Jornada sobre

Innovación y Tendencias en la Gestión de Requisitos

#gestionrequisitos2016

9 de mayo – Madrid

Sede Madrid Network

organizan:

OVERTI

the REUSE company

Requisitos y MBSE: mil palabras y un modelo

Oskar Berreteaga

ULMA Embedded Solutions

Who we are

- We are part of ULMA Group, one of the largest business groups in northern Spain
- Team: 20 engineers, highly qualified and customer oriented
- Located in Gipuzkoa – Northern Spain

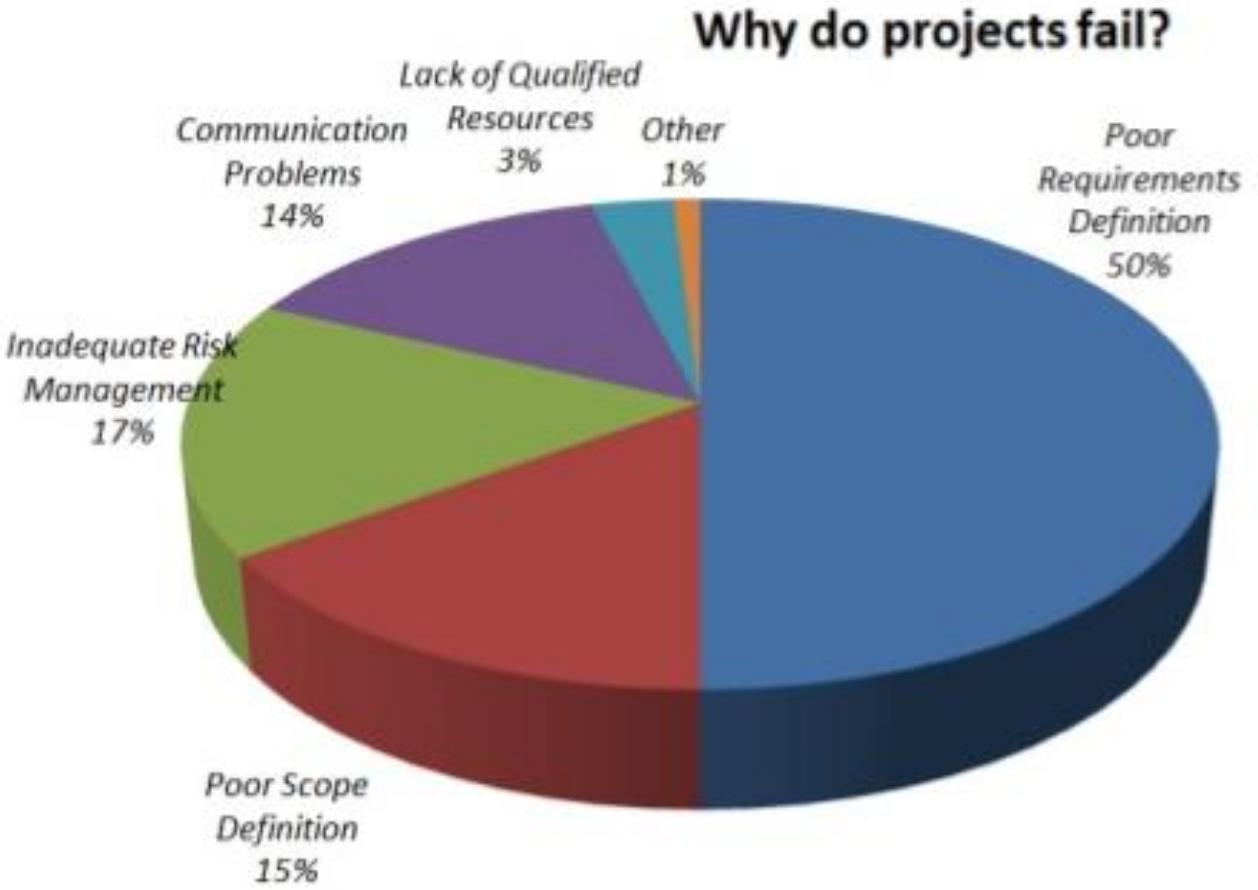
What we do

- We offer specialised consulting, design, development & testing services
- Along the whole custom embedded product lifecycle
- Software, Hardware and Programmable Logic
- Focused on Safety-and Mission-Critical applications

Outline

- Requirements Engineering Business Case
- Requirements Engineering defined
- Model Based Functional Analysis defined
- Continuous Engineering solution

