

# SYSTEMS DESIGN

## Systems Analysis & Design

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UNIVERSIDAD DISTRITAL  
FRANCISCO JOSÉ DE CALDAS

# Outline

1 Requirements Engineering ①

2 Design & Process ②



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1 Requirements Engineering

2 Design & Process



# Stakeholders Vs. Shareholders

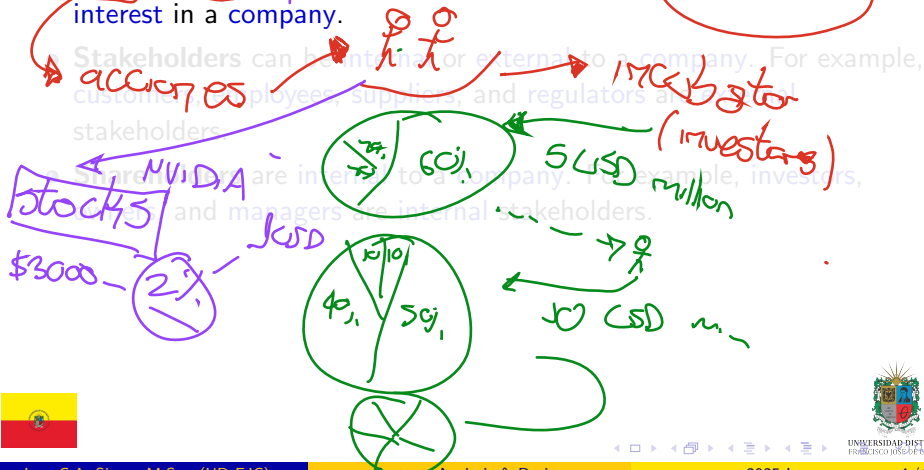
- **Stakeholders** are individuals or groups who have an interest in the success of a project.

- Developers + Architects + product owner  
account owner
  - Stakeholders can be internal or external to a company. For example, customers, employees, suppliers, and regulators are external stakeholders.
  - clients + final user  
Operation
  - Stakeholders are internal to a company. For example, investors, owners, and managers are internal stakeholders.
- CTO  
CEO  
COO



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- **Shareholders** are **internal** to a **company**. For example, **investors**, **owners**, and **managers** are **internal** stakeholders.



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stocks



# Requirements

- Requirements are statements that describe the features, functions, and constraints of a system.
- Requirements are used to communicate the needs of stakeholders to developers.
- Requirements are used to guide the design, development, and testing of a system.

User + tech





# Requirements

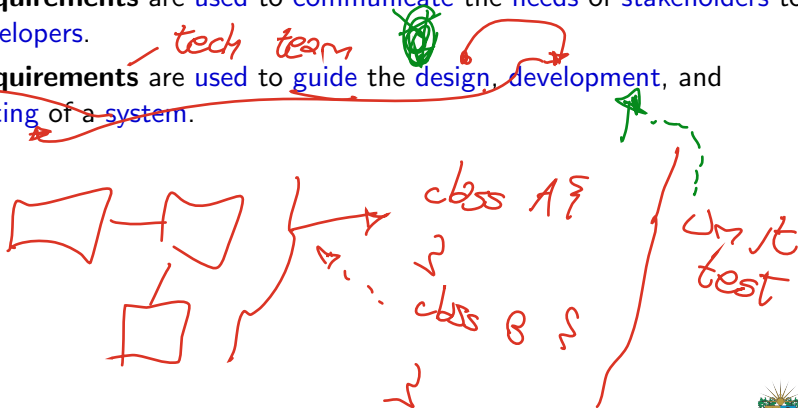
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Central



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# User Stories

→ Non technical "I" → "I"

- **User stories** are **short, simple** descriptions of a **feature** or **function** of a system.
- They are **written** from the **perspective** of the **user** and **describe** what the **user wants to achieve**.
- They are **used to capture** the **requirements** of a **system** in a **simple** and **understandable** way.

align expectation  
vocabulary

no expectation  
legal



# User Stories: Format Example



## User Story

Title:	Priority:	Estimate:
Describe	Low High	
<p><b>User Story:</b></p> <p>As a [description of user], I want [functionality] so that [benefit].</p> <p><b>Acceptance Criteria:</b></p> <p>Given [how things begin] When [action taken] Then [outcome of taking action]</p>		

Sprint Planning

optimist  
hours/team

As a student → role  
I want cancel my semester schedule  
so that I can adjust my time.

tests

test final user acceptance

impact

chart → mockups

trade off

ProductPlan



# What is Requirements Engineering?

- ~~Requirements engineering~~ is the process of eliciting, analyzing, specifying, validating, and managing the requirements of a system.
- It is a critical activity in the systems development lifecycle that ensures that the system meets the needs of its users.
- It is a collaborative process that involves stakeholders from different backgrounds and perspectives.



