The COSMIC Functional Size Measurement Method – an introduction

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COSMIC-FFP

The COSMIC Functional Size Measurement Method – an introduction

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Overview

Functional Size Measurement
What is COSMIC?
Why COSMIC?
Use of the method
Overview of the method
Some examples
Historical data
Conclusions

Functional Size Measurement

Measurement of the functional user requirements of a piece of software

- What should the software do for the user?
- Not 'how' or 'why'
- Result: size of the software expressed as number of function points (FP)

Independent of the business or systems requirements

Purposes:

- Software Project estimation
- Project Performance measurement
- Scope management
- Project Benchmarking
- RFP Management: contracting 'price/FP'

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What is COSMIC

Common Software Measurement International Consortium

- Non-profit, started end 90's
- Researchers and practitioners
- Open method (www.cosmicon.com)
- ISO standard - ISO/IEC 19761:2011
- Stable method
- Growing adoption worldwide
- Many certified practitioners
- Loads of supporting documentation, case studies, research papers, etc.

COSMIC MPC (Measurement Practices Committee)

- Maintain the Measurement Manual and other guidelines

COSMIC IAC (International Advisory Committee)

- Promote the method locally and act as a point of contact in a country

Why COSMIC?

Overcomes a number of drawbacks of traditional Function Point Analysis (FPA)

FPA: NESMA or IFPUG

FPA: Measures the size of functionality offered to the user and requested by the user. Not possible to divide the system in components or layers and measure them separately

FPA: Measurement scale is not 'natural'

ILF: 7, 10, 15 FP

EIF: 5,7,10 FP

FPA: Not possible to apply to real-time, embedded or infrastructure software

FPA: Measurement possibilities are depending heavily on availability of a data model and detailed description of the functional requirements

FPA vs. COSMIC

	FPA	COSMIC
Domain	Business applications	Business applications, Real-time applications, Infrastructure software
Data model required?	Required	Not required (but useful)
Measurement of separate components	Not possible	Possible
Size limit per function	Yes	No
Benchmarking data	Many	Some (ISBSG R11: 450)
Early sizing	Based on data model	Based on process model

Use of the method

Easier to measure modern architectures and development methods

- SOA architectures: Separate size for service, front-end and bus
- Mobile apps: Separate size for the app and for the back-end
- Agile development: Size user stories, sequence diagrams, activity diagrams

Possible to measure Real-time, embedded and infrastructure software

- Real-time measurement guideline
- Early adopters: Renault, Siemens, Nokia, Eurocopter, Philips

Case studies, research and conference papers

Translations: Arabic, Chinese, French, Dutch, Japanese, Russian, Portuguese, Turkish, Polish, etc.

COSMIC documentation

Documentation Overview & Glossary of Terms

PRINCIPLES & RULES for the COSMIC METHOD Version 3.0.1:

ISO/IEC 19761:2002
COSMIC-FFP
A functional size measurement method*

Method Overview	Measurement Manual (V3.0.1)	Advanced & Related Topics

← Beginners →
← Practitioners →
← Experienced Practitioners →

DOMAIN-SPECIFIC SUPPORT DOCUMENTS

Guidelines
- Business Application v1.1
- Real-time Software**
- Data Warehouse**
- Service-Oriented Architecture**

Case Studies (x n)
- Business Application
- Real-time software

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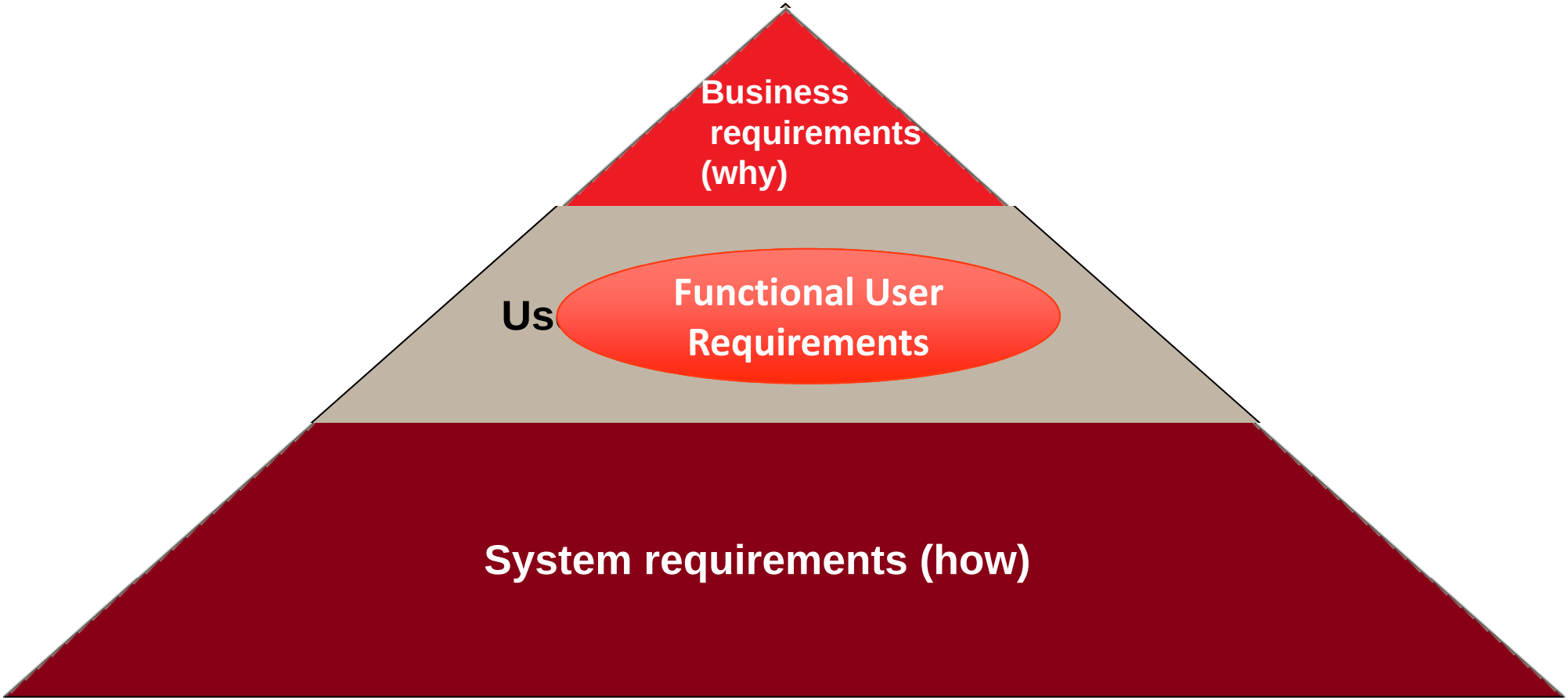
Requirements to measure



