



## Title: Functional Size Measurement Patterns: A way to quick estimate size

**Author: JEAN-MARC, Desharnais**

**Editorial label ECORFAN: 607-8695**  
**BCNMES Control Number: 2020-02**  
**BCNMES Classification (2020): 110820-0016**

**Pages: 22**  
**RNA: 03-2010-032610115700-14**

**ECORFAN-México, S.C.**  
 143 – 50 Itzopan Street  
 La Florida, Ecatepec Municipality  
 Mexico State, 55120 Zipcode  
 Phone: +52 1 55 6159 2296  
 Skype: ecorfan-mexico.s.c.  
 E-mail: contacto@ecorfan.org  
 Facebook: ECORFAN-México S. C.  
 Twitter: @EcorfanC

[www.ecorfan.org](http://www.ecorfan.org)

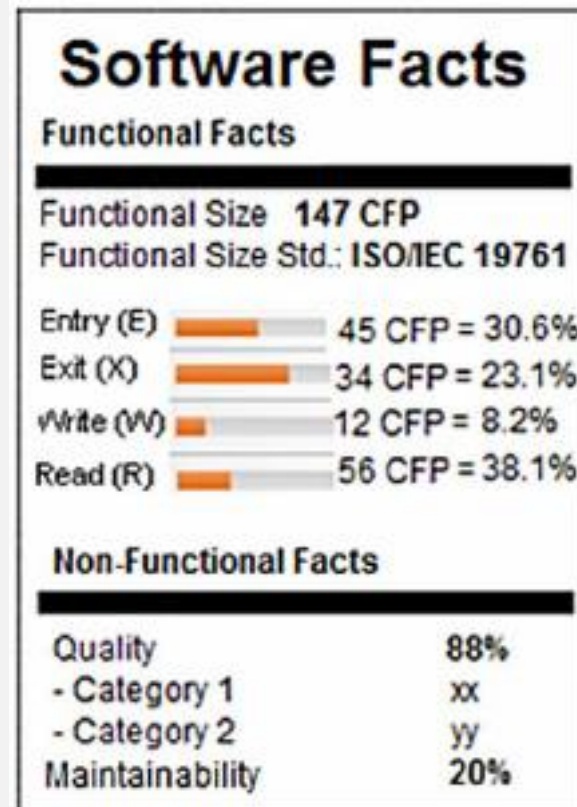
Holdings		
Mexico	Colombia	Guatemala
Bolivia	Cameroon	Democratic
Spain	El Salvador	Republic
Ecuador	Taiwan	of Congo
Peru	Paraguay	Nicaragua

