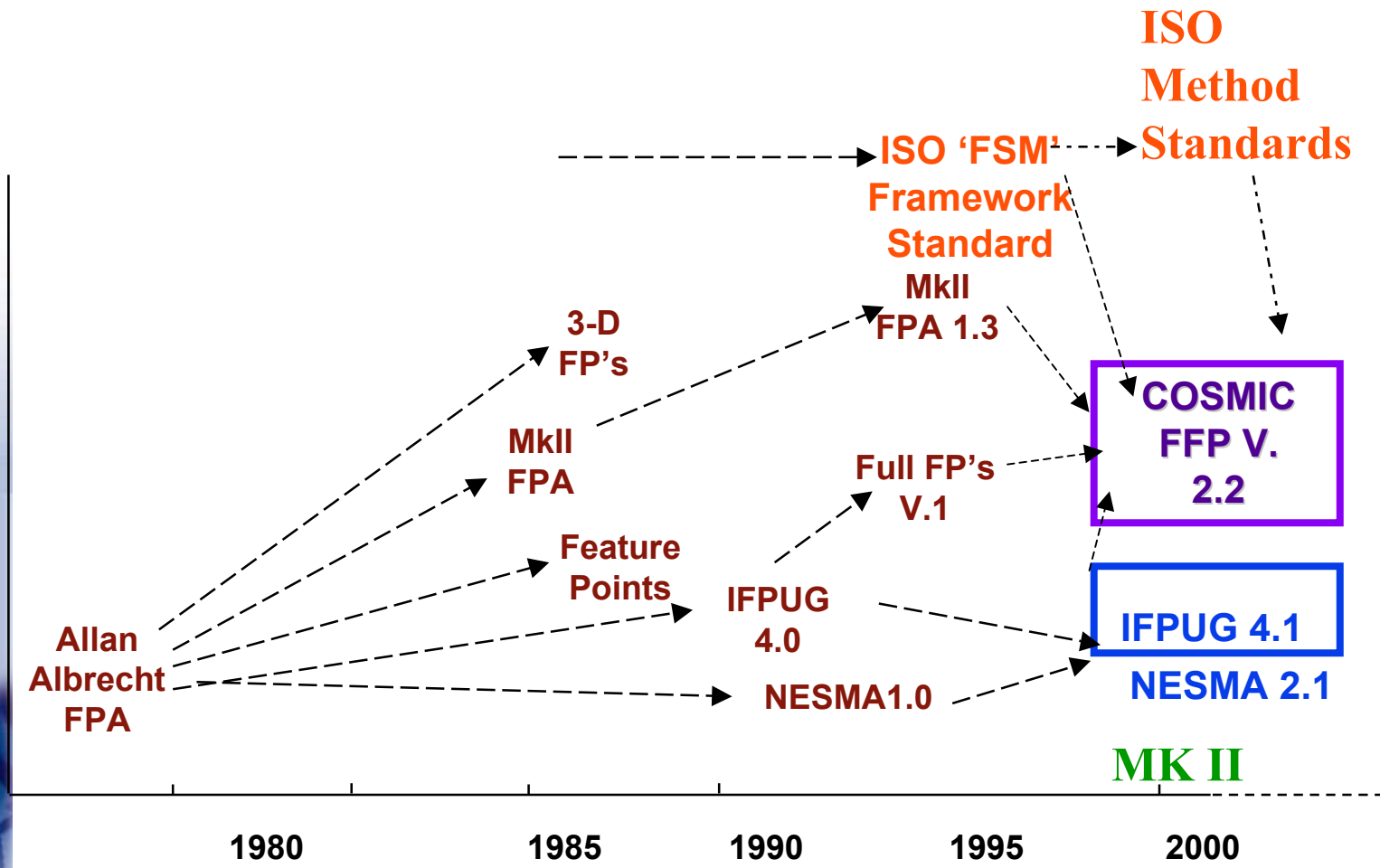
History of Functional Size Measurement