Reqmts Eng Business Case



Source: ESI International survey of 2000 business professionals, 2005

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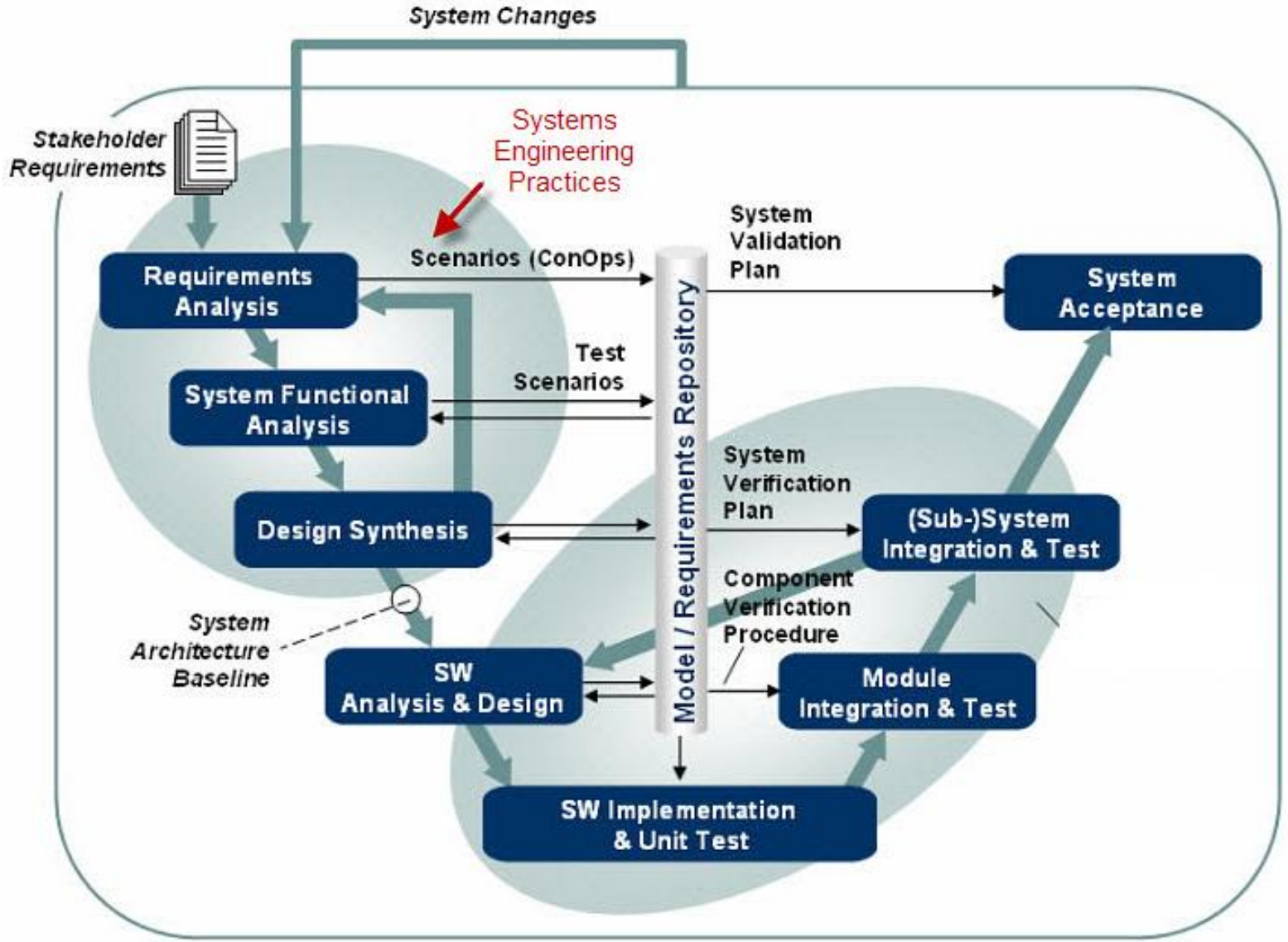
Requirements Engineering



Requirements Engineering

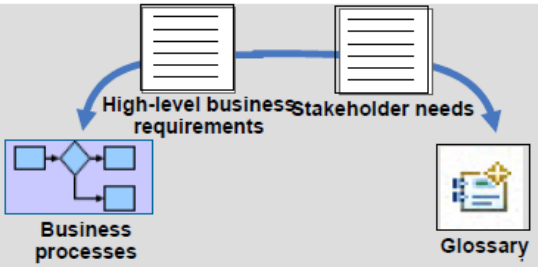
- Requirements Engineering, by one definition, involves:
  - Requirements elicitation
  - Requirements analysis and negotiation
  - Requirements specification
  - Functional analysis
  - Requirements validation
  - Requirements management