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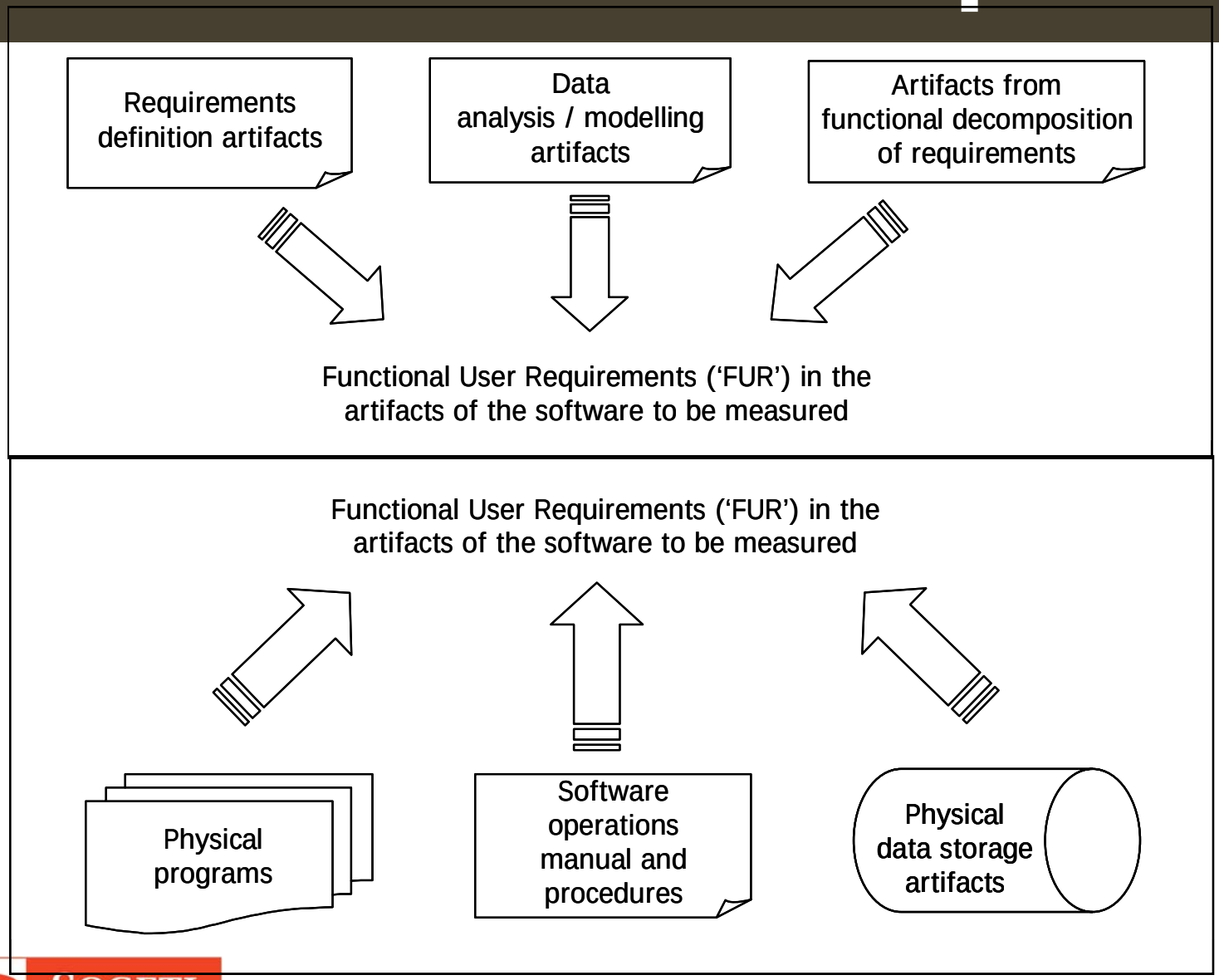
Functional User Requirements



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