Requirement Analysis & Specification (1)

Fall, 2021

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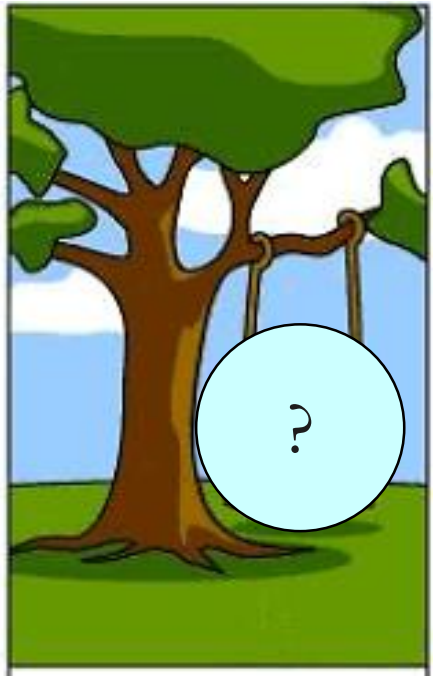
Why So difficult to Develop Software?

Invisible Creation - Diverse Stakeholders – Limited Resources



Customer's Explanation

Project Lead's Understanding

Desinger

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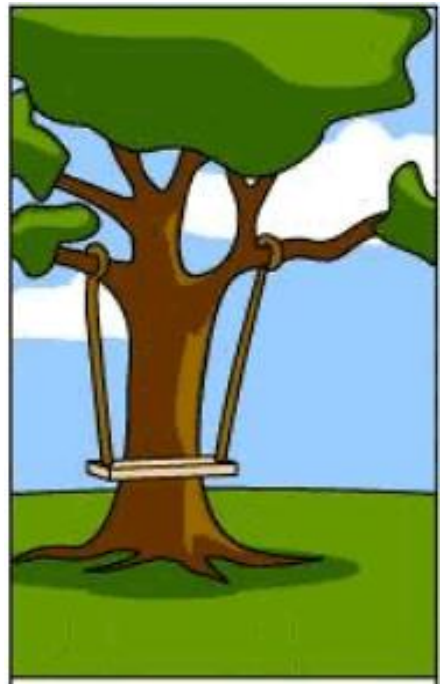

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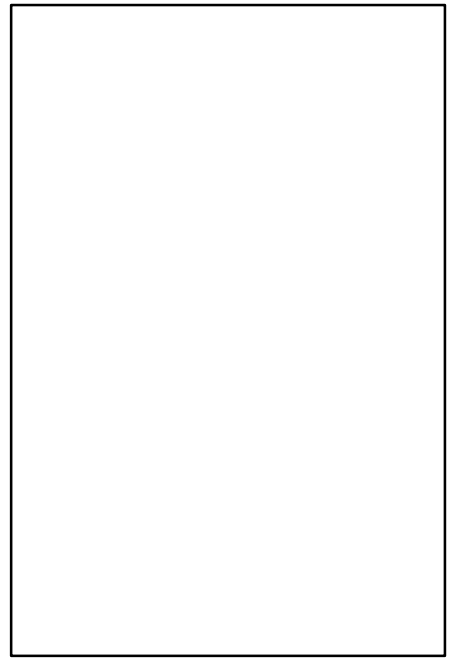

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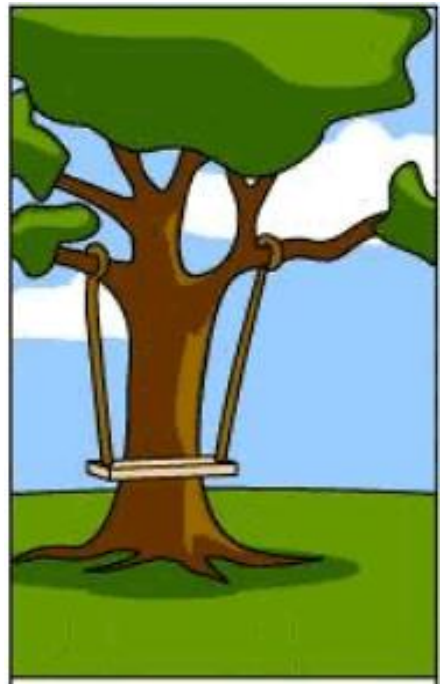