Requirements Definition

- Requirements Engineering involves:
  - Requirements elicitation – gathering requirements from customers
  - Requirements analysis and negotiation – check clarity and completeness, resolve issues
  - Requirements specification – document with text, sometimes with use cases and scenarios
  - Functional analysis
  - Requirements validation
  - Requirements management

Requirements Levels

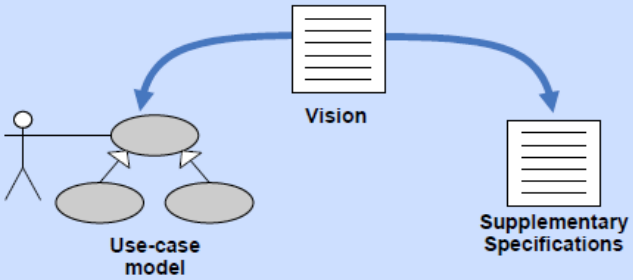
Business perspective



- Business goals and objectives
- Business processes (as-is versus to-be)
- Stakeholder needs
- Glossary
- Business rules

Problem space

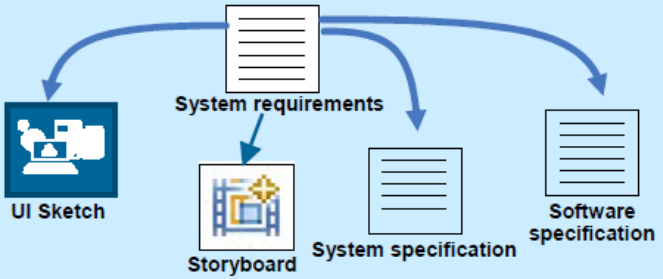
User perspective



- Features
- Functional requirements
- Non-functional requirements, including constraints.
- Use cases or user-story elaborations

Solution space

System perspective



- User interface specification
- User interface
- Storyboard
- Software specification
- System or subsystem specification

Requirements Management

- Requirements Engineering involves:
  - Requirements elicitation
  - Requirements analysis and negotiation
  - Requirements specification
  - Functional analysis
  - Requirements validation
  - Requirements management – continuous activity, traceability, requirement change handling

Rqmts Definition and Mgmnt

Requirements definition

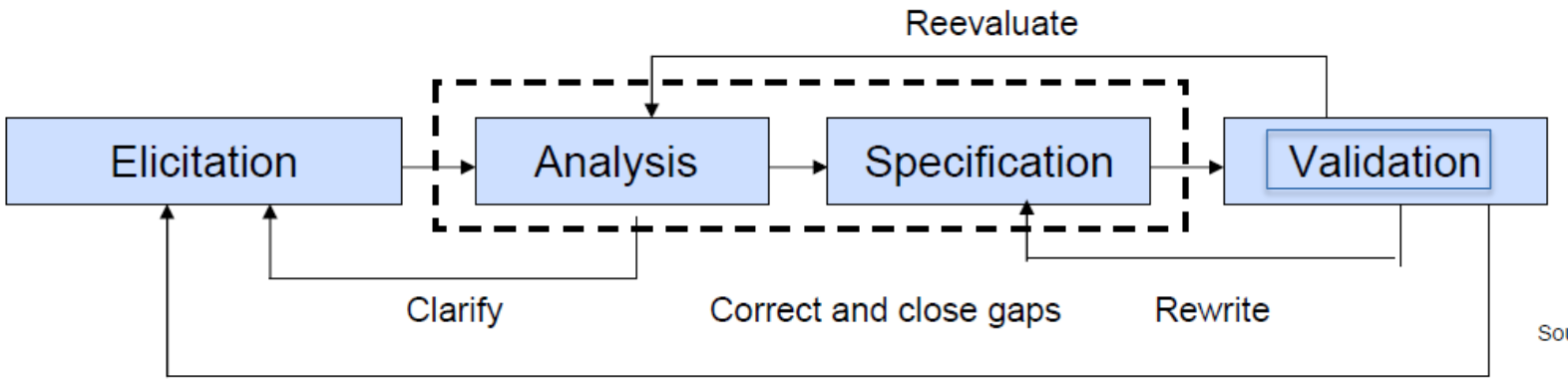
- Elicitation
- Analysis
- Specification
- Validation