# CONTENT

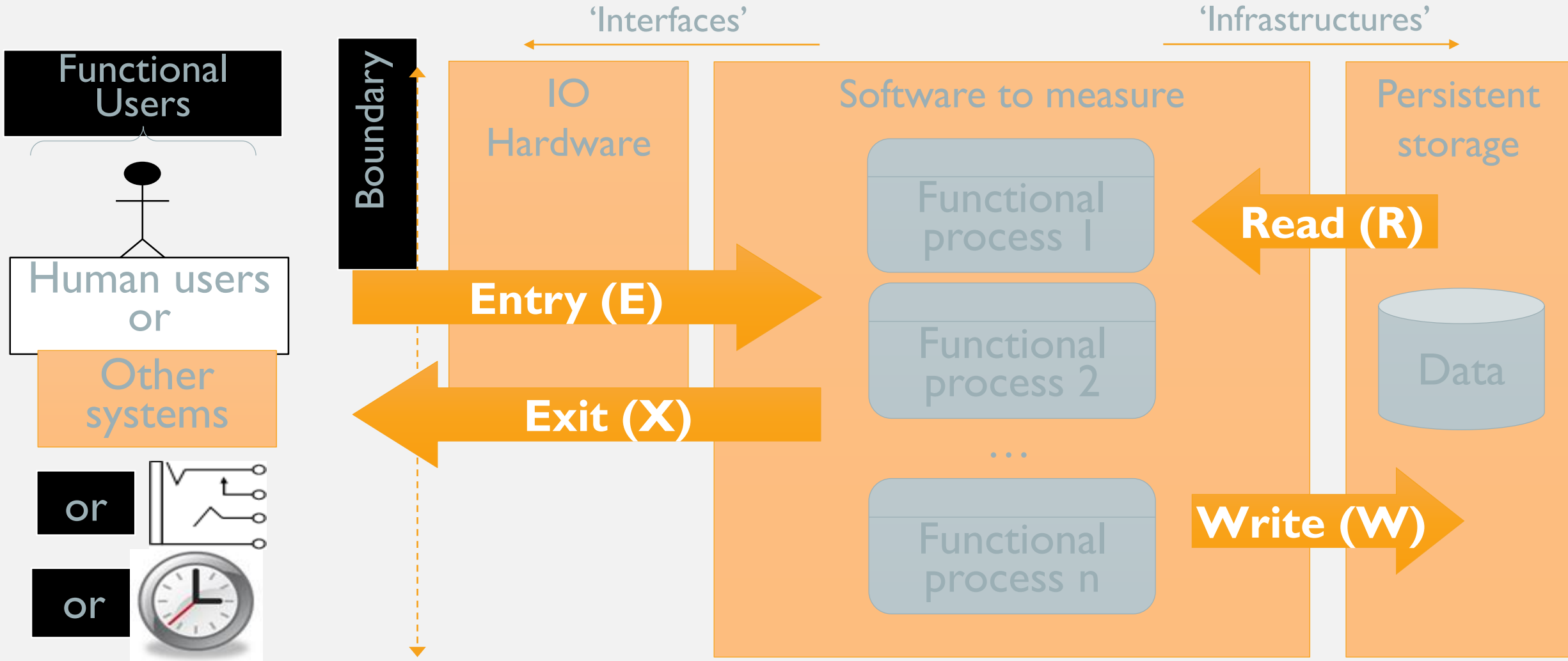
- ✧ Introduction
- ✧ Methodology: Defining FSM Patterns
- ✧ Demonstration: How to estimate the size with the patterns
- ✧ Conclusion

# INTRODUCTION

- COSMIC: a functional measure
- Size, quality, maintainability, etc.



# COSMIC : Overview



## WHY USING PATTERNS?

- Helping inexperienced measurers
  - Building the cognitive process through examples
  - Being able to measure a whole software autonomously
- Reducing measurement effort
  - Alleviate manual typing of measurement records
  - Being able to automate sizing from other sources than UML
- Sizing projects at an early phase
  - Risks inherent to applying an approximate sizing method
  - Could be done from knowing data entities to be processed
    - Master data, Transactional data, and Reference data
- Assuring accuracy of measurement
  - Even with incomplete or partially written requirements

# SOLUTION OBJECTIVES

## Defining FSM Patterns using Design Science Research Methodology

1. Must help inexperienced measurers to apply the rules governing the COSMIC method
2. Should contribute in reducing measurement effort
3. Should allow for an early sizing, even without detailed written FUR
4. Should provide a more accurate sizing by helping to avoid common measurement mistakes

