

SYSTEMS DESIGN

Systems Analysis & Design

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Outline

1 Requirements Engineering



2 Design & Process



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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.
 - Stakeholders can be internal or external to a company. For example, customers, employees, suppliers, and regulators are external stakeholders.
 - Shareholders are individuals or groups who have an ownership interest in a company.
 - Shareholders are internal to a company. For example, investors, owners, and sponsors are internal stakeholders.
- Handwritten annotations:
- Stakeholders are individuals or groups who have an interest in the success of a project.
 - dev. (development)
 - Stakeholders can be internal or external to a company.
 - internal
 - external
 - company
 - customers, employees, suppliers, and regulators
 - Shareholders are individuals or groups who have an ownership interest in a company.
 - dev.
 - sales
 - legal
 - Shareholders are internal to a company.
 - investors, owners, and sponsors
- Internal stakeholders:
[sponsors
[financial users]]



Stakeholders Vs . Shareholders

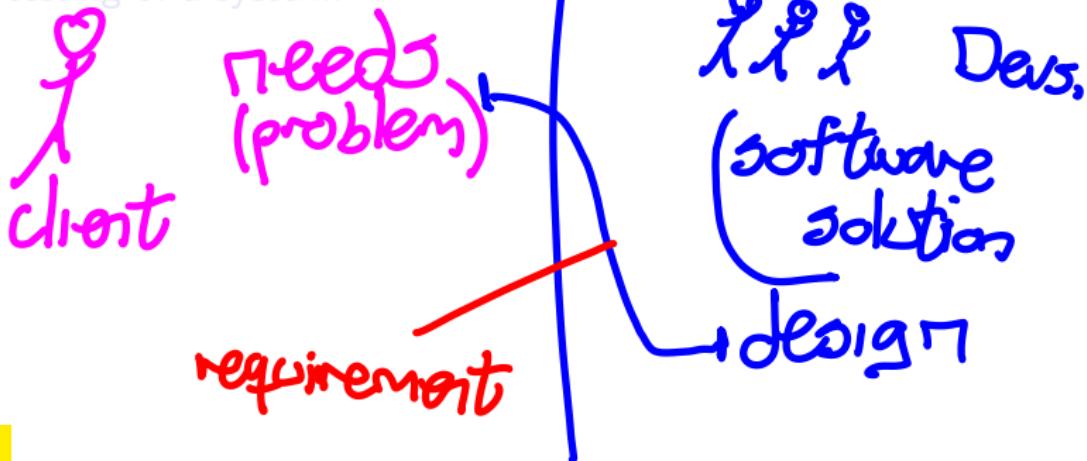
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- **Shareholders** are individuals or groups who have an ownership interest in a company. *Jav.*
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Requirements

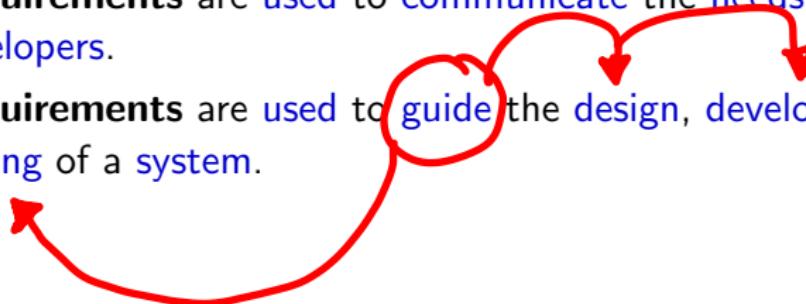
clear

- 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.



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T. D.P.
Test-driven Development

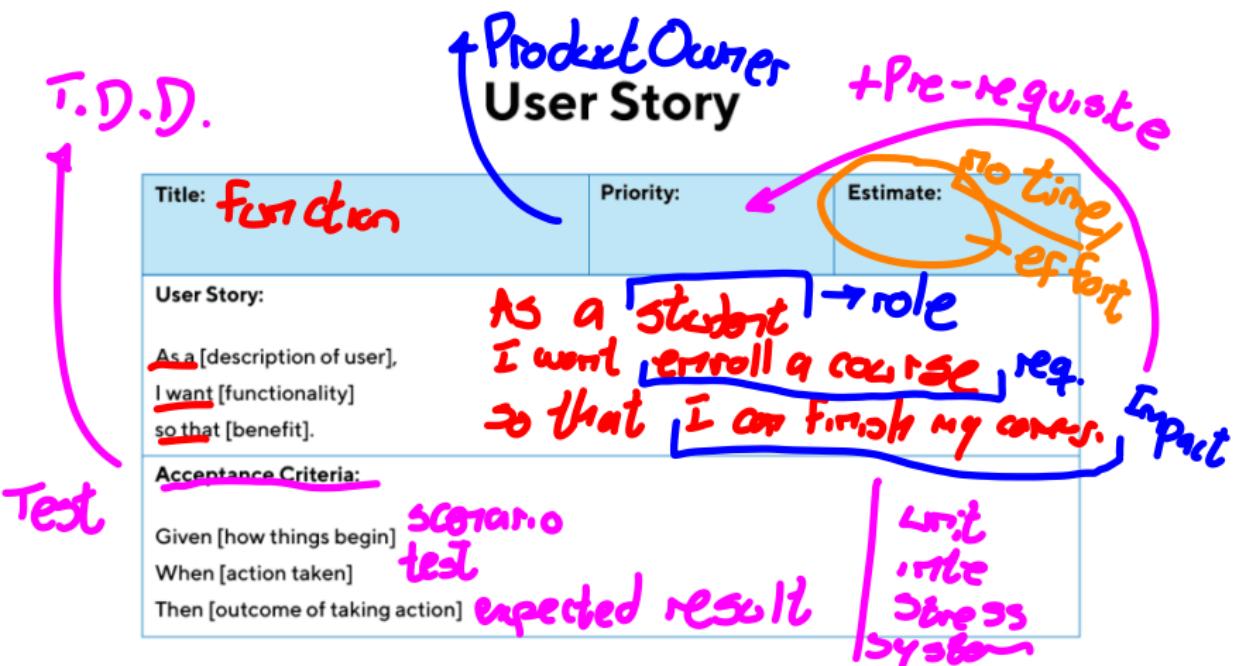


User Stories → *not-technical*

- 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.



