SMEF 2004

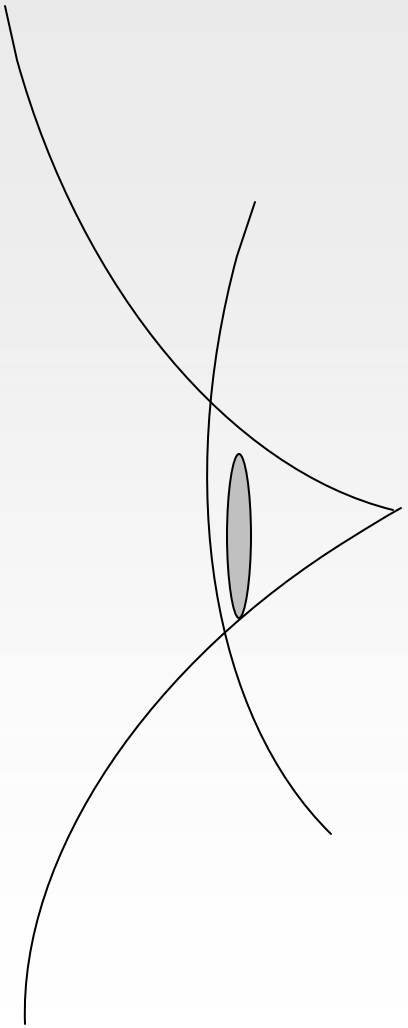
A Proposed Measurement Role in the Rational Unified Process and its Implementation with ISO 19761: COSMIC-FFP

Saadi Azzouz, Alain Abran
École de Technologie Supérieure – ETS
Montréal, Québec, Canada.

azzouz.saadi@courrier.uqam.ca aabran@ele.etsmtl.ca

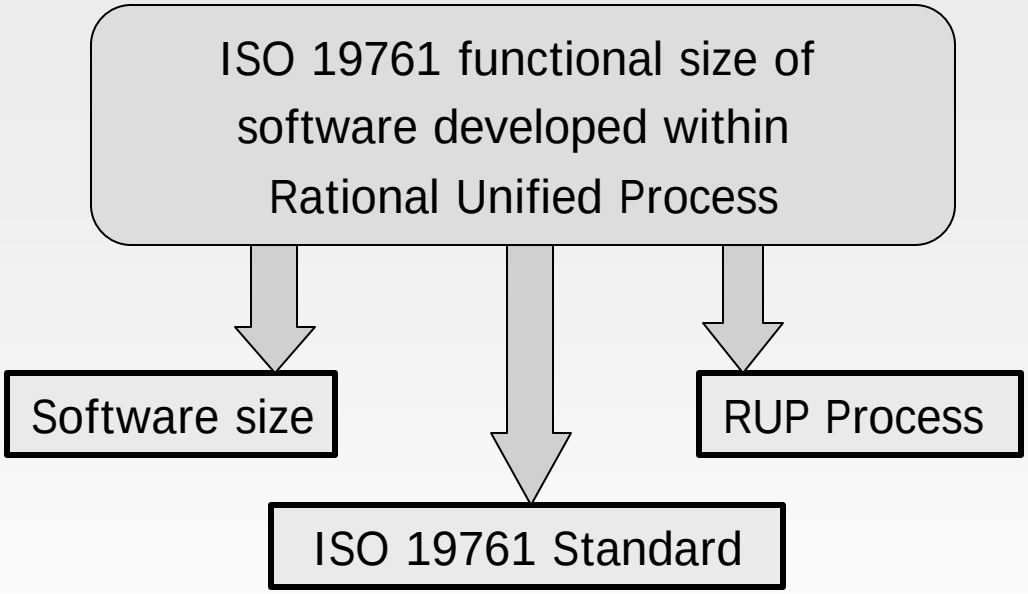
Summary

- Objective
- Software size
- Standard ISO 19761
- RUP new measurement activity
- Tool measurement basis
- Solution
- Results
- Conclusion



