

Software Requirements Engineering (SE2001)



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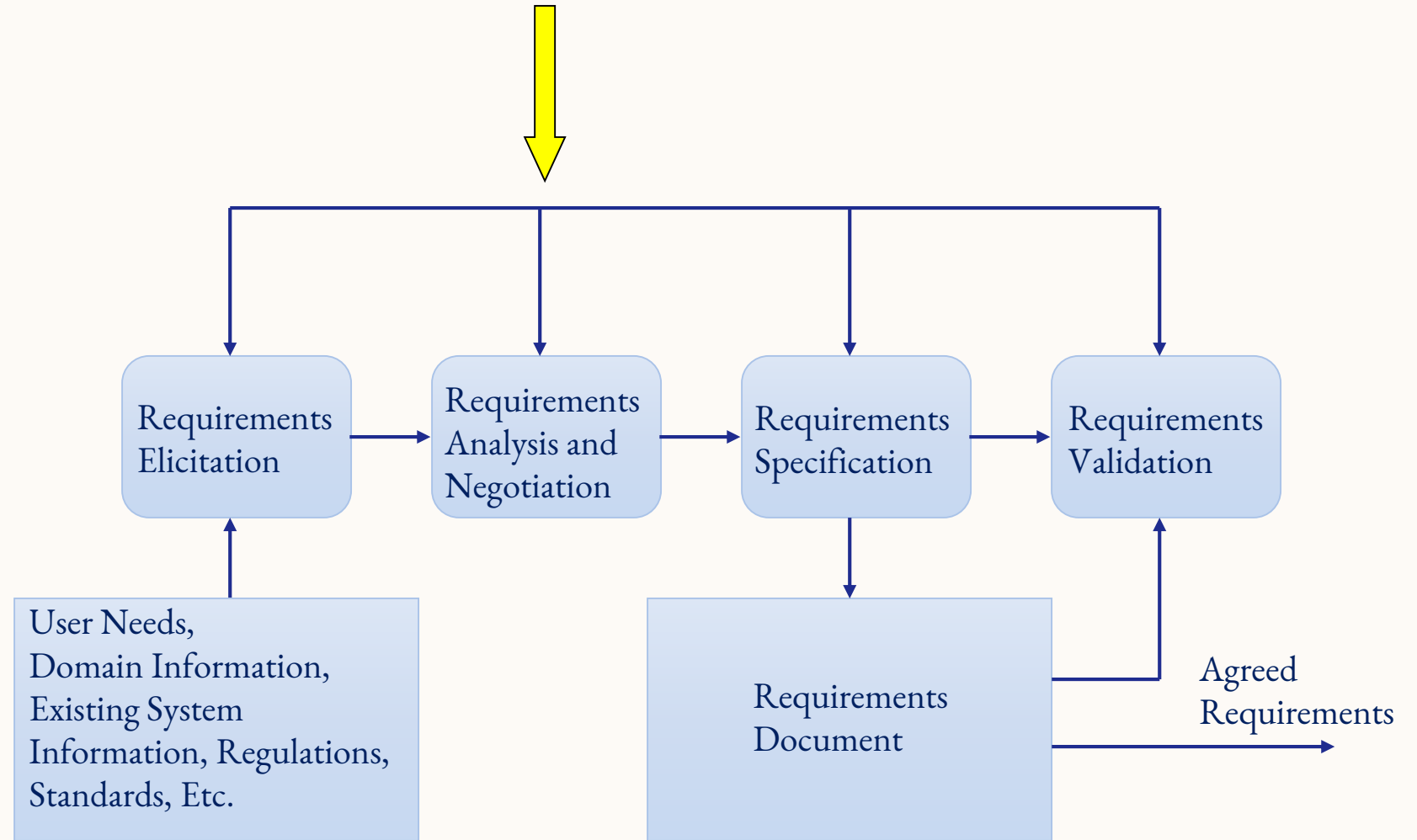
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Requirements Analysis & Negotiation

Requirements Analysis - 1³



Requirements Analysis - 2

- ❖ We'll discuss requirements analysis and negotiation separately, in order to understand them clearly and to appreciate that different skills are needed to perform them
- ❖ They are inter-leaved activities and join to form a major activity of the requirements engineering process