User Stories: Format Example



ProductPlan



What is Requirements Engineering?

Step

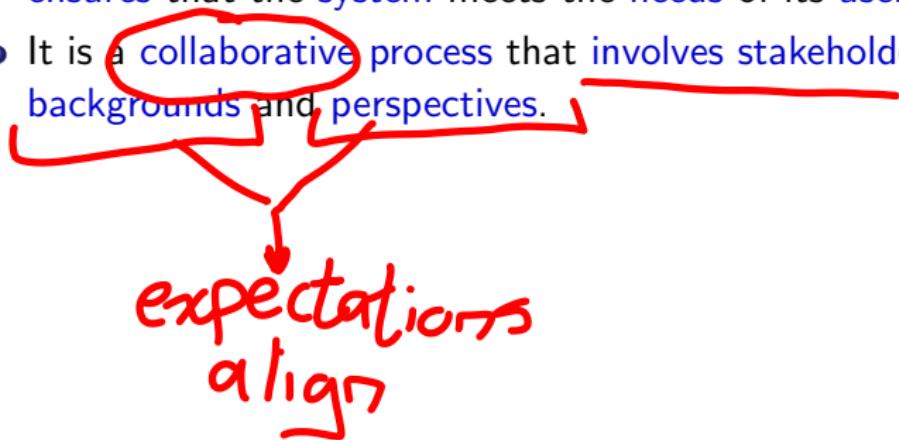
- Requirements engineering is the process of eliciting, analyzing, specifying, validating, and managing the requirements of a system.
- It is a critical activity in the systems development lifecycle that ensures that the system meets the needs of its users.
- It is a collaborative process that involves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

solve → problem



What is Requirements Engineering?

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User-Centered Design (UCD)

- 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.

agile

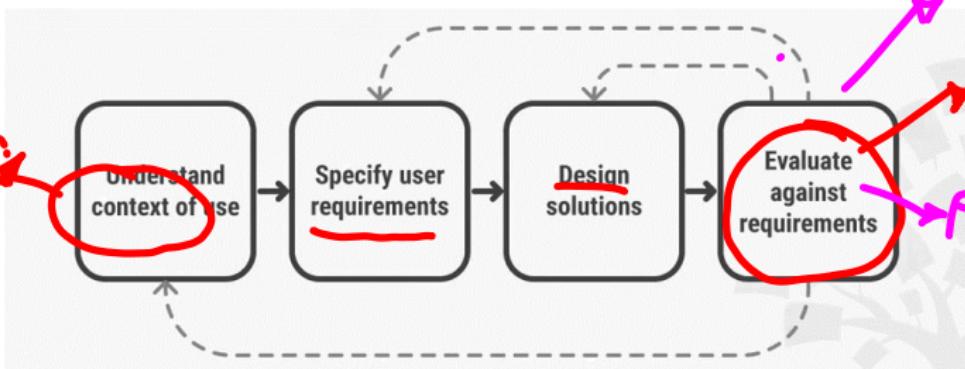
T-hard

mockup

User

Flowchart

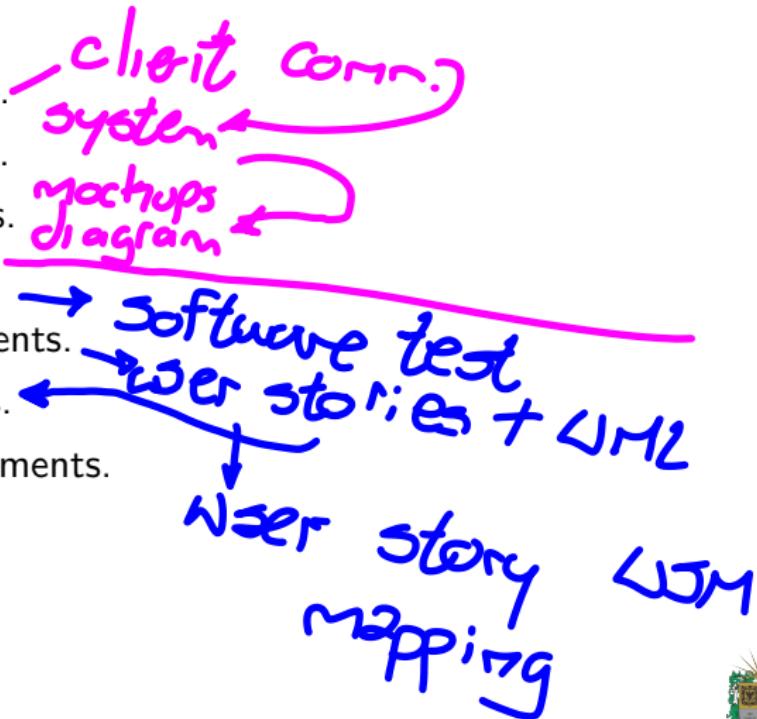
system



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.



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 **problem(s)**.
- It is a collaborative process that involves stakeholders from different backgrounds and perspectives.

root



Gathering Requirements

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Flexible
↓
take time

final users
events
relations

Fast stats
↓
non-flexible



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**.
- It is a **collaborative process** that **involves** stakeholders from **different backgrounds and perspectives**.