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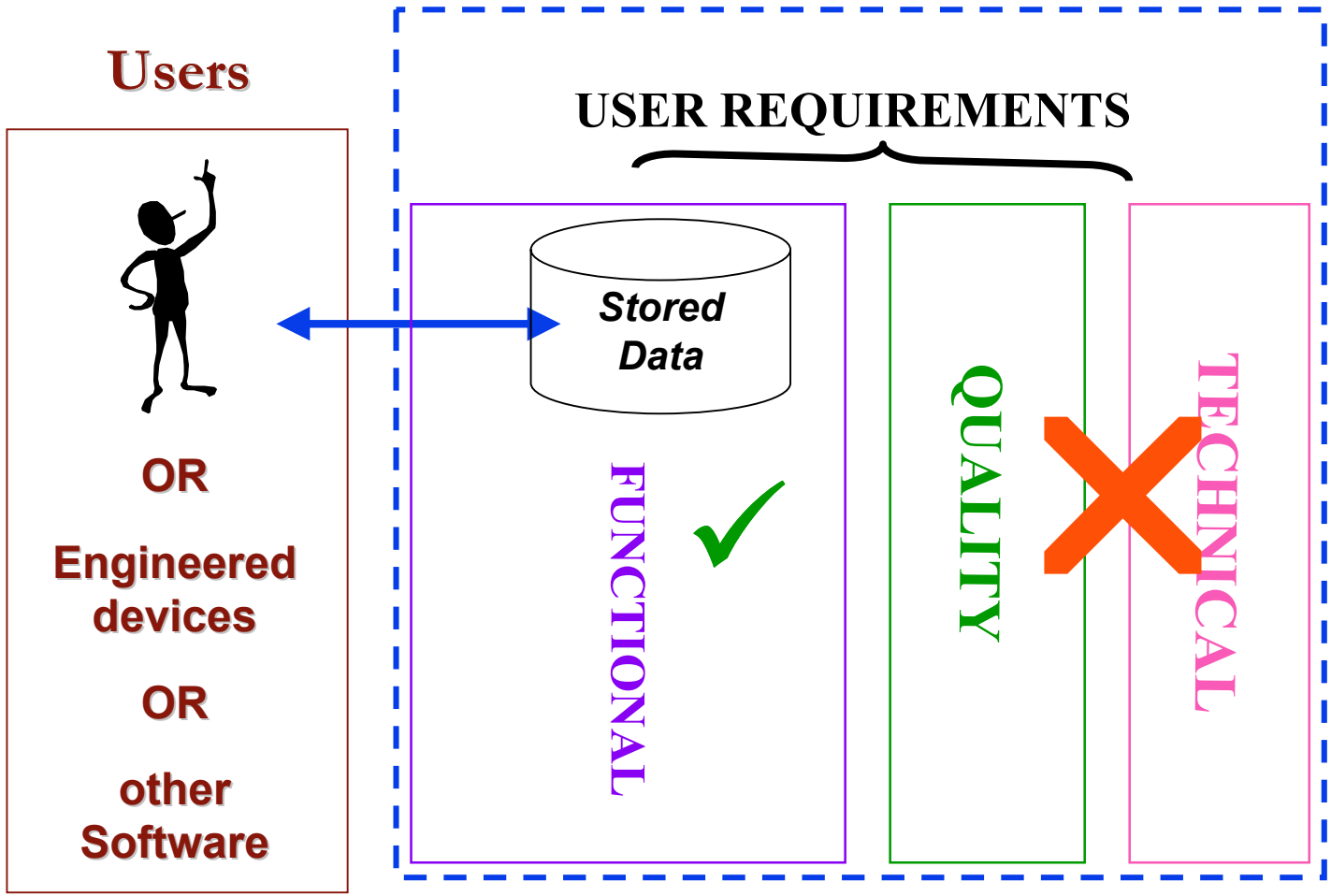
Basic Concepts of FSM



