

SYSTEMS PROJECT MANAGEMENT

Systems Analysis & Design

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2025-III



Outline

- systems
- 1 Information Systems / Data → Info
 - 2 Enterprises as Systems / Business
 - 3 Software Methodologies / software as a solution



Outline

1 Information Systems

2 Enterprises as Systems

3 Software Methodologies



Information Systems

Google maps

- An **Information System** is a system that collects, processes, stores, and disseminates information.
- Information systems are used to support and manage business operations.

Dashboard

- A Information systems are used to automate and optimize business processes.
- B Examples of information systems include transaction processing systems, management information systems, decision support systems, executive information systems, expert systems and data systems.



SQL
Documents
Objects
Graphs



Information Systems

- An **Information System** is a **system** that *collects, processes, stores, and disseminates information.*
 - **Information systems** are used to **support** and **manage** business operations.
 - **Information systems** are used to automate and **optimize** business processes.
 - Examples of information systems include transaction processing systems, management information systems, decision support systems, executive information systems, object systems, and data systems.
- Processes + data*
- steps* → *computation*



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c-level

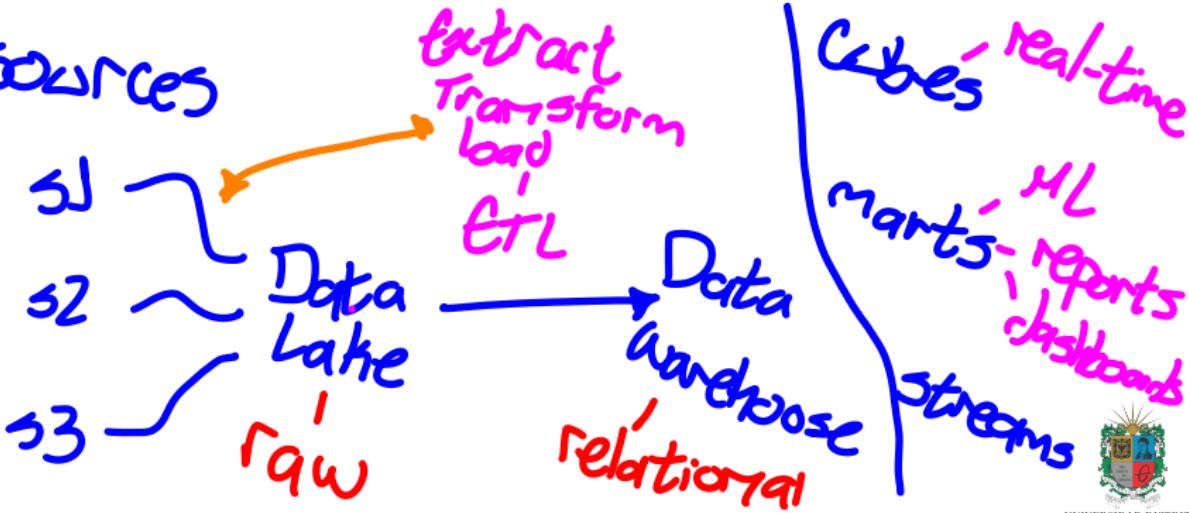
transversal



Data Systems

- A **Data System** is a system that collects, processes, stores, and retrieves data. → **Req/ SELECT**
- Data systems** are used to store and analyze data.] 7/24
- Examples of data systems include databases, data warehouses, data lakes, data marts, data cubes, and data streams.

Sources



Expert Systems

- An **Expert System** is a system that uses knowledge and reasoning to solve problems. *Bot*
- **Expert systems** are used to automate and optimize decision-making processes. *~1990s*
- Examples of expert systems include diagnostic systems, predictive systems, prescriptive systems, decision support systems, and automated reasoning systems.