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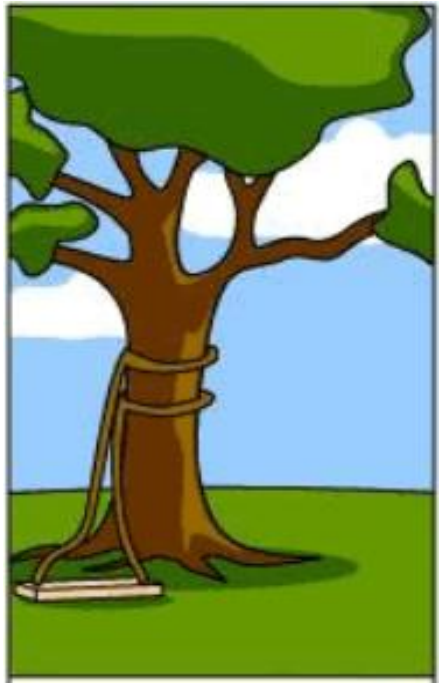
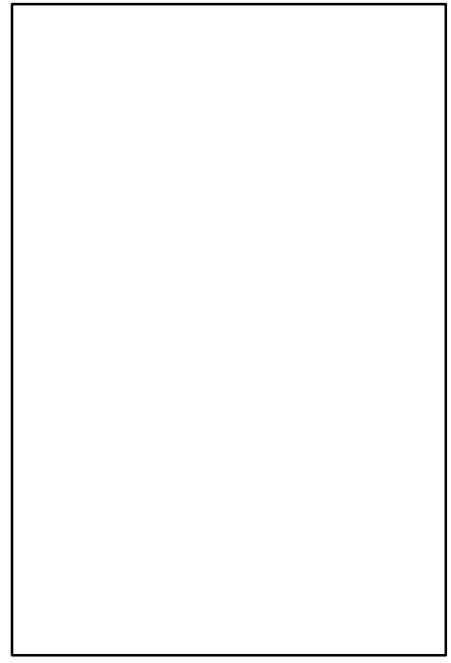


Programmer

Marketing



Project Info. & Doc.

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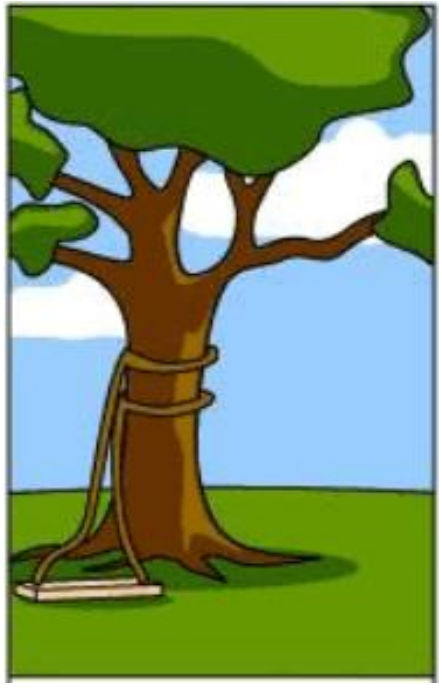

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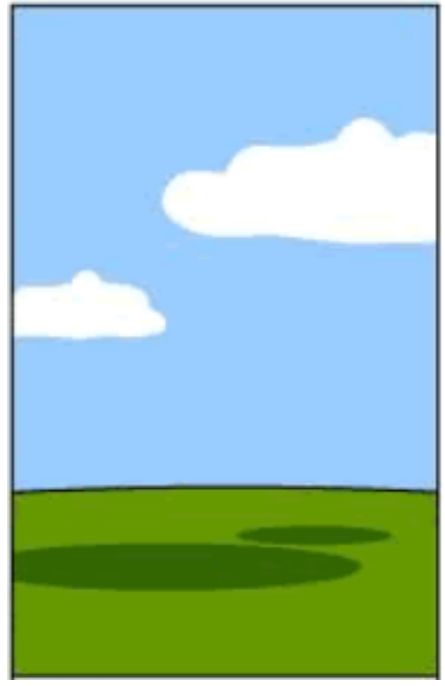