Software to be measured

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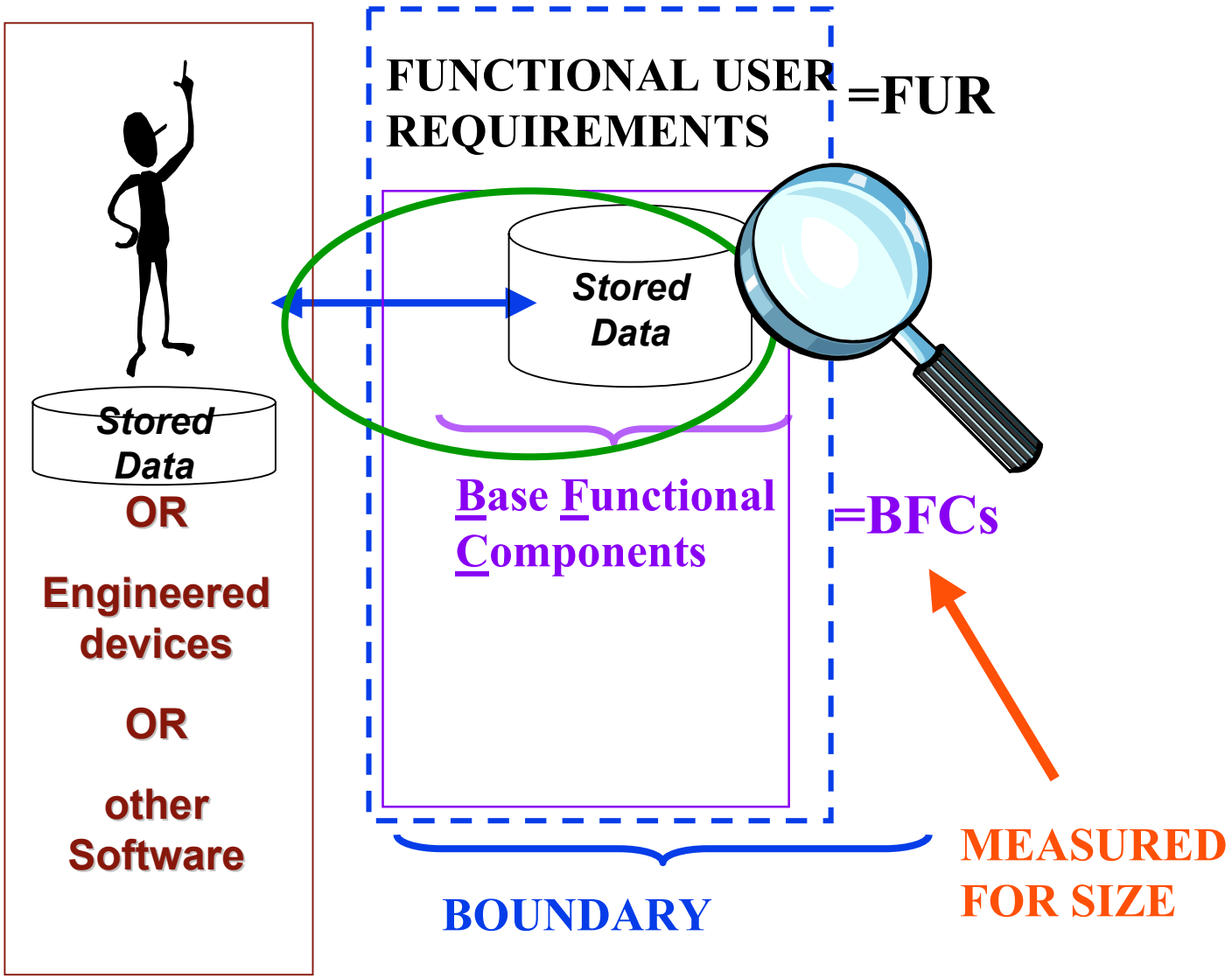
Basic Concepts of FSM