Clients are not always right

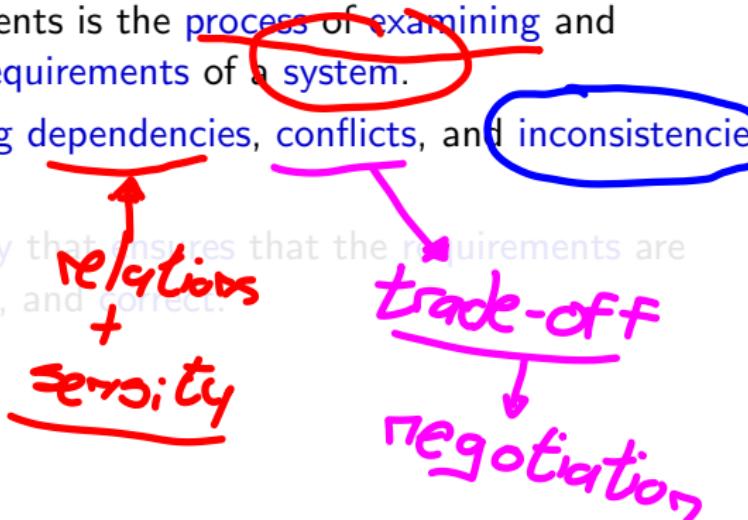
Dear Santa
How are you? I'm good.
Here is what I want for
Christmas.

A <https://www.amazon.com/gp/product/B00032HF60>
Mref=59_hps_bw_g21-ir03?pf_rd_m=ATVPDKIKXODER&pf_rd_s=center-3&pf_rd_d=IXWY42FH2KO3Y78MWQNM8P&pf_rd_t=101&pf_rd_p=1328901542&pf_rd_i=16579



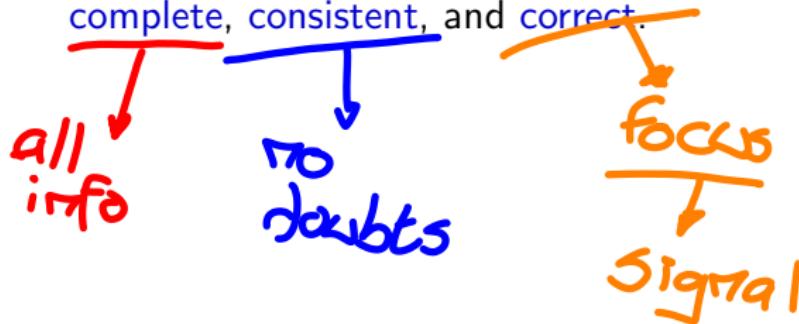
Analyzing Requirements

- **Analyzing** requirements is the process of examining and understanding the requirements of a system.
- It involves identifying dependencies, conflicts, and inconsistencies in the requirements.
- It is a critical activity that ensures that the requirements are complete, consistent, and correct.



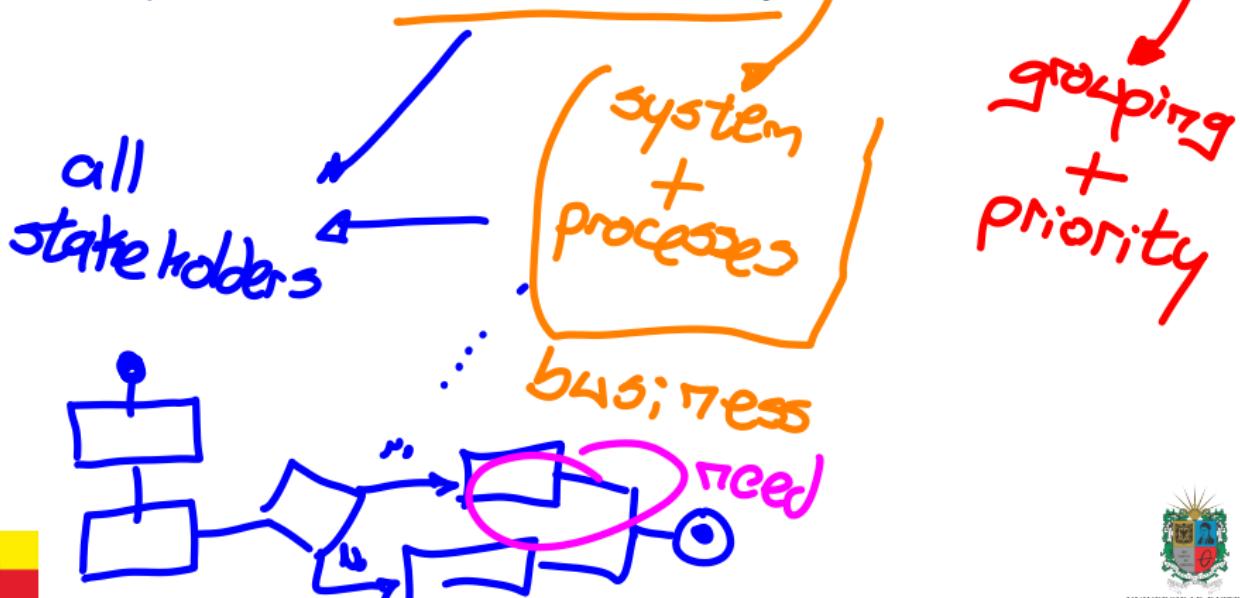
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Documenting Requirements

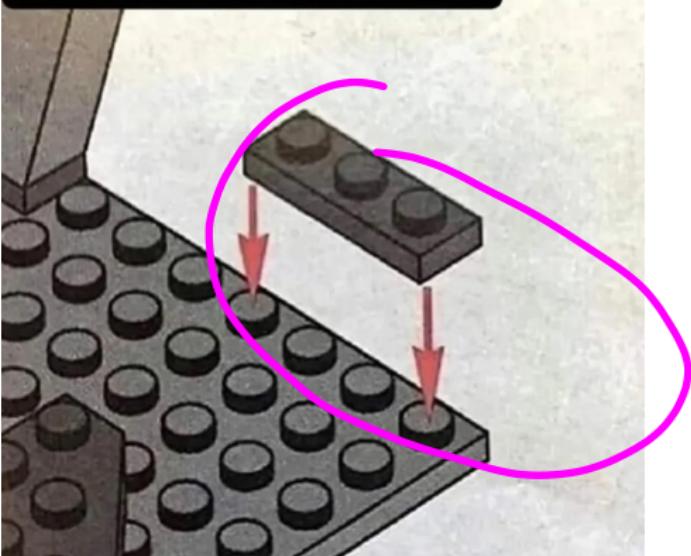
- Documenting requirements is the process of writing and organizing the requirements of a system.
- It involves creating documents, diagrams, and models that describe the requirements in a clear and concise way.