Requirements are captured and analyzed

Requirements management

- Traceability
- Change management
- Tracking and reporting

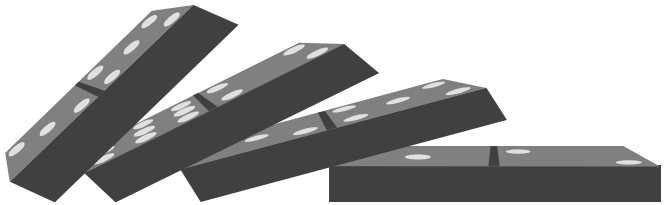
Requirements are managed and controlled



Source: Karl Wiegers

Requirements Challenges

- Misunderstood requirements by stakeholders and analysts
- Poorly expressed requirements
- Missed test coverage
- Misunderstanding or omission by development
- Requirement change impact misunderstandings



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What is Systems Engineering?

- SE is an interdisciplinary approach and means to enable the realization of successful systems
- It focuses on defining customer needs and required functionality early in the development cycle, documenting requirements, then proceeding with design synthesis and system validation while considering the complete problem

Model Based SE (MBSE)

- A Systems Engineering analysis and design practice
- A visual approach to understanding requirements and realizing them into a robust system design
- Helps manage complexity through the use of abstraction and separation of concerns

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Model Based SE (MBSE)

2 Functional Requirements

2.1 Power car

2.1.1 Move car

2.1.1.1 Move forwards

The car shall be able to move forwards at all speeds from 0 to 200 kilometers per hour on standard flat roads with winds of 0 kilometers per hour, with 180 BHP.

2.1.1.2 Move backwards

The car shall be able to move backwards to a maximum speed of 20 Kilometers per hour on standard flat roads with winds of 0 kilometers per hour, with 180 BHP.

2.1.2 Accelerate car

The car shall be able to accelerate from 0 to 100 Kilometers per hour in 10 seconds on standard flat roads with winds of 0 kilometers per hour.

The car shall be able to accelerate from 100 to 150 kilometers per hour at a rate of 5 kilometers per second on standard flat roads with winds of 0 kilometers per hour.

The car shall be able to accelerate from 150 to 200 kilometers per hour at a rate o 3 kilometers per second on standard flat roads with winds of 0 kilometers per hou

2.2 Control car

2.2.1 Switch on car

The car shall be able to discriminate which authorized people shall be able to switch on and operate the car.

2.2.2 Control speed

The car shall have a foot mechanism to control the speed of the car.

The speed control shall be infinitely variable from zero to maximum speed.

The speed of the car shall be controllable by automatic means.

