

# CS 4530: Fundamentals of Software Engineering

## Module 2.1: Requirements Analysis

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# Learning Goals for this Lesson

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- At the end of this lesson, you should be prepared to
  - Explain the overall purposes of requirements analysis
  - Recall the three major dimensions of risk in requirements analysis
  - Explain the connection between requirements analysis and user stories

# The big picture

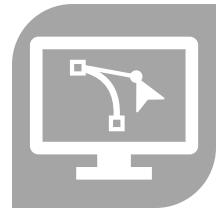
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PEOPLE



PROCESSES

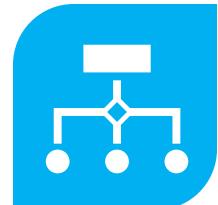


PROGRAMS

PLANNING



ORGANIZING

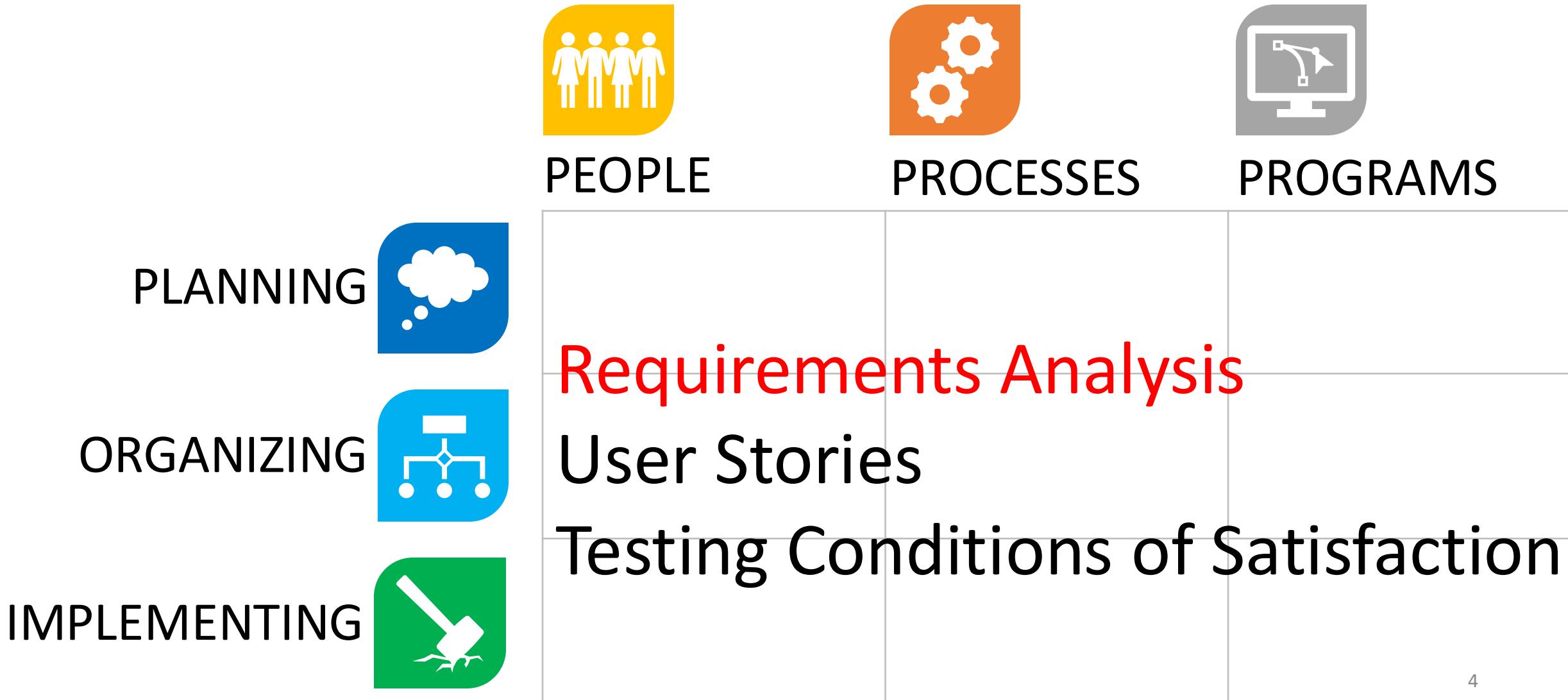


IMPLEMENTING



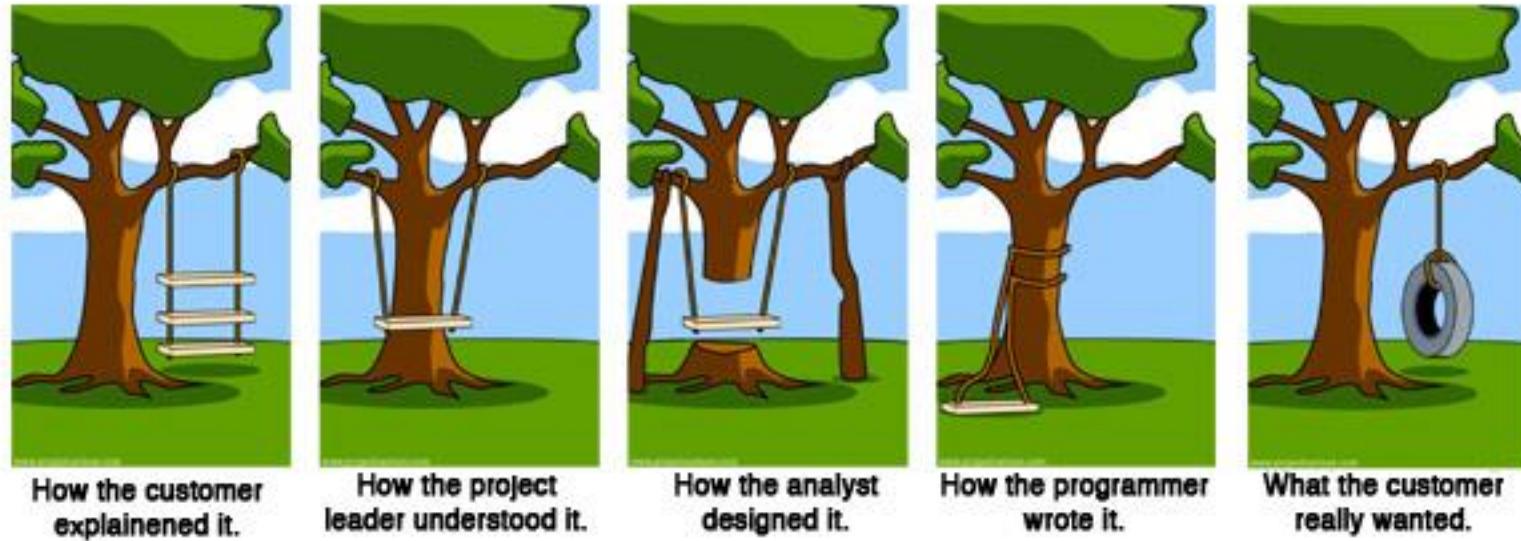
user stories  
and  
conditions of satisfaction

# Part 1: Requirements analysis



# Overall question: How to make sure we are building the right thing

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# Why is requirements analysis hard?



## Problems of understanding

Do users know what they want?  
Do users know what we don't know?  
Do we know who are users even are?



How the customer explained it.



## Problems of scope

What are we building?  
What non-functional quality attributes are included?



How the project leader understood it.



## Problems of volatility

Changing requirements over time



What the customer really wanted.

# How do we capture the requirements?

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- There are many methodologies for this.
- Often described as  $x$ -Driven Design (for some  $x$ )
- They differ in scope & details, but they have many features in common.

See also [edit]

- Behavior-driven development (BDD)
- Business process automation
- Business process management (BPM)
- Domain-driven design (DDD)
- Domain-specific modeling (DSM)
- Model-driven engineering (MDE)
- Service-oriented architecture (SOA)
- Service-oriented modeling Framework (SOMF)
- Workflow

# Common Elements

- Meet with stakeholders
- Develop a common language
- Collect desired system behaviors that offer value
- Document the desired behaviors
- Iterate and refine!!

User stories are the least common denominator of most approaches



