Software Requirements: An Evolution Point of View

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talk at: 

Summary

- Who we are
- Why are we here?
- Different Perspectives
- Evolution as a key aspect
- Results so far (from our group)
- Challenges

Who we are

- Member of the IFIP 2.9 WG
- Previous work on Elicitation, Modeling and Analysis
- 3 Phds and 11 masters on the topic.
- Lexicon, Scenarios, Viewpoints, Requirements Baseline, Extreme Requirements
- See more at: www.inf.puc-rio.br/~julio
- On sabbatical at UofT, involved in the goal/agent (Tropos) method (Prof. Mylopoulos)

Why are we here?

- von Neumann:

  "There is no sense in being precise when you don't even know what you are talking about"

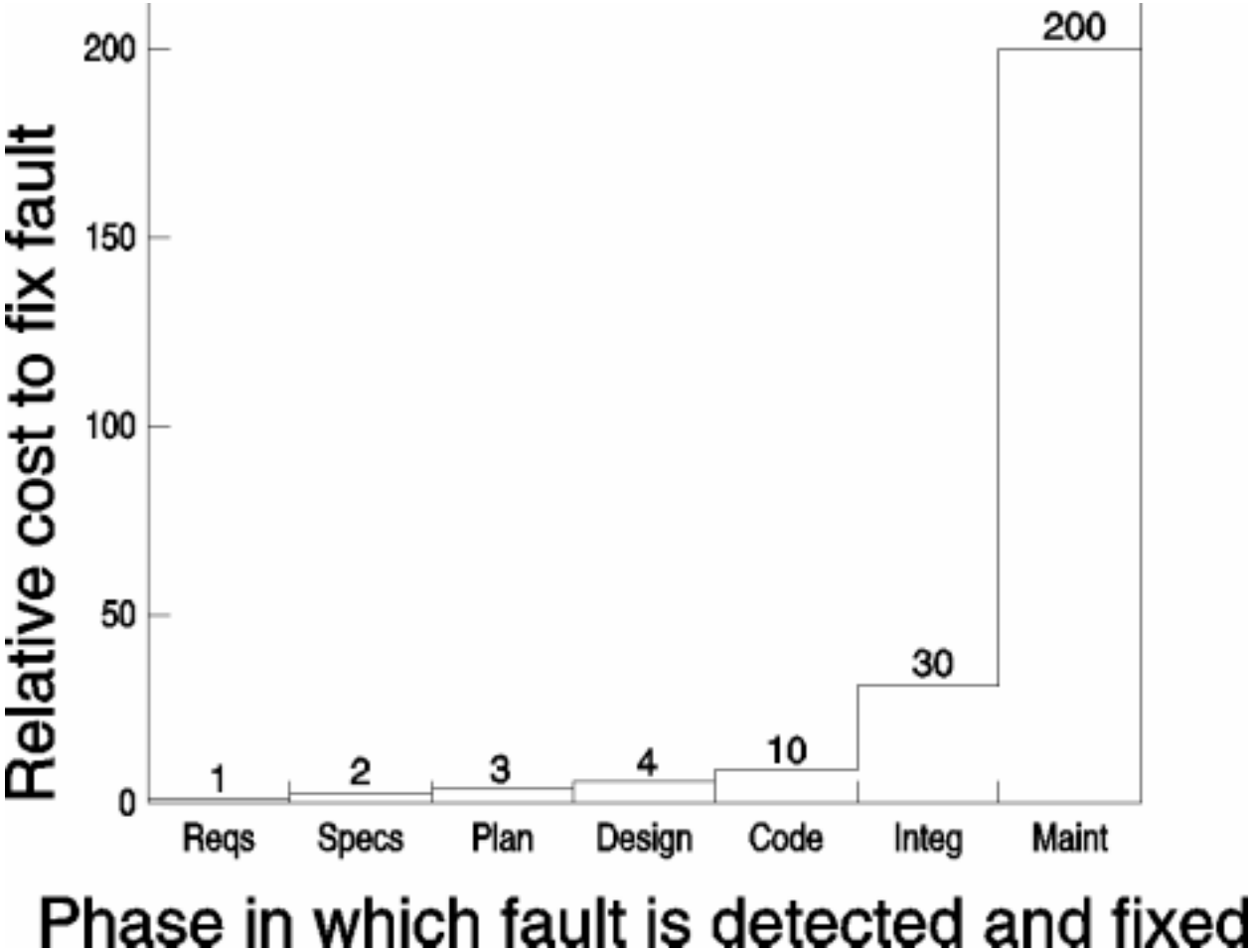
- Standish Group

  74% of the projects had failed!

- Tom de Marco

  56% of the errors in a software can be traced back to the requirements

Why are we here?