Functional Size Measurement

Objective

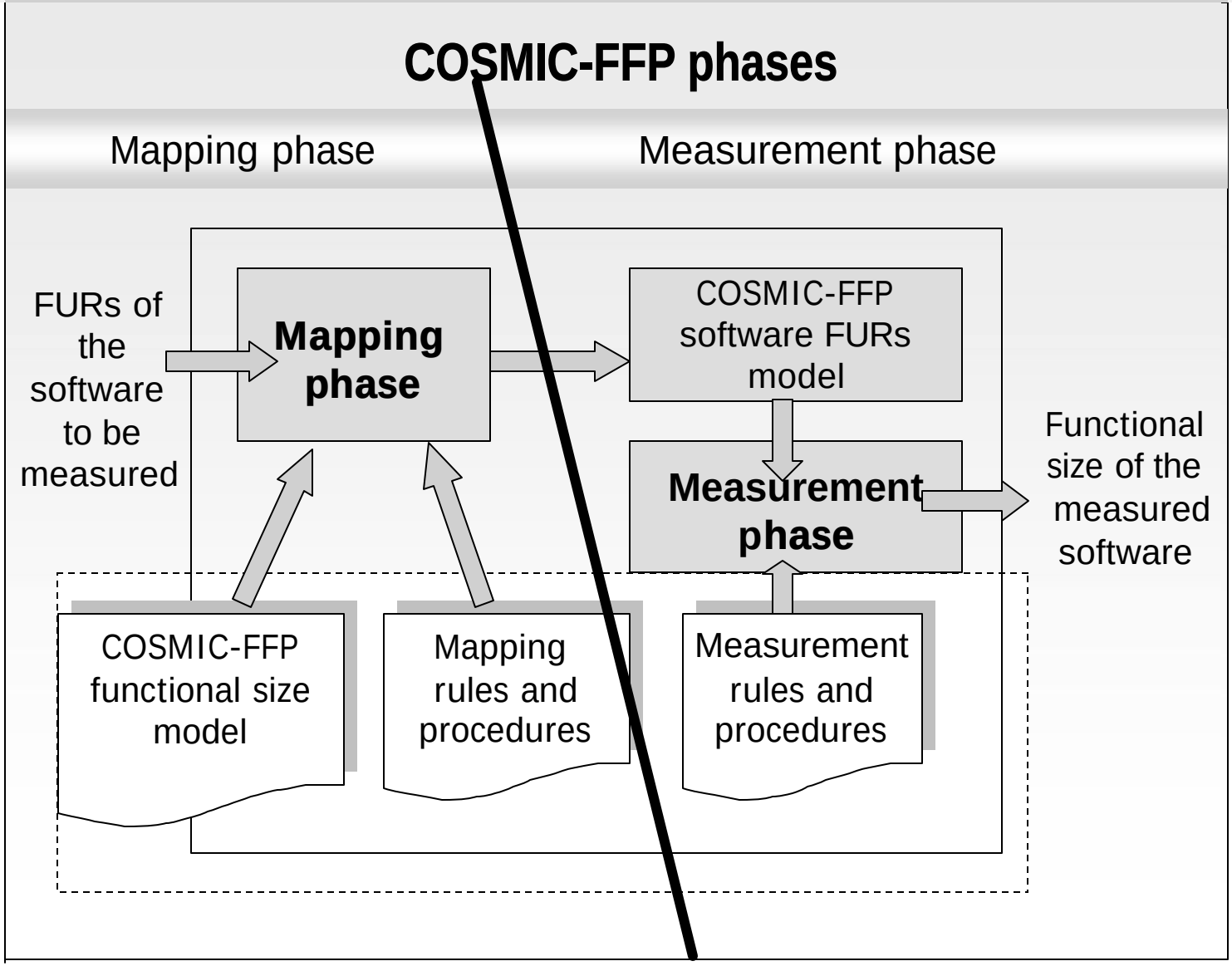


Predict – Measure software size at the first steps of development process

COSMIC-FFP

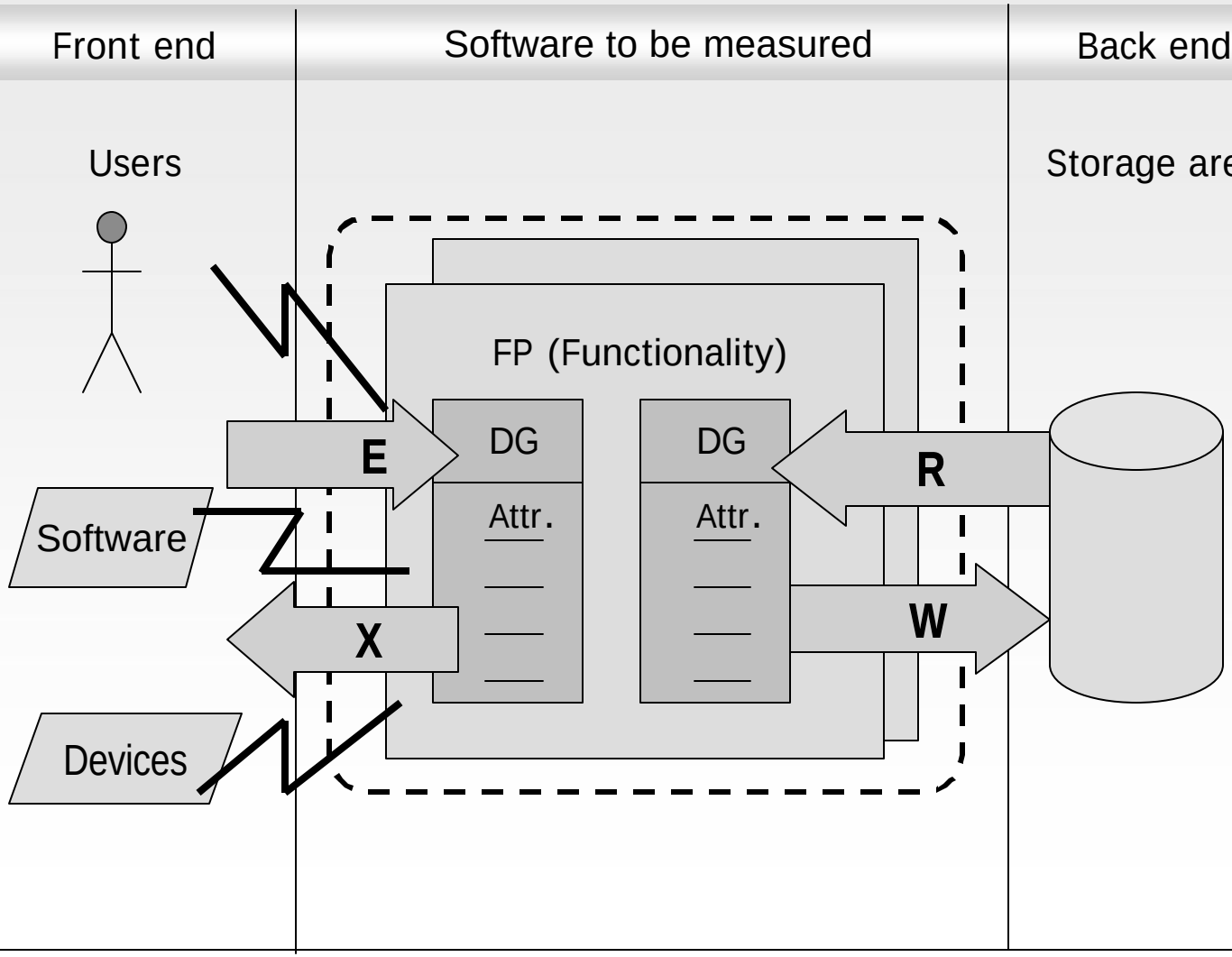
Common Software Measurement International Consortium - Full Function Point