Expert Systems

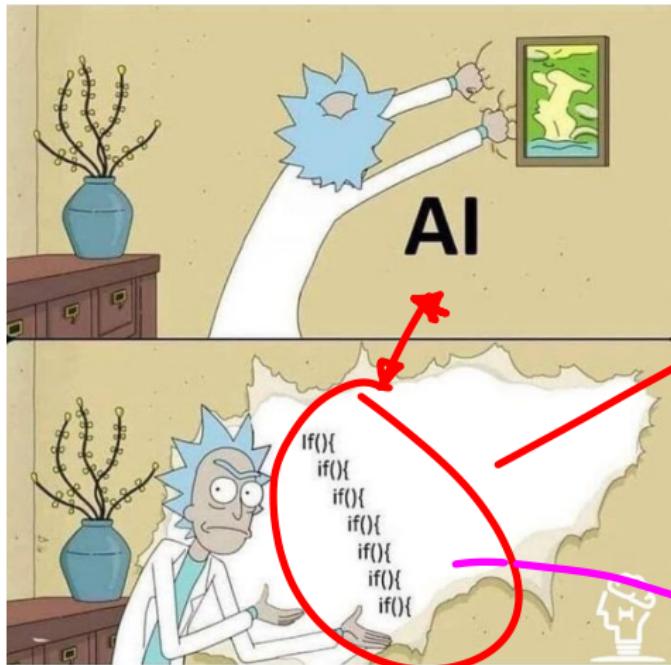
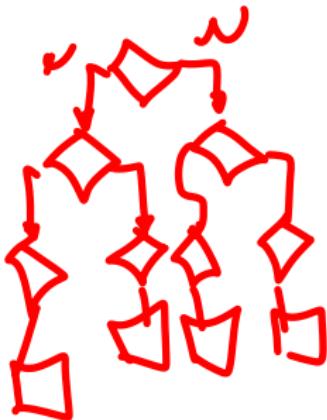
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recommendations



Expert Systems as Classical Artificial Intelligence

Here there is a great example of a **diagnostic system**.



Random forest

decision tree

business



Risks and Failures in Information

- **Information systems** are subject to **risks** and **failures** that can impact business operations.
- Risks and failures can be mitigated through security measures, backup systems, disaster recovery plans, and monitoring tools.

- Examples of risks and failures include security breaches, data loss, system downtime, performance issues, and compliance violations.



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memory
time

• 2-step
auth. factor
• store data



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Enterprises: Bottom-Up and Top-Down Approaches

- **Bottom-Up Approach:** Analyzes an enterprise by examining its individual units or components, then aggregating them to understand the entire organization.
- **Top-Down Approach:** Starts with an overall vision or strategy and decomposes it into subsystems, departments, and processes.



Enterprises: Bottom-Up and Top-Down Approaches

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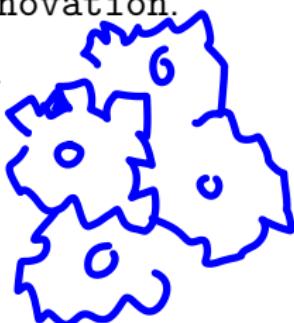
PIECE Framework for Enterprises

- **Participation:** Engaging stakeholders at every level.
- **Independence of Thought:** Encouraging diverse, innovative ideas.
- **Elaboration:** Developing and refining ideas and processes.
- **Communication:** Ensuring clear, effective exchange of information.
- **Exploration:** Embracing continuous innovation and improvement.



Enterprise System Typologies

- **Rational Systems:** Organizations driven by logical, structured processes and clear hierarchies.
- **Natural Systems:** Organizations viewed as self-organizing entities with emergent behavior. → *Humanos - Personas*
- **Open Systems:** Enterprises that continuously interact with their external environment for information, resources, and innovation.



*Humanos
Personas
Tolerancia*



Business Systems and Models

- **Business Systems:** Frameworks that encompass an enterprise's internal processes, operations, and strategies.
 - **Examples:** ERP systems, CRM systems, SCM systems.
 - **Business Models:** Describe how an organization creates, delivers,

$$f_{\theta, \beta} = x_1 f_{\theta, 1} + \dots + x_n f_{\theta, n}$$

- Examples include ~~subscription~~ ~~new~~ premium, platform-based, and direct sales models

