Escuela Técnica Superior de Ingeniería Informática
Departamento de Lenguajes y Sistemas Informáticos

Requirements Quality Verification

Software Engineering and Databases Group
Department of Computer Languages and Systems
University of Seville
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Requirements Quality Verification

- Learning objectives
  - Know the main concepts related to requirements **quality**.
  - Know the goals, products and techniques of **requirements verification**.
  - Know the basics of requirements **nonconformities** management.

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1. Requirements quality
2. Requirements verification goal
3. Quality model for verification
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Requirements Quality Verification

- What is a quality model?
  - The **quality model** of a product is the set of **quality characteristics** to be assessed to determine its **goodness**.
- What is a quality characteristic?
  - A **quality characteristic** of a product is a **desirable property** of that product which helps make it **good** within its class.
  - For example: non-ambiguity of a requirement, syntactic correctness of a class diagram, source code following coding standards, etc.

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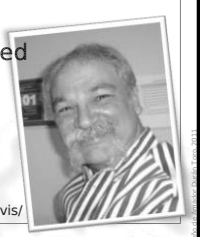
Requirements Quality Verification

- Quality requirements model (Davis, 1993)

1. Unambiguous
2. Complete
3. Correct
4. Understandable
5. Verifiable
6. Internally consistent
7. Externally consistent
8. Achievable
9. Concise
10. Design independent
11. Traceable
12. Modifiable
13. Electronically stored
14. Executable/interpretable
15. Annotated by relative importance
16. Annotated by relative stability
17. Annotated by version
18. Not redundant
19. At right level of detail
20. Precise
21. Reusable
22. Traced
23. Organized
24. Cross-referenced



http://www.reqbib.com/adavis/

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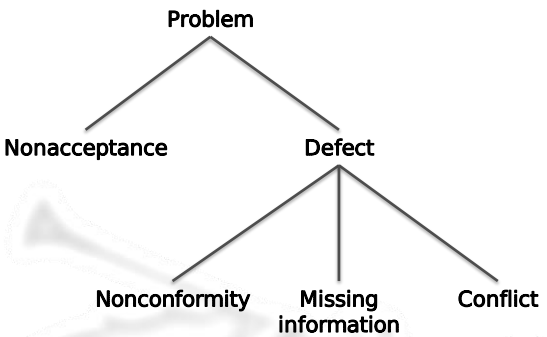
Requirements Quality Verification

- Problems in requirements quality
  - There are different types of requirements quality **problems**. A possible taxonomy is:



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Requirements Quality Verification

- Problems in requirements quality
  - **Problem**
    - Any circumstance that adversely affects requirements and that must therefore be solved to avoid future problems during development.
  - **Defect**
    - A kind of problem due to non-compliance with a requirements quality characteristic.
  - **Nonacceptance**
    - A kind of problem due to the rejection of one or more requirements by customers and users.

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Requirements Quality Verification

- Problems in requirements quality
  - **Nonconformity**
    - A kind of defect due to one or more requirements not being compliant with specifications about content, structure, format, etc.
    - It is not usually necessary to know the problem domain for detecting them (they are more syntactic than semantic).
  - **Missing information**
    - A kind of defect due to one or more requirements not containing enough information about a system feature.
  - **Conflict**
    - A kind of defect due to two or more requirements containing conflicting information.

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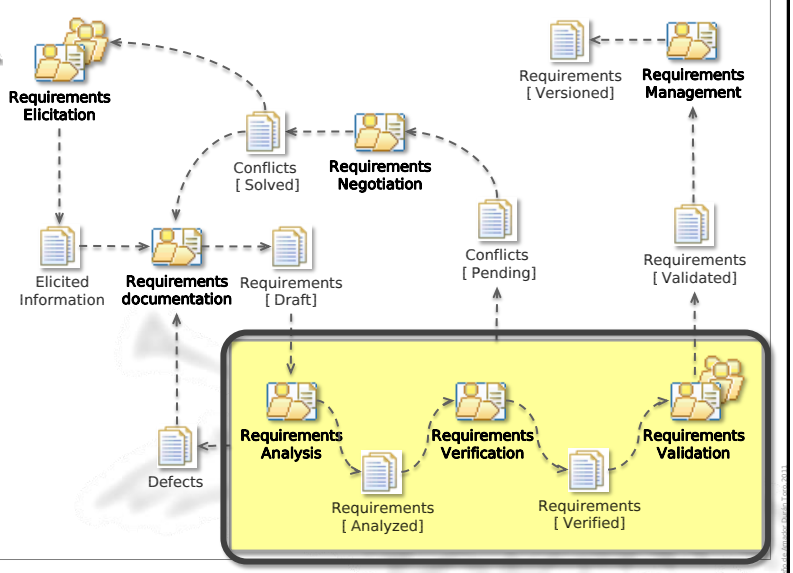
Requirements Quality Verification