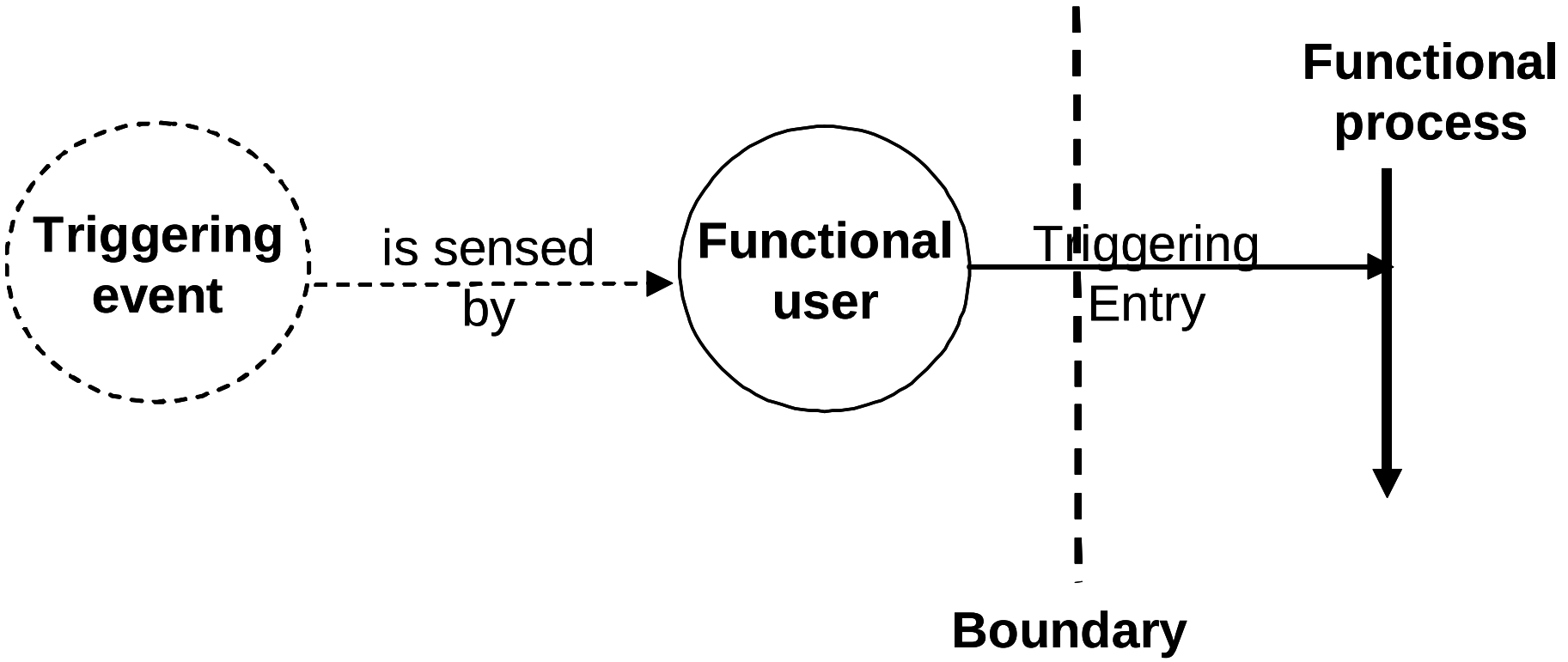
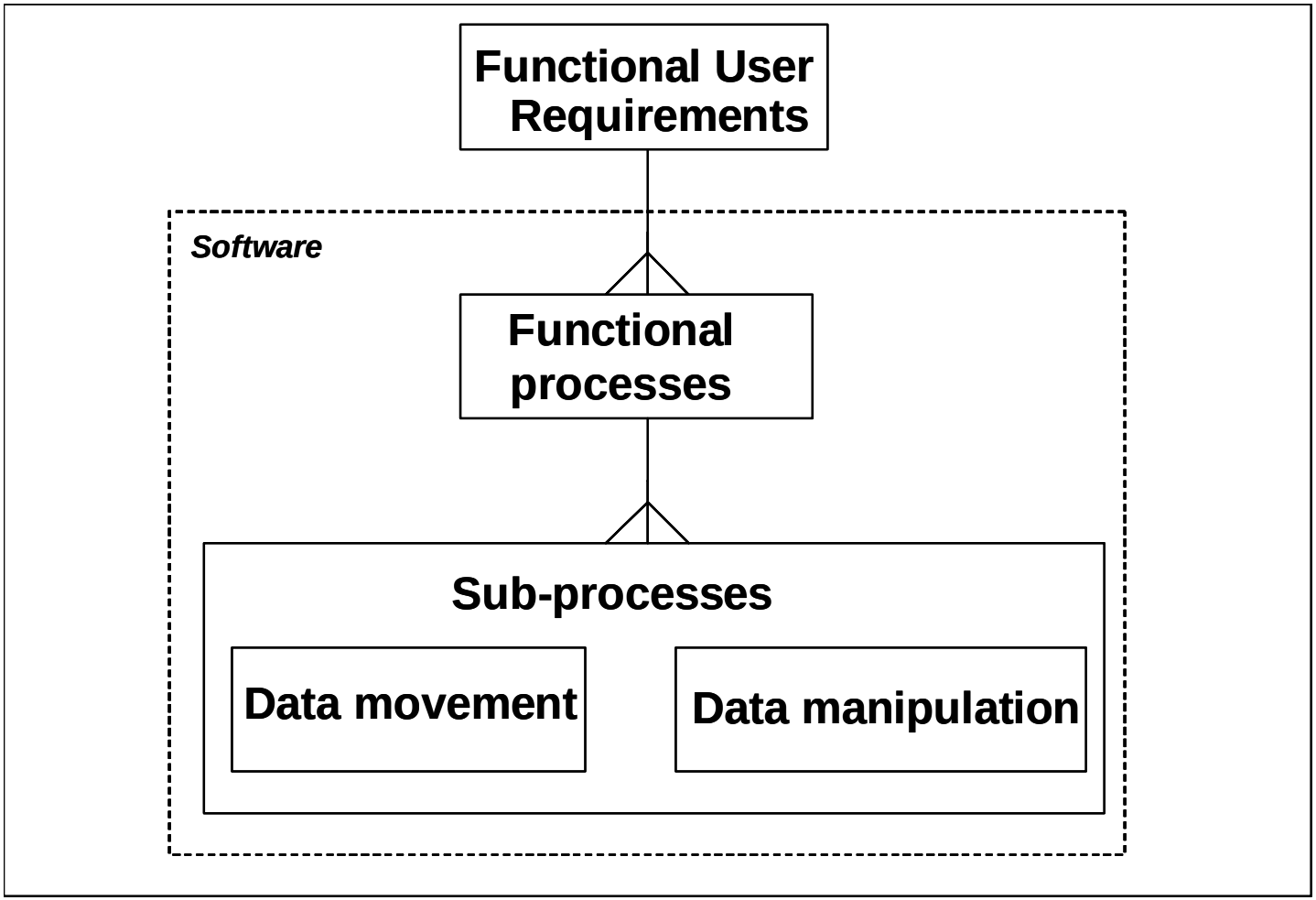
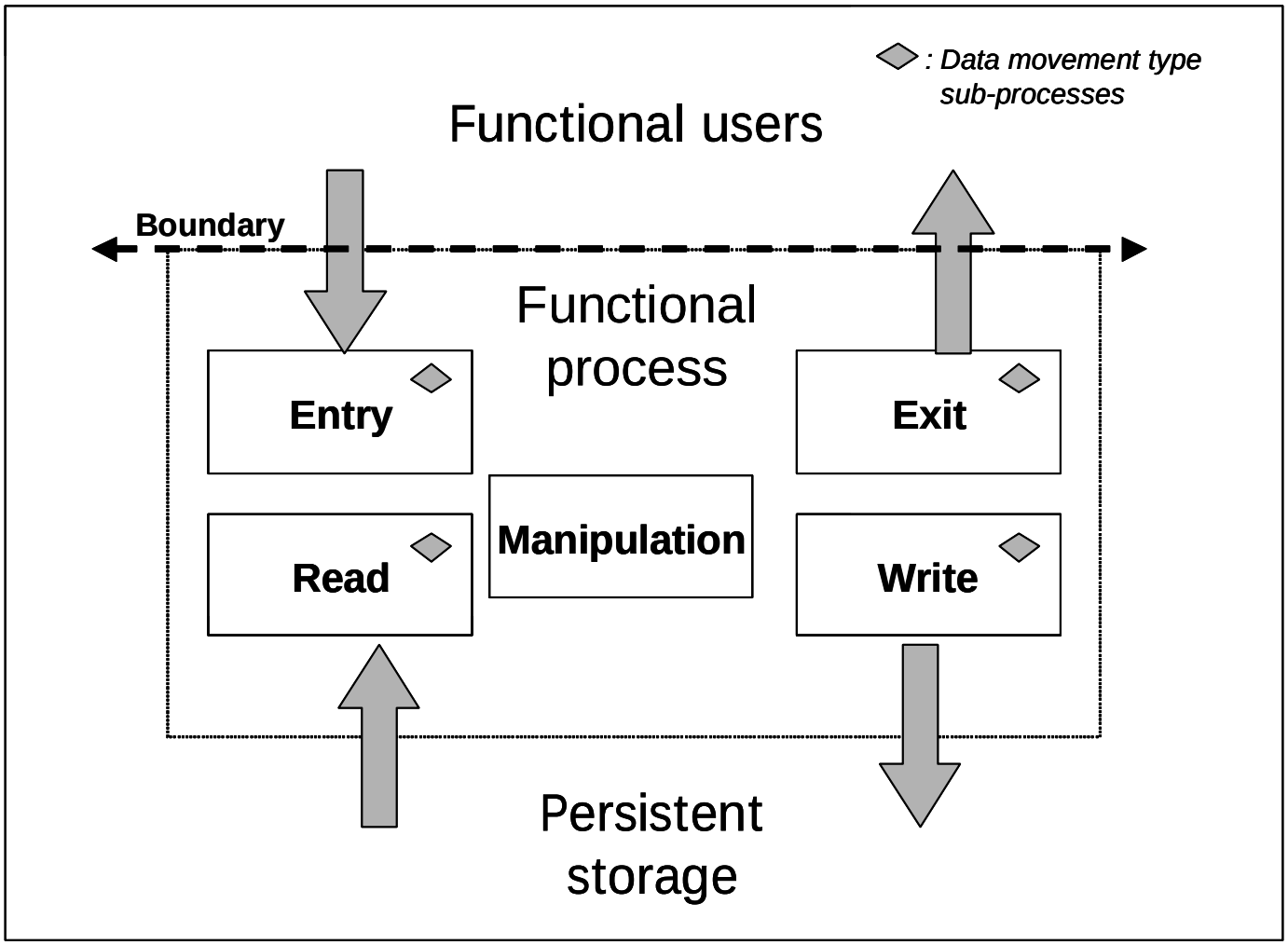
Functional Process