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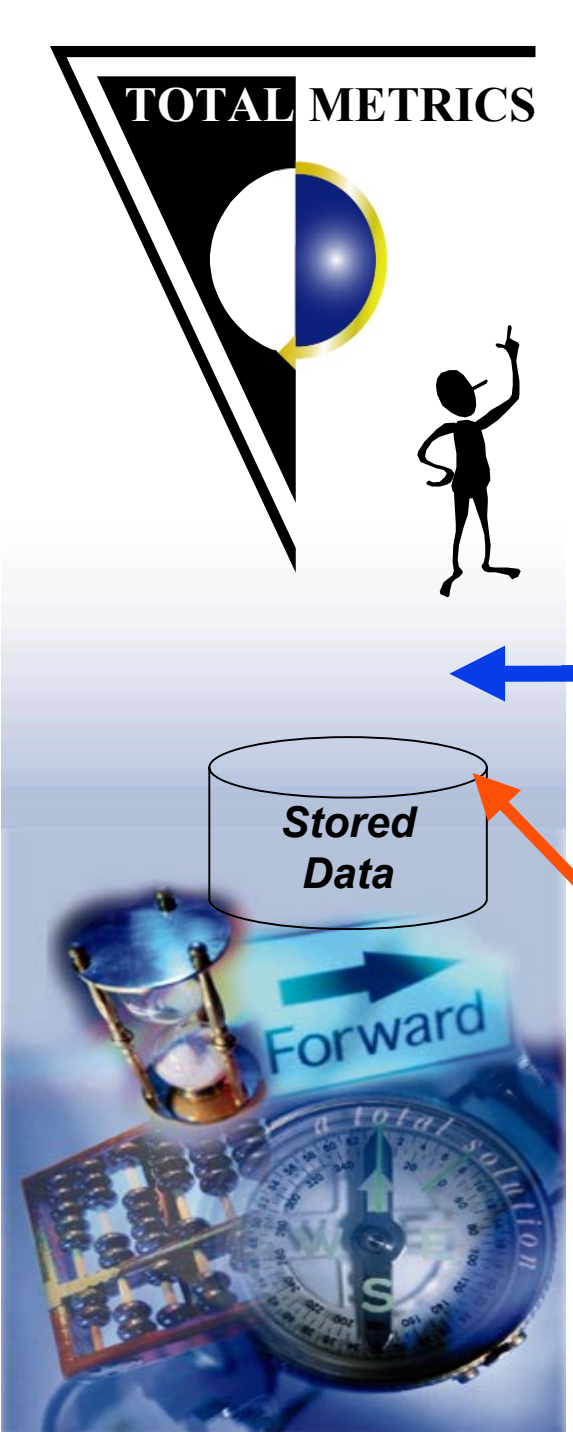
IFPUG BFC Types



INPUT, OUTPUT,
ENQUIRY

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

Stored Data

Stored Data

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 :

Items

Deliver Goods To :

Print

Save

Additional Instructions:

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

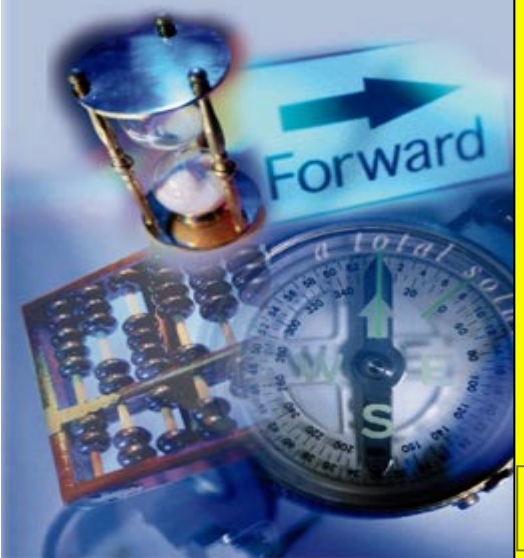
Sales Tax $ 138.70

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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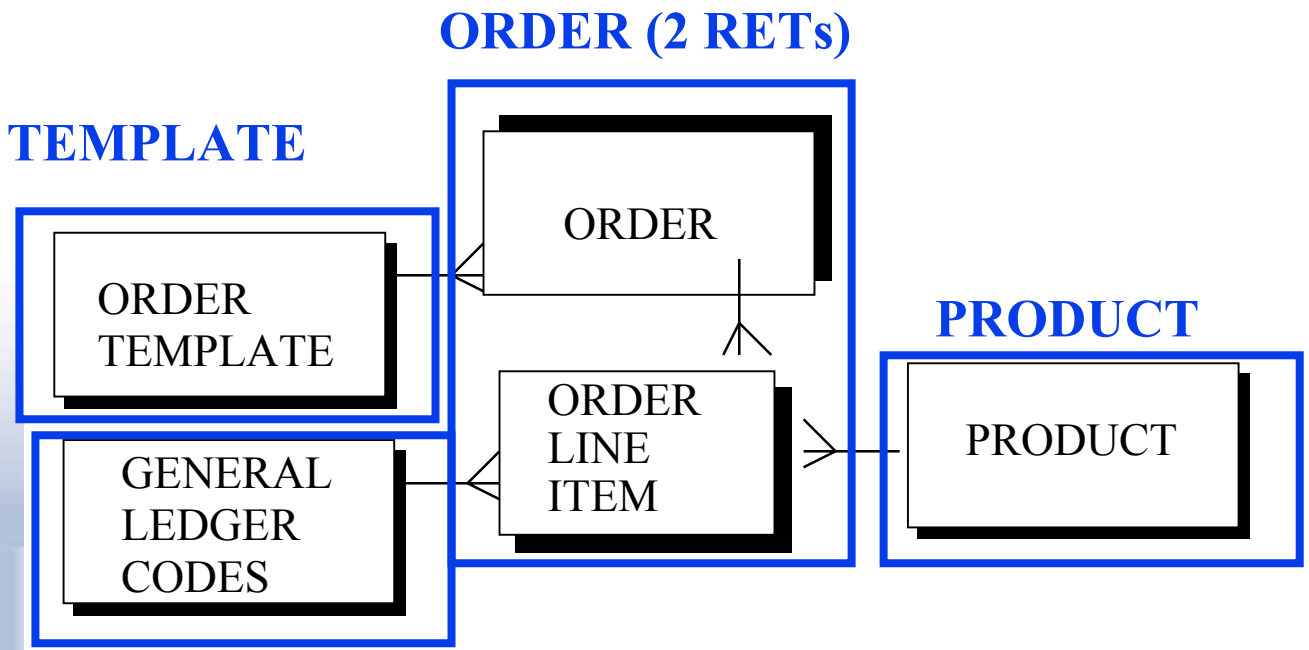
IFPUG Count - Identify Logical Files