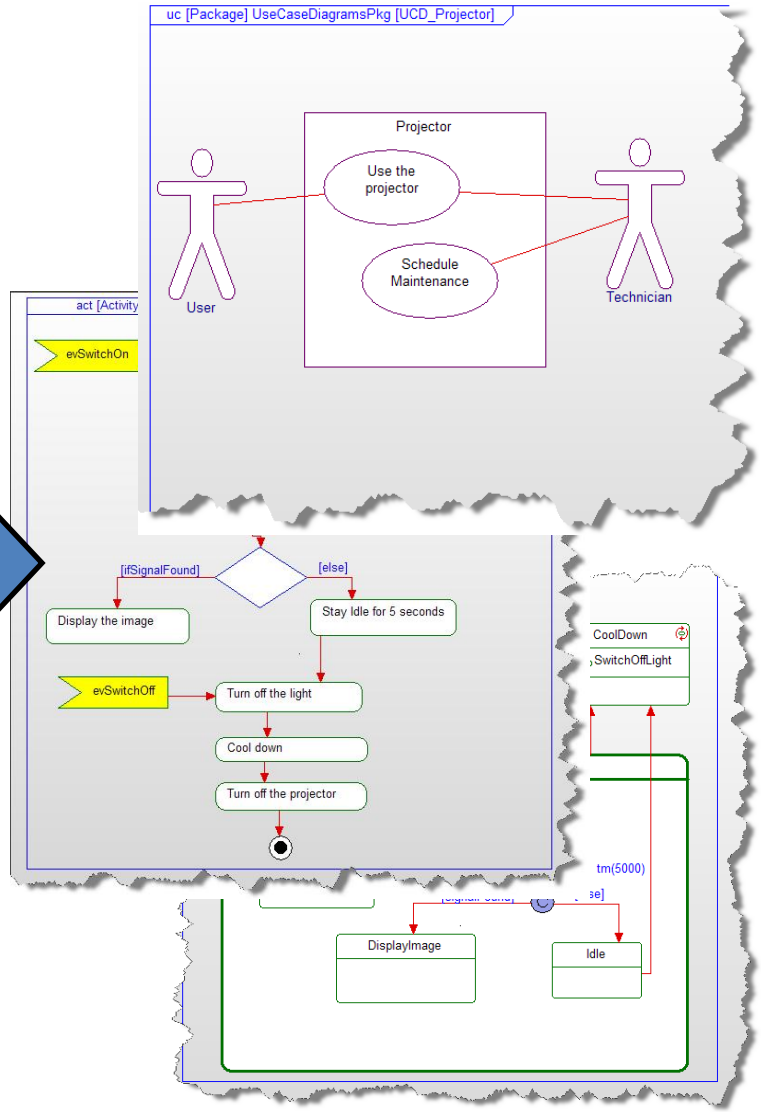
2.2.3 Brake car

The car shall be able to stop from 10 kilometers per hour to 0 kph in 2 seconds.

The car shall be able to stop from 30 kilometers per hour to 0 kph in 6 seconds.

The car shall be able to stop from 100 kilometers per hour to 0 kph in 30 seconds.

The car shall be able to stop from 200 kilometers per hour to 0 kph in 45 seconds.



Collaboration in text

- Engineer 1:

  Ok this is how it should work:

  The Device Manager sends a request to the Transaction Manager – that will put the Transaction Manager into a Checking State, from what it was before which was Idle.

  The Transaction Manager then sends a message to the Account manager to get authorisation and waits for a message to come back.

  If the authorisation doesn't come back within 2 seconds the Transaction Manager sends a denied message back to the Device Manager. The Device manager will have started in an Idle state but after it gets the confirmation it should move to a state where it waits until it gets the authorisation. If it instead gets a denied message then it should move back to being idle.

  All this should happen in less than 5 seconds

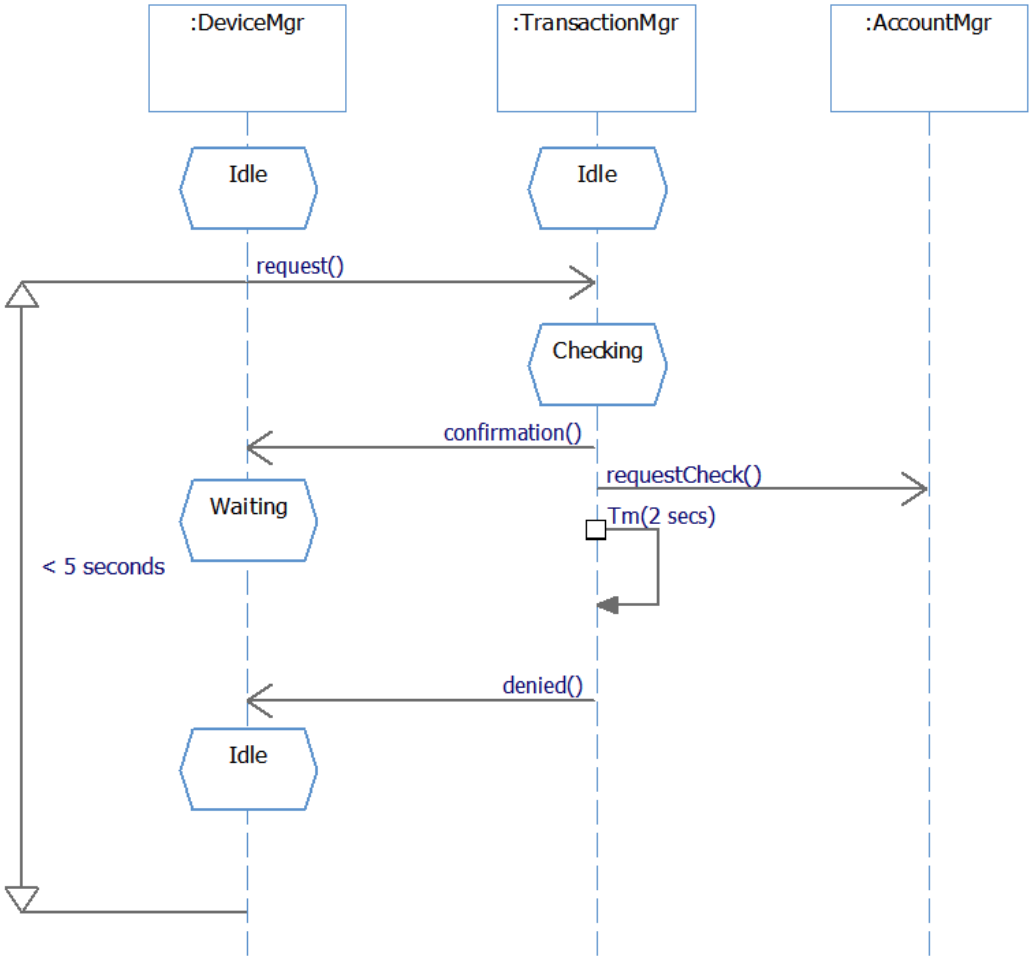
- Engineer 2:

  What?