Functional processes

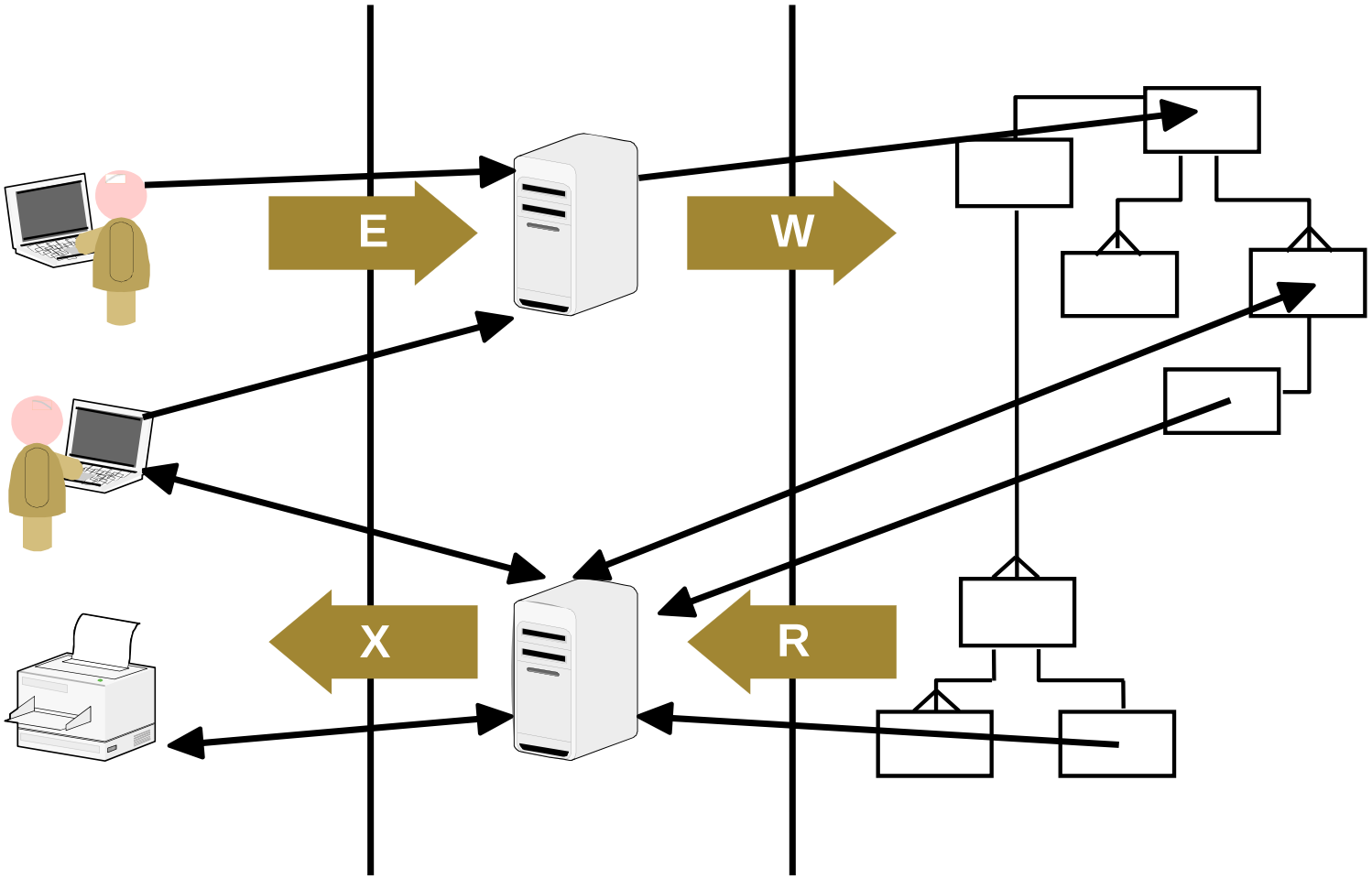


Data movements



COSMIC measurement

Users **Functional process** **Data**



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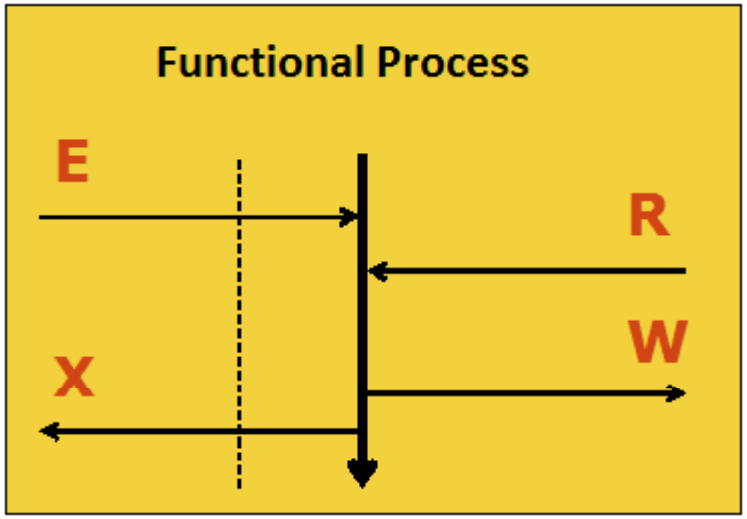
Entry / Exit

An ENTRY (E) is a data movement that:

moves a data group
from the user
across the boundary
to the functional process

An Exit (X) is a data movement that:

moves a data group
from a functional process
across the boundary
to the user

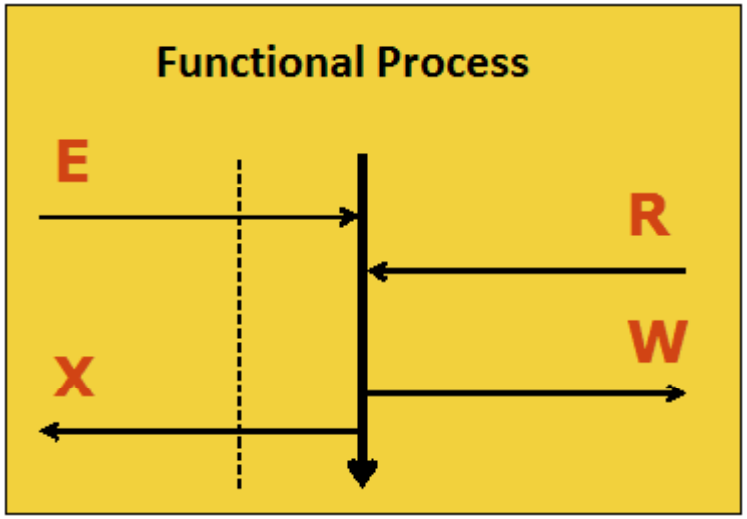


Entry (E) : 1 COSMIC function point
Exit (X) : 1 COSMIC function point

Read / Write

A Read (R) is a data movement that:
moves a data group
from persistent storage
to the functional process

A Write (W) is a data movement that:
moves a data group
from a functional process
to persistent storage



Read (R) : 1 COSMIC function point
Write (W) : 1 COSMIC function point

Objects of Interest

DEFINITION – Object of interest

Any 'thing' that is identified from the point of view of the Functional User Requirements. It may be any physical thing, as well as any conceptual object or part of a conceptual object in the world of the functional user about which the software is required to process and/or store data.

NOTE: In the COSMIC method, the term 'object of interest' is used in order to avoid terms related to specific software engineering methods. The term does not imply 'objects' in the sense used in Object Oriented methods.

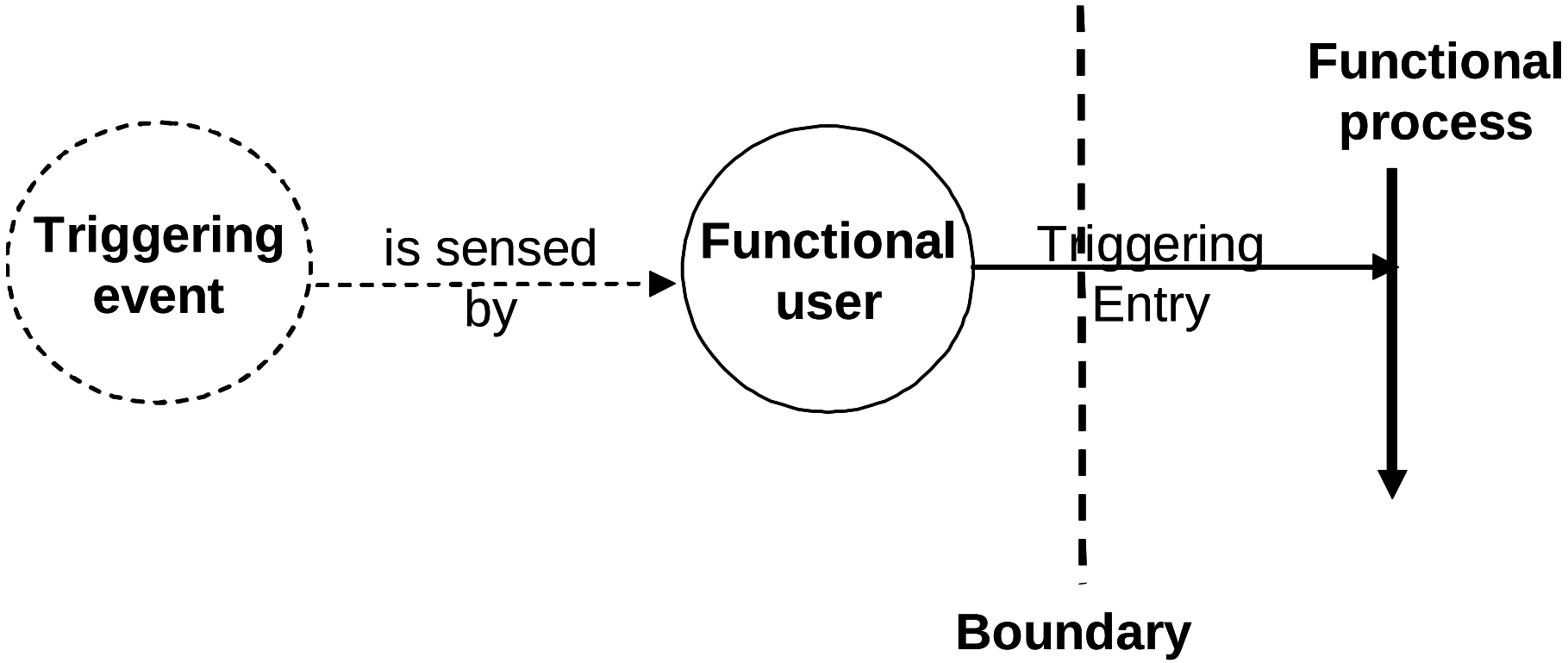
DEFINITION – Data group

A data group is a distinct, non empty, non ordered and non redundant set of data attributes where each included data attribute describes a complementary aspect of the same object of interest.

