Introduction to Requirements Engineering

Dr. Rodrigo Spínola

Agenda

- Requirements
- Importance of requirements
- Challenges of working with requirements
- Requirements engineering
- Classic issues in requirements engineering

> Lecture 9 - Introduction to Requirements Engineering

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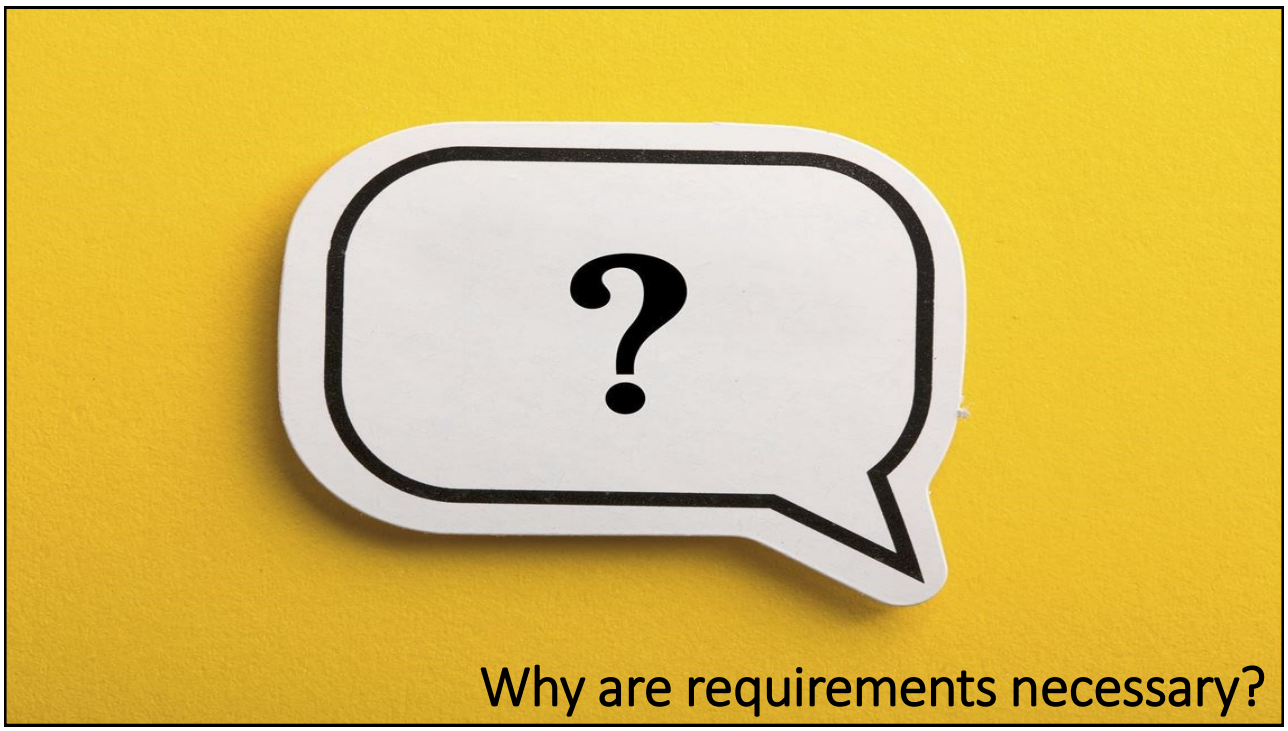
A requirement is

- A condition or capability needed by a user to solve a problem or achieve an objective (IEEE Software Engineering Standards, 1987).

Functional aspects of software

and

Non-functional aspects of software



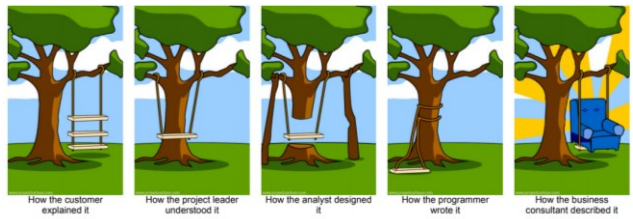
Importance of Requirements

- A requirements specification is necessary because:
  - It establishes a **basis of agreement** between the customer and the software organization on what the software will do
  - Provides a **reference** for final **product validation**
  - A high-quality requirements specification is a **prerequisite** **for high quality software**
  - **Reduces** development **cost**.