ISO 19761 Standard



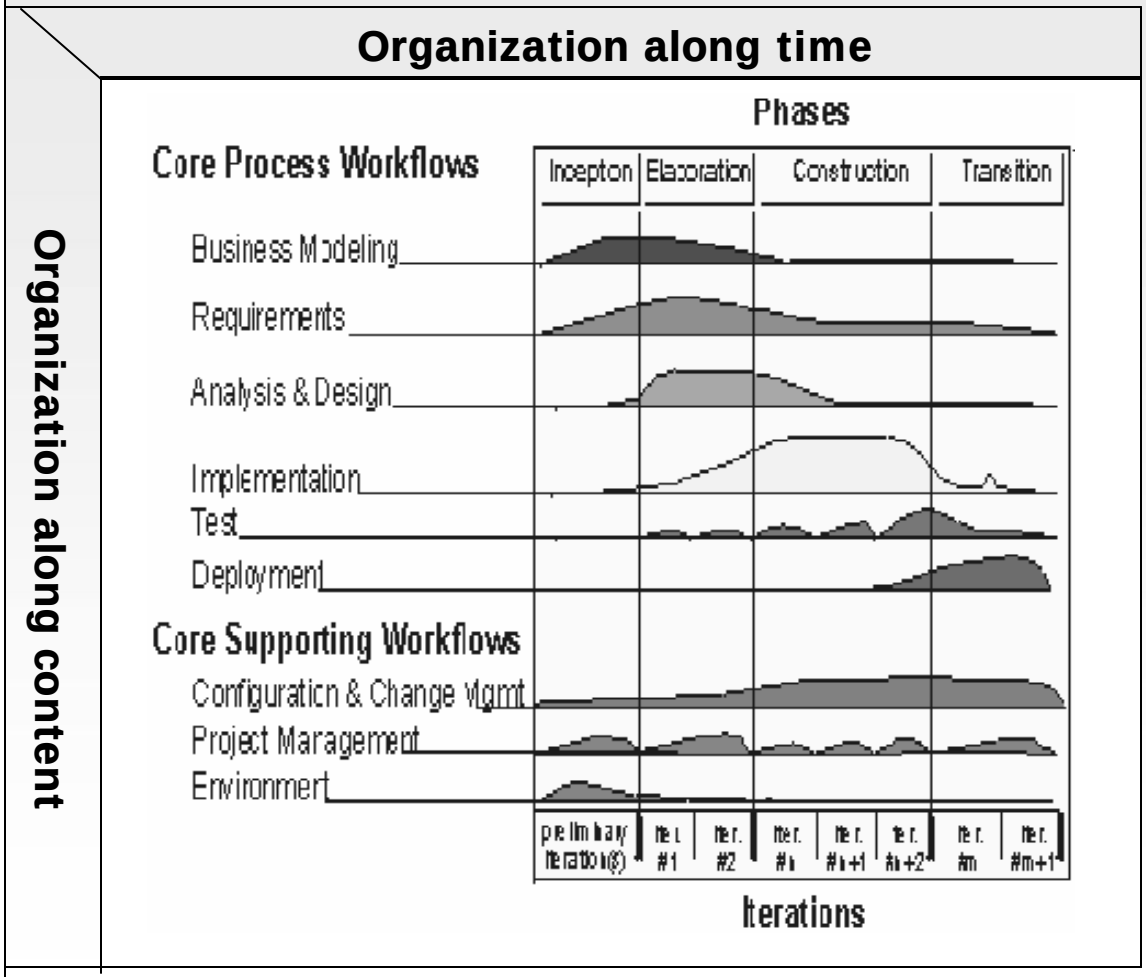
ISO 19761 Standard

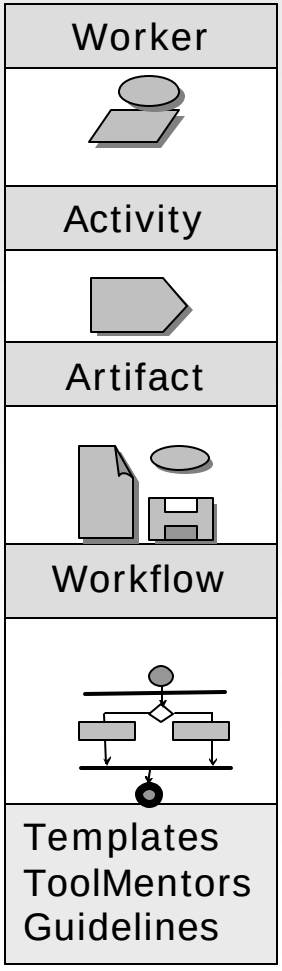
Generic data flow



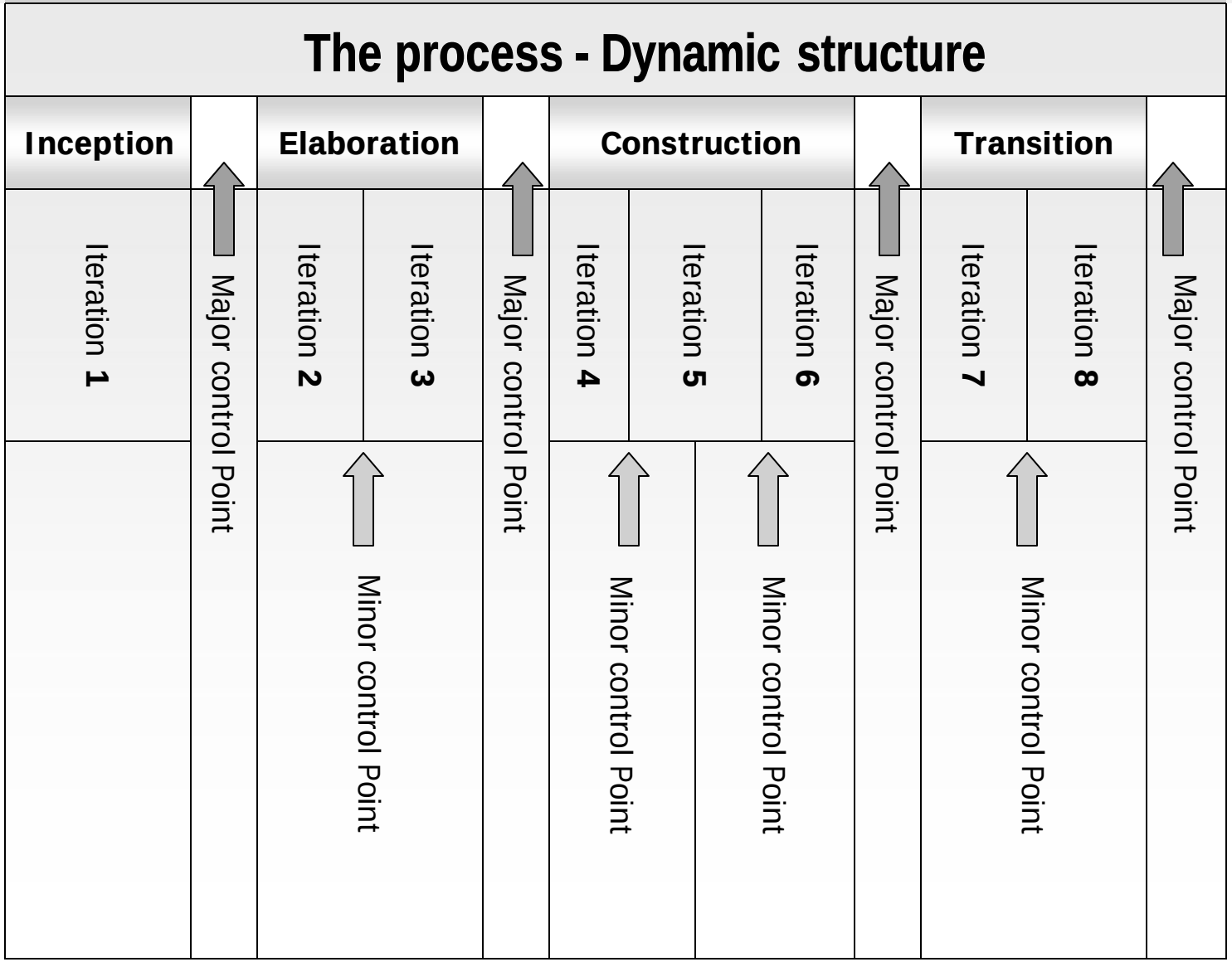
RUP and measurement activity

The process - Static structure

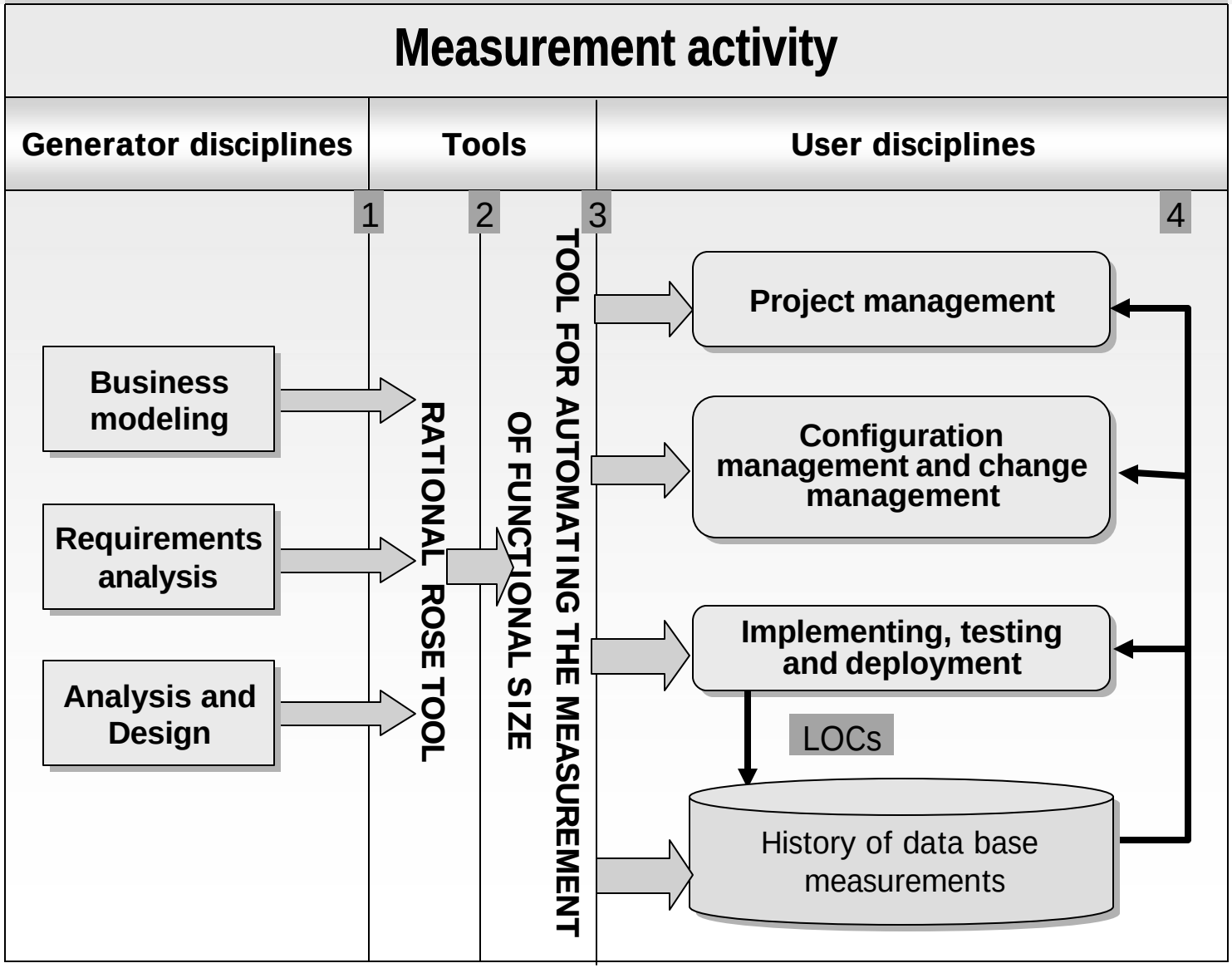




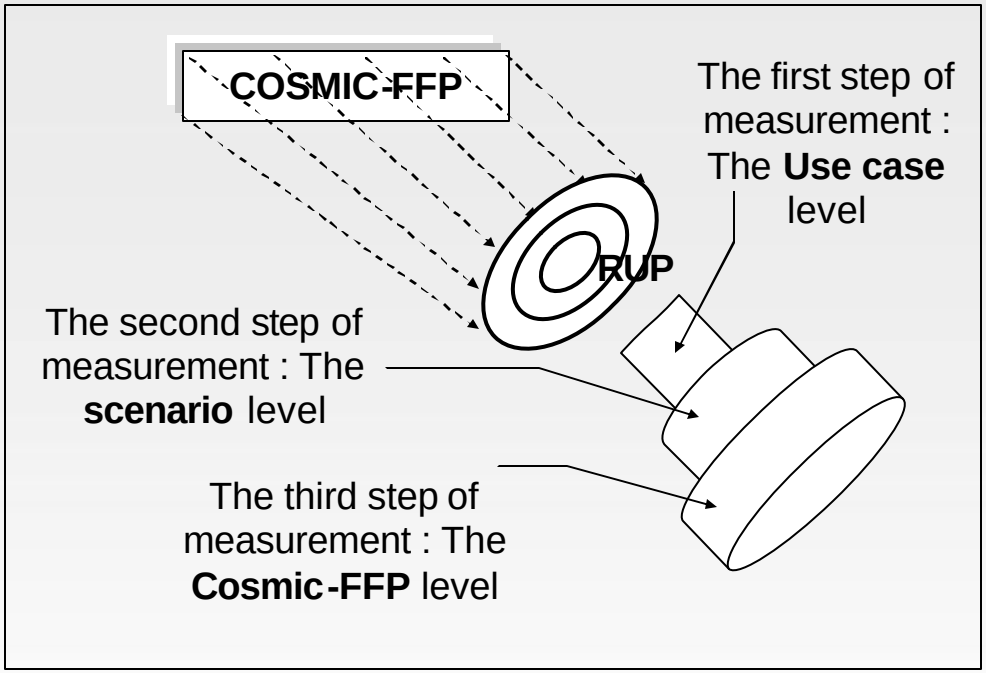
RUP and measurement activity



RUP and measurement activity



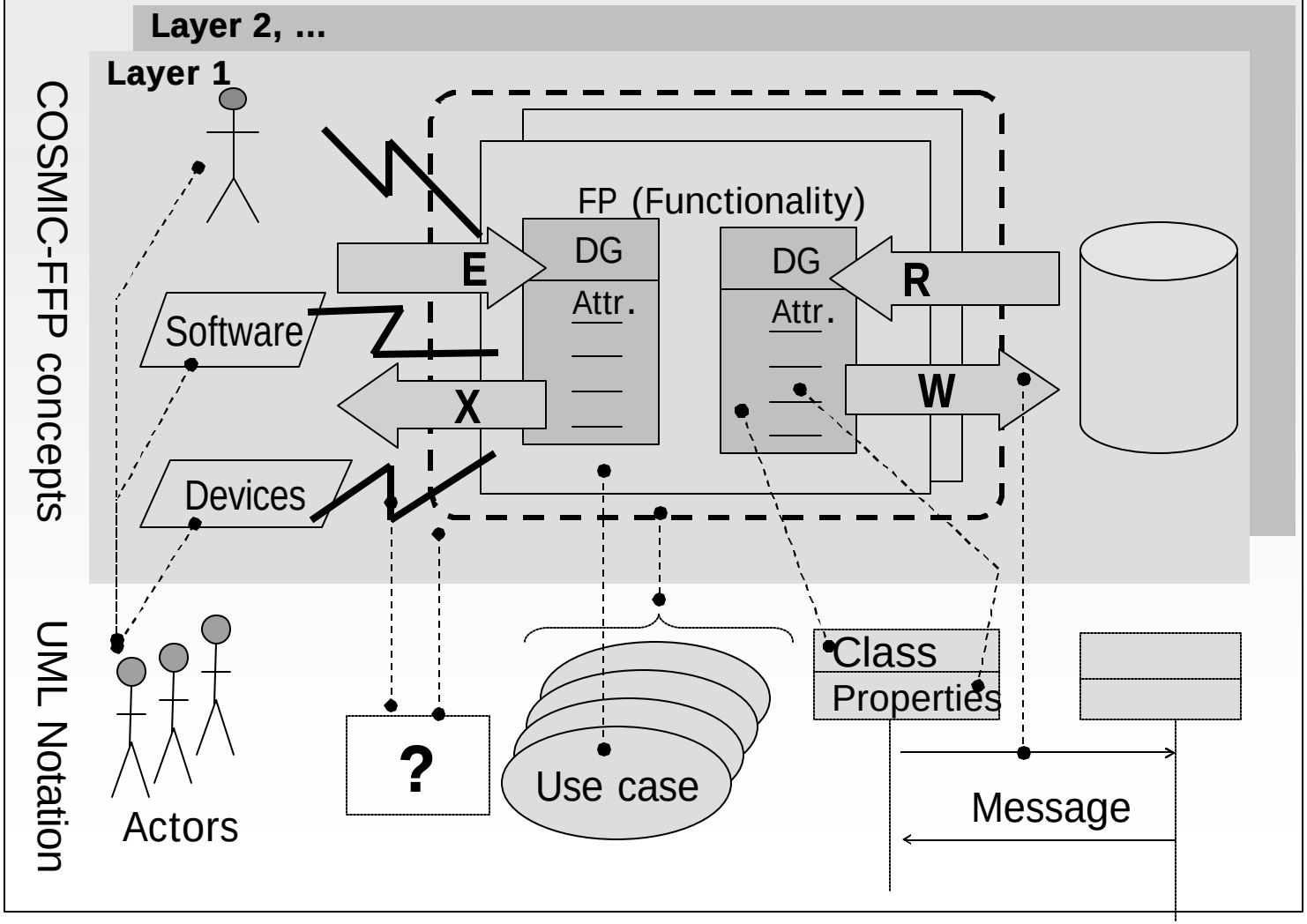
Automated measurement



Automation is very useful but needs oversight

Automated measurement

Mapping of COSMIC-FFP concepts to UML



Automated measurement

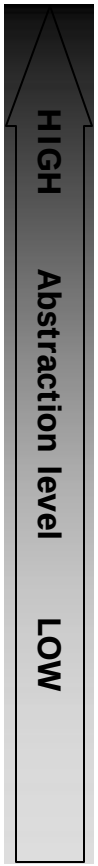
Mapping of COSMIC-FFP concepts to UML

COSMIC-FFP Concept	UML equivalent
Software boundary	**Use case diagram** ✓
Software Layer	**No UML equivalent (Has to be identified manually)**
COSMIC-FFP user	**UML actor** ✓
Functional process	**Use case** ✓
Data movement	**Operation (message)** ✓
Triggering event	**No UML equivalent (A new UML stereotype is created to distinguish a trigger event from a simple message in use-case diagrams)** 
Data group	**UML class** ✓
Data attribute	**Class property** ✓

Automated measurement

Measurement levels

Development phase	RUP artifacts used	Precursor Indicators (numbers)	Unit convention
• **Business modeling** • **Requirements analysis**	• **Use-case diagrams**	• **Use-cases** • **Actors** • **Interactions**	Ufsu
• **Analyse & Design**	• **Scenario diagrams**	• **Scenarios** • **Objets**	**Sfsu**
• **Analyse & Design**	• **Detailed scenarios**	• **Data movements** • **Type (E,X,R,W)**	**Cfsu**