OOI / FP / DG

Object of Interest	Functional Process	Data group (Write)
Employee	Add employee	{emp_nr, name, address, city, ssn}
Employee	Change employee	{name, address, city}
Employee	Delete employee	{emp_nr}

Example: Add employee



Employee is hired

HR backoffice Employee

Add Employee

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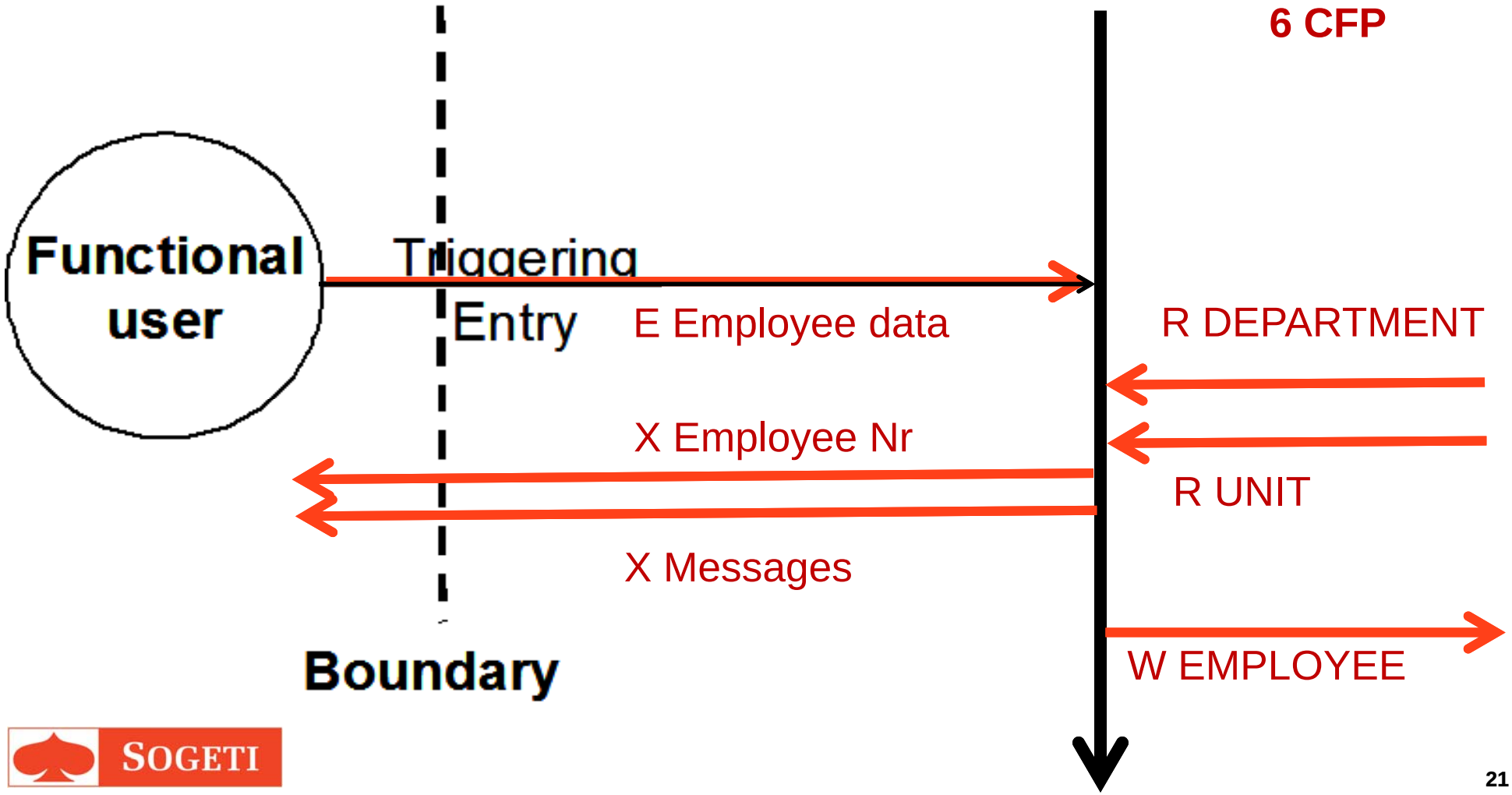
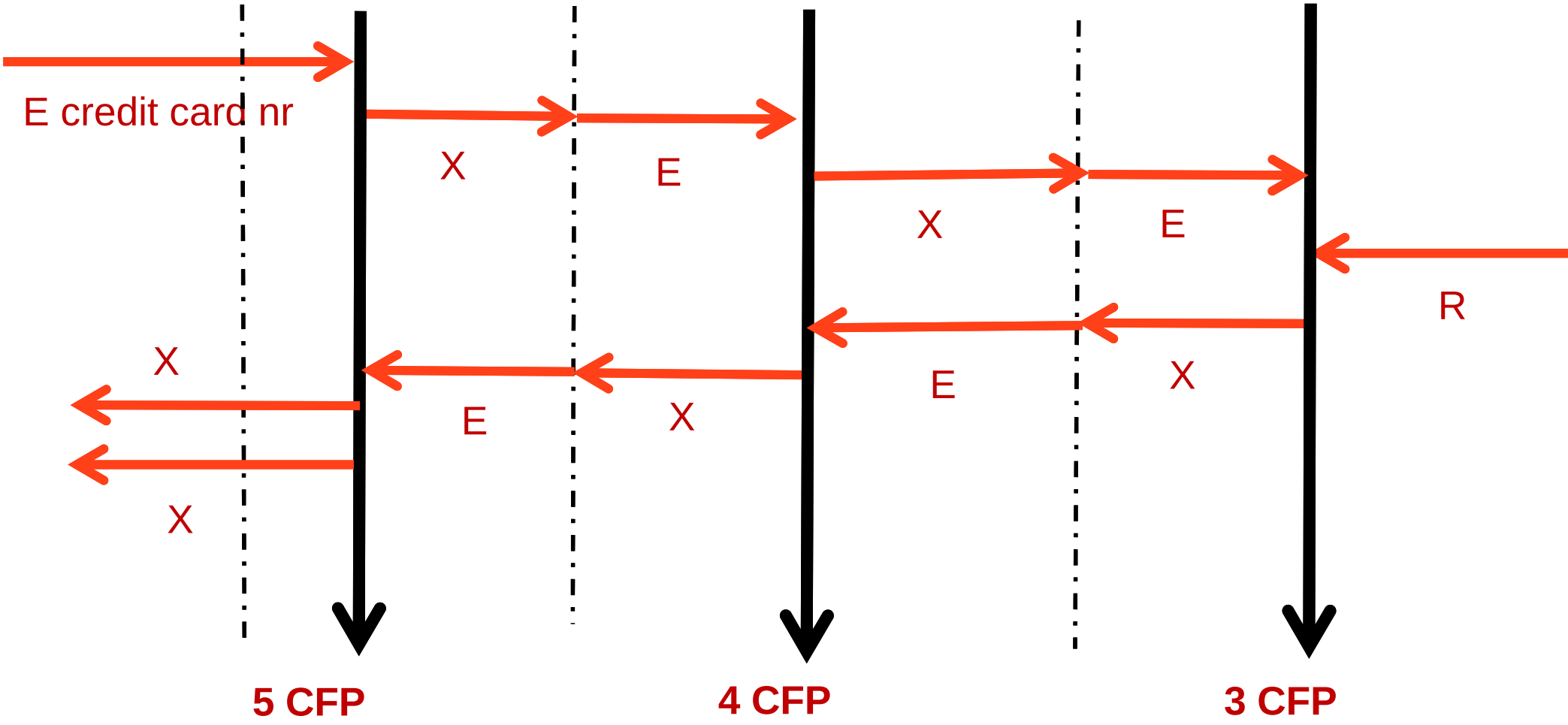
Example 1 Add Employee

EMPLOYEE [employee nr, name, address, phone number, department code, unit code, e-mail address]



Example 2 SOA

Service: Check credit card balance and latest transactions (user is logged in)