Collaboration using SysML

- Engineer 1:
- “Here look at this Sequence Diagram.”

- Engineer 2:
- “**Ahhh**, now I see!”

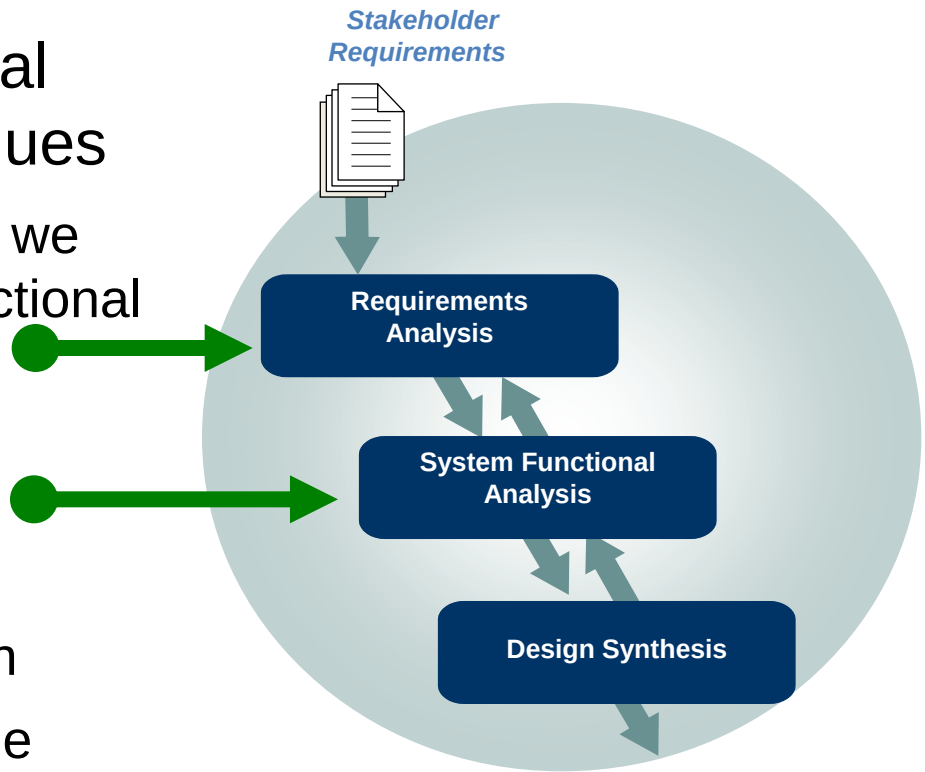


Modeling in Rqmts Engineering

- Requirements Engineering involves:
  - Requirements elicitation
  - Requirements analysis and negotiation
  - Requirements specification – use cases and scenarios for describing user interactions
  - Functional analysis – functional flows, interface definition, documented rationale
  - Requirements validation – testing of requirements through model execution
  - Requirements management

Systems Engineering Workflow

- MBSE complements traditional requirements analysis techniques
  - During Requirements Analysis, we organize requirements into functional groups (use cases)
  - During Functional Analysis, we identify system functions and explore the system's dynamic behavior using model execution
    - refines and improves upon the systems requirements