Everyone hates to write Documentation

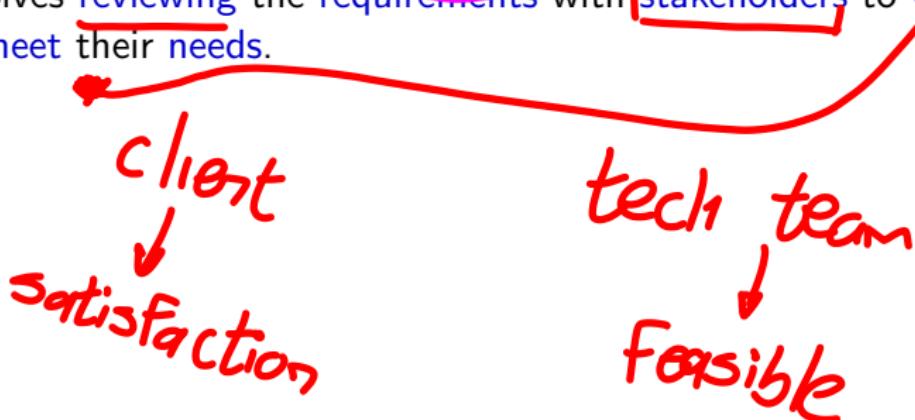
**En la documentación
está todo bien explicado**

La documentación:



Validating Requirements

- **Validating** requirements is the process of ensuring that the requirements are **correct** and **complete**.
- It involves **reviewing** the requirements with **stakeholders** to **verify** that they **meet** their needs.



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.

To understanding

→ example
training



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.
- It is a critical activity that ensures that the system meets the needs of its users.

product \Rightarrow testing
engineering

- check functionalities
- quality



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**.
- It is a critical activity that **ensures** that the **system** meets the **needs** of its **users**.

unit
integration
stress
system
acceptance

solve
the problem

QA-area
testing
org-area / ROI



Typical Mistakes when Testing

Disturbing Chinese calorie app...

70-Case X



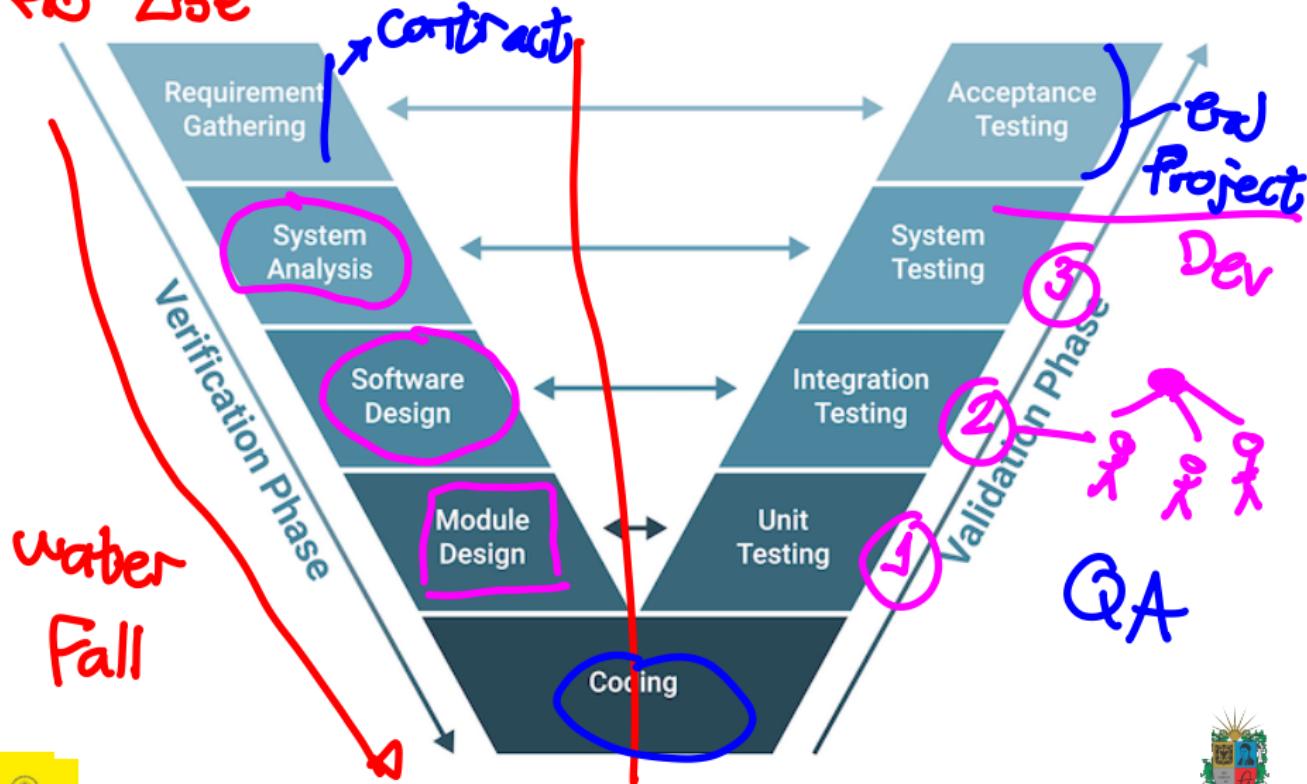
	カシューナッツ (cashew)	1粒	9 kcal
	ジャムパン (Pomeranian)	1個	327 kcal



V-Model in SDLC

70s - 80s

to use



Outline

1 Requirements Engineering

2 Design & Process



Conceptual Design

tech-less

- Once the initial set of **requirements** is 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.

