Validation of
- Context of consideration
- Execution of RE activities
- Created requirements artefacts
Validation Goal

- Check whether the **outputs** of activities fulfill defined quality criteria
- Check whether the **execution of activities** adheres to process definitions and activity guidelines
- Check whether the **inputs** of activities fulfill defined quality criteria
Validation Goal

Check whether the **outputs** of activities fulfill defined quality criteria

Content

Agreement

Documentation

Check whether the execution of activities adheres to process definitions and activity guidelines

Check whether the **inputs** of activities fulfill defined quality criteria
Requirements Lifecycle

*Source:* Adapted from Pohl, CAISE 1993
Validating

Created Requirements Artefacts

Validation with regard to

• **Content dimension**
  – Check whether all relevant requirements are known and understood to the required level of detail

• **Documentation dimension**
  – Check whether the requirements are documented according to the defined documentation and specification rules

• **Agreement dimension**
  – Check whether the stakeholders have reached agreement about the documented requirements
  – Check all known conflicts; if they have been resolved
  – Check whether there are conflicts that have not yet been identified
Validation of Content

Quality of the information contained in the requirements artefacts

- **Completeness of artefact/document**
  - Does the requirement artefact / document contain all relevant information and requirements

- **Completeness of requirements**
  - Does each requirement contain all the information
    - that is needed according to the relevant reference model (e.g., template)
    - that is needed to perform subsequent development activities?

- **Consistency**
  - Can the system meet all requirements together
  - Are there requirements that contradict each other
Validation of

Content

Quality of the information contained in the requirements artefacts

• **Correctness of requirements**
  – Does the content of each requirement correspond to the *actual stakeholder needs and wishes*?
  – Are *all assumptions* about the system context made when defining the requirements correct?

• **Correctness of requirements classification**
  – Has each requirement
    • assigned to the right *requirement type*
      – goal, scenario, functional, quality, constraint, etc.
    • documented at the proper place
Validation of Documentation

- **Correct documentation format**
  - Does the requirements artefact have the prescribed documentation format

- **Comprehensibility**
  - Are the documented requirements comprehensible in the given context
    - *e.g.*, all terms that are used in the requirements artefacts clearly defined
Validation of Documentation

- **Unambiguous documentation**
  - Does the documentation format of the requirements artefacts allow for an *unambiguous interpretation* of the requirements?
  - Could ambiguities be avoided
    * by using a different, more appropriate documentation format

- **Compliance with documentation rules**
  - Does the requirements artefact adhere to the documentation (or specification) *rules and guidelines*?
Validation of Agreement

• **Agreement**
  – Did the relevant stakeholders agree upon each requirement

• **Agreement after modification**
  – Has approval of the relevant stakeholders been obtained anew after
    • a requirements was modified
    • the content of the requirement changed
Validation of Agreement

- **Check for conflicts**
  - Have the requirements been **checked for potential conflicts** caused
    - e.g., by conflicting goals?

- **Conflicts resolved**
  - Have **all known conflicts** been resolved for each requirement
Validation Goal

- Check whether the outputs of activities fulfill defined quality criteria.
- Check whether the execution of activities adheres to process definitions and activity guidelines.
- Check whether the inputs of activities fulfill defined quality criteria.

Subject facet  |  Usage facet  |  IT system facet  |  Development facet
Context defects

• **Missing context information**
  – Important requirements have not been identified

• **Incorrect context information**
  – Requirements are defined on incorrect context information
    • E.g., wrong assumptions

• **Insufficiently considered context information**
  – Relevant context not adequately documented

• **Incomplete requirements sources**
  – Not all relevant requirements sources were considered
Subject Facet

• Have all relevant **objects** been **identified** and **documented**?

• Have all identified **objects** been captured **completely** and **correctly**?

• Have all **quality requirements** for the **representation of objects** been captured?
Subject Facet

- Have all relevant **legal requirements** (e.g., privacy regulations) for **representation of objects** in the system been considered?

- Have all relevant **requirements sources** been incorporated in the **identification** of the objects, their properties and relationships?
  - Stakeholders, documents and existing systems
Usage Facet

• Have the **desired interaction** with the environment been captured completely and correctly
  – **stimuli** the system must detect and
  – **responses** the system must produce

• Have the **quality requirements for interaction** with the environment been captured completely and correctly
  – desired performance
  – robustness against faulty operation and correct inputs
  – prevention of misuse
Usage Facet

- Have the **specifics of different user groups** been taken into account
  - *e.g.*, specific requirements for different cultures and countries

- Have the **usage goals** of the **relevant stakeholders** and the **relevant systems** been elicited completely and correctly

- Have all **relevant requirements sources** for the usage facet been involved
  - *e.g.*, expert for human-machine interfaces for the corresponding type of system
IT System Facet

• Have the relevant properties of the **hardware and software components** with which the system interacts or that belong to underlying hardware and software platform of the system been captured completely and correctly

• Have all required **system interfaces** and the **relevant protocols** at each interface been documented completely and correctly
IT System Facet

• Have all **relevant IT strategies** been considered appropriately
  – *e.g.*, with regard to the use of upcoming or future technology

• Have all **relevant IT policies** been considered and documented
  – installation, update and backup policies

• Have all **relevant requirement sources** of the IT system facet been involved in the requirements elicitation activities
Development Facet

• Have all requirements pertaining to the languages and development tools to be used been captured completely and correctly
  – Specification languages, programming languages, etc.

• Have the requirements for the development process and development standards been captured completely and correctly
  – including the development rules and guidelines with which the project must comply
Have all development artefacts to be provided or exchanged been identified
   – e.g., between the client and the contractor

Have the targeted project duration and cost been checked for feasibility after all (essential) requirements been agreed on

Have all relevant requirements sources of the development facet been considered
Validation Goal

- Check whether the **outputs** of activities fulfill defined quality criteria
- Check whether the **inputs** of activities fulfill defined quality criteria
- Check whether the **execution of activities** adheres to process definitions and activity guidelines
Validation of Execution of Activities

• Has the **execution of the activities** been **documented** in the prescribed way?

• Have all **activities** that are required according to the process definition **been performed**

• Have all **inputs** defined in each activity description **been considered for the respected activity**
Validation of

Execution of Activities

• Does the execution of each activity correspond to the rules and guidelines defined in the activity description

• Have all outputs defined in each activity description been created

• Have all stakeholders who are relevant for performing the respective activity been involved in the execution of the activity