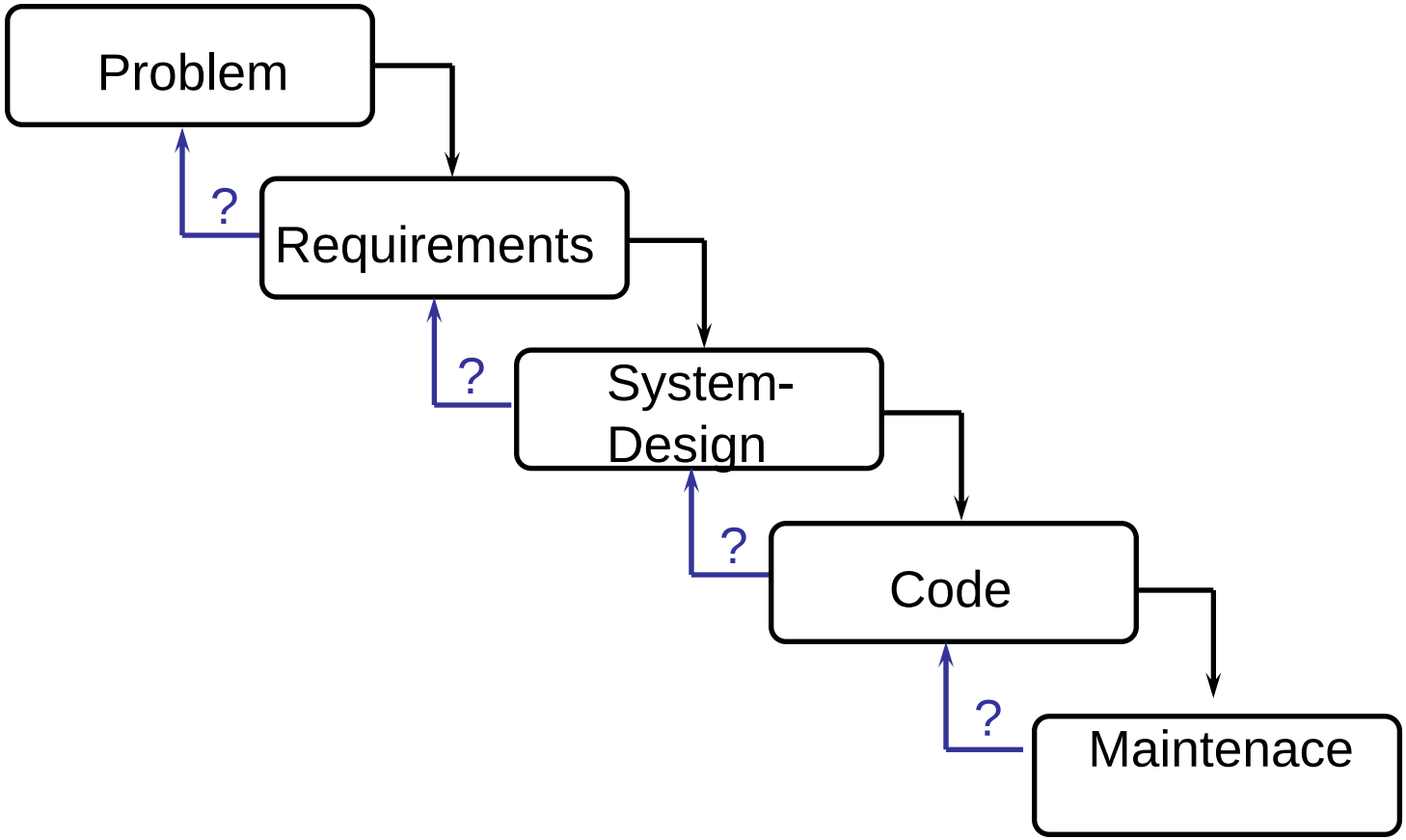


Different Perspectives

- Waterfall Model
- V Model
- Spiral Model
- Extreme Programming
- Open Source
- Tropos