Understand

Problem as a system



Conceptual Design

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client
Diagrams

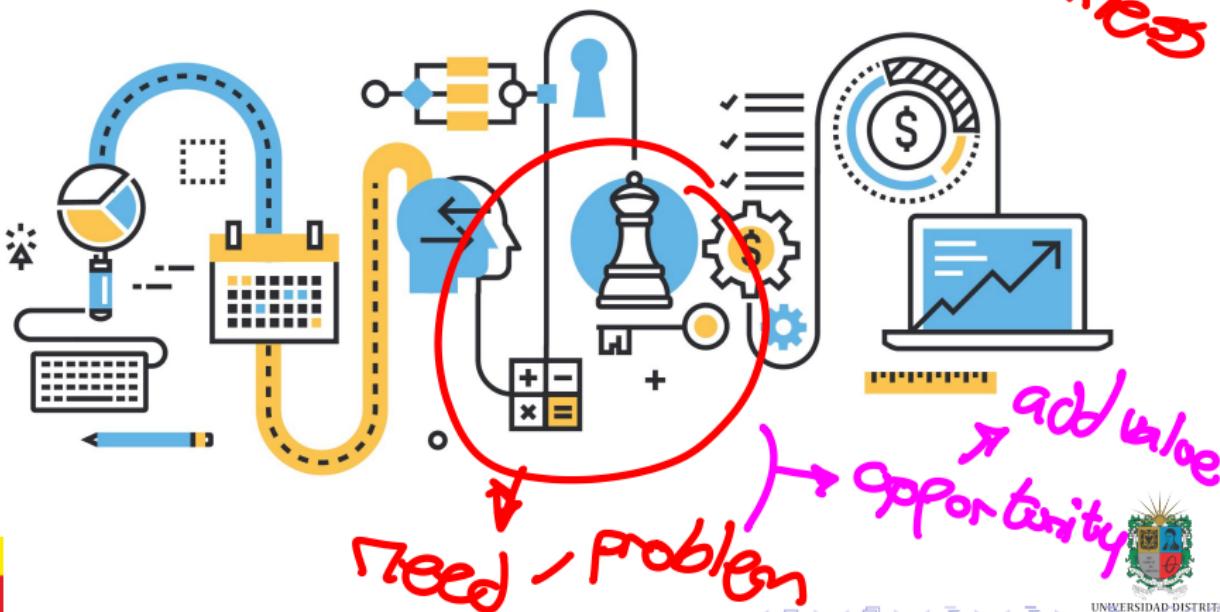


Process Definition

Algorithm → Coding

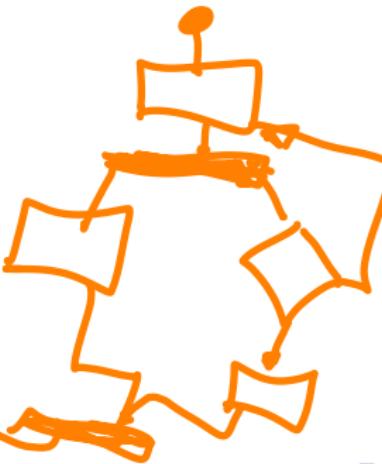
- A **Process** is a **series** of steps or actions taken to achieve a particular end.
- Processes are used to **organize** and **manage** work.

Business



Workflows → Pipelines → automation

- 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.



② quality
① speed

Flowchart



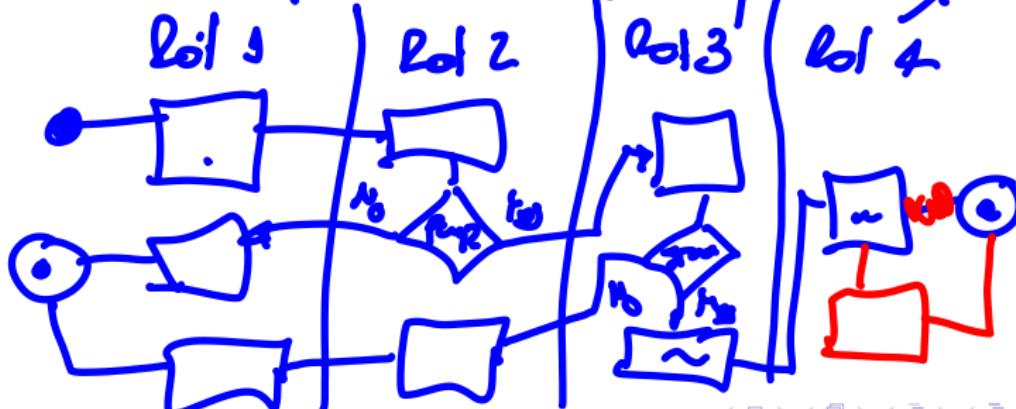
Process Models

- 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.