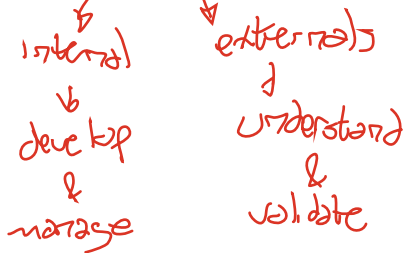
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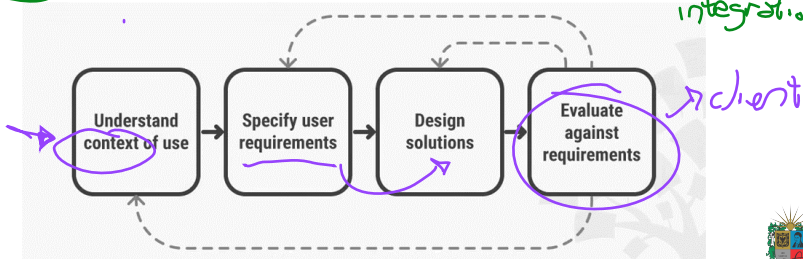
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informal

- **User-centered design (UCD)** is an iterative design process that focuses on understanding the needs, preferences, and behaviors of users.
- UCD is a collaborative process that involves users in the design and development of a system.
- UCD is used to create systems that are usable, efficient, and satisfying to users.

business  
integration





# Requirements Engineering Process

The **requirements engineering** process consists of the following activities:

- **Gathering** requirements.
- **Analyzing** requirements.
- **Validating** requirements.
- **Verifying** requirements.
- **Documenting** requirements.
- **Managing** requirements.
- **Communicating** requirements.

→ Interviews, brainstorming, gamification (role games)

→ user stories

[req. functional]  
[req. non-functional]

performance

technical tasks

life cycle project



# Gathering Requirements

- **Gathering** requirements is the **process** of **collecting** and **documenting** the **needs** of **stakeholders**.
- It involves **interviewing** stakeholders, **conducting** surveys, and **observing** users to understand their **requirements**.
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# Clients are not always right

Dear Santa,  
 How are you? I'm good.  
 Here is what I want for  
 Christmas.

[http://www.amazon.com/gp/product/B0032HFG0M/ref=ssq\\_hps\\_bw\\_g21-ir03?pf\\_rd\\_m=ATVPDKIKXODER&pf\\_rd\\_s=center-3&pf\\_rd\\_f=1XW442FH2K03Y7BMWQNM&pf\\_rd\\_t=101&pf\\_rd\\_p=1328901542&pf\\_rd\\_i=165379](http://www.amazon.com/gp/product/B0032HFG0M/ref=ssq_hps_bw_g21-ir03?pf_rd_m=ATVPDKIKXODER&pf_rd_s=center-3&pf_rd_f=1XW442FH2K03Y7BMWQNM&pf_rd_t=101&pf_rd_p=1328901542&pf_rd_i=165379)



# Analyzing Requirements

- **Analyzing** requirements is the **process** of **examining** and **understanding** the **requirements** of a **system**.
- It involves identifying dependencies, conflicts, and inconsistencies in the requirements.
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# Documenting Requirements

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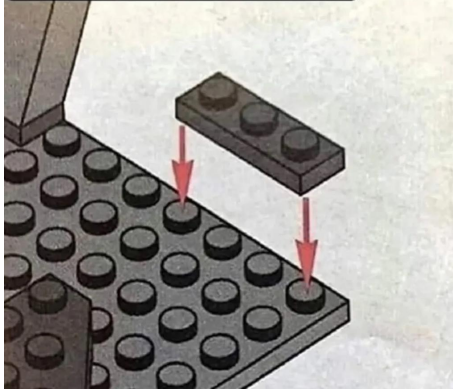
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# Everyone hates to write Documentation

**En la documentación  
está todo bien explicado**

**La documentación:**



# Validating Requirements

- **Validating** requirements is the **process** of **ensuring** that the **requirements** are **correct** and **complete**.
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# NOT Clear Understanding of Requirements



**Dad Jokes**  
@Dadsaysjokes

..

