IWSM2001

Multi-Agent Approach For Software Functional Size Measurement

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Agenda

- Principle of agent-based system design
- A methodology for designing and developping multi-agent systems
- The question of automating the software functional size measurement process
- Agent-based approach for software functional size measurement
- Advantages of the agent-based approach
- Questions and further research steps
- Some references

Principle of agent-based system design

- Perceive a real world system as a set of autonomous, interacting agents in a given environment.
- Two main perceptions of the concept of agent:
  - Some authors confer to an agent, mental habilities such as belief, desire, intention, … which are to be taken into account when modeling an agent
  - Other authors suggest to take into consideration only observable properties of agents such as autonomy, reactivity, pro-activity, cooperation, ...

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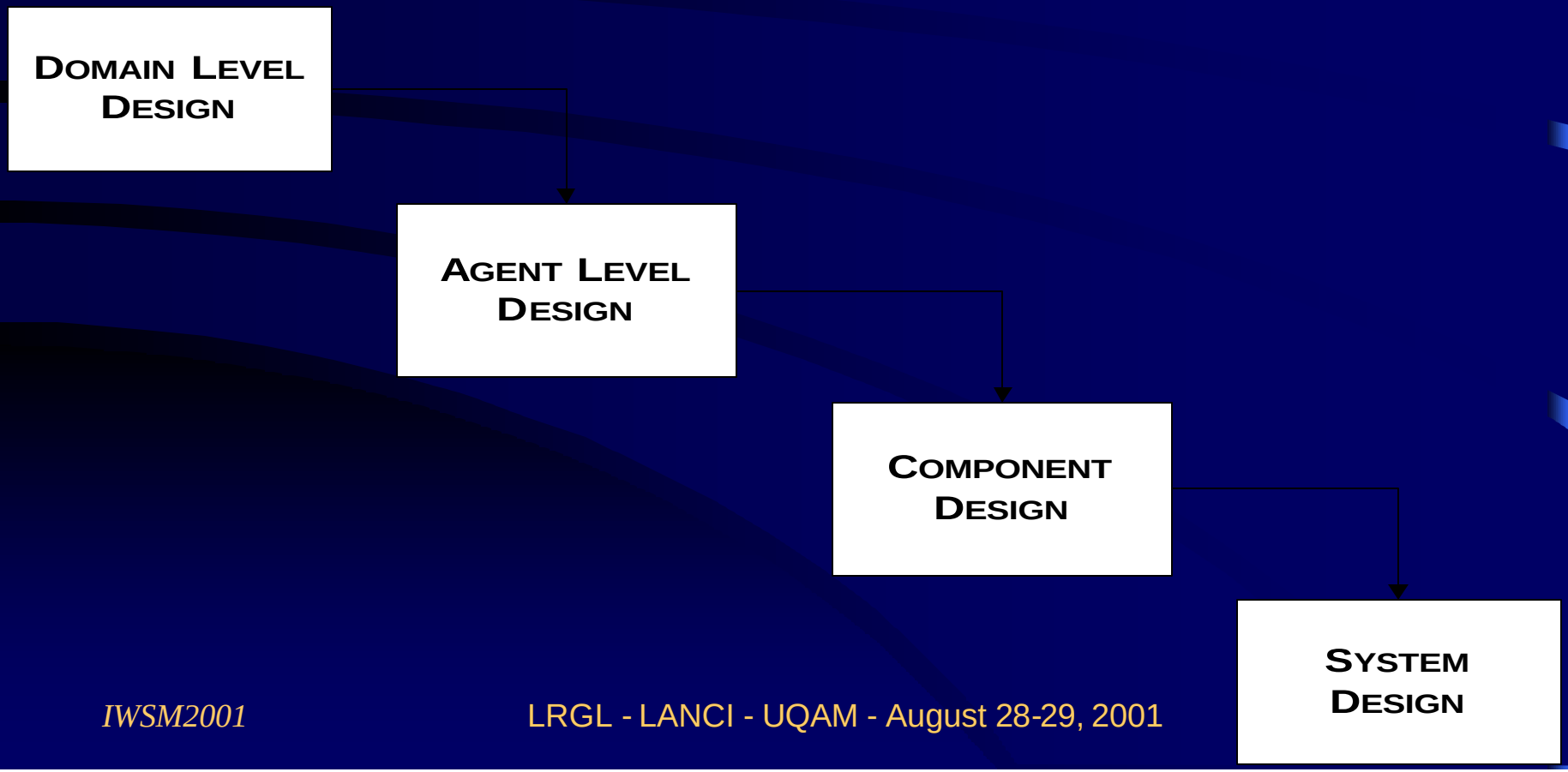
MaSE: A methodology for designing and developping multi-agent systems