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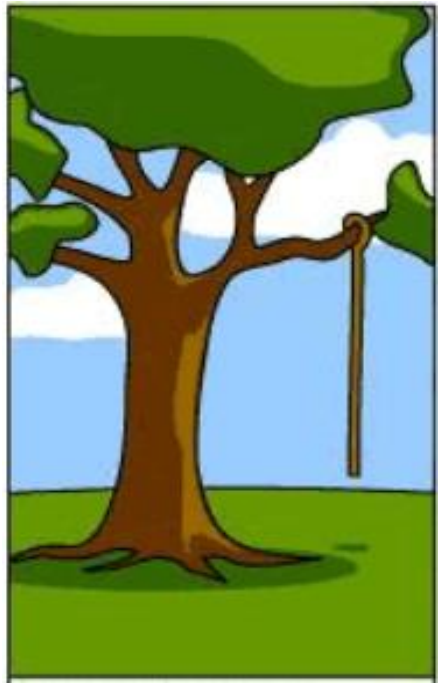
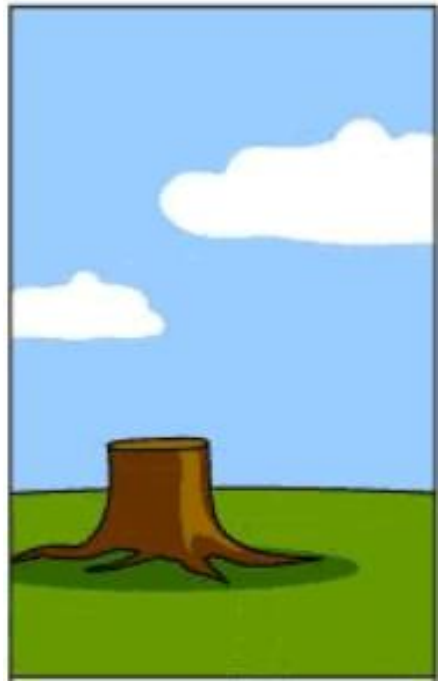
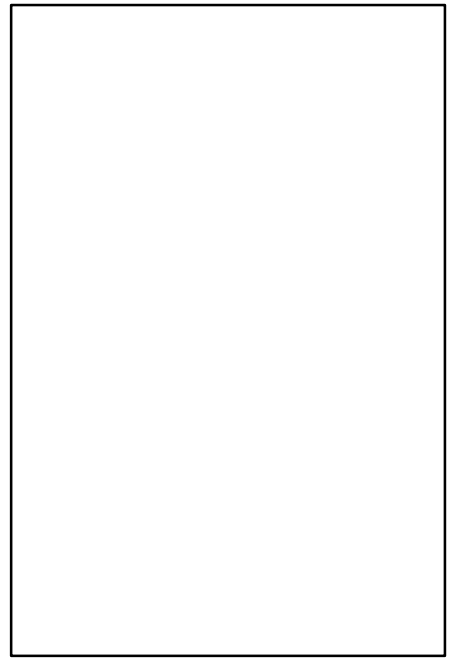


Provided Support



Customer's Needs



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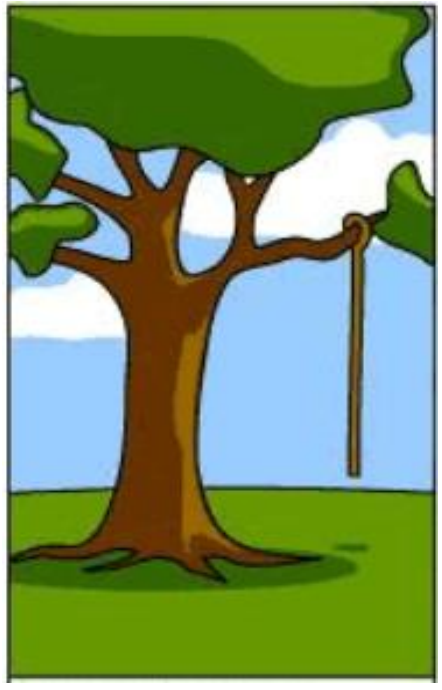