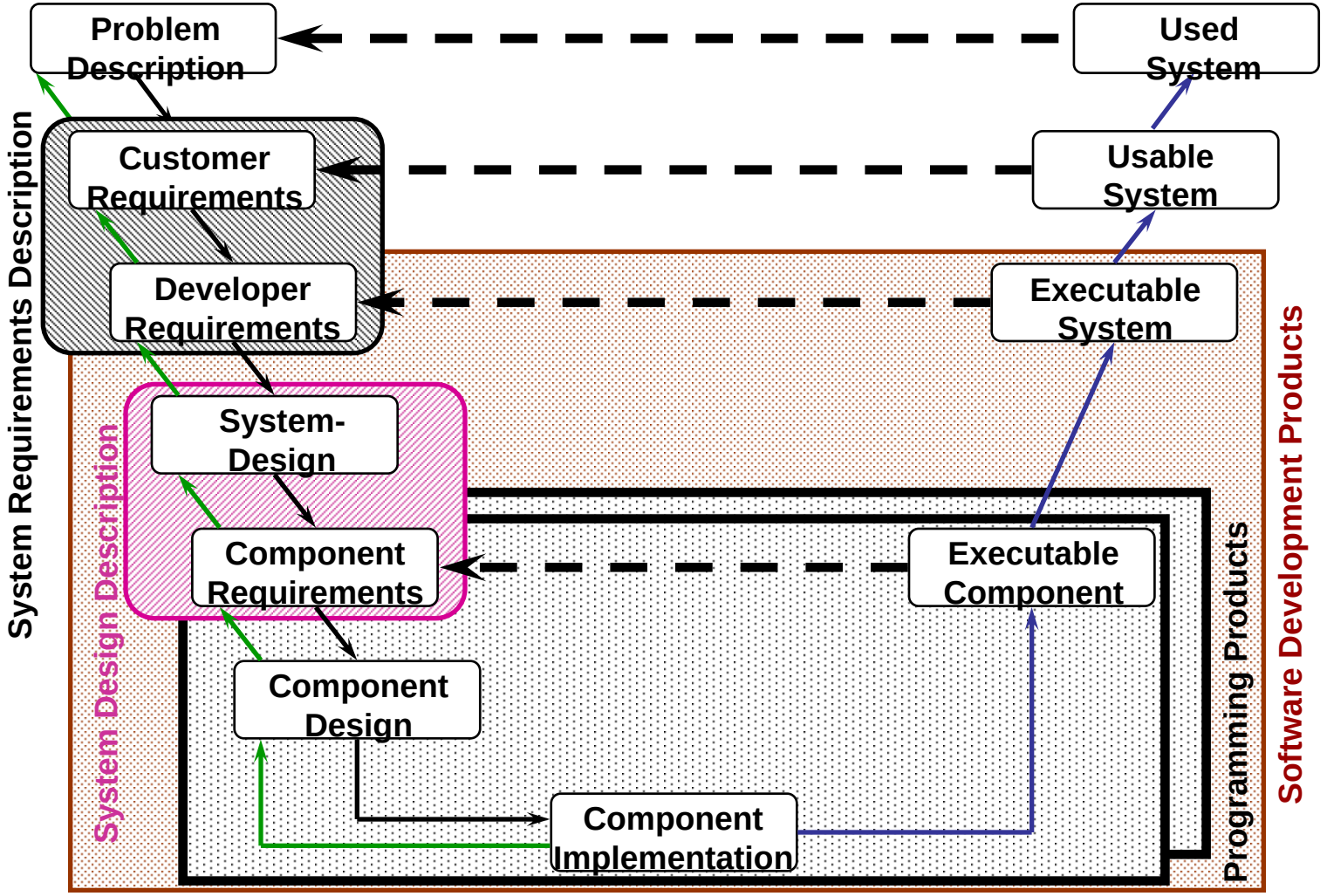
Different Perspectives

Waterfall Model



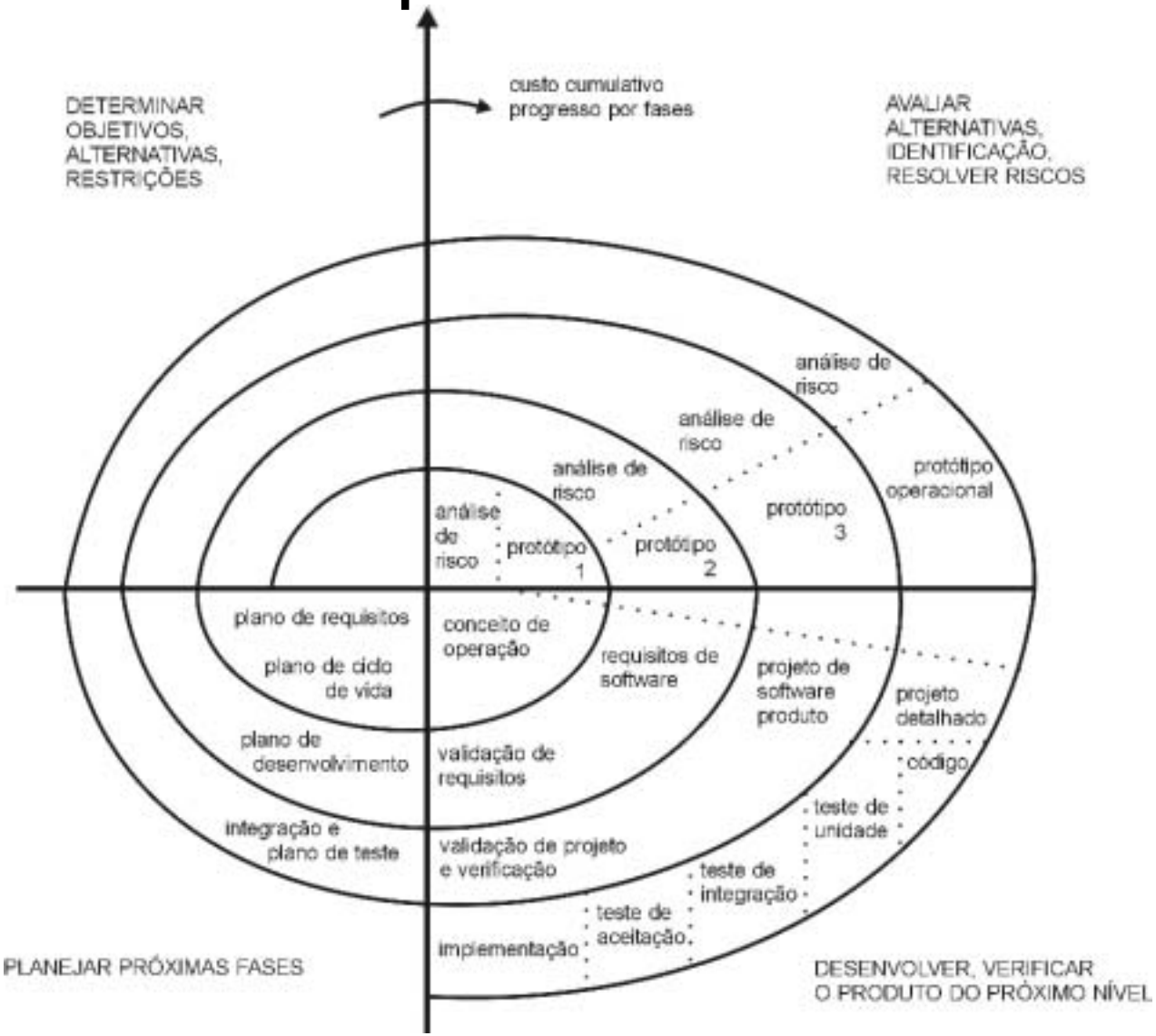
Different Perspectives

V Model



Different Perspectives

Spiral Model



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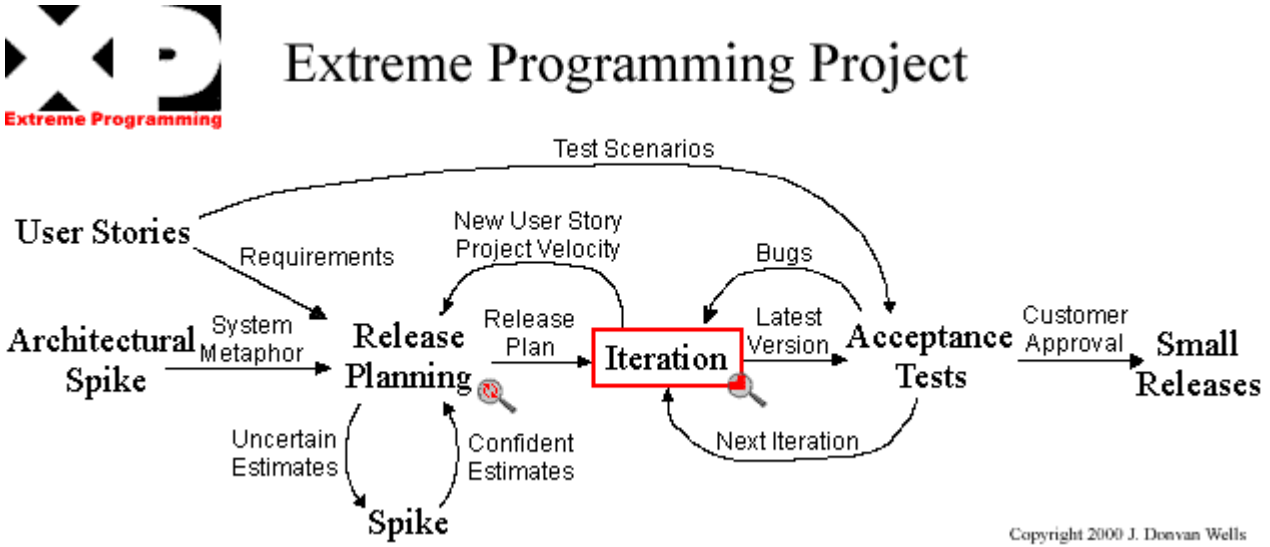
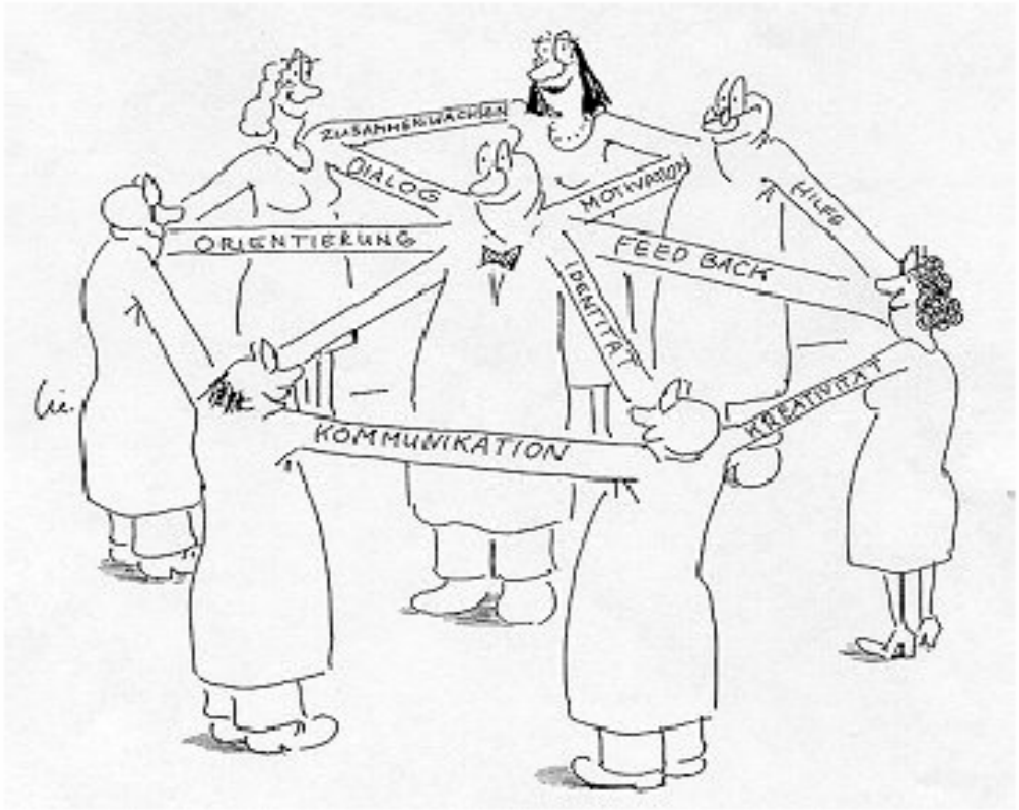
Different Perspectives