- MaSE: Multi-agent System Engineering



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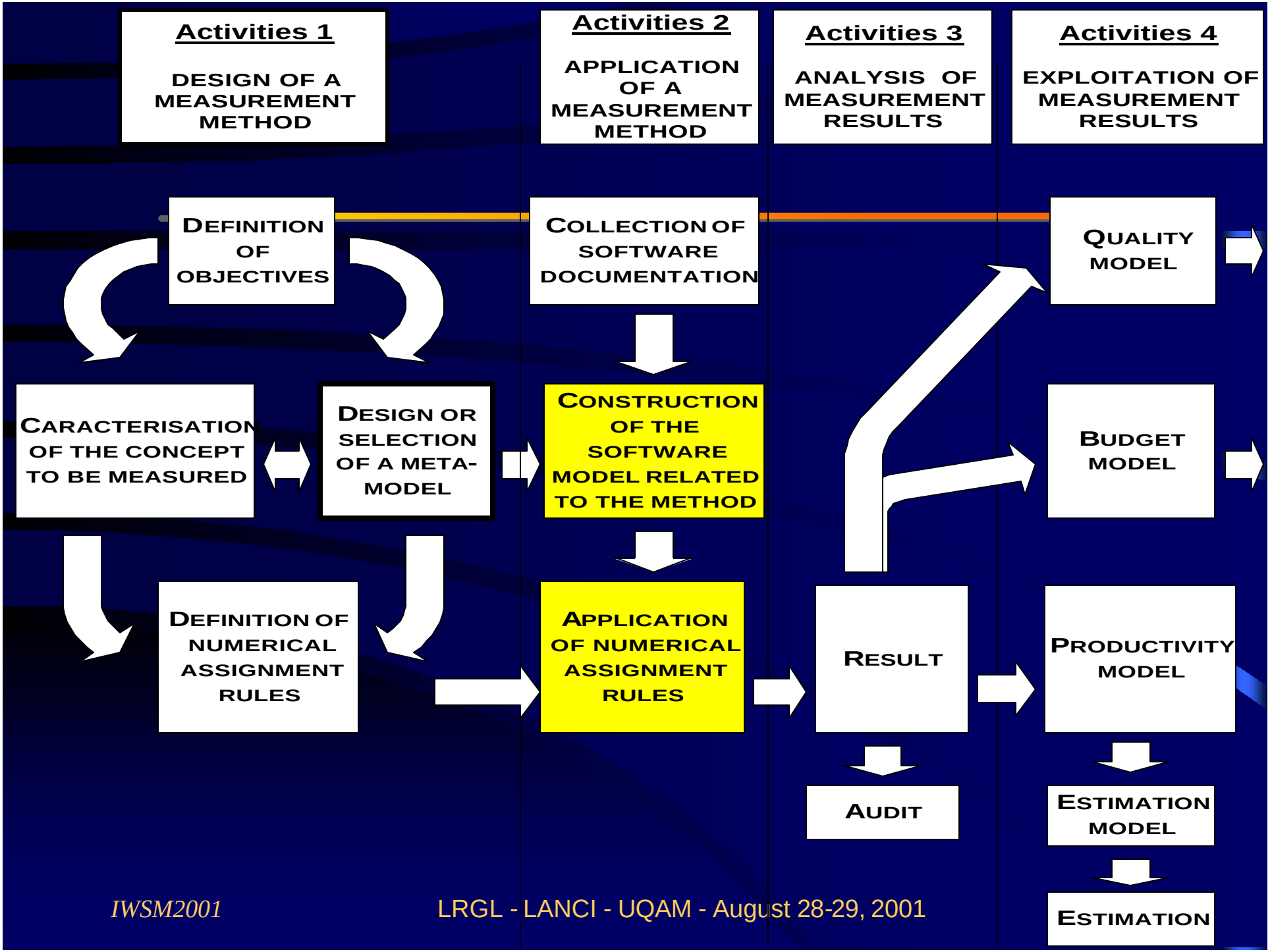
The question of automating the software functional size measurement process