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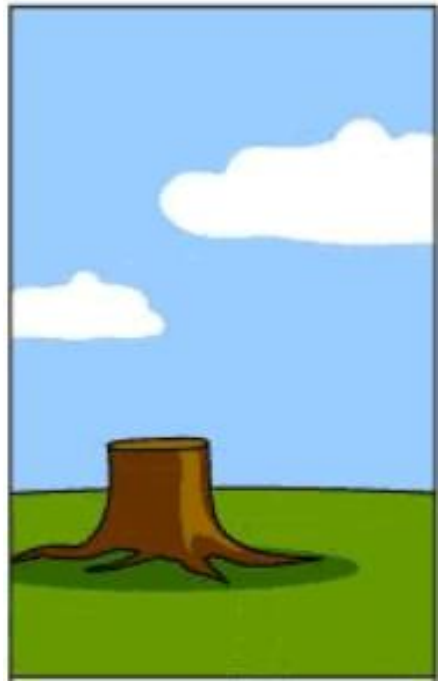


Customer's Needs

Topics Covered

Feasibility Study

Information Gathering

- Requirements gathering

Requirements Specification

Specification Qualities

Feasibility Study

Evaluate

1_____,

2_____, and

3_____ of the proposed application.

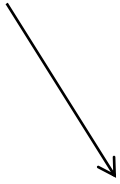
Evaluation in Feasibility Study

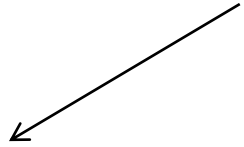
Benefits

- New or improved capabilities
- Efficiency of operations
- Accuracy
- Timeliness of decisions
- Cost savings

Cost

- Hardware: remember backup
- Software
  - for development, operation
  - documentation, training, etc.
- Operational costs: maintenance
- Client's personnel
  - During development, for operations
- Changeover to new system





Considerations of Alternatives

- benefit/cost analysis on each
- Tradeoffs explicit

Kinds of Feasibility

Economic

- Does the benefit/cost analysis justify the project?

Technical

- Are there limits of theory or technology applicable to the project?

Schedule

- Can the project be completed on time with available staff and resources?

Operational

- Is the client staff technically able to operate the project? e.g., data entry, computer phobia.

Motivational

- Is the client staff motivated to perform the necessary steps correctly and promptly?

Legal & Ethical

- Do any infringements or liability arise from this project?

Information (Requirements) Gathering

Sources

- Interviewing
  - Executives
  - Managers & administrative staff
  - Operational staff (clerical, shop floor, etc)
- Documents
  - Business plans
  - Policies and procedures
  - Forms, reports, etc
  - Existing computer programs and databases
- Joint Application Development
- Questionnaires
- Observation

Before interview

Interview process

- Before interview
- During interview
- After interview

Plan and schedule interview

- Define topic.
- Organize your questions.
- Designate roles to team members.
- Inform the client.
- Indicate the topic.

Prepare for interview

- Learn about the client's business area.
- Learn about the client's organization.
- Memorize client's names.

During interview

Open interview

- Introduce team.
- Summarize previous meetings findings (if applicable).
- Introduce topics.

Body of interview

- Make clients feel they are participants in the solution.
- Take notes, but listen.
- Keep it short.
- Keep it focused.

Close interview

- Summarize.
- Thanks clients for their time.

After interview

Immediately organize your notes.

Summarize findings.

Identify points still unclear. (starting point for next)

Evaluate your performance.

Selecting the Appropriate Techniques

	Interviews	JAD	Question.	Document Analysis	Observation	SNS?
Type of Information	As-Is Improve. To-Be	As-Is Improve. To-Be	As-Is Improve.	As-Is	As-Is	
Depth of Information	High	High	Medium	Low	Low	
Breadth of Information	Low	Medium	High	High	Low	
Integration of Info.	Low	High	Low	Low	Low	
User Involvement	Medium	High	Low	Low	Low	
Cost	Medium	Low-Medium	Low	Low	Low-Medium	

Requirements Analysis and Specification

Identify the requirements from various stakeholders.

Identify the specific qualities required for the application.

Must state what to do, not how to do.

Used by both customer and designers

Analysis can be divided into

1) problem recognition
2) evaluation & syntheses

} **Requirement Definition**

3) modeling
4) specification
5) review

} **Requirement Analysis**

Requirements Description

Requirement

- a statement of what the system must do or what characteristic it must have
- can be changed over time as moves from analysis to design
- can be either functional requirements or nonfunctional requirements
- Incorrect specification is major reason for project's failure.
- Late discovery of problems is costly.