XP



Different Perspectives

Open Source

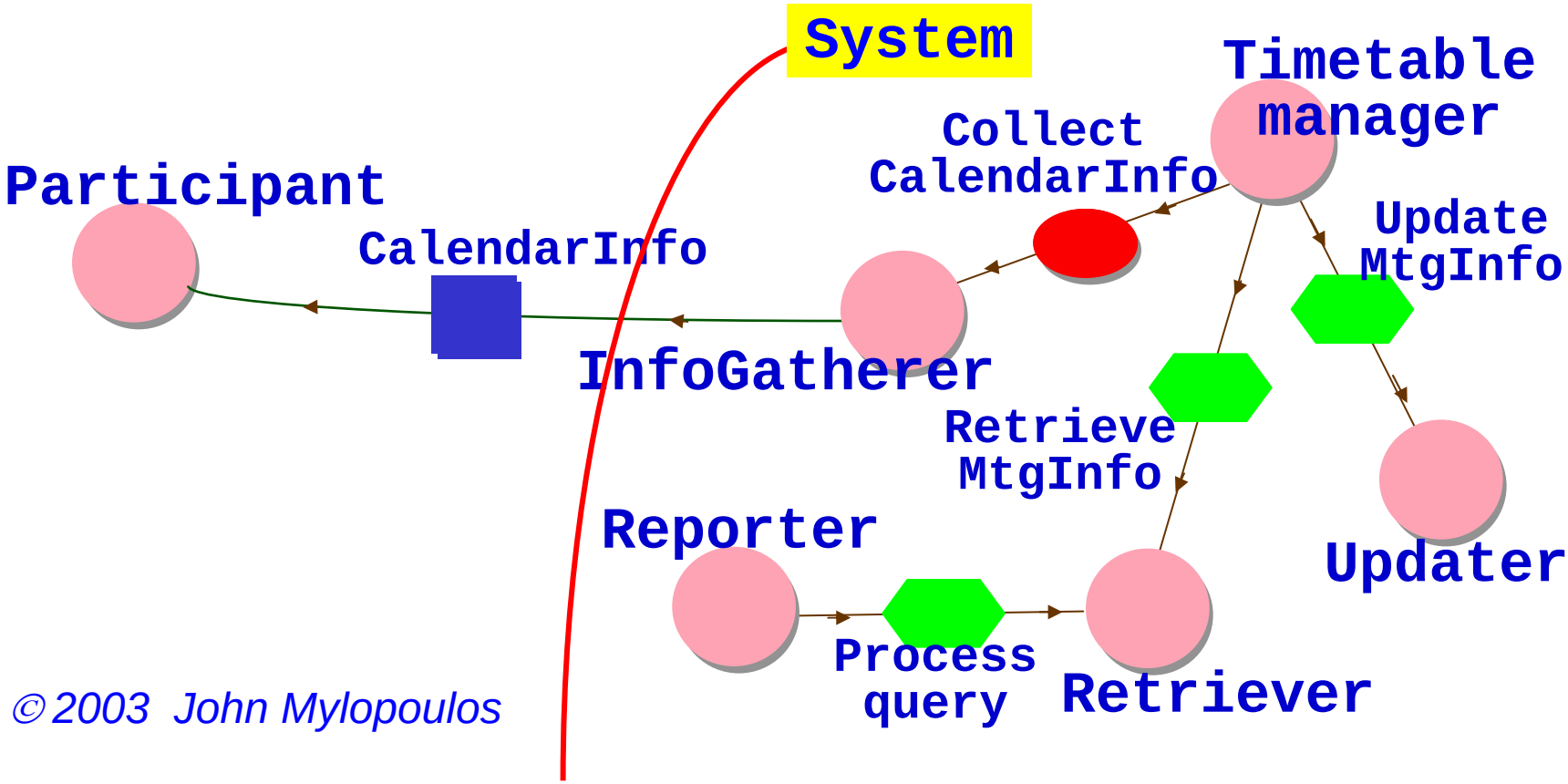


Picture taken from:

http://www.sti-ev.de/veranstaltungen/jahrestagung/2001/unterlagen/rupp_sti.pdf

Different Perspectives

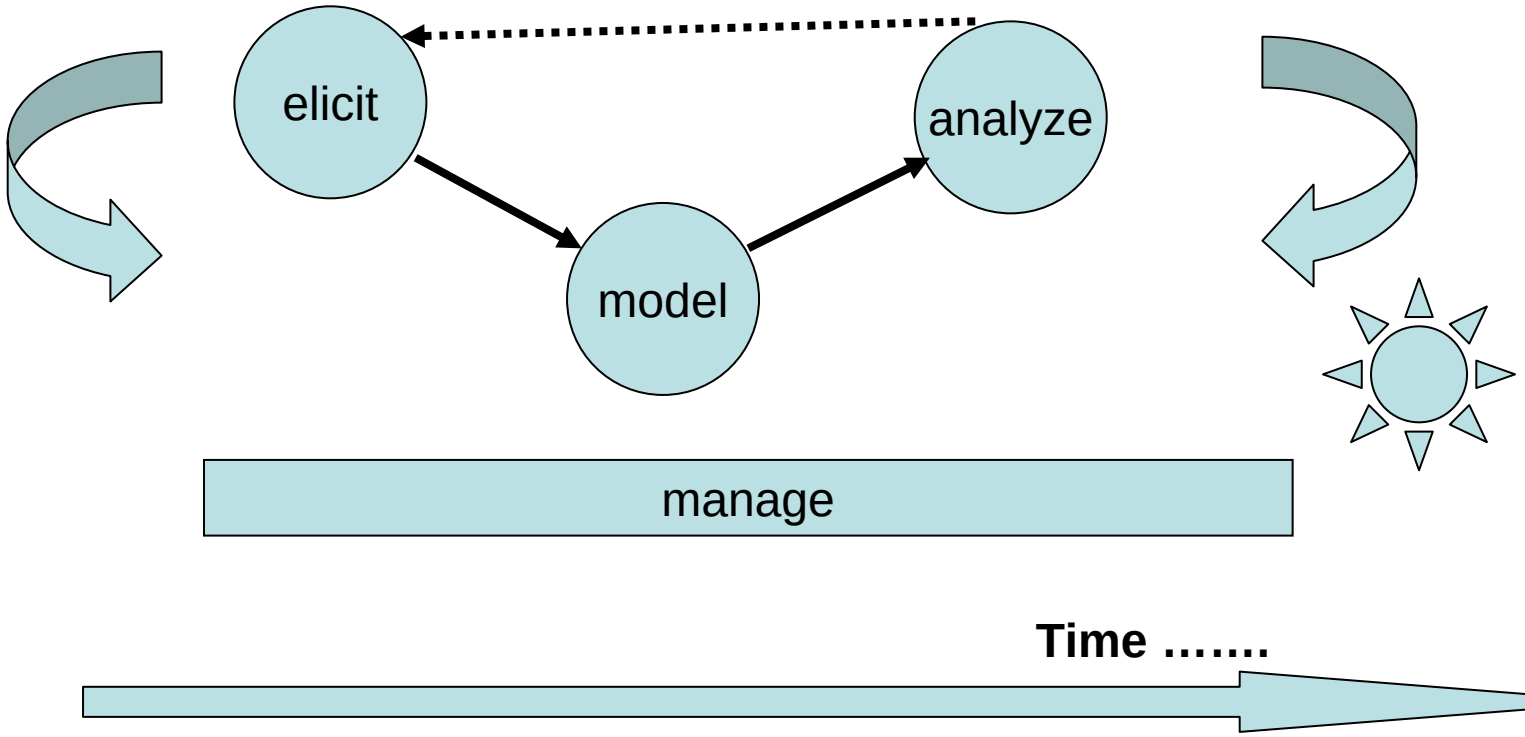
Tropos



Evolution as a Key Aspect

- Requirements process
- Change of perception
- Requirements Baseline
- Is “Quality is job one” still valid?

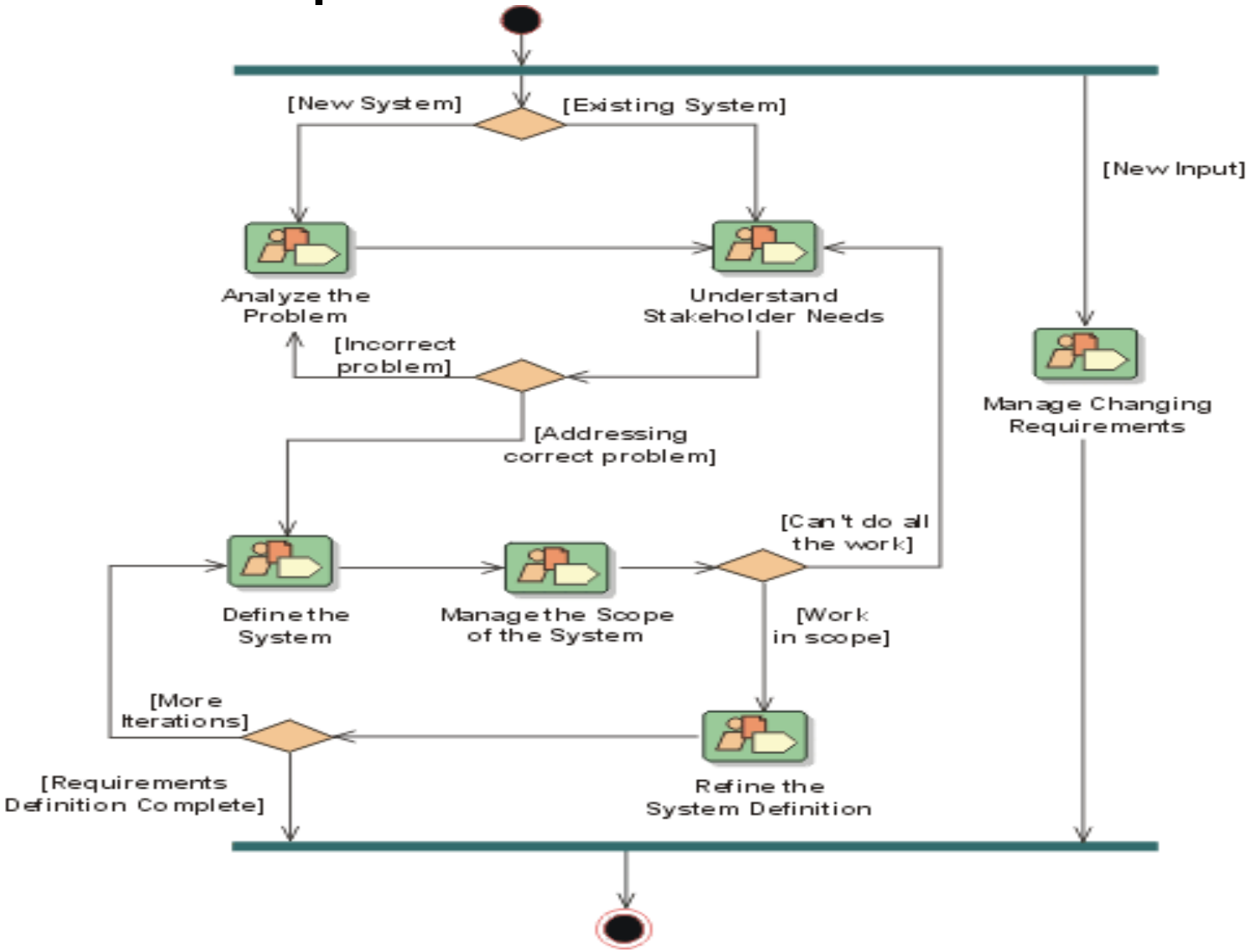
Evolution as a Key Aspect
Requirements Process