L sequence + activity

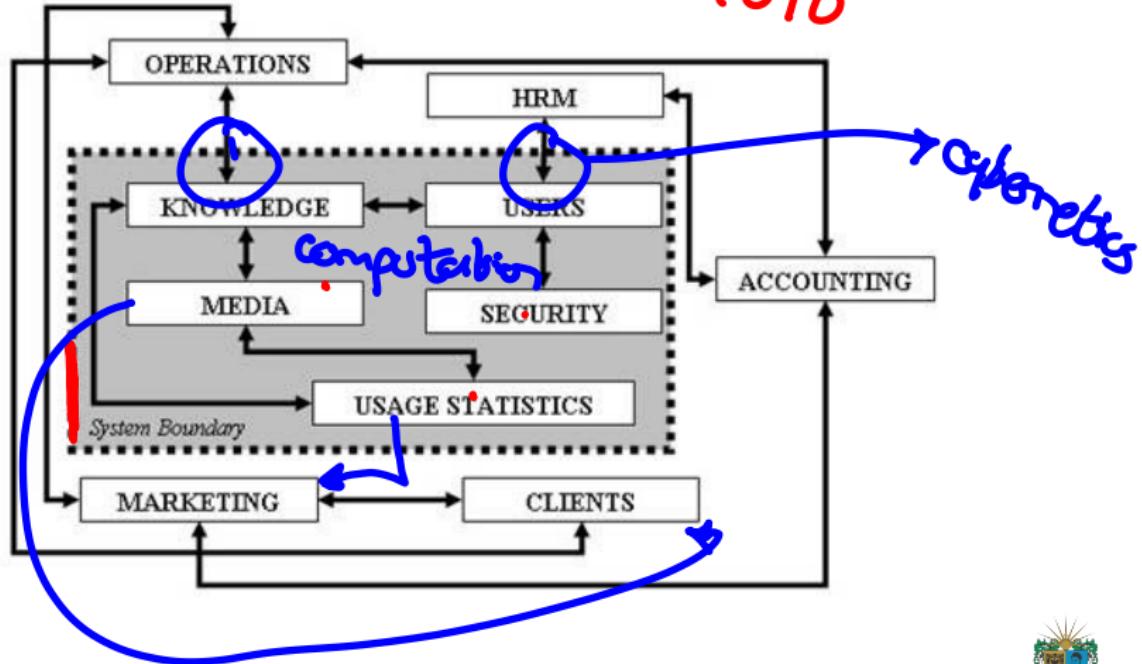
→ business

how
→



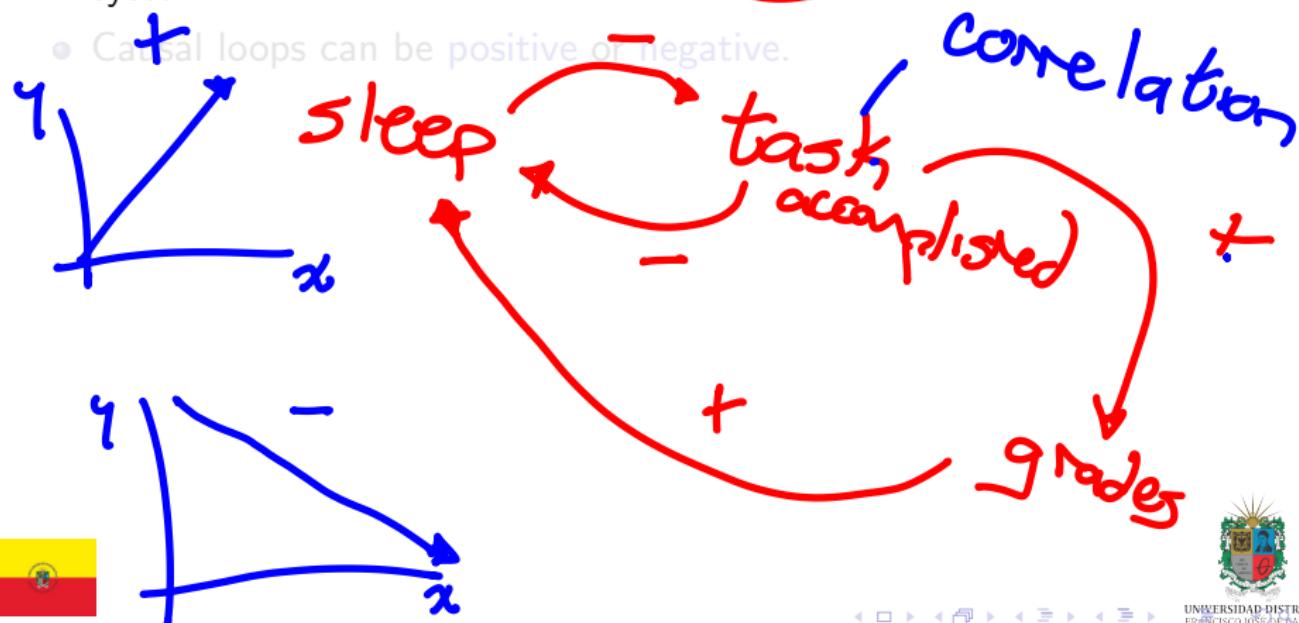
System Schema Example: Company Structure

Environment



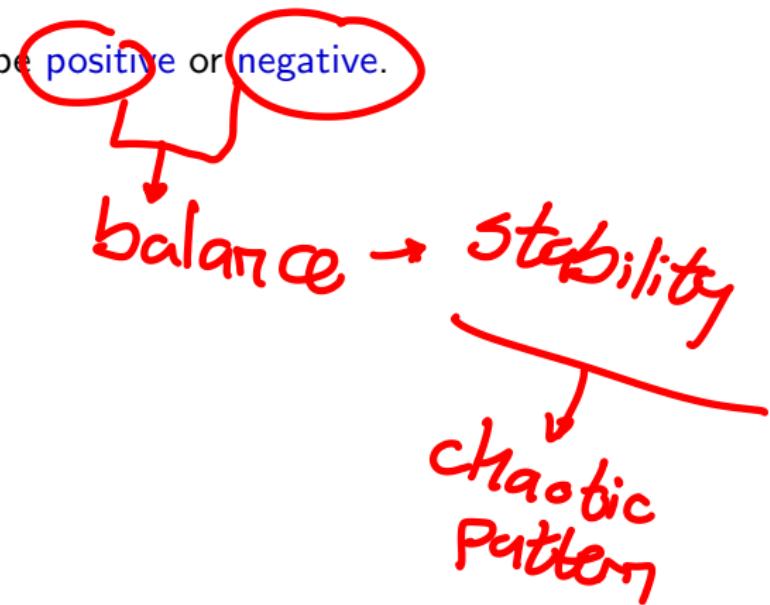
Causal Loops

- 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.