Requirements Analysis - 3

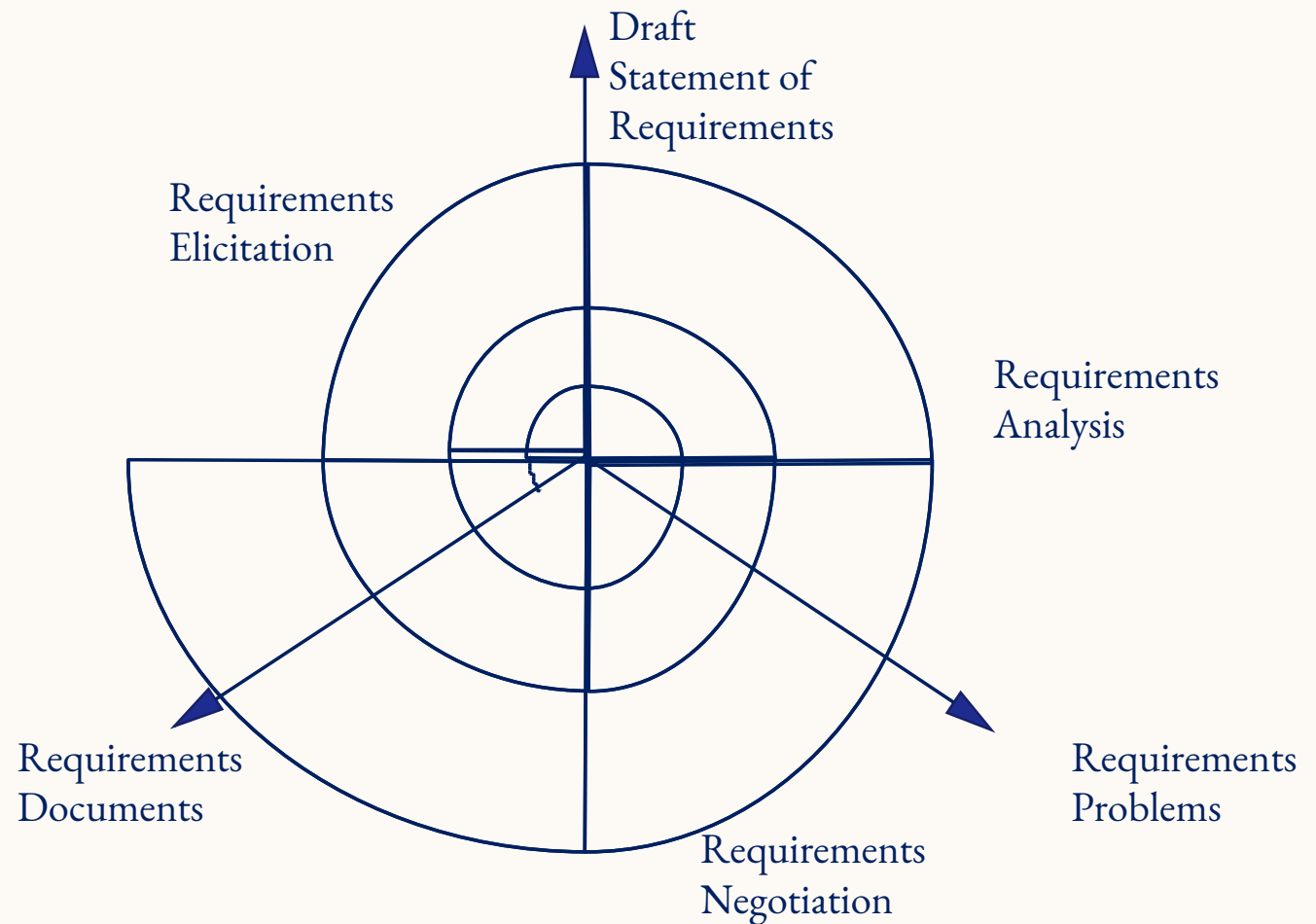
- ❖ The aim of requirements analysis is to discover problems with the system requirements, especially incompleteness and inconsistencies.
- ❖ Some analysis is inter-leaved with requirements elicitation as problems are sometimes obvious as soon as a requirement is expressed

Requirements Analysis - 4

- ❖ Detailed analysis usually takes place after the initial draft of the requirements document is produced
- ❖ Analysis is concerned with incomplete set of requirements, which has not been discussed by stakeholders

Iterative Aspects of Elicitation, Analysis, and Negotiation

7



Requirements Analysis activities - 1

8

❖ Requirements Analysis activities:

- ☐ Necessity checking
- ☐ Consistency and Completeness checking
- ☐ Feasibility checking

Requirements Analysis activities - 2

9

❖ Necessity Checking:

- The needs for the requirements are analyzed.
- In some cases requirements may be proposed which don't contribute to:
 - The business goals of the organization.
 - The specific problems to be addressed by the system.