x Ufsu = y Sfsu = z Cfsu

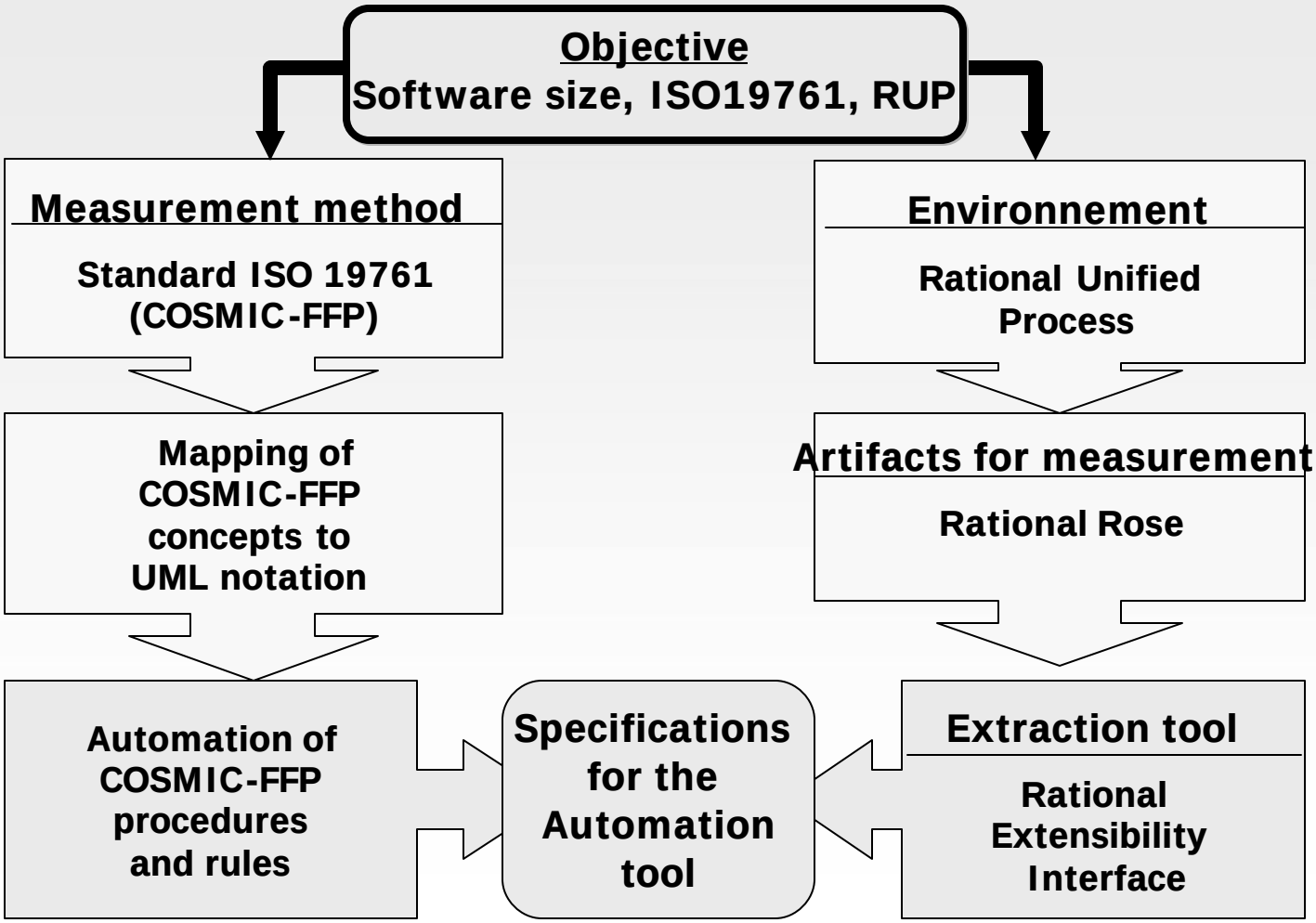
Solution Overview

Tool basis :

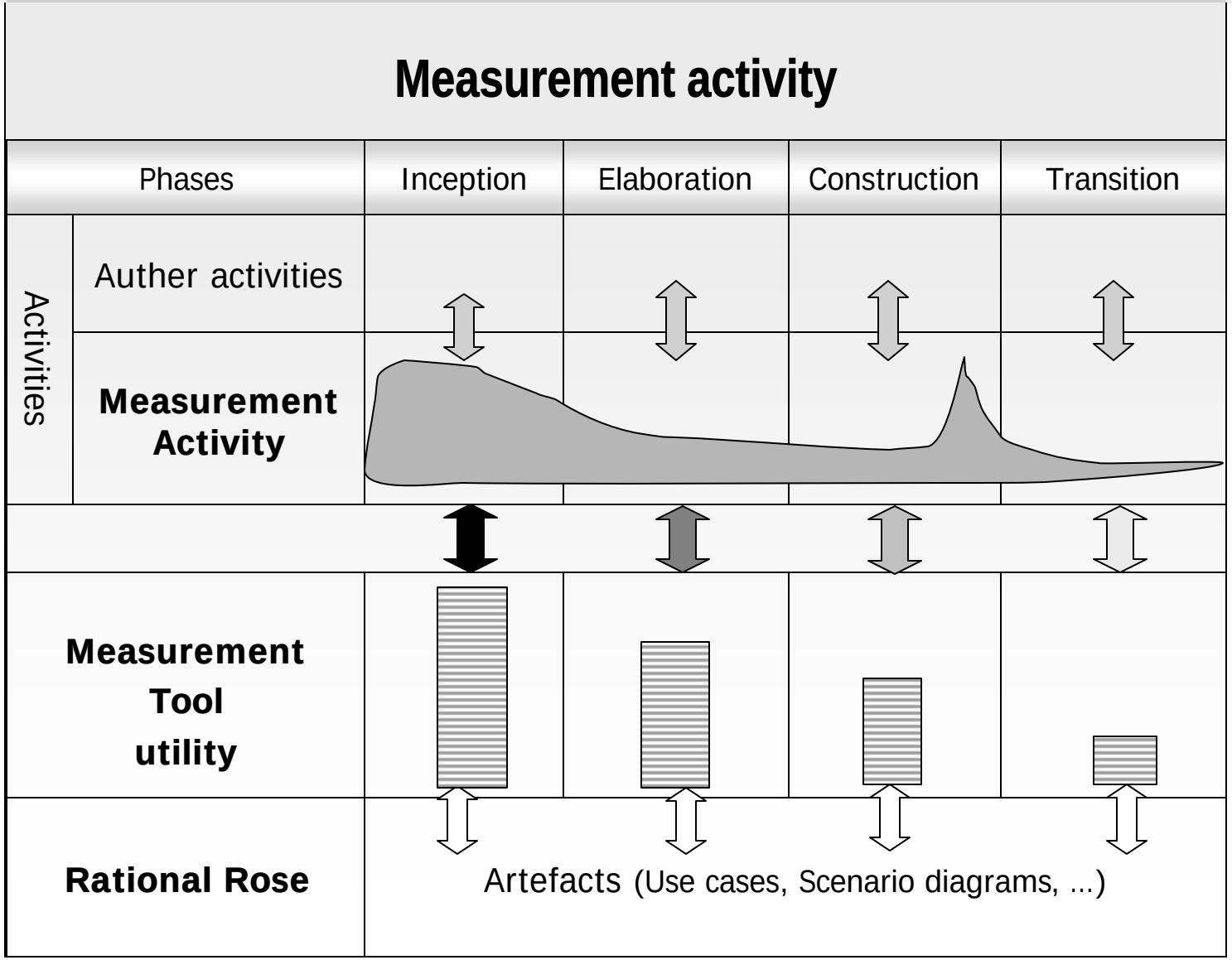
Mapping of COSMIC-FFP concepts to UML notation