Evolution as a Key Aspect

Requirements Process

State of the Practice (Method) from Rational



Evolution as a Key Aspect

Requirements Process

State of the Practice (Tools)

Starbase
http://www.tbi.com/caliberrm30/index.cfm

Telelogic
http://www.er.les.inf.puc-rio.br/doors.htm

Rational
http://www.rational.com/products/reqpro/index.jsp

EDS
http://www.eds.com/products/plm/teamcenter/slate/

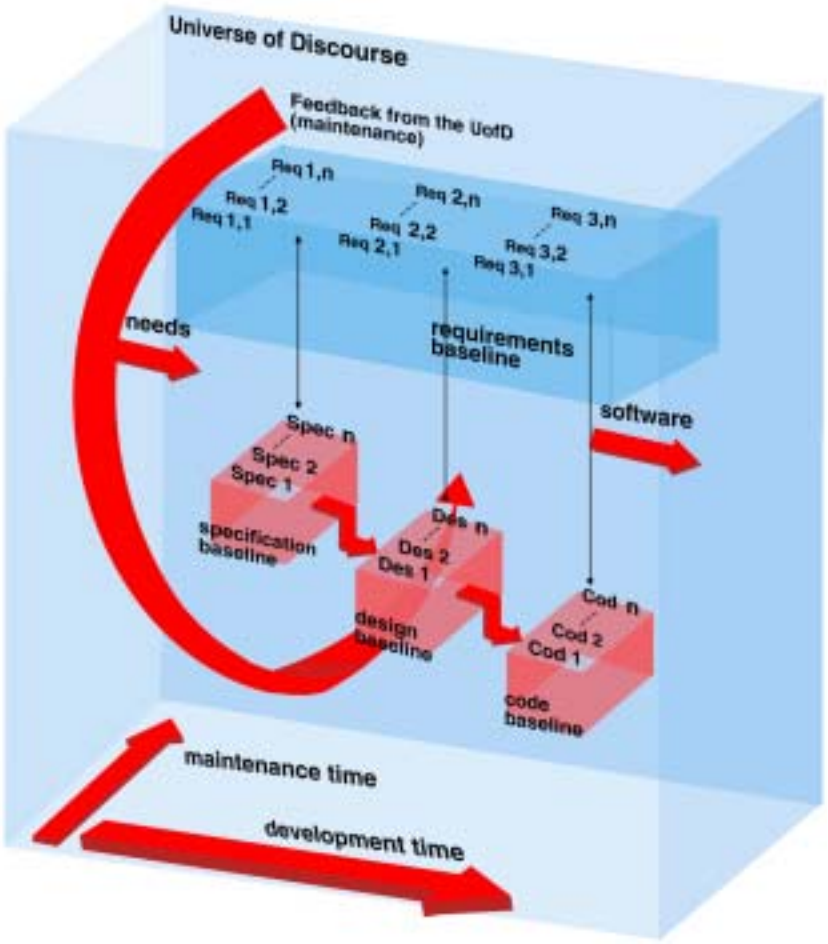
Evolution as a Key Aspect

Change of Perception

- Completeness
- Consistency
- Frozen document
- Constant change
- Time to market

Evolution as a Key Aspect

Requirements Baseline



Is “Quality is Job One” still valid?

- Of course, but…
- Efficacy is measured time wise
- Functional and Non-Functional requirements are tangled even more.

Results so Far (from our group)

- Lexicon
- Scenarios
- NFR
- Scenarios Inspection (as an instance of quality driven methods)
- Extreme Requirements

Results so Far

Lexicon

Actuators / Actuator / Physical actuator

Notion:

It is a device that can be controlled by *control system* .

An *actuator* has name, abbreviation, *type*, *range*, control, *reaction time* and a description.

Behavioral responses:

It is controlled by the *control system* .

An *actuator* responds in linear time.
It controls *light*.

Sensors / Physical sensor / Sensor

Notion:

A device that can sense state of the building, users or environment.

A *sensor* has name, abbreviation, *type*, *resolution*, *range*, *reaction time* and *conversion time* .

Behavioral responses:

Analog sensors respond in exponential time.

A *sensor* is triggered by a physical occurrence under its *range*. (It is not defined in the text, here is my definition)

Reaction time

Notion:

For a *sensor* , it is the time from a change of the sensed property to the time when the *sensor* has reached 90% of the change, excluding *conversion time*.

For an *actuator* , it is the time to change from 0 to 100% / 100 to 0%, if different.

Behavioral responses:

It is not defined in the text.

It is activated by a change in the environment (this need to be elaborated) in the case *o* f a *sensor*.

It is activated by the *control system* in the case of an *actuator*.

Dimmer actuators / Ile / Dimmer actuator

Notion:

It is an *actuator*.

It controls the output of a *luminaire*.