Requirements Analysis activities - 3

10

❖ Consistency and Completeness Checking:

- The requirements should be cross-checked for consistency and completeness.
 - Consistency means no requirements should be contradictory.
 - Completeness means that no services or constraints which are needed have been missed out.

Requirements Analysis activities - 4

11

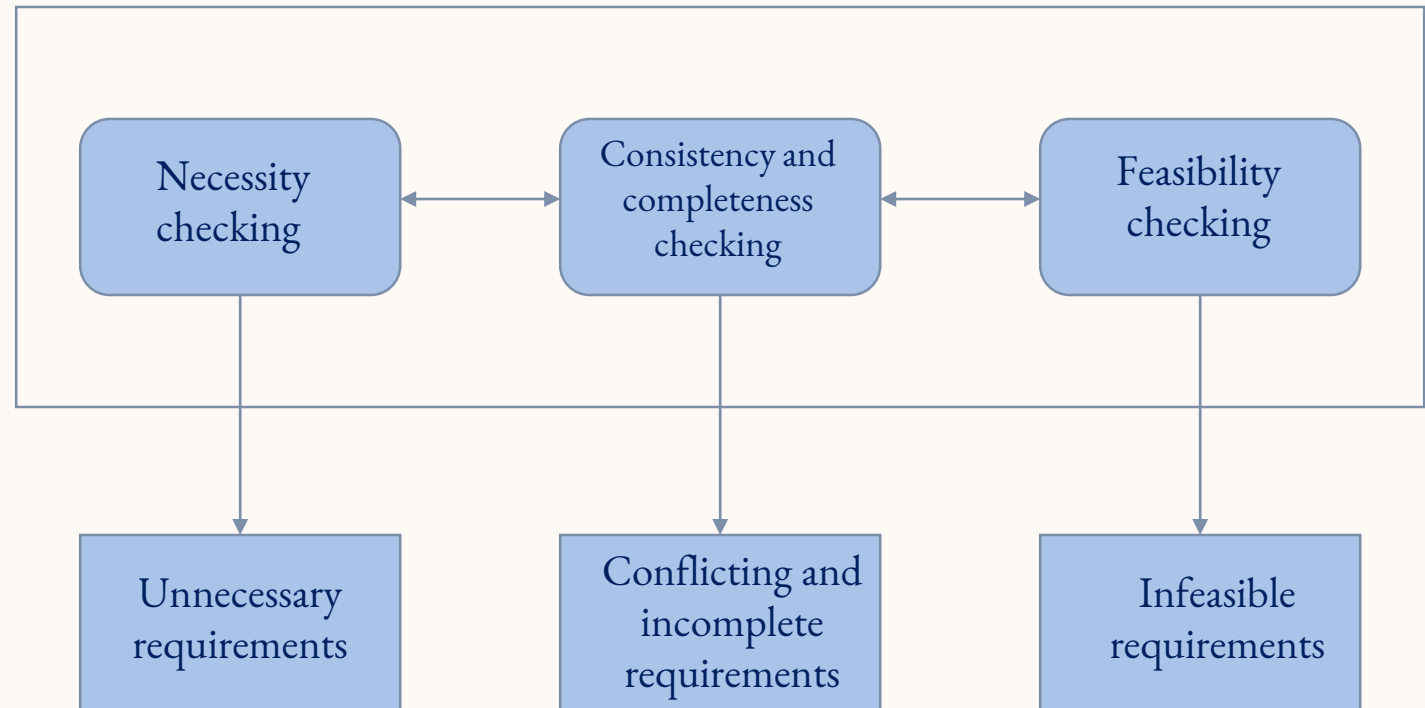
❖ Feasibility Checking:

- The requirements are checked to ensure that they are feasible in context of .
 - Budget
 - Schedule