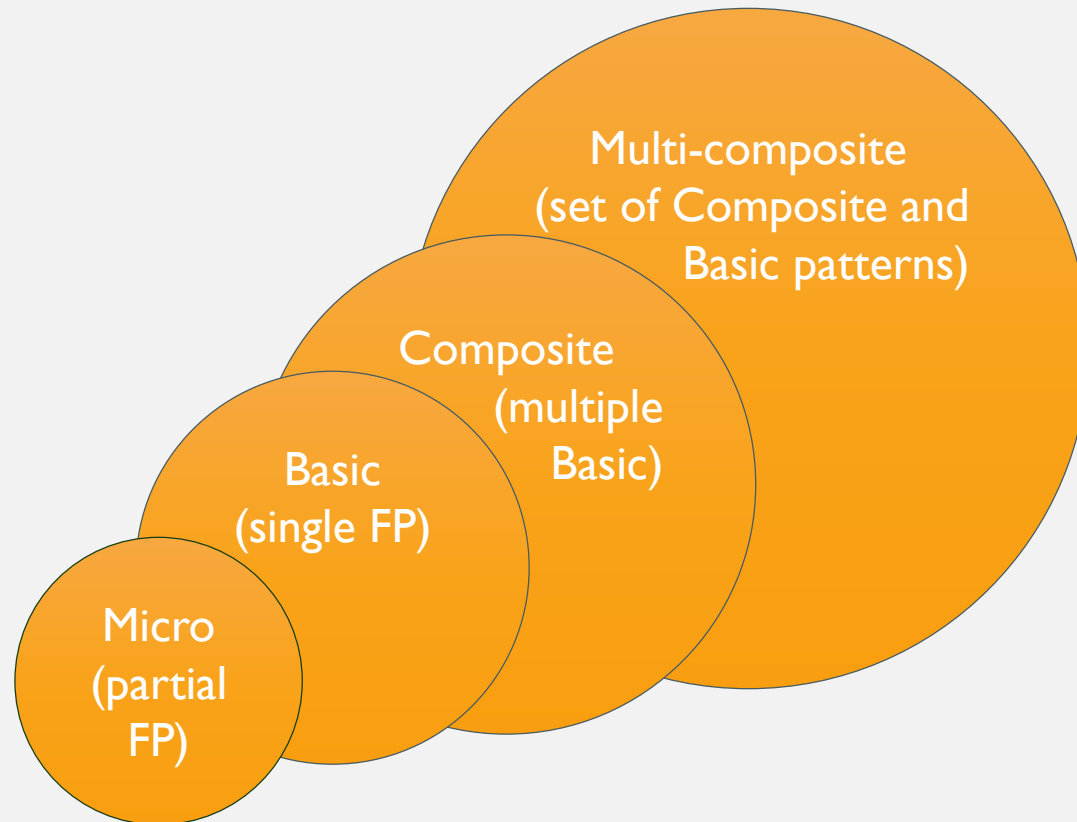
## WHAT IS A FSM PATTERNS

- Inspired from well known “Design patterns”
- FSM Pattern Definition:

A FSM pattern is a predefined generic software model solving a recurring measurement problem in a specific context

- Mostly applied during the mapping phase
  - Relationships of Functional processes, Data Groups , and Data Models
  - Showing an adequate sizing to a recurring measurement problem

# CATEGORIES OF FSM PATTERNS





# EVALUATION AND COMMUNICATION OF FSM PATTERNS

- Applied in both IS and embedded real-time domains
  - We have been applying them for over 4 years
- Quantifying FSM Pattern application and usage against research objectives is yet to be done
  - We know it helps novices but not by how much
- This paper/presentation one of the first communication means (the first one at Mensura conference)


# Micro FSM Pattern Examples

- Display simple error messages
- Display localized error messages
- Asynchronous data sending to an external service
- Data sending to an external service with confirmation
- External service request with data group or error code return

Functional process	Data Group	DM	Size (CFP)
<Functional process>	Error message	X	1
Total:			1

# Basic FSM Pattern Examples (IS)

- Create an occurrence of a data group
- Retrieve [and display] a data group
- Update a data group
- Delete a data group



Functional process	Data Group	DM	Size (CFP)
Create <data group>	<Data group>	<u>E</u> RW	3
	Error message	X	1
Total:			4

# Composite FSM Pattern Examples (IS)

CRUDL using 3

DGs:

<First DG>=Customer

<Second DG>=Sales rep

<Third DG>=Category

Functional process	Data Group	DM	Size (CFP)
Create <First DG>	<First DG>	<u>E</u> RW	3
	<Second DG>	RX	2
	<Third DG>	RX	2
	Error message	X	1
Sub-total:			8
Retrieve <First DG>	(same as Create)	--	8
Update <First DG>	(same as Create)	--	8
Delete <First DG>	<First DG>+Msg	ERW+ X	4
List <First DG>	Filter+Msg + 3 DGs	E+X+ 3(RX)	8
<b>Total:</b>			<b>36</b>

# Multi-composite FSM Pattern Examples (IS)

Module using multiple DGs  
of expected categories:

- Master data
- Transaction data
- Reference data

FSM Pattern	Category	Size (CFP)
CRUDL-3DG	Composite	36
CRUDL-1DG (x2)	Composite	40
CRUD-2DG	Composite	22
CRUD-3DG (x2)	Composite	52
Transaction-7DG (x3)	Basic	36
Reports-4DG (x3)	Basic	27
Milestone-2DG	Basic	10
<b>Total:</b>		<b>223</b>

## EXAMPLE WITH A CASE

The aim of the application is to provide a project plan for the EUC Dashboard. EUC Dashboard is a visualization tool for the status of multiple crucial systems across the firm in terms of a RAG (Red, Amber, Green) statuses.