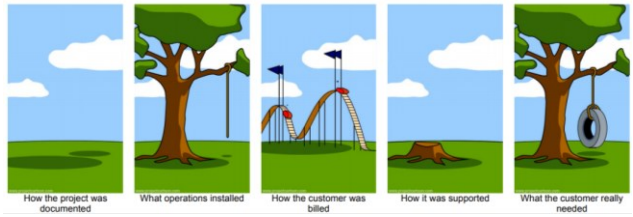
Not a guarantee

What is the big deal represented in this illustration?

There are several issues represented in this illustration!

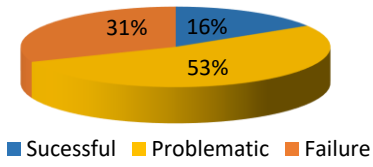


Appropriate Requirements Specification is one of them!



Importance of Requirements

- Study done by the Standish Group
  - 350 companies and 8,000 software projects
  - The Standish Group described 3 categories of projects:
    - Successful (16.2%): Covers all functionality on time and within the estimated cost
    - Problematic (52.7%): Does not cover all required functionality, increased cost and is late
    - Failure (31.1%): Canceled during development

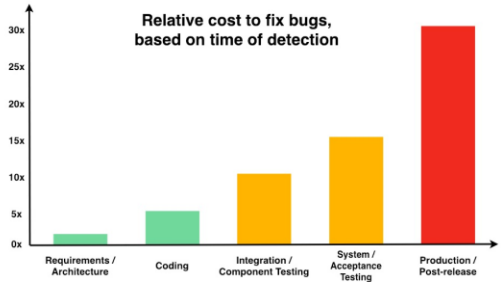


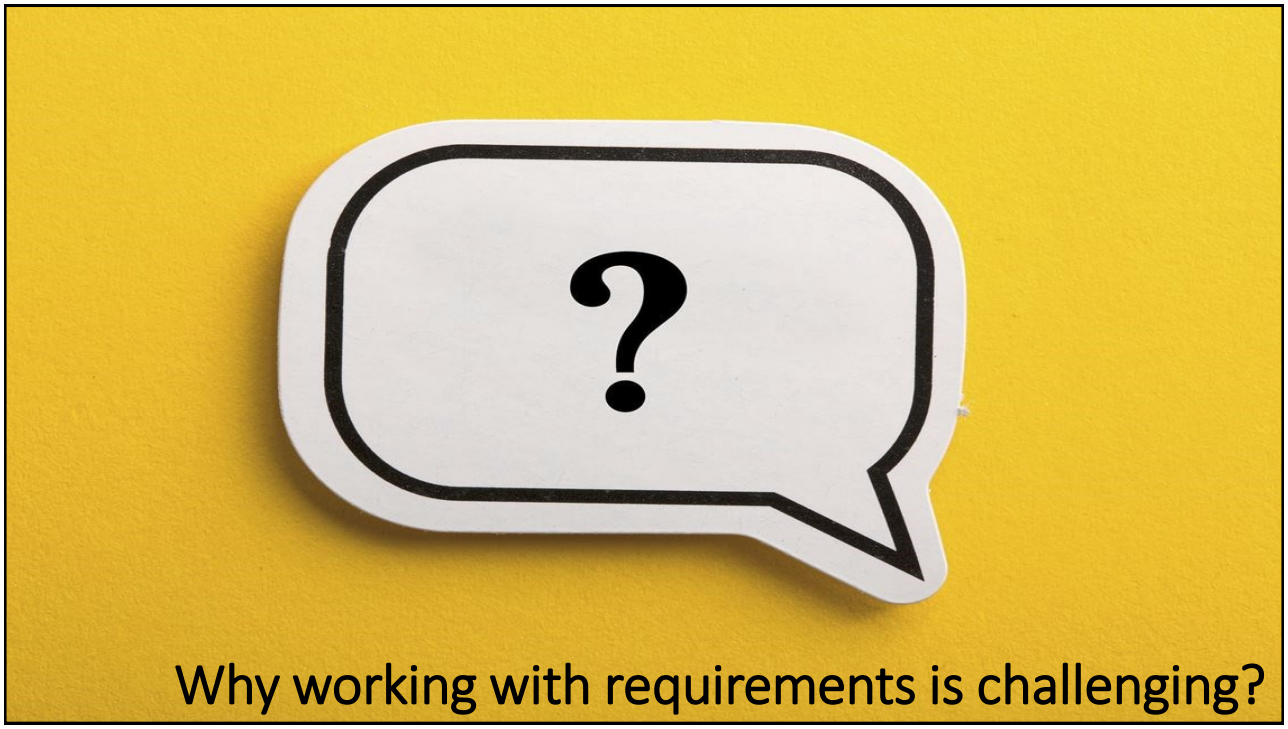
Importance of Requirements

Critical Project Factors	% Resp.
1. Incomplete requirements	**13.1%**
2. Lack of user involvement	**12.4%**
3. Lack of resources	10.6%
4. Unrealistic expectations	9.9%
5. Lack of organizational support	9.3%
6. Change of requirements and specifications	**8.7%**
7. Lack of planning	8.1%
8. System no longer needed	7.5%

Importance of Requirements

- According to Boehm and Papaccio (Pfleeger, 2004), the relative cost of fixing a requirements problem at each stage of system development is:
  - $1 in the requirements analysis phase
  - $5 in the system design phase
  - $10 in the encoding phase
  - $20 in the unit test phase