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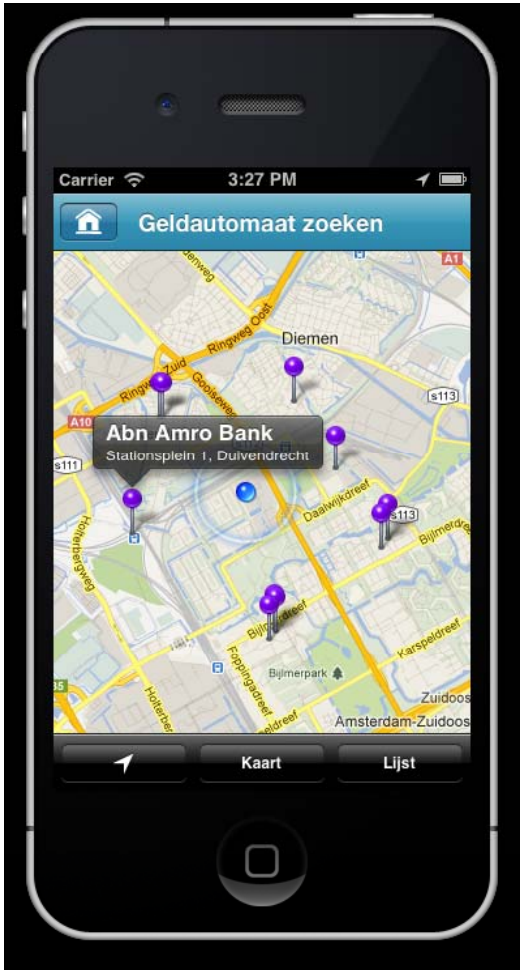
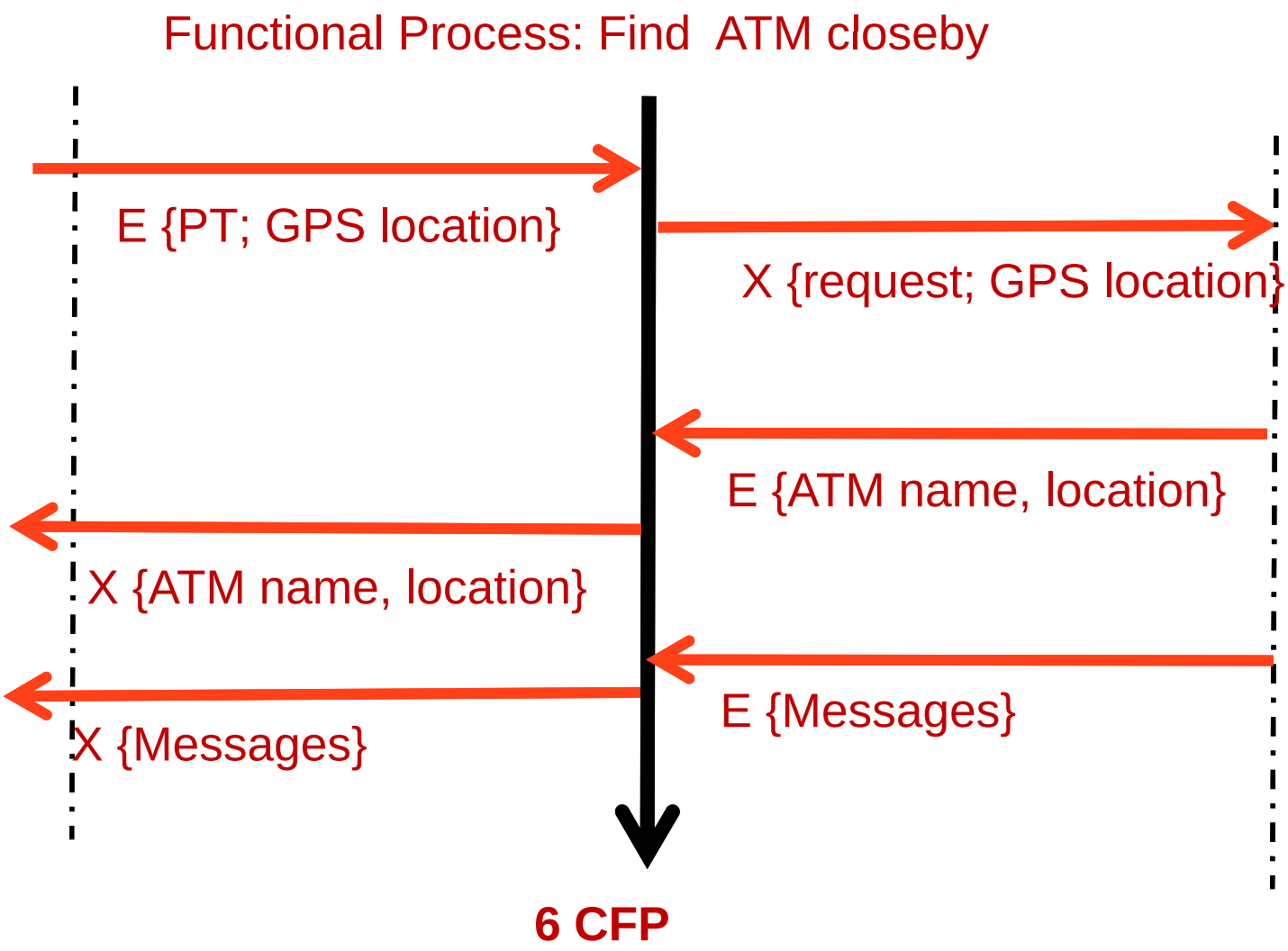
Front end

Service bus

Data layer

Example 3: Mobile app





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Historical data: ISBSG repositories

International Software Benchmarking Standards Group
Independent and not-for-profit
Members are non-profit organizations, like IFPUG and NESMA

Grows and exploits two repositories of software data:
- New development projects and enhancements (> 6000 projects)
- Maintenance and support (> 1000 applications)

Everybody can submit project data
- DCQ on the site (COSMIC DCQ)
- Anonymous
- Free benchmark report in return

Special reports, Practical Project Estimation book, Compendium
Portal to access the project data

ISBSG

Mission: “To improve the management of IT resources by both business and government, through the provision and exploitation of public repositories of software engineering knowledge that are standardized, verified, recent and representative of current technologies”.

All ISBSG data is

- validated and rated in accordance with its quality guidelines
- current
- representative of the industry
- independent and trusted
- captured from a range of organization sizes and industries

Industry leaders around the world contribute to the ISBSG’s development, offering the highest metrics expertise worldwide

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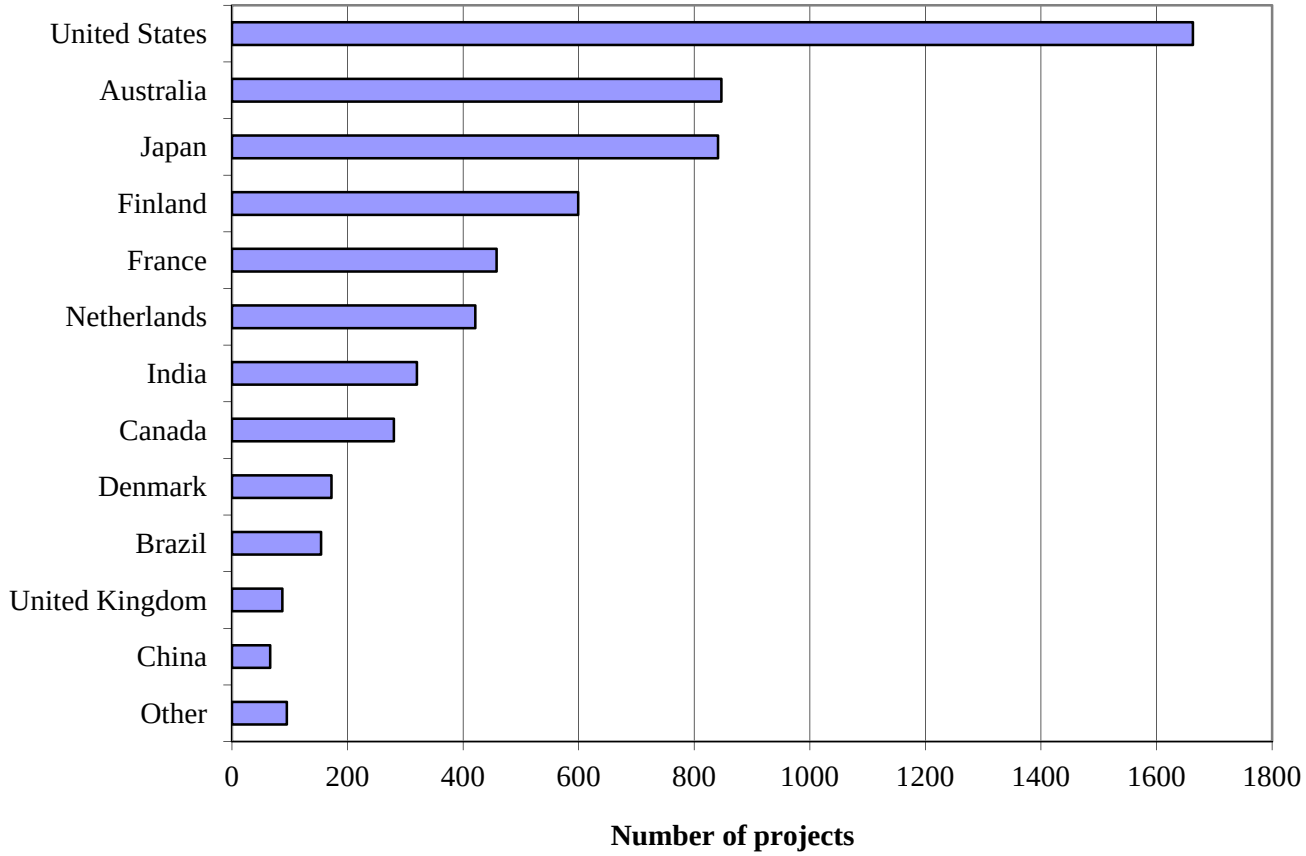
ISBSG New developments