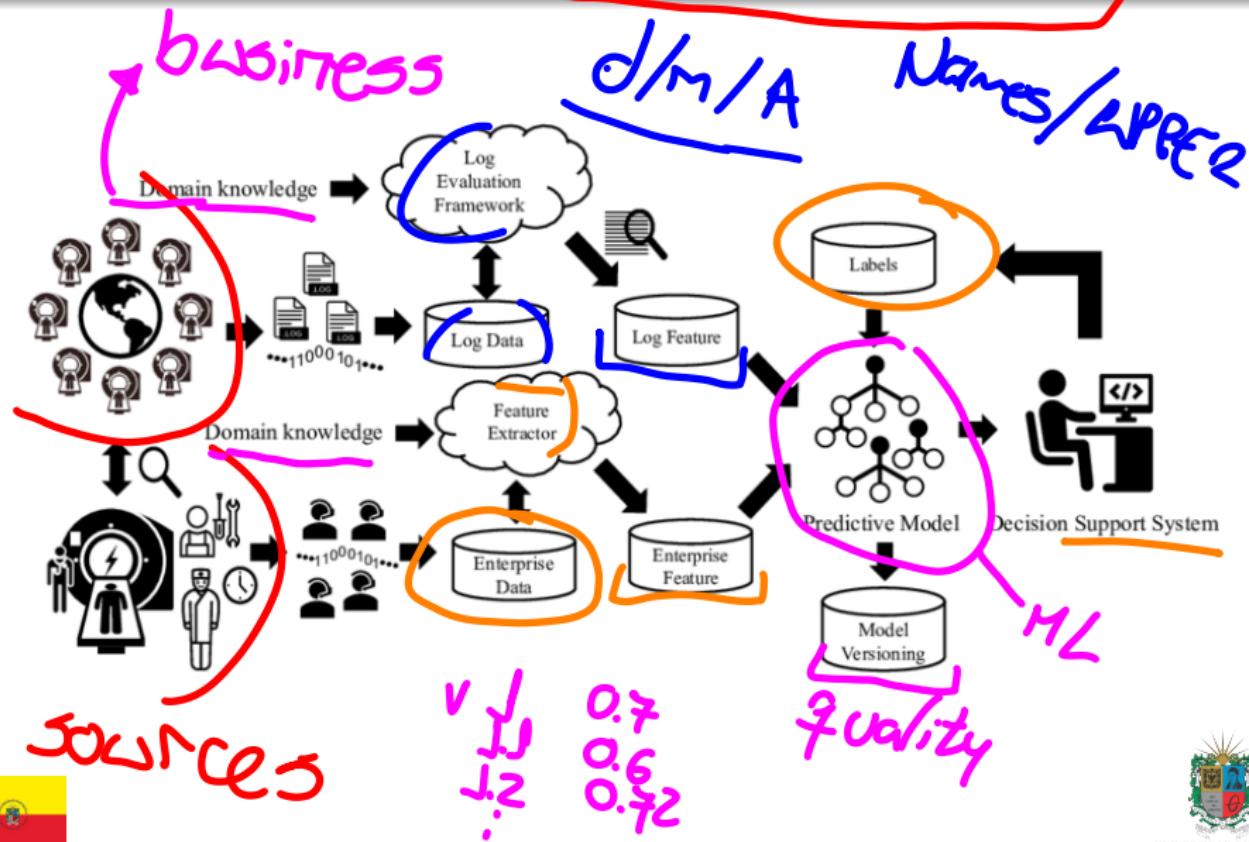


Causal Loops

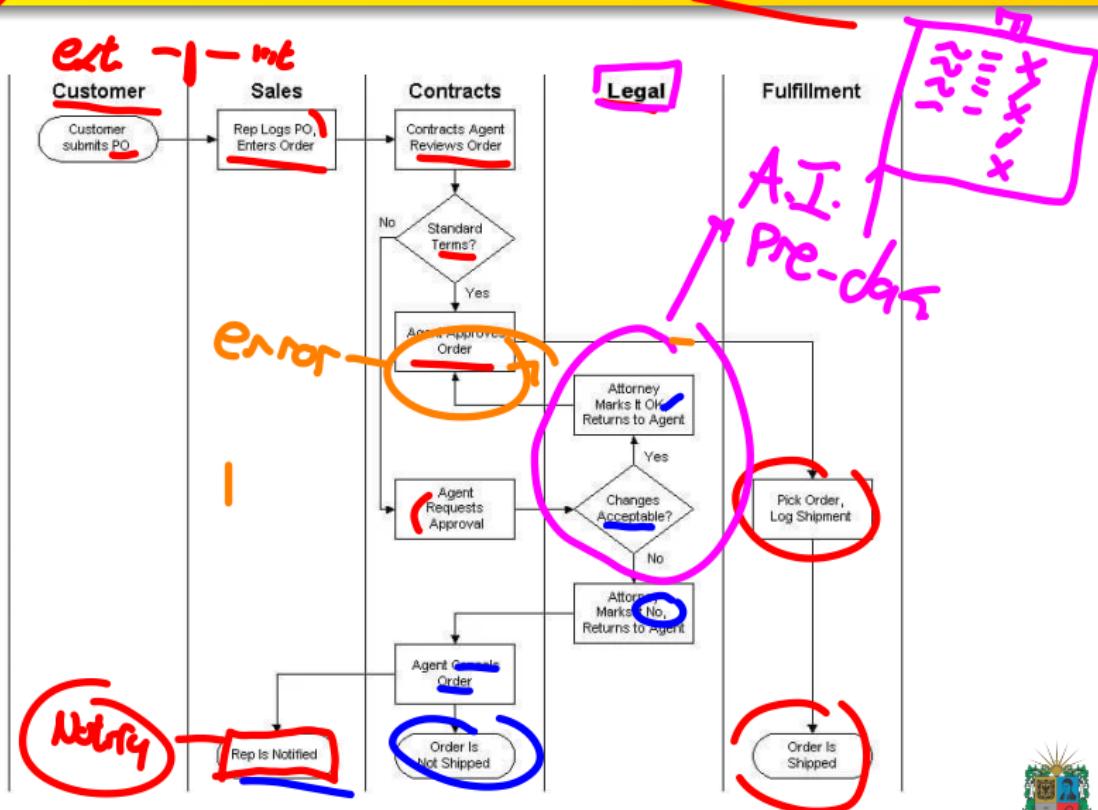
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System Schema Example: Processing Pipeline



Business Process Model and Notation (BPMN)