Functional requirements

- directly related to a process the system has to perform

Nonfunctional requirements

- behavioral properties that the system must have, such as performance

Interface requirements

Requirements Description

Functional requirements

- Functionality : what the system should do ?
- Data : input and/or output data, their formats
- Users : persons who use or manage the system

Nonfunctional requirements

- Operational requirements
- Resource requirements
- Performance requirements
- Security requirements
- Culture and political requirements
- Quality requirements

Interface requirements

Requirements Analysis Specification

Specification Principles

- Separate functionality from implementation.
- Encompass the system of which the software is a component.
- Encompass the environment in which the system operates.
- Use cognitive models
  - To reflect the real-world
  - To communicate with user.
- Provide operational specification using scenarios.
- Provide ability to change and grow.
- Have localized, loosely coupled structure.

The Seven Deadly Sins in Specification

Noise

- Irrelevant information
- Confusing presentation

Silence

- Omissions

Overspecification

- Premature implementation decisions

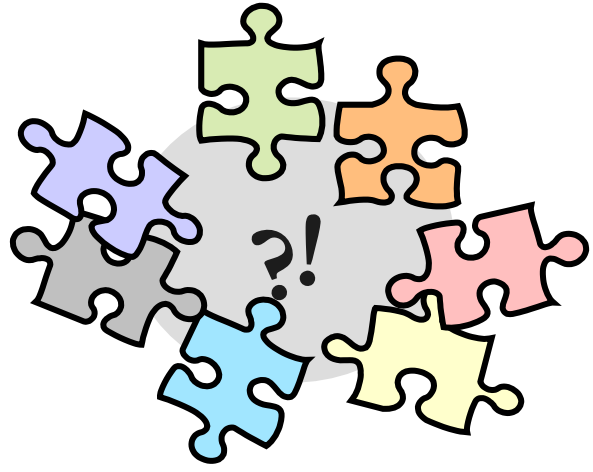
Contradiction

- Inconsistency

Ambiguity

Forward reference

Wishful thinking



Specification Qualities (1)

Correct

- A Requirements Specification (RS) is correct if and only if every requirements stated therein represents something required of the system to be built.

Unambiguous

- A RS is unambiguous if and only if every requirements stated therein has only one interpretation

Complete : A RS is complete if it possesses the following 4 qualities

- Everything that the system is supposed to do is included in the RS.
- Definitions of the responses of the system to all realizable classes of input data in all realizable classes of situations is included
- All pages are numbered; all figures and tables are numbered, named, and referenced; all terms and units of measure are provided; and all referenced material and sections are present
- No sections are marked "To Be Determined (TBD)."

Specification Qualities (2)

Consistent

- A RS is consistent, if and only if, (1) no requirement stated therein is in conflict with other preceding documents, such as a statement of work or Concept of Operations, (2) no subset of requirements stated therein conflict, and (3) wording is based on glossary - same word is used for same meaning

Understandable by customer

- A RS can be understandable by customer if it is written in customer understandable language such as English

Modifiable

- A RS is modifiable if its structure and style are such that any necessary changes to the requirements can be made easily, completely, and consistently

Traceable

- A RS is traceable if it is written in a manner that facilitates the referencing of each individual requirement

Examples

Example: A text editor

- "The whole text should be kept in lines of equal length, with the length specified by the user. Unless the user is given an explicit hyper-nation command, a carriage return should occur only at the end of a word."
- Q: What is incomplete ?

Examples

Example: Space shuttle monitoring system

- "The message must be triplicated. The three copies must be forwarded through three different physical channels. The receiver accepts the message on the basis of a two-out-of-three voting policy."
- Q: What is not clear?

Contents of Deliverables (RDD)

Introduction

- Document description
- Related documents

Brief system description

- System overview

Requirements definition

- Functional Requirements
- Nonfunctional Requirements
- Interface requirements (if needed)

Other constraints

Appendix

Summary and Discussion

Feasibility study evaluates

- Cost, Benefits, Alternatives in economic, Technical, legal, ...

Requirements Description

- functional / nonfunctional / interface requirements

Quality of requirements specification

- Correct, Unambiguous, Complete, Consistent, Traceable, ...

Why the consistent and complete requirements specification is important ?