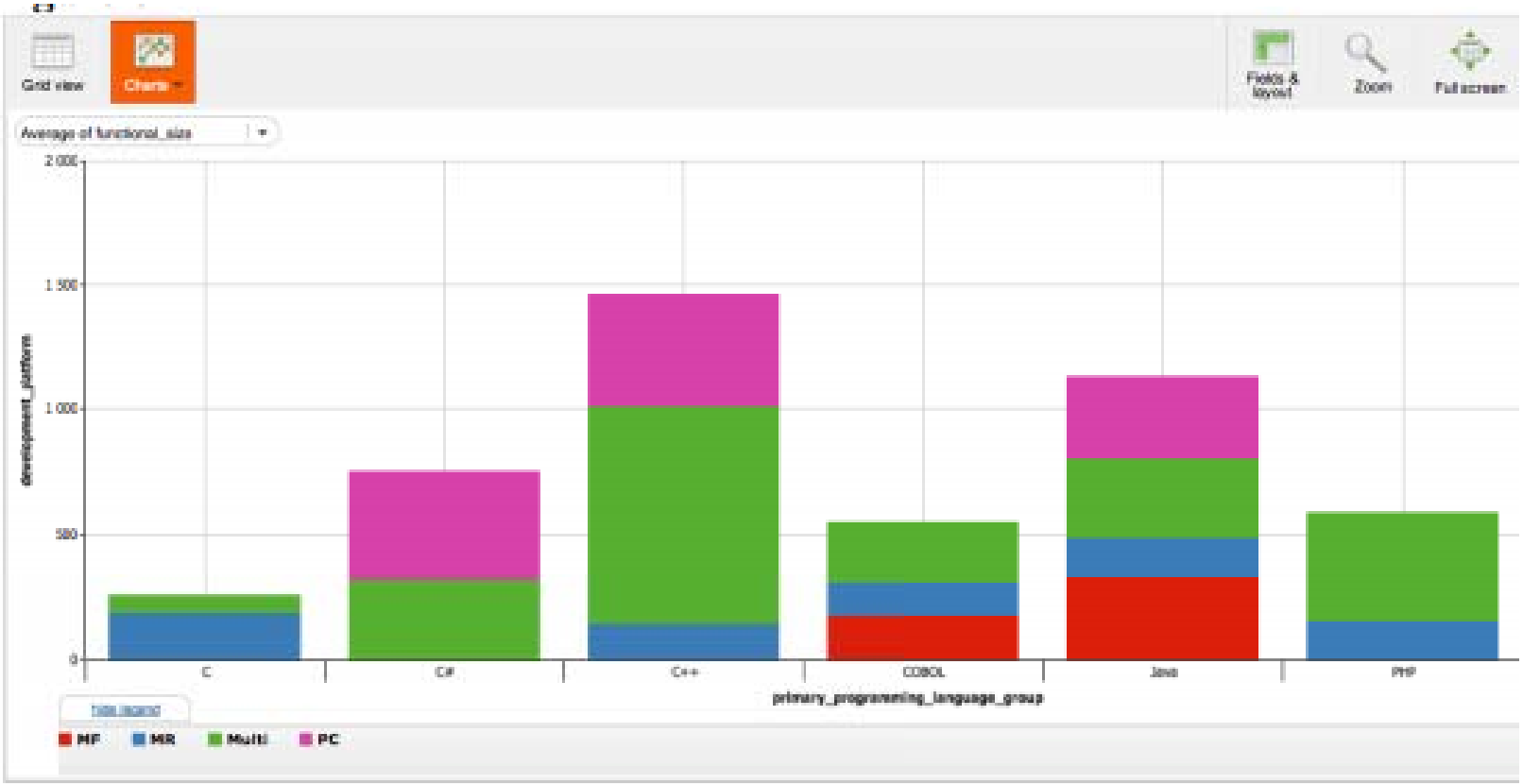
R12: >6000 projects

Projects measured with COSMIC : >450 projects



ISBSG data

Repository in MS Excel (open)
Use the data portal (portal.isbsg.org)



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Some trends in COSMIC data

The Performance of Business Application, Real-Time and Component Software Projects

Published March 2012

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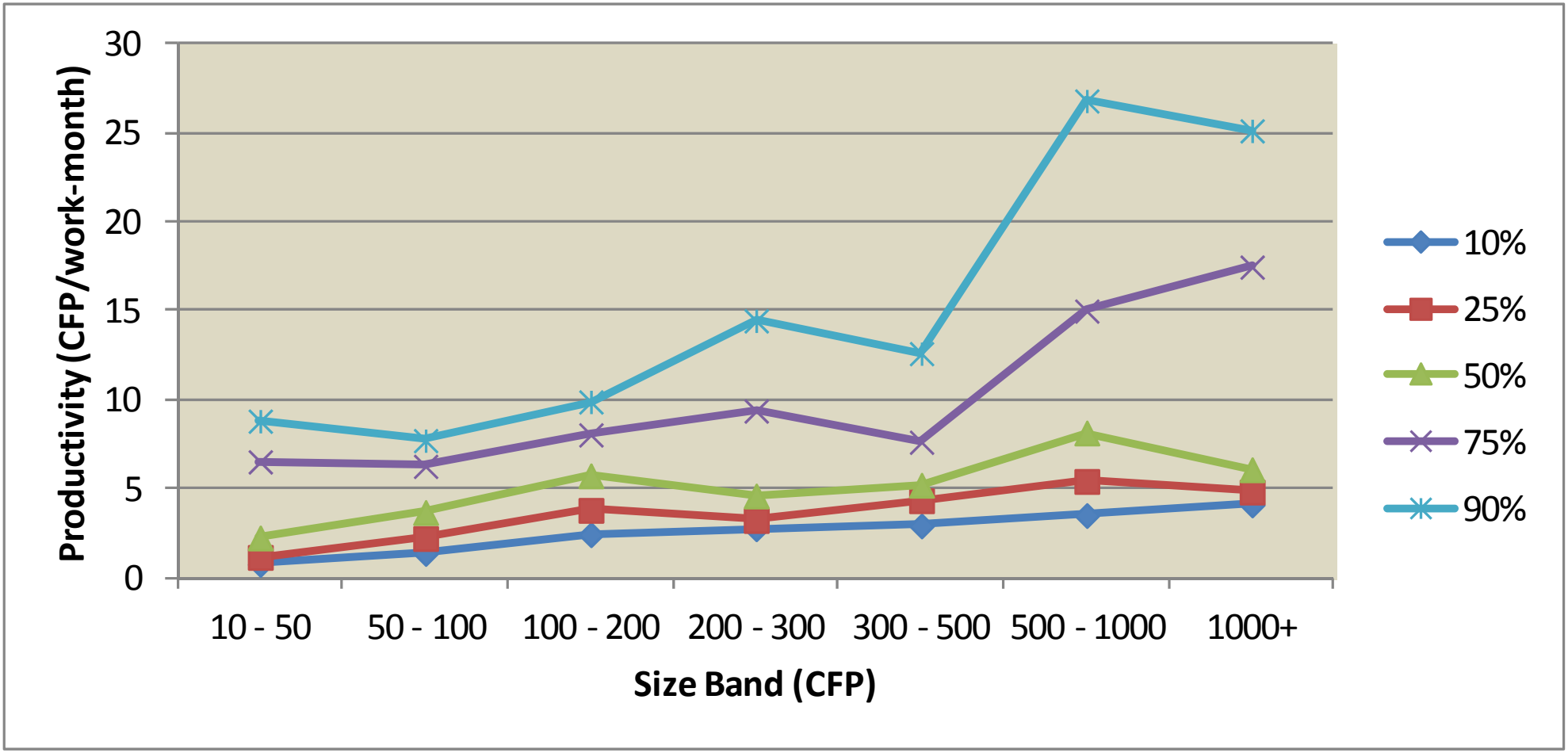
COSMIC productivity data