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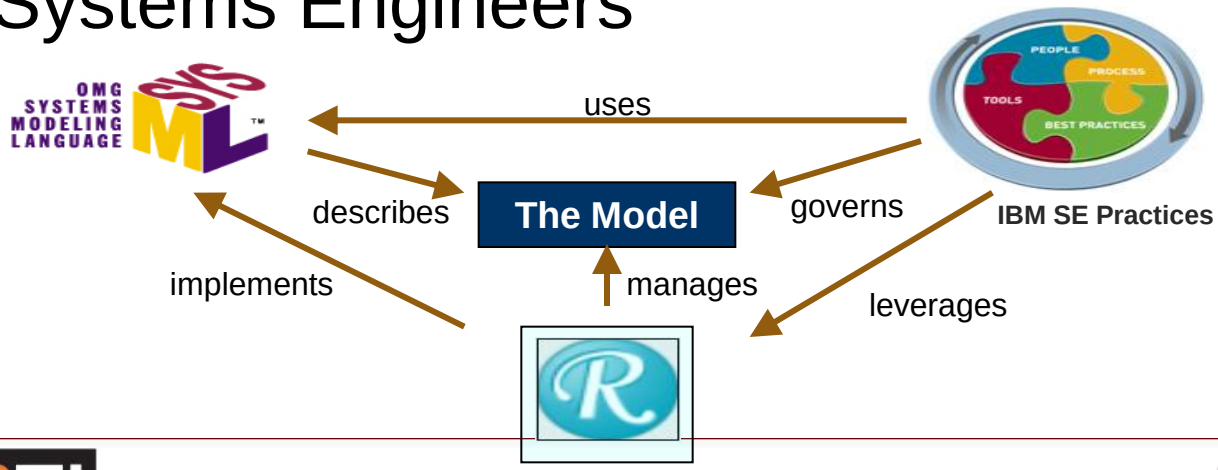
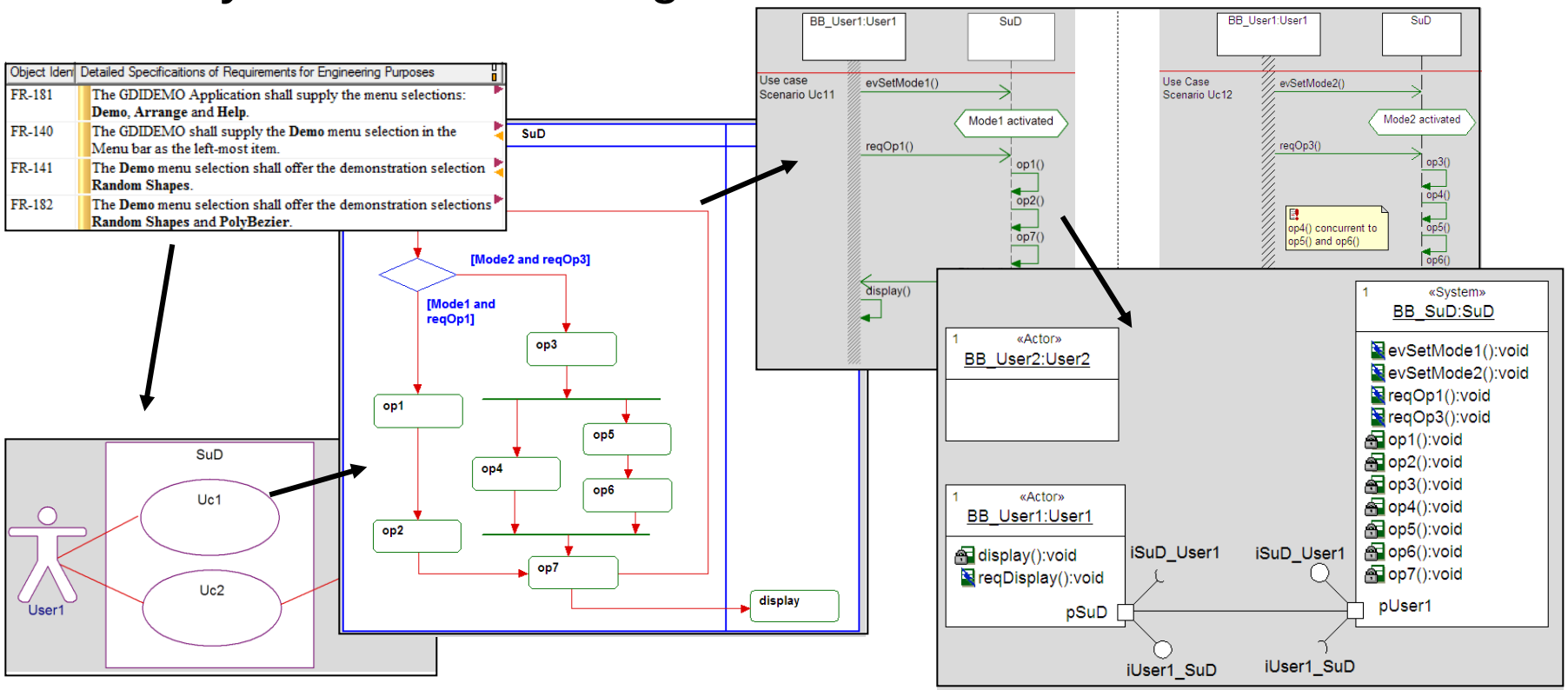
Model Based SE (MBSE)