Requirements Analysis Process

12

Requirements Analysis



Analysis Techniques

13

❖ Analysis checklists

- ❑ A checklist is a list of questions which analysts may use to assess each requirement

❖ Interaction matrices

- ❑ Interaction matrices are used to discover interactions between requirements and to highlight conflicts and overlaps

Analysis checklists

14

- ❖ Each requirement may be assessed against the checklist
- ❖ When potential problems are discovered, these should be noted carefully
- ❖ They can be implemented as a spreadsheet, where the rows are labeled with the requirements identifiers and columns are the checklist items

Analysis checklists

15

- ❖ They are useful as they provide a reminder of what to look for and reduce the chances that you will forget some requirements checks
- ❖ They must evolve with the experience of the requirements analysis process
- ❖ The questions should be general, rather than restrictive, which can be irrelevant for most systems

Analysis checklists

16

- ❖ Checklists should not include more than ten items, because people forget items on long checklists reading through a document

Checklists Items

17

- ❖ Premature design
- ❖ Combined requirements
- ❖ Unnecessary requirements
- ❖ Use of non-standard hardware
- ❖ Conformance with business goals
- ❖ Requirements ambiguity
- ❖ Requirements realism
- ❖ Requirements testability

Checklists Items

18

❖ **Premature design**

- ☐ Does the requirement include premature design or implementation information?

❖ **Combined requirements**

- ☐ Does the description of a requirement describe a single requirement or could it be broken down into several different requirements?

Checklists Items

19

❖ Unnecessary requirements:

- ☐ Is the requirement 'gold plating'? That is, is the requirement a cosmetic addition to the system which is not really necessary

❖ Use of non-standard hardware:

- ☐ Does the requirement mean that non-standard hardware or software must be used? To make this decision, you need to know the computer platform requirements

Checklists Items

20

❖ Conformance with business goals:

- ☐ Is the requirement consistent with the business goals defined in the introduction to the requirements document?

❖ Requirements ambiguity:

- ☐ Is the requirement ambiguous i.e., could it be read in different ways by different people? What are the possible interpretations of the requirement?

Checklists Items

21

❖ Requirements realism:

- ☐ Is the requirement realistic given the technology which will be used to implement the system?

❖ Requirements testability:

- ☐ Is the requirement testable, that is, is it stated in such a way that test engineers can derive a test which can show if the system meets that requirement?

Requirements Interactions 1²²

- ❖ A very important objective of requirements analysis is to discover the interactions between requirements and to highlight requirements conflicts and overlaps
- ❖ A requirements interaction matrix shows how requirements interact with each other, which can be constructed using a spreadsheet

Requirements Interactions ²³2

- ❖ Each requirement is compared with other requirements, and the matrix is filled as follows:
 - For requirements which conflict, fill in a 1
 - For requirements which overlap, fill in a 1000
 - For requirements which are independent, fill in a 0

An Interaction Matrix

24

Requirement	R1	R2	R3	R4	R5	R6
R1	0	0	1000	0	1	1
R2	0	0	0	0	0	0
R3	1000	0	0	1000	0	1000
R4	0	0	1000	0	1	1
R5	1	0	0	1	0	0
R6	1	0	1000	1	0	0

Comments on Interaction

25

Matrices - 1

- ❖ If you can't decide whether requirements conflict, you should assume that a conflict exists. If an error is made it is usually fairly cheap to fix; it can be much more expensive to resolve undetected conflicts

Comments on Interaction

26

Matrices - 2

- ❖ In the example, we are considering, we can see that R1 overlaps with R3 and conflicts with R5 and R6 R2 is an independent requirement R3 overlaps with R1, R4, and R6

Comments on Interaction

27

Matrices - 3

- ❖ The advantage of using numeric values for conflicts and overlaps is that you can sum each row and column to find the number of conflicts and the number of overlaps
- ❖ Requirements which have high values for one or both of these figures should be carefully

Comments on Interaction

28

Matrices - 4

- ❖ A large number of conflicts or overlaps means that any changes to that requirement will probably have a major impact of the rest of the requirements
- ❖ Interaction matrices work only when there is relatively small number of requirements, as each requirement is compared with every other requirement

Comments on Interaction

29

Matrices - 5

- ❖ The upper limit should be about 200 requirements
- ❖ These overlaps and conflicts have to be discussed and resolved during requirements negotiation, which we'll discuss next



THANK YOU

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