- Quality in the RE process



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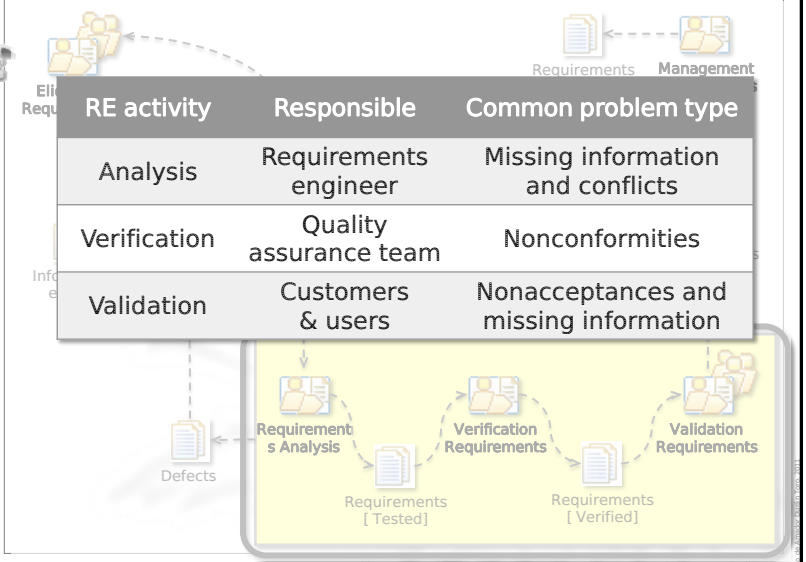
Requirements Quality Verification

- Quality in the RE process



RE activity	Responsible	Common problem type
Analysis	Requirements engineer	Missing information and conflicts
Verification	Quality assurance team	Nonconformities
Validation	Customers & users	Nonacceptances and missing information

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Requirements Quality Verification

- Requirements verification goals
  - Check that not only **requirements documents** but also **individual requirements** are compliant with the project **quality standards**, i.e. with the **requirements quality model** of the project.

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Requirements Quality Verification

- Quality model for requirements documents
  - **Correct**
    - It contains all mandatory sections, the content of the sections is compliant with project standards, and appropriate templates are used correctly.
  - **Complete**
    - It contains all requirements known so far and all mandatory sections are developed correctly.

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Requirements Quality Verification

- Quality model for requirements documents
  - **Internally consistent**
    - It does not contain any requirements or other information incoherent with each other, i.e. it does contain neither internal contradictions nor unnecessary redundancies.
  - **Externally consistent**
    - It does not contain any requirements or other information incoherent with other project documents.

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Requirements Quality Verification

- Quality model for individual requirements
  - **Understandable**
    - It is written so that it is easily understandable by all project stakeholders.
  - **Unambiguous**
    - It is written so that it can only be interpreted in one way and its meaning does not depend on reader's subjectivity.

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Requirements Quality Verification

- Quality model for individual requirements
  - **Grammatically correct**
    - It is written according to appropriate language grammar rules.
  - **Orthographically correct**
    - It is written according to appropriate language spelling rules, i.e. it does not contain misspellings.
  - **Feasible**
    - It can be implemented using existing technology and with an affordable cost within the project budget.

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Requirements Quality Verification

- Quality model for individual requirements
  - **Verifiable**
    - It is written so that one or more tests with reasonable cost and time can be defined to verify that the developed software system meets the requirement.
  - **Traced**
    - Requirement dependencies are mapped to other requirements or higher level documentation items on which it depends.

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Requirements Quality Verification

- Requirements verification techniques
  - The most common way of requirements verification is **requirements review**.
    - It involves a **careful reading** of documentation for identifying nonconformities with the quality model.
    - Automation of this process, i.e. using tools to automatically identify **suspicious** words, phrases, or document attributes that can lead to requirements defects, is very useful.
    - Using **checklists** is recommended.

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Requirements Quality Verification

- Requirements checklists
  - They are organized sets of **questions** to **check** whether a product meets its **quality model** or not.
  - During requirements verification, a checklist makes easier to identify **nonconformities**:
    - Example of nonconformity: ambiguity.
    - Example of question in a checklist: *Can the item be interpreted in more than one manner?*

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Requirements Quality Verification

- Requirements documents checklist
  - Does it contain all mandatory sections in compliance with organization's standards?
  - Is the content of the sections compliant with the organization's standards?
  - Are appropriate requirements templates used correctly?

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Requirements Quality Verification

- Individual requirements checklist
  - Is the description of the item correct in grammar and spelling?
  - Is the description of the item written in a way that is easy to understand?
  - Is the description of the item written in a way that it can only be interpreted in one way?
  - Are concepts from the **glossary of items** used in the item description?
  - Are the **traces** to other elements on which it depends registered?

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Requirements Quality Verification

- Individual requirements checklist
  - **General requirements**
    - Does the general requirement describes a service of value to any user?
  - **Use cases**
    - Does the use case describes a nontrivial interaction between one or more actors with the system to be developed?
    - Is the use case free of explicit references to specific elements of the user interface?

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Requirements Quality Verification

- Requirements nonconformities management
  - As a result of the requirements verification process, a set of nonconformities is obtained.
  - Requirements engineers are responsible for solving nonconformities in requirements documentation.
  - To register and manage nonconformities, a bugtracking system can be used.

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Requirements Quality Verification

- Comments, suggestions,...