- MBSE is a standards based Systems Engineering practice that incorporates:
  - **Modeling language** – SysML
  - **Modeling process** – Rational Systems Engineering Practices
  - **Modeling tools** – Rhapsody Designer for Systems Engineers

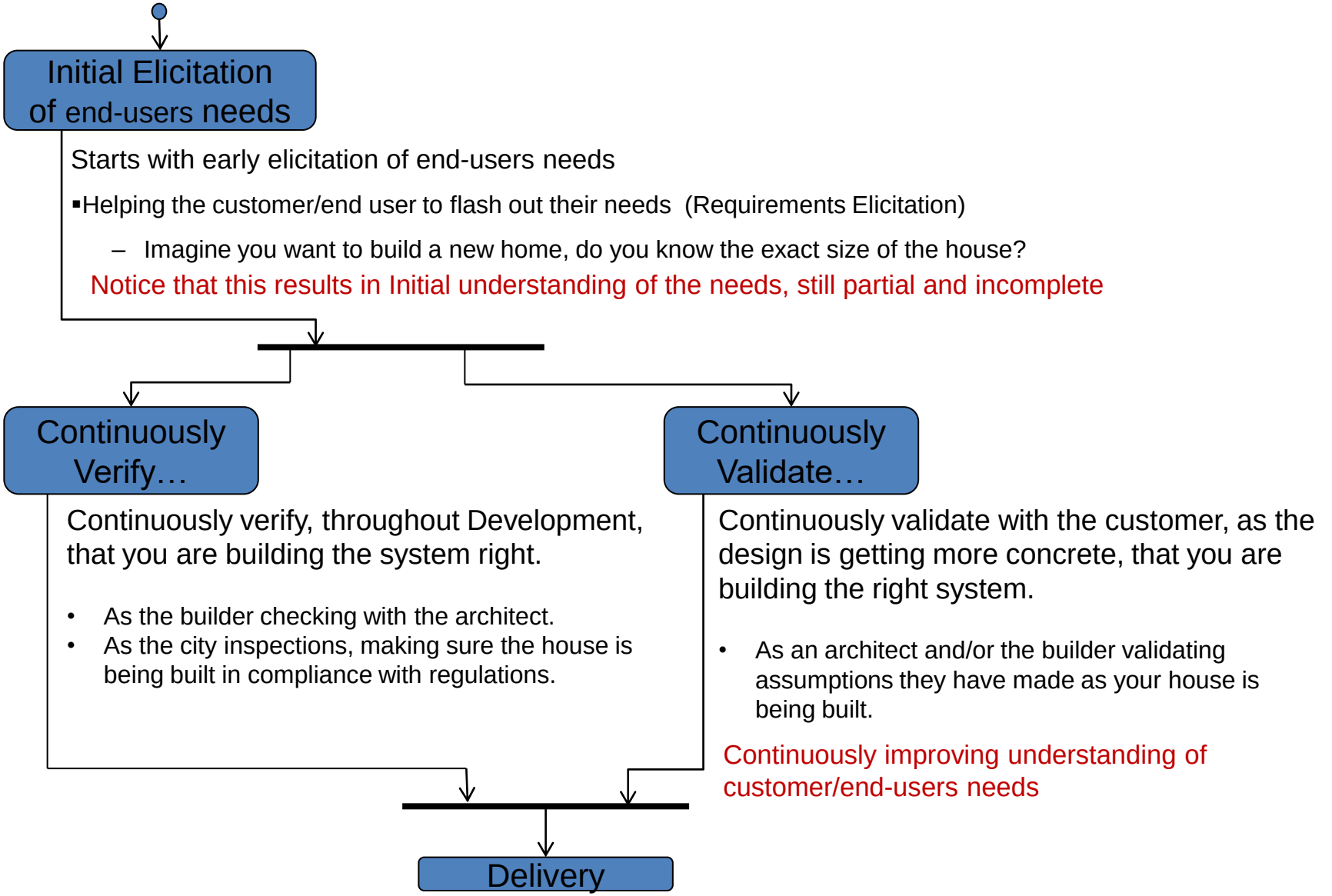


SE practices provides guidance

- Helps you identify and derive system functions, identify associated system modes, and allocate system operations to decomposed architectures, while retaining the option to verify the model through execution



Continuous V&V Process



Concluding remarks. We model to

- Manage complexity
- Simplify and abstract essential aspects of a system
  - Increase understanding
- Enhance team communication
- Reduce risk
  - Model execution reduces uncertainty and risk
- Provide traceability
  - Models document what you have done
  - Allow for effective change or impact analysis

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Detalles de Contacto

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