- To simplify the application of methods
- To reduce subjectivity
- To ensure repeatability

- *What is to be automated ?*


Activities 1
DESIGN OF A MEASUREMENT METHOD
Activities 2
APPLICATION OF A MEASUREMENT METHOD
Activities 3
ANALYSIS OF MEASUREMENT RESULTS
Activities 4
EXPLOITATION OF MEASUREMENT RESULTS
DEFINITION OF OBJECTIVES
COLLECTION OF SOFTWARE DOCUMENTATION
QUALITY MODEL
CARACTERISATION OF THE CONCEPT TO BE MEASURED
DESIGN OR SELECTION OF A META-MODEL
CONSTRUCTION OF THE SOFTWARE MODEL RELATED TO THE METHOD
BUDGET MODEL
DEFINITION OF NUMERICAL ASSIGNMENT RULES
APPLICATION OF NUMERICAL ASSIGNMENT RULES
RESULT
PRODUCTIVITY MODEL
AUDIT
ESTIMATION MODEL
ESTIMATION

The question of automating the software functional size measurement process

- Two main research areas:
  - *Based on source code (retro-engineering)*
  - ***Based on specifications (case tools)***

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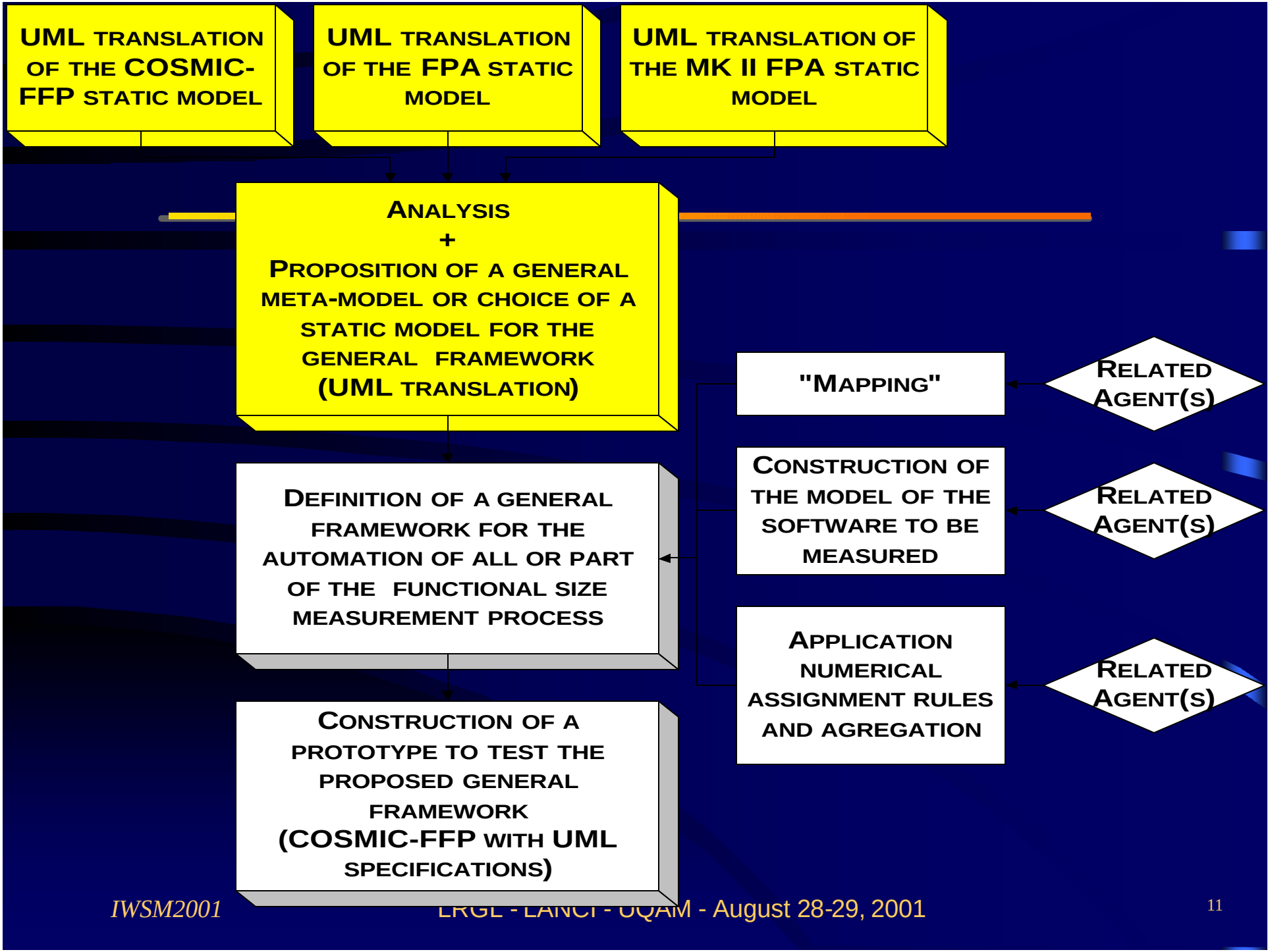
UML TRANSLATION OF THE COSMIC-FFP STATIC MODEL
UML TRANSLATION OF THE FPA STATIC MODEL
UML TRANSLATION OF THE MK II FPA STATIC MODEL
ANALYSIS
+
PROPOSITION OF A GENERAL META-MODEL OR CHOICE OF A STATIC MODEL FOR THE GENERAL FRAMEWORK
(UML TRANSLATION)
DEFINITION OF A GENERAL FRAMEWORK FOR THE AUTOMATION OF ALL OR PART OF THE FUNCTIONAL SIZE MEASUREMENT PROCESS
CONSTRUCTION OF A PROTOTYPE TO TEST THE PROPOSED GENERAL FRAMEWORK
(COSMIC-FFP WITH UML SPECIFICATIONS)
"MAPPING"
CONSTRUCTION OF THE MODEL OF THE SOFTWARE TO BE MEASURED
APPLICATION NUMERICAL ASSIGNMENT RULES AND AGREGATION
RELATED AGENT(S)
RELATED AGENT(S)
RELATED AGENT(S)