Solution Overview

Architecture of the solution

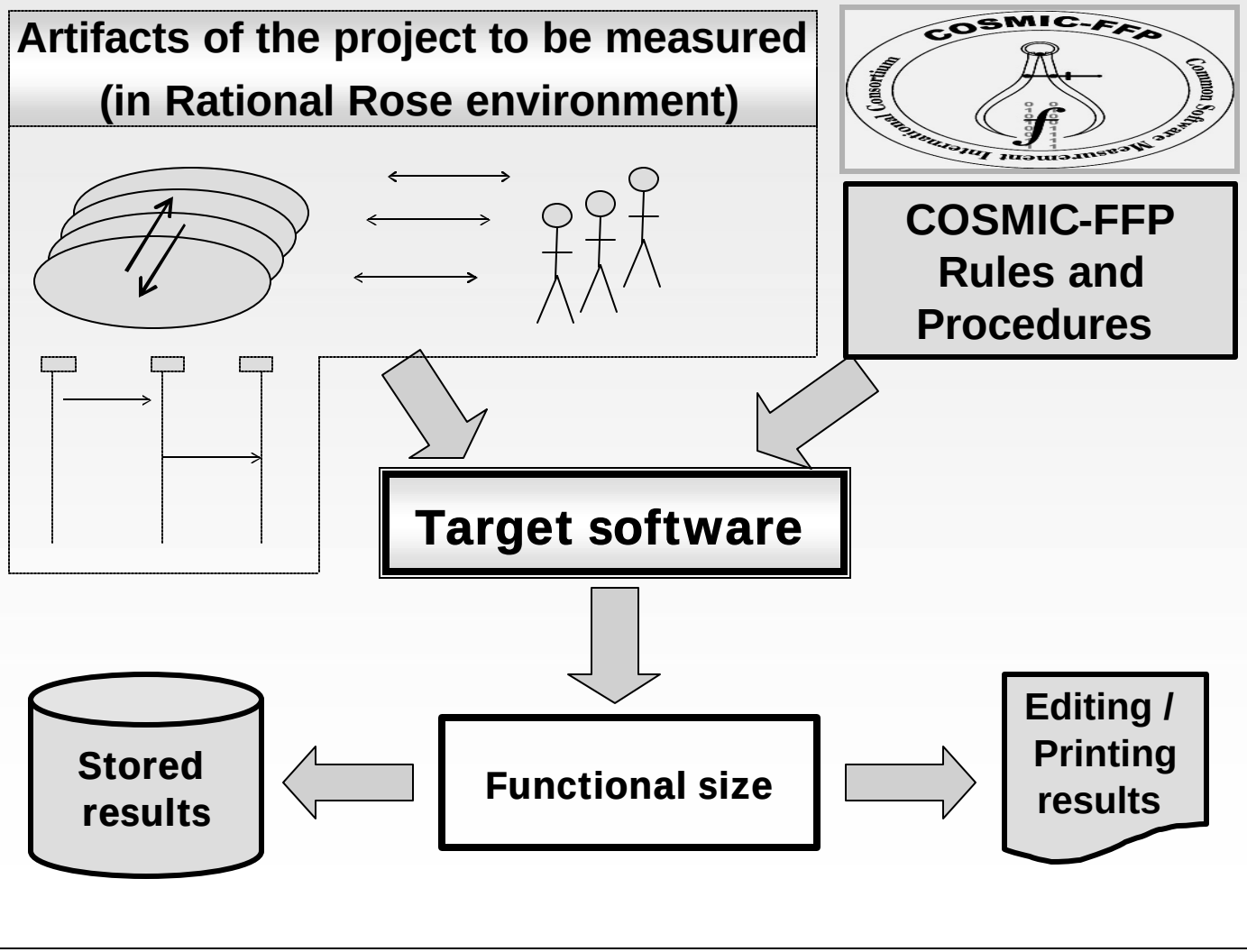


Solution Overview



Solution Overview

Tool implementation

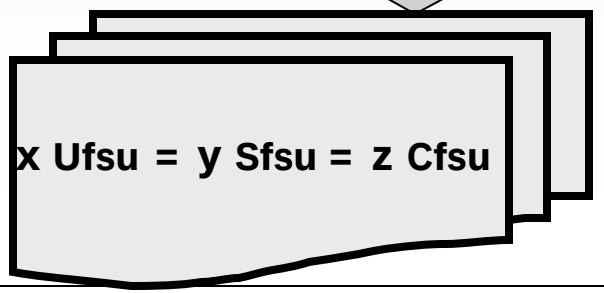


Solution Overview

The three measurement levels

Stored results by software type (MIS, real time, embedded, etc.)		
Use case level (Ufsu)	**Scenario level (Sfsu)**	**COSMIC-FFP level (Cfsu)**
• Use Cases • Actors • Use case interactions	• Scenarios • Objects	• Data movements . • Type (E,X,R,W, ?)

Analysis and synthesis



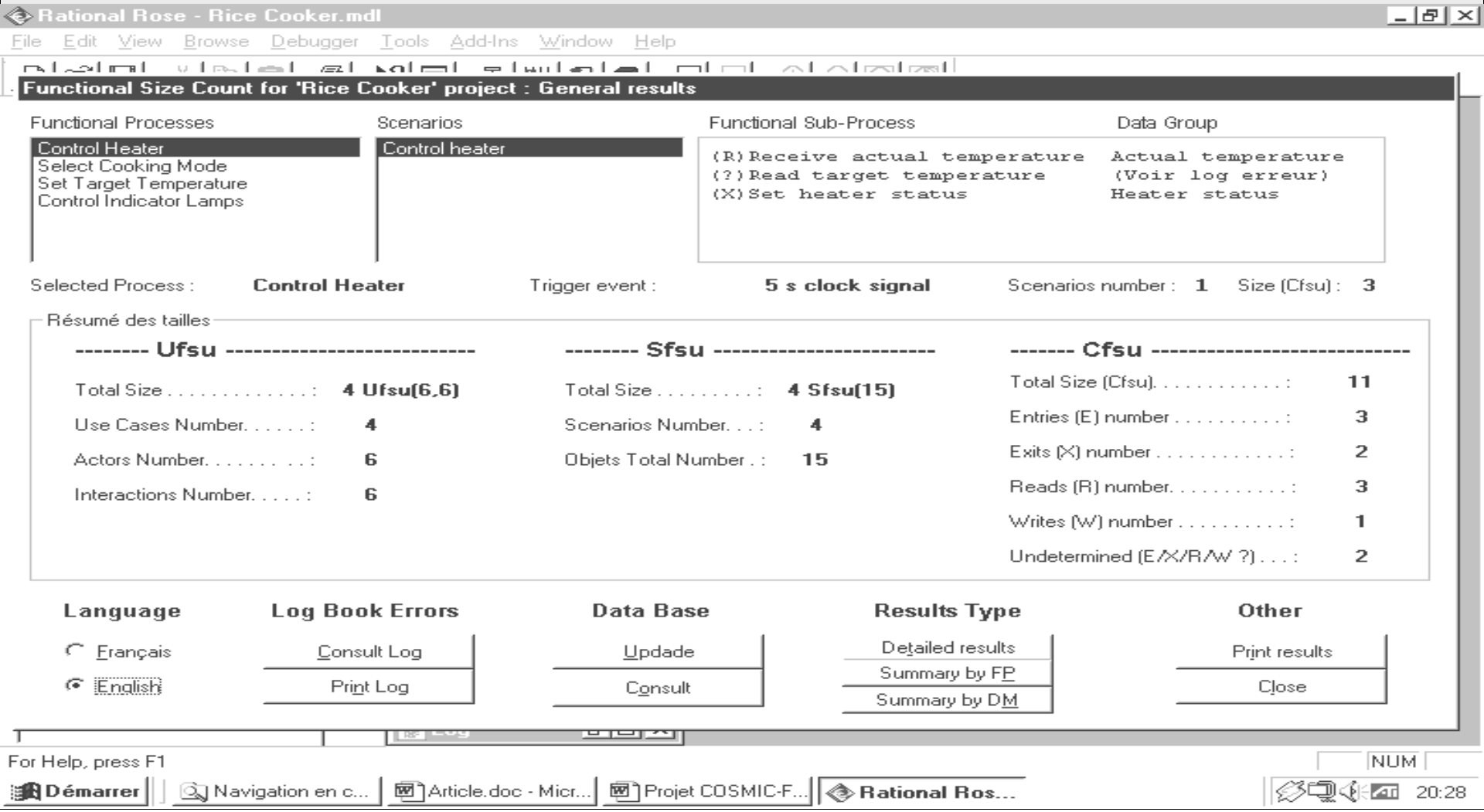
Estimations :
- **Time,**
- **Effort,**
- **Costs, …**