  - $200 after system delivery





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Why working with requirements is challenging?

- Understanding the domain
- Effective communication with users of the system
- Continuous evolution of system requirements
- Problems have ill-defined boundaries
- Requirements are in the organizational context (prone to conflict)
- It requires interdisciplinary knowledge and specific skills on the part of the requirements analyst.

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Requirements Engineering

- For Sommerville (2003), requirements engineering can be described as the process of discovering, analyzing, documenting and verifying system functions and constraints.
- According to Carvalho and Chiossi (2001), requirements engineering is "Understanding what you want to build before you start doing it"

Developing requirements and **Managing Requirements**

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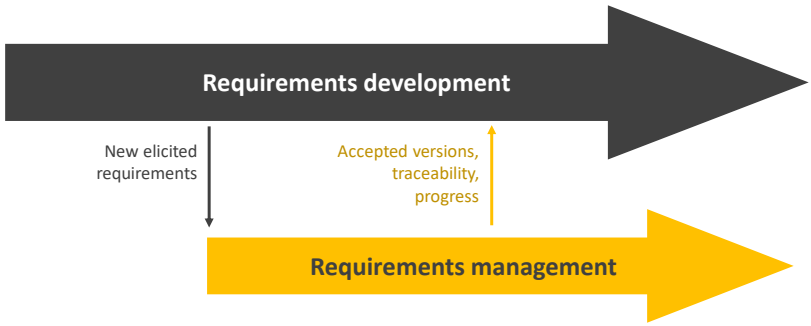
Requirements Engineering

Developing Requirements	Managing Requirements
Requirements elicitation	Change control
Requirements specification	Configuration management
Requirements verification	Traceability
Requirements validation	Quality management

Requirements Engineering

- Requirements Development creates and interprets requirements
- Requirements Management organizes and maintains their record