My dad told me his password is:  
MickeyMinnieGoofyDonaldPlutoHuey  
LouieDeweyDublin.

Because he was told his password  
had to contain 8 characters and at  
least one Capital.





# Verifying Requirements

- **Verifying** requirements is the **process** of **ensuring** that the **requirements** are **correctly implemented** in the **system**.
- It involves **testing** the **system** to **verify** that it **meets** the **requirements**.
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# Typical Mistakes when Testing

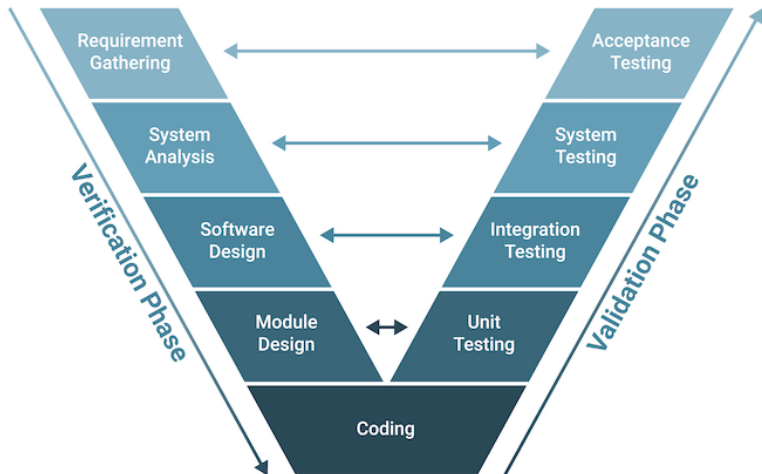
Disturbing Chinese calorie app...



	カシューナッツ (cashew)	1 粒	9 kcal
	ジャムパン (Pomeranian)	1 個	327 kcal



# V-Model inn SDLC



# Outline

1 Requirements Engineering

2 Design & Process



# Conceptual Design

- Once the initial set of **requirements** are defined, the next step is to create a **conceptual design** of the system.
- **Conceptual Design** is a **high-level design** that defines the structure and behavior of the system. It is achieved by the recognition of the appropriate **components**, **connections**, and **responsibilities**.
- The **conceptual design** is used to **communicate the vision** of the system to **stakeholders** and to **guide the development** of the system.



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# Process Definition

- A **Process** is a **series** of steps or actions taken to achieve a particular end.
- **Processes** are used to **organize** and **manage** work.



# Workflows

- A **Workflow** is a **series** of tasks that are performed in a specific order to achieve a goal.
- **Workflows** are used to **automate** and **optimize** business processes.
- **Workflows** can be **sequential**, **parallel**, **conditional**, or **repetitive**.

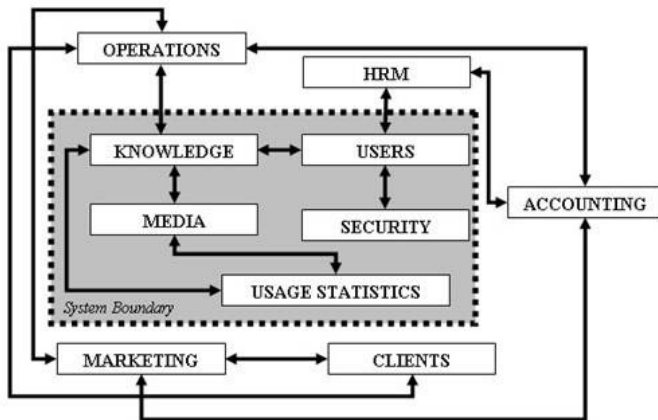


# Process Models

- A **Process Model** is a representation of a **process** that shows the sequence of steps and the **relationships** between them.
- **Process models** are used to **analyze**, **design**, and **improve** processes.
- Examples of **process models** include flowcharts, data flow diagrams, activity diagrams, business process model and notation (BPMN), petri nets, state diagrams, among others.