GENERAL = 3 ILFs (1 average, 2 low complexity)

LEDGER = 24 function points

= 1 EIF (low)

=5 function points

Total = 29 function points

IFPUG Count - Identify DETs and FTRs

EXTERNAL INPUT

24 DETs

4 FTRs

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

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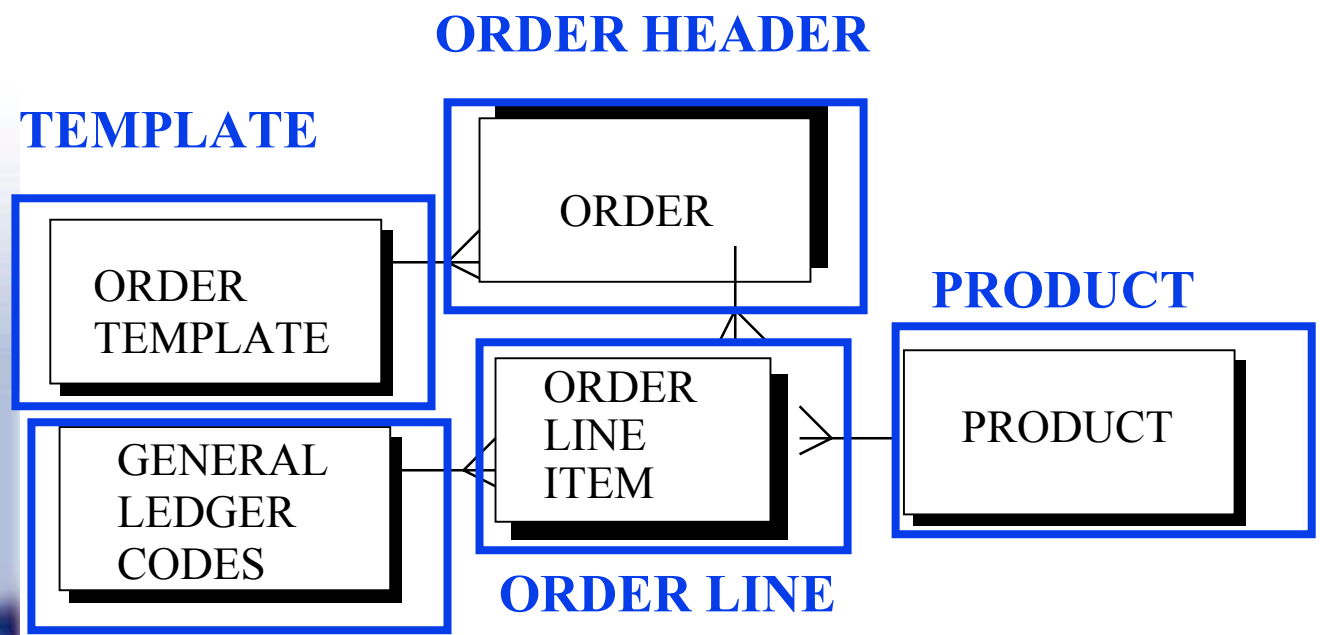
COSMIC Count - Group Persistent Data - 3NF



Group Persitent data into 3rd Normal form

= **4** Persistent Data Groups

Total = 0 CFSU

Not BFC Type

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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 Details to *Order*

Map data being written (WRITE) to Persistent data to determin unique WRITES

= 1 unique WRITE = **Total =1 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 and 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 entering to Entities and Group Data exiting into 3rd Normal form to get 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	FPs	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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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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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 measure:**
  - algorithms, processing logic, data transformations, etc.