Classic Issues in Requirements Engineering

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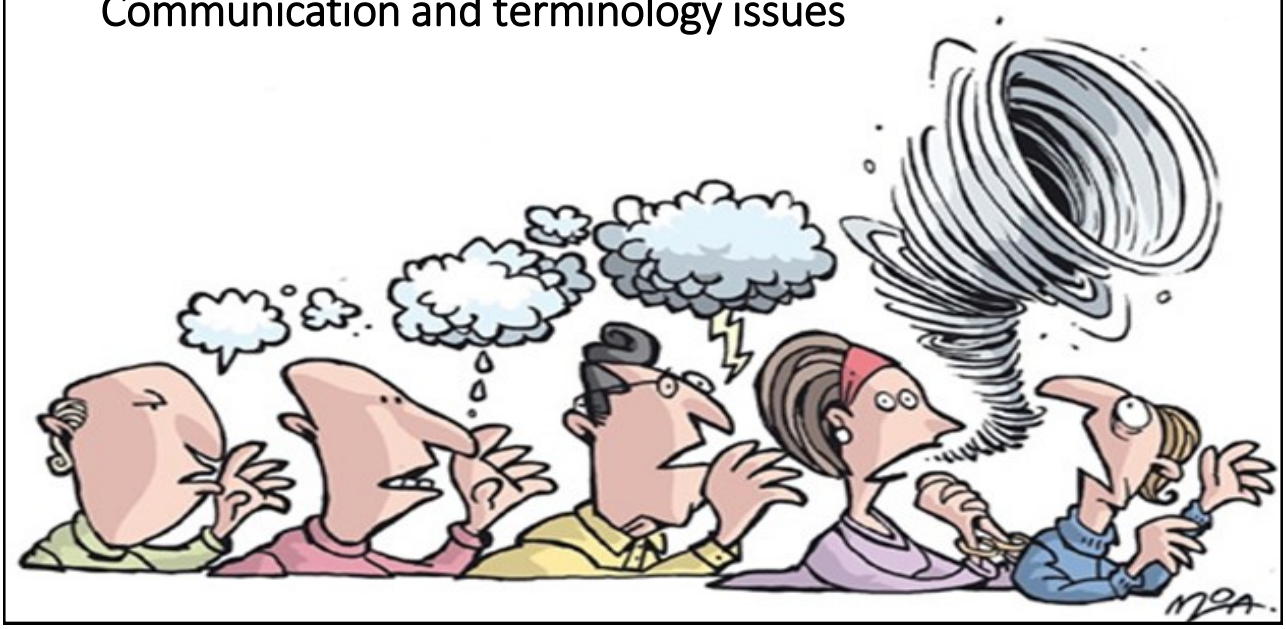