Behavioral responses:

It is used to dim individually *ceiling light groups*

Results so Far

Scenarios

Scenario:Reoccupied *room*

Goal:Return to the previous *light scene*

Context: *Motion detector* is working, value T1 is known for this *room*.
Any *room* in the *4th floor of building 32* .

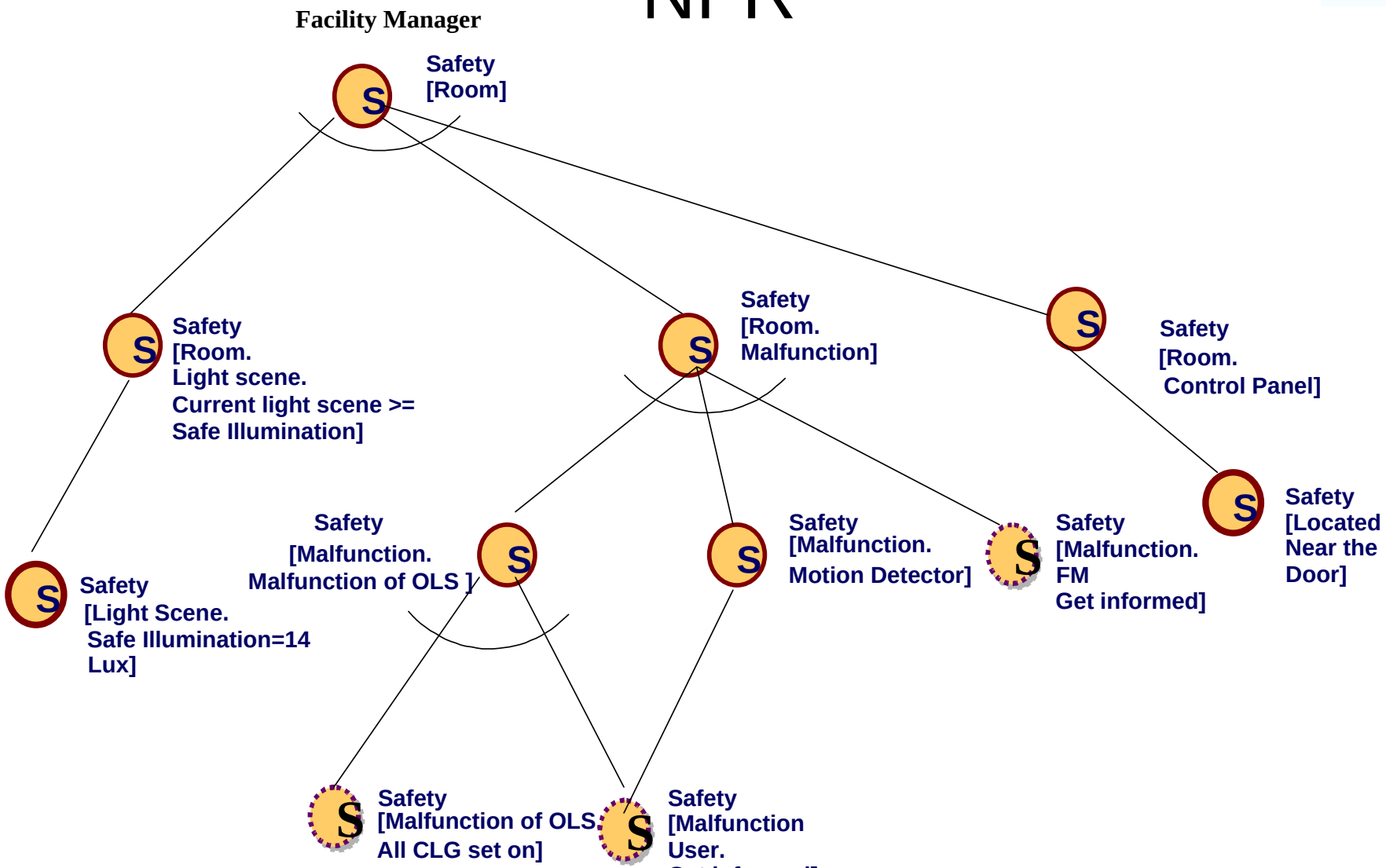
Resources: *ceiling light groups* , *task lights* , *push-buttons* , *control panel*

Actors: *user*, *control system*, *motion detector* , *dimmer actuators* , *status lines*, *control system* ,

Episodes:
user enters the *room*.
motion detector signals to *control system*.
system verifies how long the *room* has been empty
If time has been shorter than T1 the *system* retrieves the last *chosen light scene* Exception: OCCUPIED *ROOM*
control system terminates the *standard light scene*
system implements last *chosen light scene* ***Exception***: *Light* Malfunction