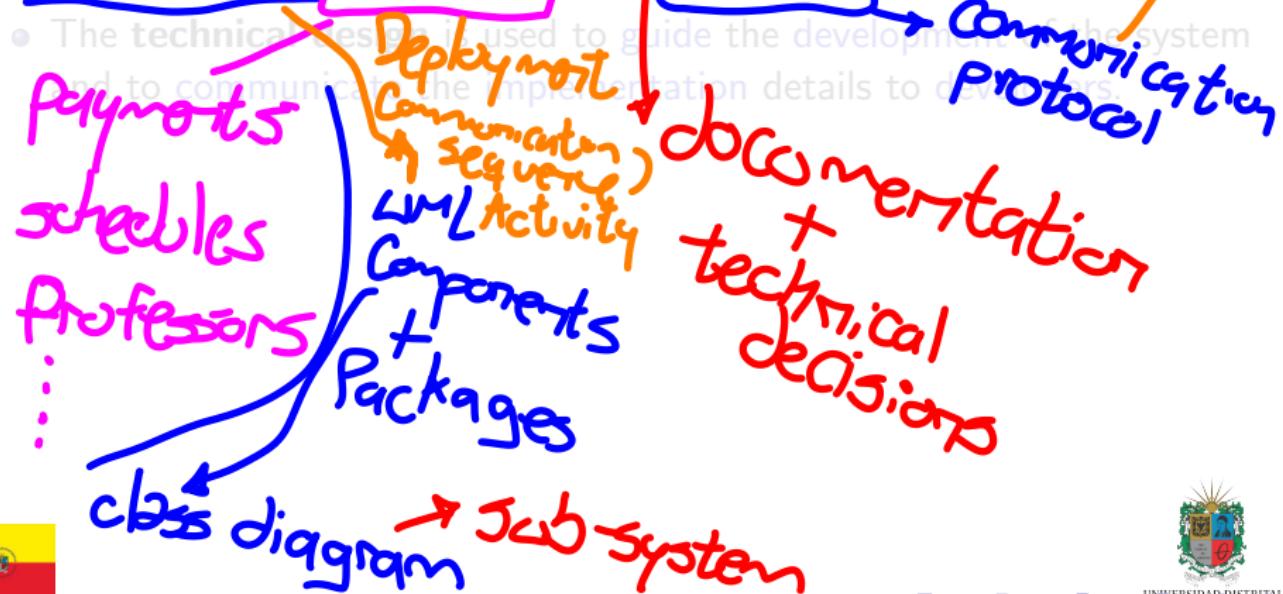


Technical Design

- 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.

- The technical design is used to guide the development of the system and to communicate the implementation details to developers.





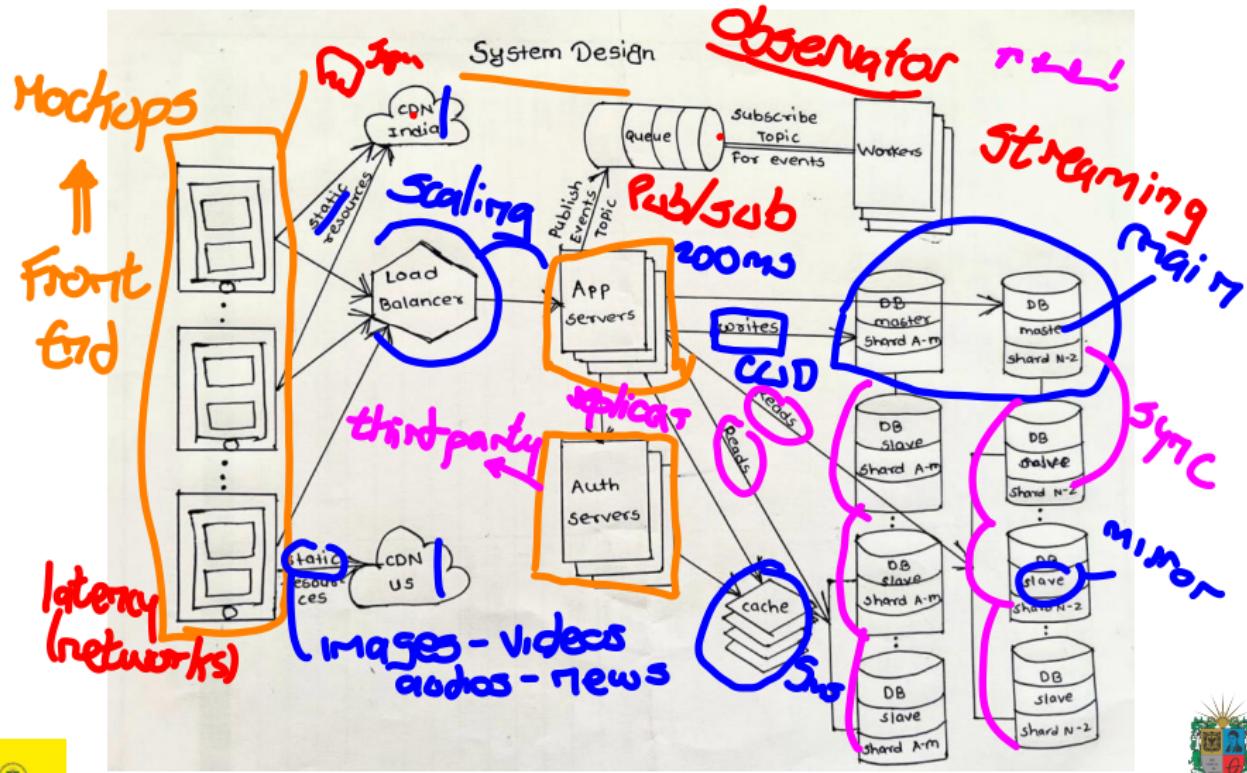
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- good practices
 - standard
 - UML diagrams
- styles
names



Systems Design applied to Software Architectures



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1 Requirements Engineering

2 Design & Process



Thanks!

Questions?



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