# Requirements gathering frameworks inform the structure and priority of user stories

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- “Building the right thing” is necessarily a value judgment
  - (right for whom? who benefits?)
- You need some way to think about what capabilities you *shouldn't* implement!



Your scientists were so preoccupied with whether or not they could, they didn't stop to think if they should."

- Ian Malcom (in *Jurassic Park*, 1993)

# Requirements gathering frameworks inform the structure and priority of user stories

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- Value Sensitive Design (VSD) is one framework (of many!)
- VSD guides designers and engineers to pay special attention to **stakeholders** and **human values** when writing and prioritizing user stories
- Combines **empirical**, **value**, and **technical**

# VSD Example – Informed Consent

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## Empirical Investigation:

- ❖ Understand what we mean by informed consent, encompasses:
  - Disclosure. Do we know the pros and cons of taking an action?
  - Comprehension. Do we understand the disclosures?
  - Voluntariness. Is there coercion or manipulation?
  - Agreement. Is there a clear opportunity to consent or not?
  - Competence. Are we capable to give consent?

## Values Investigation:

- ❖ Who are the direct and indirect stakeholders?
- ❖ Do the stakeholders have conflicting values?
- ❖ How can we resolve them?

## Technical Investigation:

- ❖ What are the technical mechanisms for implementing informed consent.
  - One way => cookie consent management system.
  - Websites use them to obtain and manage user permission for using cookies.

Read the tutorial!

# Review: Requirements analysis

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- How do we make sure we are building the right thing?
- How do we learn from potential users before we start?
- Values: what even makes something the “right thing”
- Most forms of  $x$ -Driven Design could be a whole course on their own

# Review

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It's the end of the lesson, so you should be prepared to:

- Explain the overall purposes of requirements analysis
- Recall the three major dimensions of risk in requirements analysis
- Explain the connection between requirements analysis and user stories