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Advantages of the agent-based approach

- **Modularity (abstraction levels, specialized agents, ...)**
- **Flexibility (interaction with the user when automation is not possible or for validation, possibility of learning rules, ...)**
- **Feedback to measurement methods**

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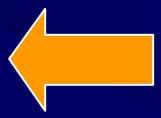

Questions and further research steps

- **Is it possible to automate the « mapping » ?**
  - $Concepts_{Measurement} @ F_{mapping}(Concepts_{specifications\ language})$
- **How to represent the results of the « mapping » so that they could be used to build the model of a software to be measured ?**
  - ***Production rules, decision trees, ... ?***
- **Is it possible to automate the construction of the model of a software to be measured ?**
  - ***Text analysis tools, ... ?***

Questions and further research steps

- **How to represent the model of a software to be measured ?**
  - ***Decomposition tree, ... ?***
- **Is it possible to automate the application of numerical assignment rules (*measurement function*) and the aggregation of results, from the model of a software to be measured ?**
  - ***Probably.***
- **How to represent numerical assignment rules ?**
  - ***Function [numericalValue-F(concept)], Array[concept, numericalValue], ...?***

References

- [1] Abran, A.; Jacquet, J.-P., " A Structured Analysis of the New ISO Standard on: « Functional Size Measurement - Definition of Concepts » (ISO/IEC 14143-1) " in 4th IEEE International Software Engineering Standards Symposium, ISESS'99, Curitiba, Brazil, May 17-22, 1999.
- [2] Ho, T.V. and Abran, A., " A Framework for Automatic Function point Counting From Source Code ", IWSM'99, Lac Supérieur, Canada, p.248, Sept.ember 8-10, 1999
- [3] Diab, H.; Frappier, M.; St-Denis, R., " A Formal Definition of COSMIC-FFP for Automated Measurement of Room Specifications ", 2001, 12 p.

References

- [4] Abran, A.; Desharnais, J.-M.; Oligny, S.; St-Pierre, D.; Symons, C., COSMIC FFP - Manuel de mesures version 2.1 - Essais sur le terrain, Montréal, Mai, 2001.
- [5] IFPUG, Function Point Counting Practices Manual, release 4.1, Mequon, Wisconsin, 2000.
- [6] UKSMA Metrics Practices Committee., MK II Function Point Analysis Counting Practices Manual., v.1.3.1, UK, September 1998.

Thank you for your attention.

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