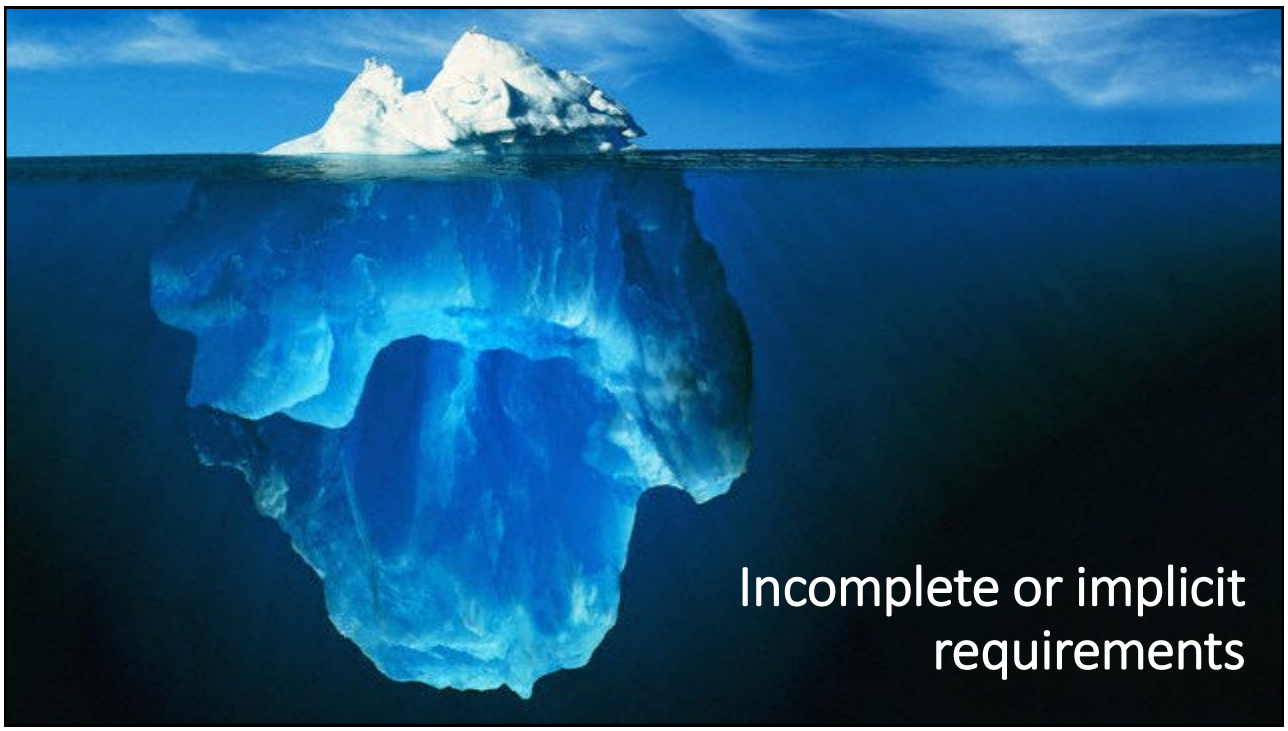
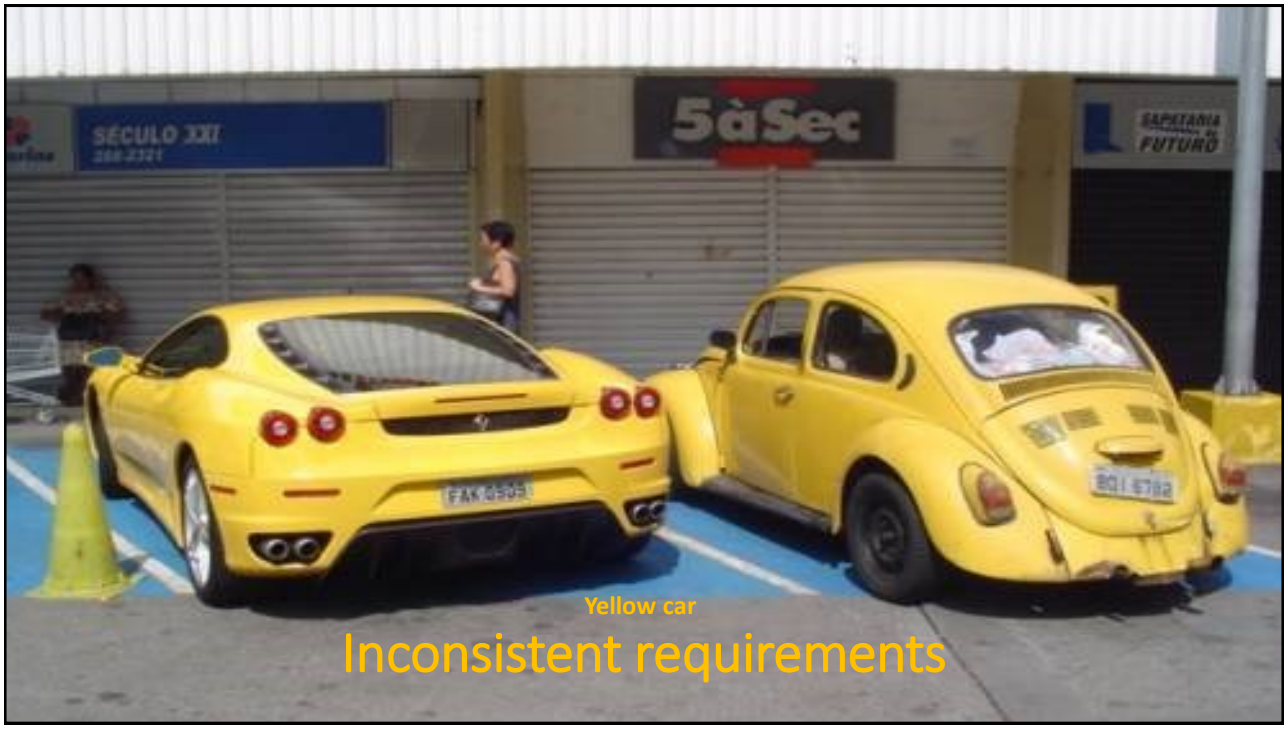
Communication and terminology issues