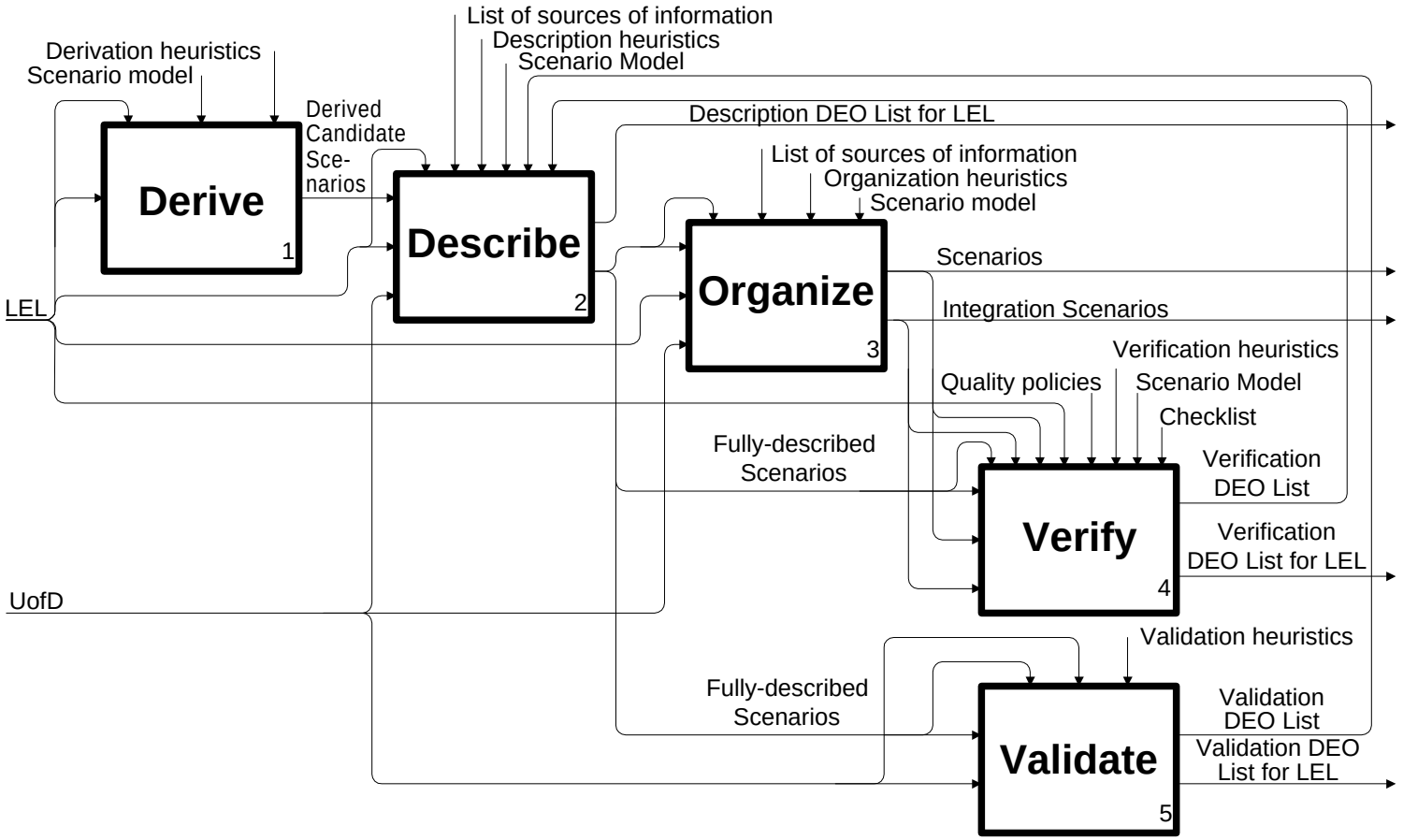
Results so Far

NFR



Results so Far

Scenarios Inspection



A0 **Build**

Results so Far

Extreme Requirements

XP Problems

- **The assumption that, in the planning game, the business could be represented by just one customer.**

- **The lack of consideration of non-functional requirements from the standpoint of the business.**

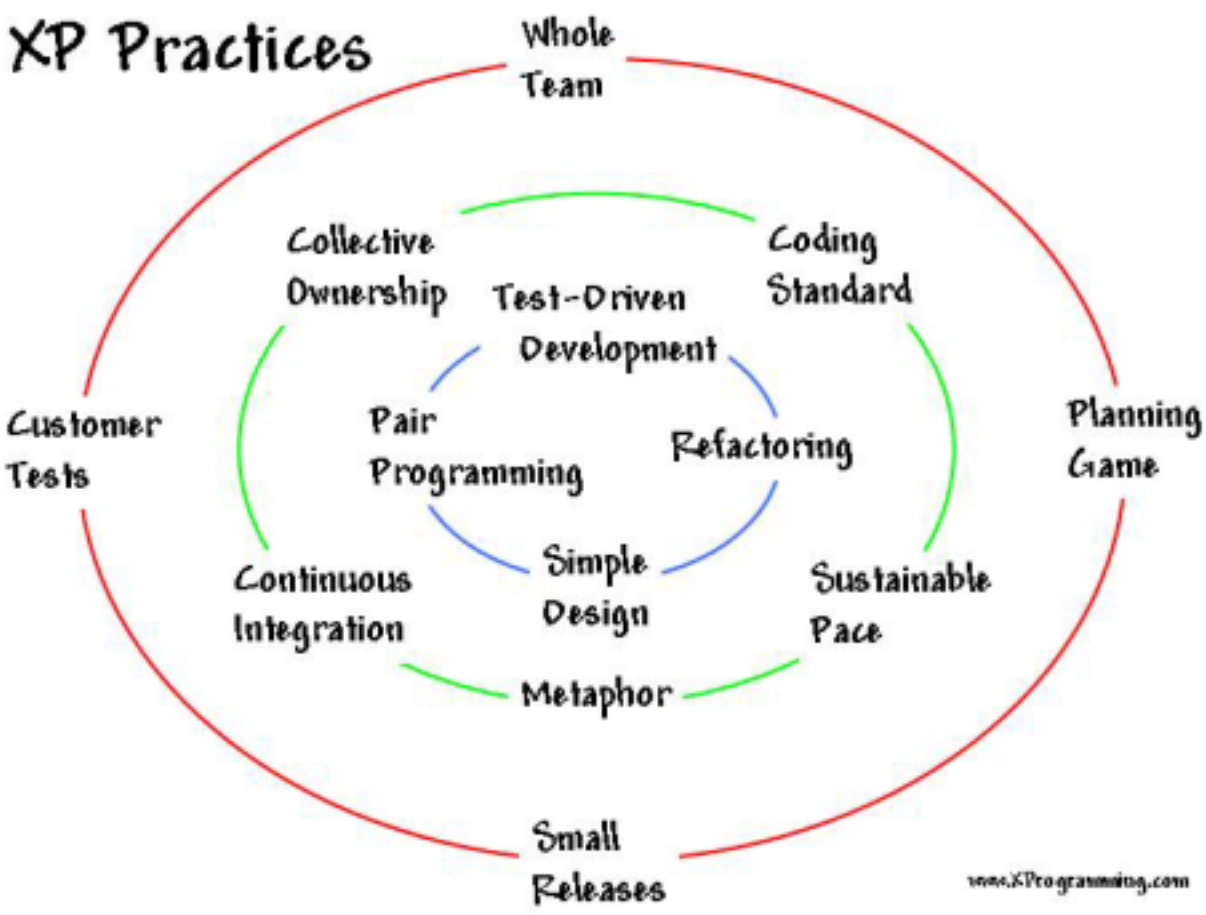
- **The lack of explicit links between stories and tasks cards to the code**

- **The lack of a process for producing functional tests.**

- **The lack of a process for producing stories and tasks.**

Results so Far

Extreme Requirements



Challenges

- Produce software that is more flexible, more reliable and more quick to enter the market.
- Goal oriented approach seems to be an important step forward towards evolution
- Engineering methods for goal/agent based methods