Business application new development 3GL projects:

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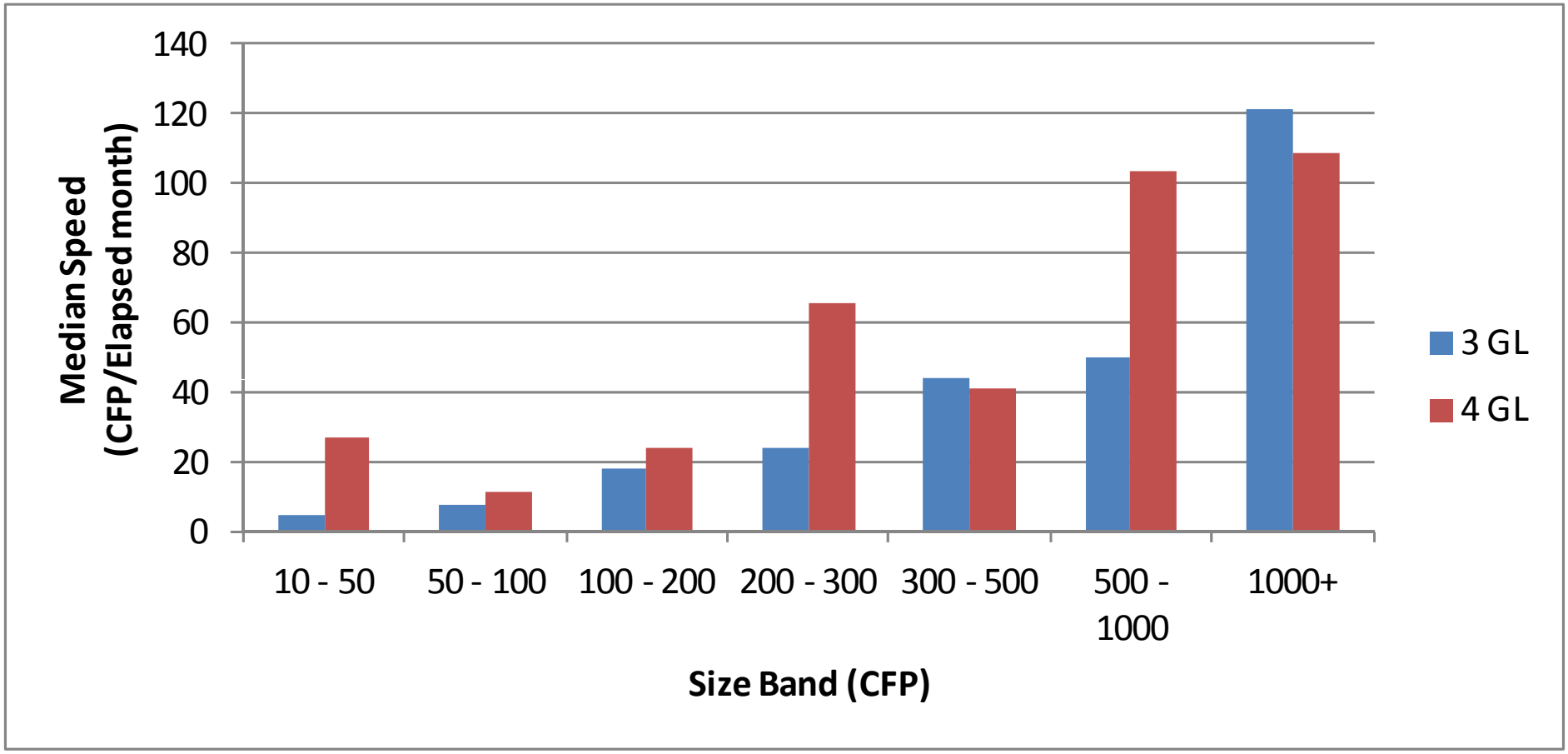
COSMIC productivity data



Business application new development projects: Median Project Speed vs Size Band

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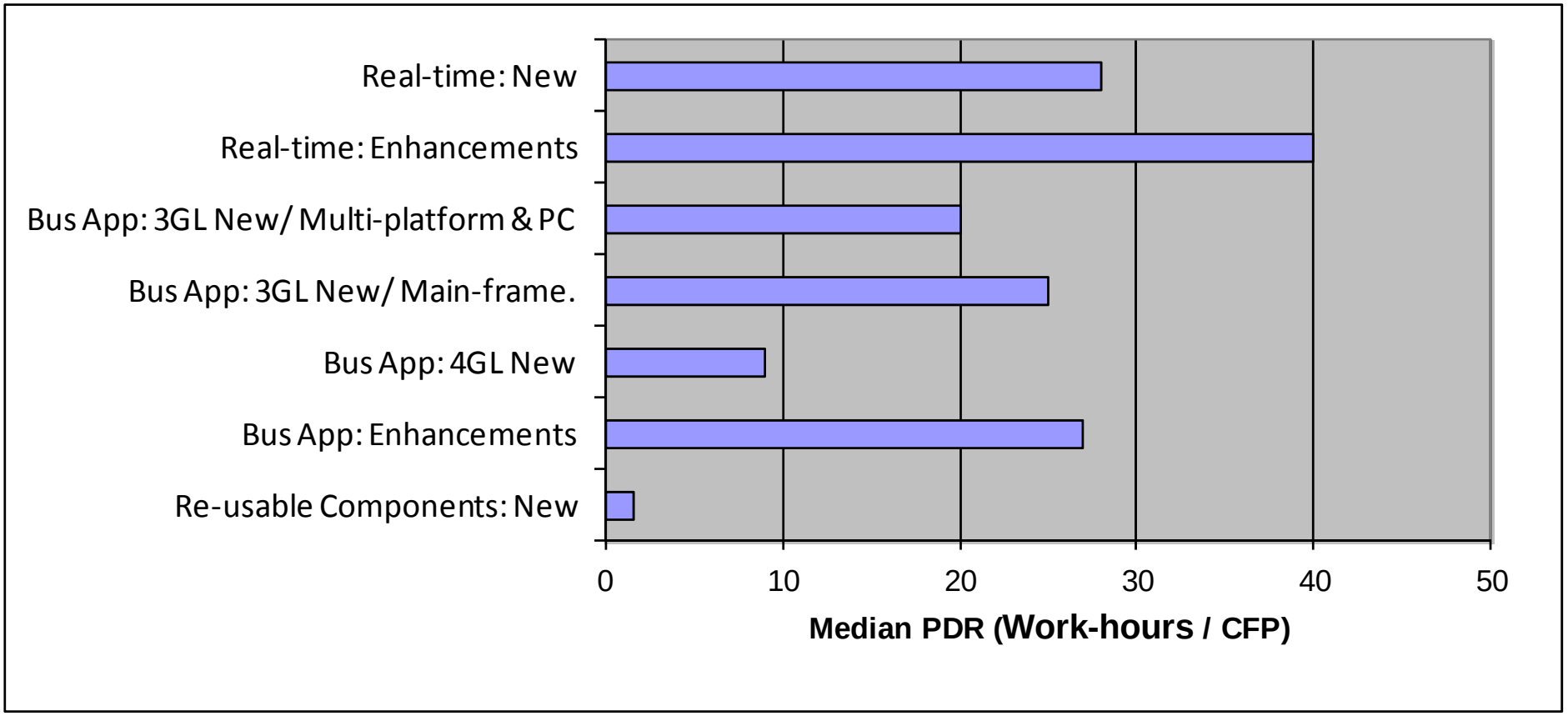
Key PDR benchmarks



Conclusions

COSMIC is now a modern and stable method and has considerable advantages over the traditional functional sizing measurement methods

Possible to measure Real-time, embedded and infrastructure software, and business applications

Growing adoption, especially in RT domain

Enough historical data available in the ISBSG repository to use COSMIC in Software Cost Engineering

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