Results

Integrating the measurement tool as an Add-In to Rational Rose

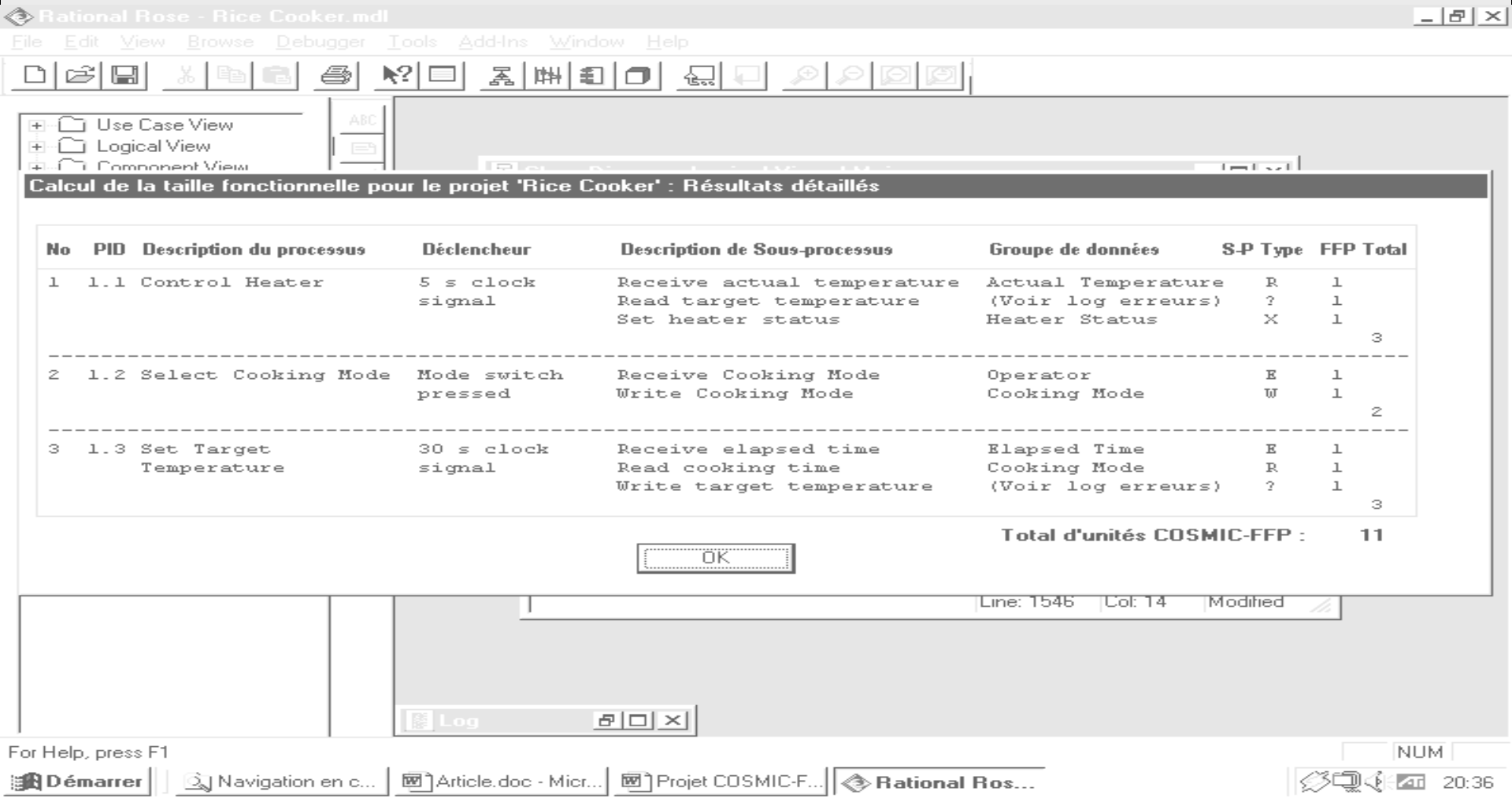
Results

Results - Main screen



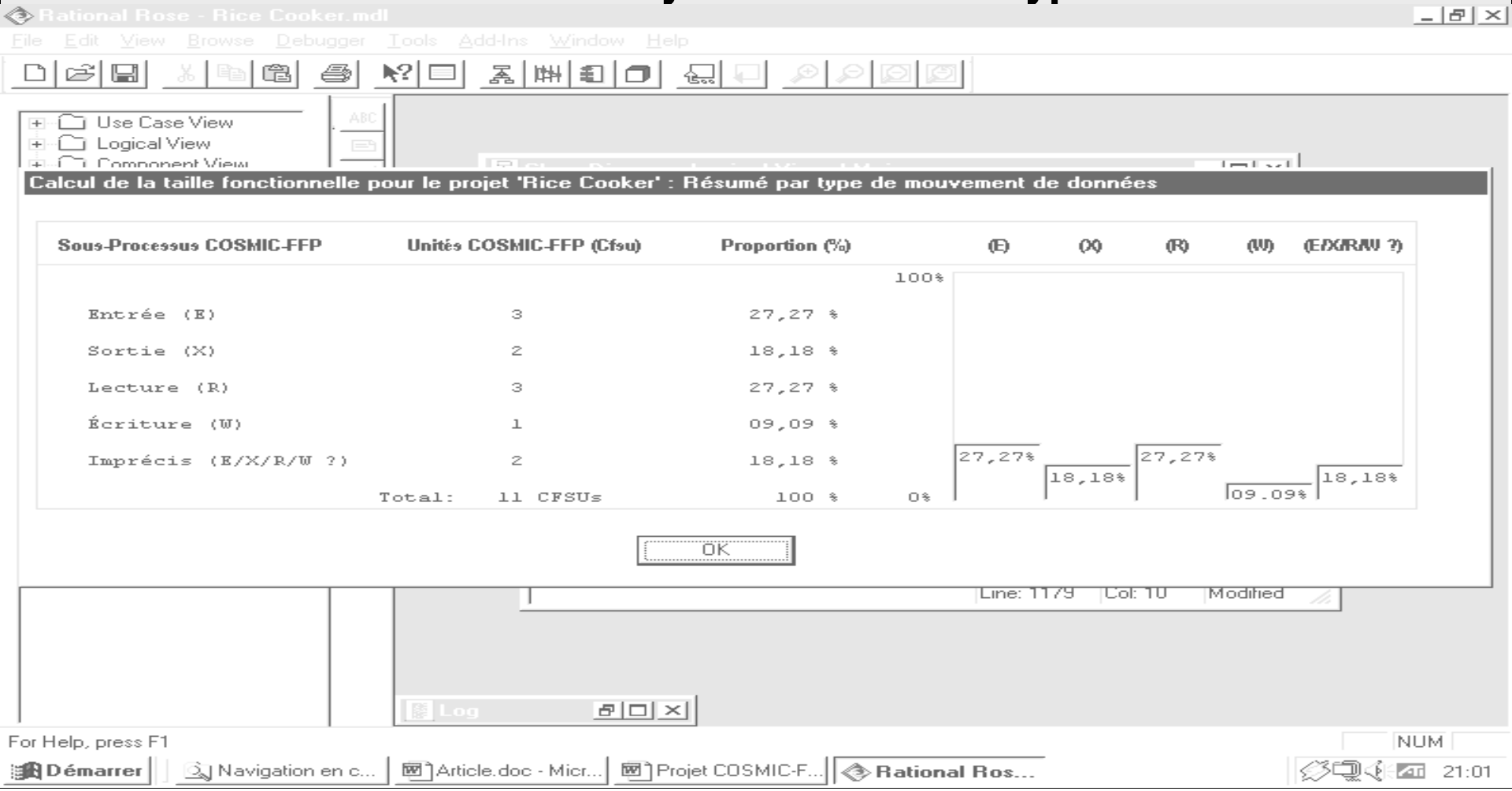
Results

Results - By Functional process



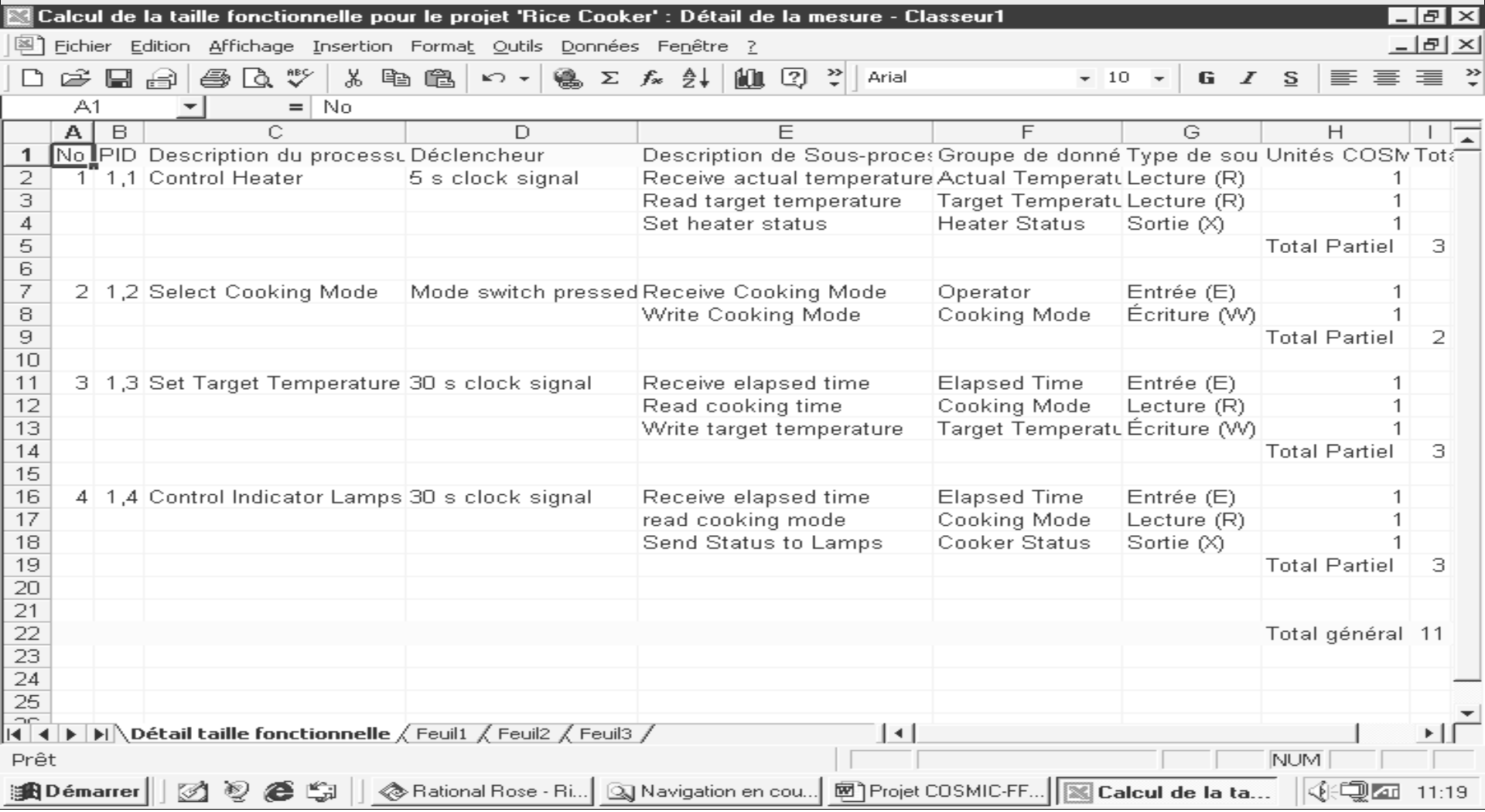
Results

Results - by Data Movement types



Results

Printed results


Calcul de la taille fonctionnelle pour le projet 'Rice Cooker' : Détail de la mesure - Classeur1

Fichier Edition Affichage Insertion Format Outils Données Fenêtre ?