# System Schema Example: Company Structure



# Causal Loops

- A **Causal Loop** is a **diagram** that shows the **relationships** between different variables in a system.
- Causal loops are used to **analyze** and **understand** the **dynamics** of a system.
- Causal loops can be **positive** or **negative**.

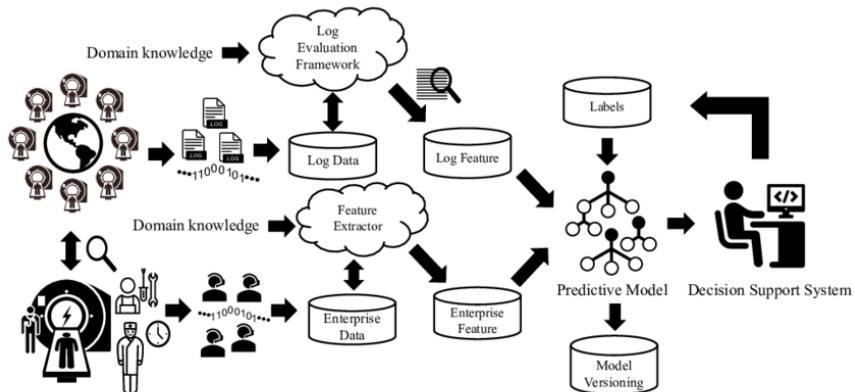


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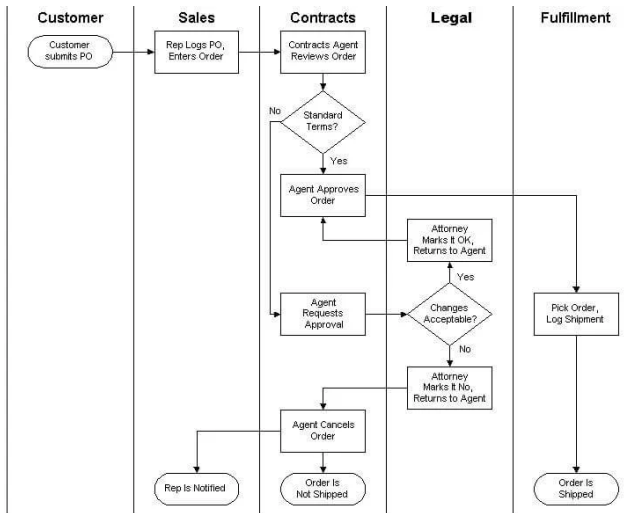
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# System Schema Example: Processing Pipeline



# Business Process Model and Notation (BPMN)





# Technical Design

- Once the **conceptual design** of the system is defined, the next step is to create a **technical design** of the system.
- **Technical Design** is a **detailed design** that defines the architecture, components, and interfaces of the system.
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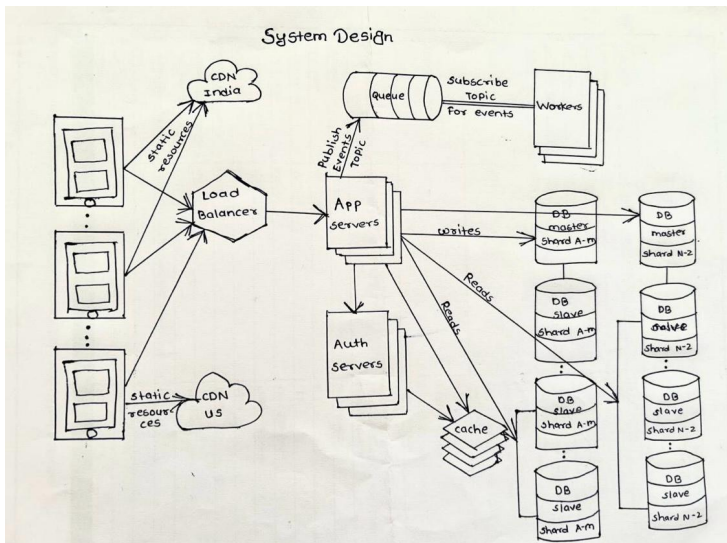


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# Systems Design applied to Software Architectures



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# Thanks!

## Questions?



Repo: <https://github.com/EngAndres/ud-public/tree/main/courses/systems-analysis>