The objective is to create a web page that simplifies and represents these two characteristics (availability and performance) in terms of Red (bad), Amber (acceptable, but actions must be taken) and Green (all is well, continuous improvement) status.

## CONSTRAINTS AND ASSUMPTIONS

- This project will be completed according to a few constraints and dependencies:
  - Data access will be granted by the firms security division
  - Only authorized and trained personnel will interact with the system
  - Execution of the development will be conducted according to the schedule, and any changes to workforce or skill level will necessarily reflect the deliverables.
  - Stakeholders identified will contribute with opinions and suggestions, but will limit change requests to the appropriate phase of the development lifecycle.

## DATA GROUPS

Few examples:

- Parameters (system name, description, cost center, owner)
- Quality Measure Element (Description, level, event number, value)
- Derived measure (description, value)



## MICRO LEVEL

- Example: Data sending to an external service with confirmation
- Status of the system (one data movement exit)

## BASIC FSM PATTERN (LEVEL OF FUNCTIONAL PROCESS)

- Example with Add parameters
  - system name, description, cost center, owner.  
(three data movements: Entry, Read, Write, Exit)
  - Note: the Exit is for the error message)
  - 4 data movements

## COMPOSITE FSM PATTERN

1. Calculate RAG status (2 DGs)
2. Add system (1 DG)
3. Modify system (1 DG)
4. Delete system (1 DG)
5. Display system status (1 DG)
6. Search system status (1 DG)
7. Search rag status by system (2 DGs)

Assuming 4 data movements with 1 DG and 6 with 2 DGs  
Total of 32 data movements or 32 CFPs

Note: at the end of the project the number of CFPs was 49 points, mainly because 2 new processes were added.

## MULTI-COMPOSITE FSM PATTERNS

- It will be necessary to evaluate the same way each composite pattern and add all the data movements.

## CONCLUSION

- We used the Design Science Research Methodology
- We introduced the concept of FSM Patterns, as a means to
  - Help inexperienced measurer to ramp-up their learning curve faster
  - Avoid measurement mistakes
  - Reduce measurement effort
  - Assist in measuring projects at an early phase

## CONCLUSION

- Opportunities for tool development and usage
  - Increased FSM popularity
  - COSMIC compliant measurement records
- Opportunities for COSMIC
  - New approach for early sizing
  - Micro and Basic FSM Pattern to be included in training material

## FUTURE WORK

- Provide quantitative evidences for evaluation of FSM patterns against this research objectives
  - Effectiveness on novice learning curve and their ability to avoid mistakes
- Libraries of FSM need to be developed and taught
  - New types, such as “Reports”, “Batch FP”, etc.
  - Should be made available freely to the community, along with a measurement-recording tool supporting FSM Patterns
- Automation



**ECORFAN®**

© ECORFAN-Mexico, S.C.

No part of this document covered by the Federal Copyright Law may be reproduced, transmitted or used in any form or medium, whether graphic, electronic or mechanical, including but not limited to the following: Citations in articles and comments Bibliographical, compilation of radio or electronic journalistic data. For the effects of articles 13, 162,163 fraction I, 164 fraction I, 168, 169,209 fraction III and other relative of the Federal Law of Copyright. Violations: Be forced to prosecute under Mexican copyright law. The use of general descriptive names, registered names, trademarks, in this publication do not imply, uniformly in the absence of a specific statement, that such names are exempt from the relevant protector in laws and regulations of Mexico and therefore free for General use of the international scientific community. BCNMES is part of the media of ECORFAN-Mexico, S.C., E: 94-443.F: 008- ([www.ecorfan.org/](http://www.ecorfan.org/) booklets)