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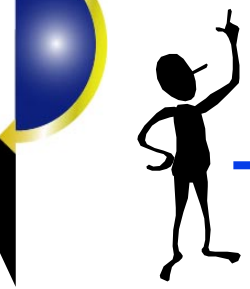
PROCESS



Stored Data

IFPUG = Files Accessed (FTRs)

COSMIC = Sub-process(READ WRITE)

Stored Data

IFPUG = Logical File

COSMIC = Persistent Data

IFPUG = DETs crossing boundary

COSMIC = Sub-process (ENTRY, EXIT)

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Differences

IFPUG

- Measures Processes **AND** Data
- **3 Process** BFC Types
- Min size = **3** fps
- Max size = **7** fps
- Aggregates **DETs** crossing boundary - unique DETs
- Counts **individual** DETs
- Counts access to persistent data group **once only per process**
- Can **select ranges of DETs** and FTRs/RETs for speed

COSMIC

- **Only** measures Processes
- **4 sub-**Process BFC Types
- Min size = **2** CFSU
- Max Size = α (infinite)
- Aggregates **DET groups** crossing boundary - unique ENTRY, EXITs
- Count DETs **groups**
- Counts access to persistent data group as READ and/or WRITE(**one/twice**)
- Ranges **not** used

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Differences

- **IFPUG**
  - No explicit rules for dealing with layered software
  - Rules focus on external userview of software
  - IFPUG 4.1 still has adjustment for quality and technical features (VAF)
- **COSMIC**
  - Explicit rules for counting application layers within multi-layered architectures
  - Rules designed for sizing software from different viewpoints
  - Quality and technical features if delivered in software are counted as functionality but in another 'conceptual' layer

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Advantages of IFPUG

- easy counting - '**ranges**' of DETs and RETs/FTRs
- **quick rough counting**- default BFCs to industry averages
- long term Industry evidence of **good correlation to effort**
- **Readily available** skills, training, tools, resources and historical data
- International **certification**

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Advantages of COSMIC

- Fast, consistent counting as all processes counted using **same rules**
- Explicit rules for sizing software in **layered architectures**
- Gives **proportional functional size** when:
  - processes **vary in size** up to several orders of magnitude
  - processes move many groups of data across the boundary that **do not involve data accesses**
- Data tends to be grouped more consistently by using **standard data modelling rules**
- **Avoids double counting** of data groups AND data in processes
- Developers find it more closely **aligned to methods** for specifying functionality eg. UML
- Rules for counting in **public domain** and **are concise** (73 Pages)

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Disadvantages of IFPUG

- CPM Rules and Guidelines for counting **focus on MIS** 'application layer' software.
- BFC types (EI/EO/EQ) processes **difficult to distinguish consistently** in realtime and embedded software
- **data contribution** to size is **distorts** in process rich environments
- Any errors in identifying **data groups are compounded** when incorporated into Process complexity
- **maximum size BFC restricted** to only twice minimum
- BFC type often **inconsistently appraised** :
  - where processes do not have a clear primary intent
  - processes are part of a multi - layered architecture
- **size distortion** when many processes actually vary more than two-fold
- Rules and guidelines need to be **purchased** and are **voluminous** (391pages)

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Disadvantages of COSMIC

- **No available 'quick' short-cut** methods of counting
- Needs fairly **detailed specifications**
- **Inconsistency** in way people identify **layers**
- Provide very **few extra guidelines** for counting different environments or examples of counts
- Very **limited supporting resources**, training, tools and industry data

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Which Method?

- Consider
  - functional domain of software to be measured (embedded process rich or data rich MIS?)
  - need and availability of support services
    - training
    - tools
    - historical data
    - skilled functional size analysts
  - how the size result will be used

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REMEMBER

- BOTH METHODS
  - Used internationally
  - ISO/IEC standards
  - 'work' in most environments
  - developed and refined by international experts (sometimes the same ones!)

THANK YOU

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"To measure is to know!"

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