Yellow car

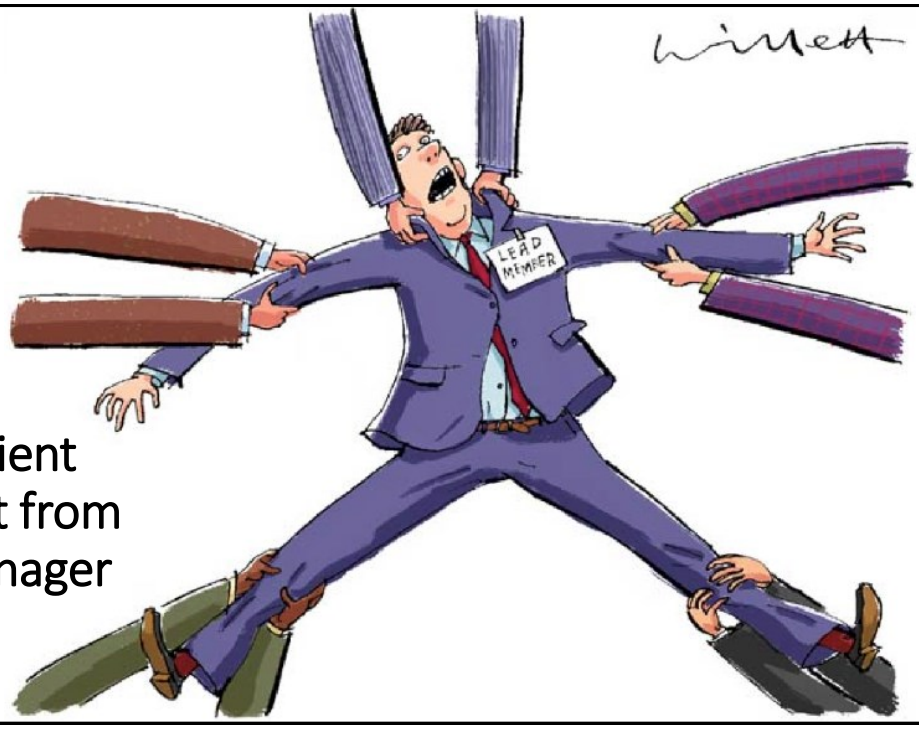
Inconsistent requirements

Ambiguous requirements that allow for multiple interpretations

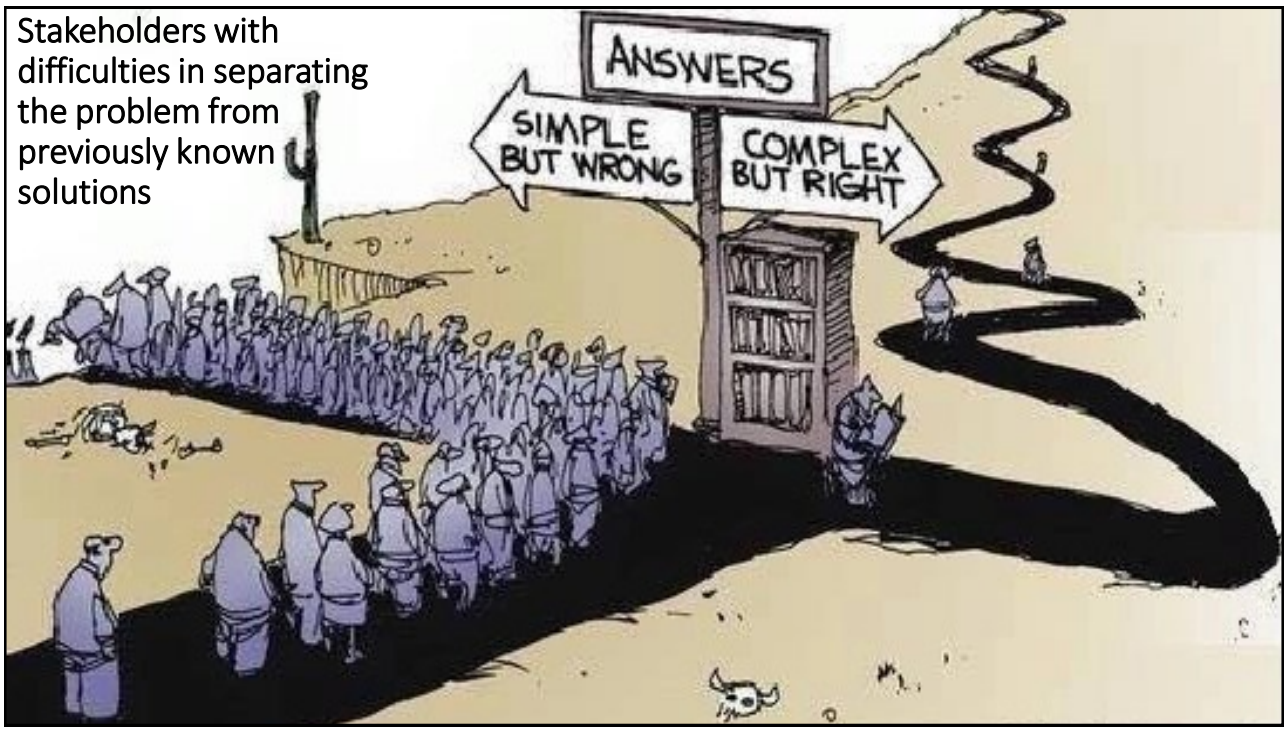
Responsibilities not clearly defined

Insufficient customer support

Insufficient support from the manager



Stakeholders with difficulties in separating the problem from previously known solutions



Moving targets (changes in business objectives)

Summary

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- Importance of requirements
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