Arial 10

A1 = No

No	PID	Description du processu	Déclencheur	Description de Sous-proces	Groupe de donné	Type de sou	Unités COSM	Tota
1	1,1	Control Heater	5 s clock signal	Receive actual temperature	Actual Temperatu	Lecture (R)	1	
				Read target temperature	Target Temperatu	Lecture (R)	1	
				Set heater status	Heater Status	Sortie (X)	1	
							Total Partiel	3
2	1,2	Select Cooking Mode	Mode switch pressed	Receive Cooking Mode	Operator	Entrée (E)	1	
				Write Cooking Mode	Cooking Mode	Écriture (W)	1	
							Total Partiel	2
3	1,3	Set Target Temperature	30 s clock signal	Receive elapsed time	Elapsed Time	Entrée (E)	1	
				Read cooking time	Cooking Mode	Lecture (R)	1	
				Write target temperature	Target Temperatu	Écriture (W)	1	
							Total Partiel	3
4	1,4	Control Indicator Lamps	30 s clock signal	Receive elapsed time	Elapsed Time	Entrée (E)	1	
				read cooking mode	Cooking Mode	Lecture (R)	1	
				Send Status to Lamps	Cooker Status	Sortie (X)	1	
							Total Partiel	3
							Total général	11

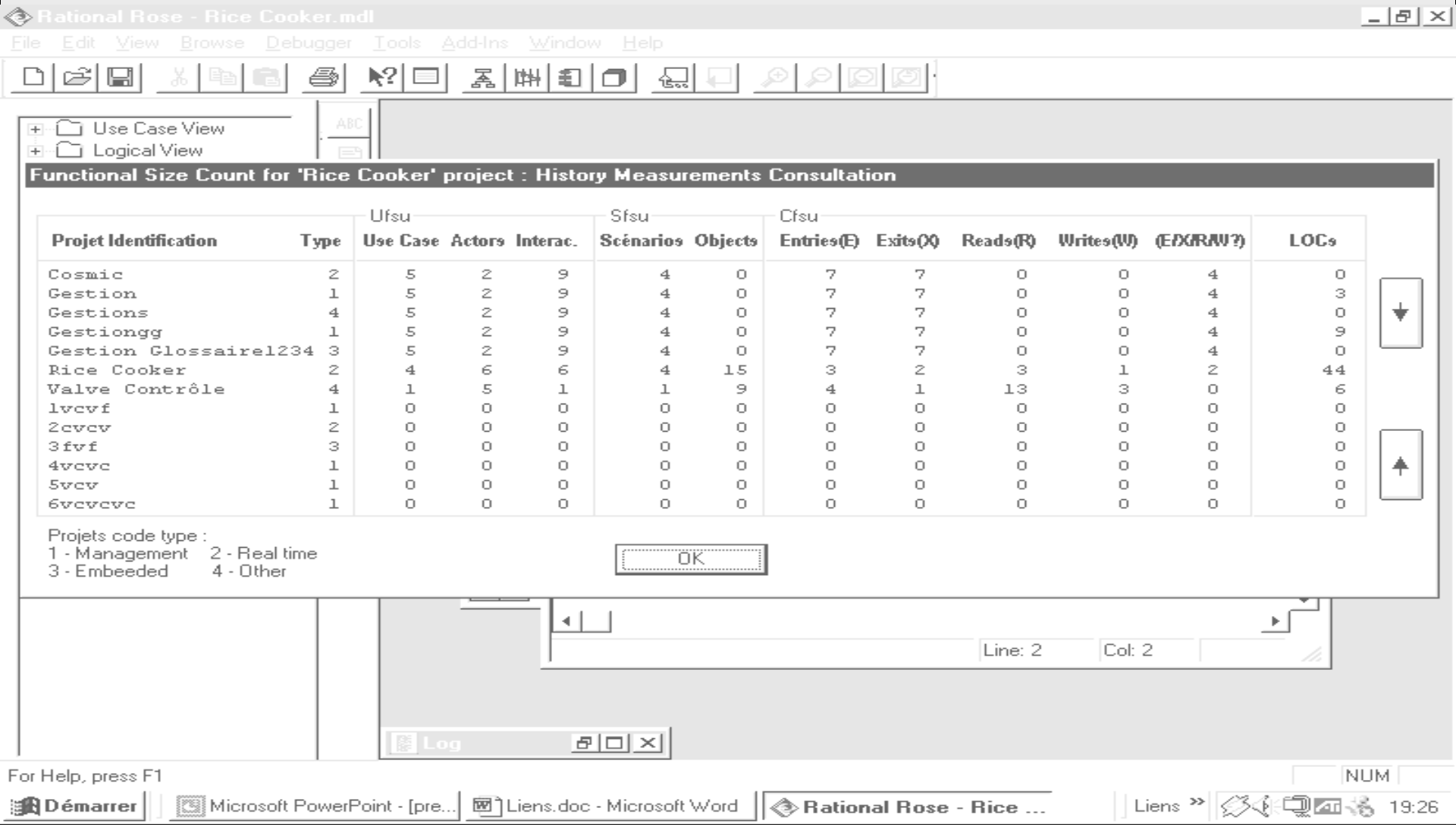
Détail taille fonctionnelle | Feuil1 | Feuil2 | Feuil3

Prêt NUM

Démarrer | Rational Rose - Ri... | Navigation en cou... | Projet COSMIC-FF... | Calcul de la ta... | 11:19

Results

Measurement - Log



Conclusion

Advantages:

- Measurement results at 3 levels of abstraction
- Good results with Rice Cooker & Valve Control case studies
  - ⇨ Delta = 1 cfsu between manual and automated measurements
- Requires rigor in the specifications

Constraints:

- Operates on one layer
- Limited to Rational Rose tool

References

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⦿ S. Azzouz, "Calcul avec ISO 19761 de la taille fonctionnel des logiciels développés avec Rational Unified Process", Master degree thesis report, Department of Computer Sciences, Université du Québec à Montréal, Montréal, Canada, 2003.

⦿ COSMIC Group, "Rice Cooker – Cosmic Group Case Study", École de technologie supérieure, Université du Québec, Montréal, Canada, January 26, 2003 version http://www.lrgl.uqam.ca/cosmic-ffp/casestudies/

⦿ COSMIC Group, "Valve Control System – Cosmic Group Case Study", École de technologie supérieure, Université du Québec, Montréal, Canada, January 25, 2003 version http://www.lrgl.uqam.ca/cosmic-ffp/casestudies/

⦿ G. Booch, J. Rumbaugh and I Jacobson**.** "The Unified Modeling Language User Guide," Addison-Wesley , 1999

⦿ V. Béro, G. Lévesque and A. Abran, "Application de la méthode FFP à partir d'une spécification selon la notation UML: Comte-rendu des premiers essais d'application et questions," p. 18

⦿ P. Kruchten, "The Rational Unified Process, an introduction," Addison Wesley, March 2000, p. 298.

⦿ P. Kruchten, "The RUP platform," Montréal-SPIN,Montréal,Canada, Nov. 2003, p 33

⦿ M. Jenner, "Automation of Counting of Functional Size Using COSMIC-FFP in UML", 12th International Workshop on Software Measurement – IWSM 2002, Magdeburg, Germany, Oct. 7-9, 2002, pp. 43-51.

Questions

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http://www.internet.uqam.ca/web/t15040