CRM → Customer Relationship Management
SCM → Supply Chain Management



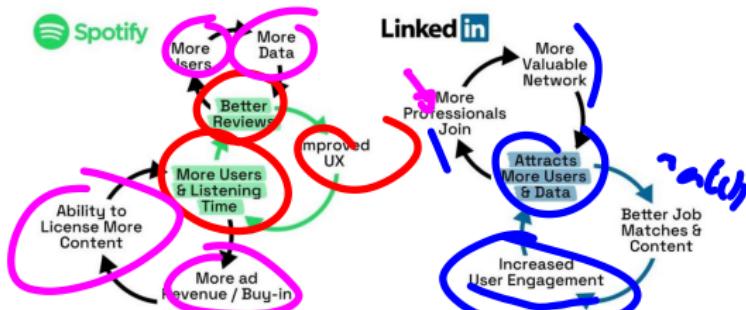
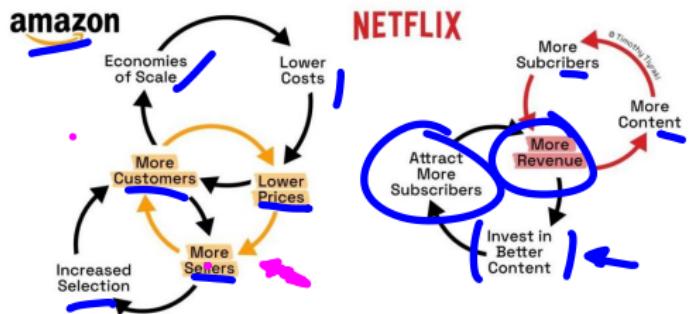
Business Systems and Models

- **Business Systems:** Frameworks that encompass an enterprise's internal processes, operations, and strategies.
- **Examples:** ERP systems, CRM systems, SCM systems.
- **Business Models:** Describe how an organization creates, delivers, and captures value.
 - Examples include subscription-based, freemium, platform-based, and direct sales models.

about

Business Models Examples

Understanding Business Models Through Flywheels



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Basic Concepts in Software Methodologies

- **Software methodologies** provide frameworks for **planning**, **designing**, **developing**, **testing**, and **maintaining software projects**.
- They help **teams** manage project complexity and ensure quality deliverables.

System analysis

6 months
5 persons
40 hours/week

quality

acceptance
close the project

planning

legacy



Traditional Methodologies

~ 1960-1970

- **Waterfall:** A linear approach where each phase must be *completed* before moving to the next.

Requirements

- Emphasize thorough documentation and planning.

→ Analysis & Design

→ Implementation

→ Testing

→ Deployment

numerical methods

NASA
military

physical applications



Traditional Methodologies

- **Waterfall:** A linear approach where each phase must be completed before moving to the next.
- Suitable for projects with well-defined requirements and low uncertainty.
- Emphasize thorough documentation and planning.

20-30 artifacts

rigid

until
80's late



Agile Methodologies

- Emphasize iterative development, customer collaboration, and flexibility. *model business*
 - Based on the Agile Manifesto, which values individuals and interactions over processes and tools.
 - Examples include Scrum, Kanban, Extreme Programming (XP), and Lean Software Development.
 - Agile methodologies are suitable for projects with rapidly changing requirements and uncertainty.
 - Promote adaptive planning, evolutionary development, and early delivery of valuable software.
- quality* *12 items* *2-3 wks*
- product* *continuous delivery* *no money*
- client* *happy* *team* *up & quality*
- tests automation* *continuous learning*



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startups

Scrum

management

~2000's

Pair Programming

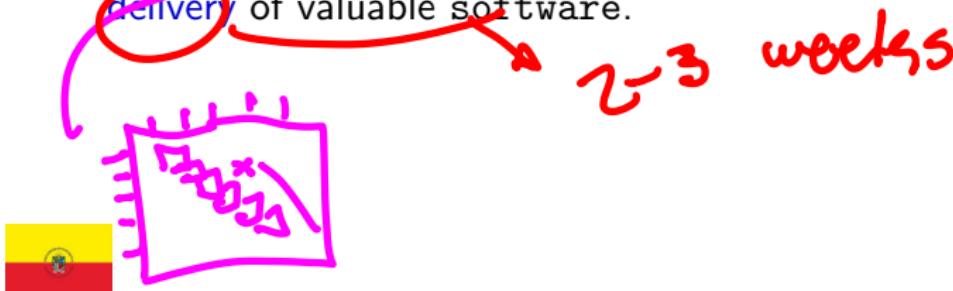
2	□	♂
2	♀	□
2	♀	♂
2	♂	□

*on-boarding
incidents*



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Case Study: Scrum

what = to do
deliver
2 weeks

- Scrum employs short, time-boxed iterations called sprints.
- Key practices include daily stand-ups, sprint planning, reviews, and retrospectives.
- Focuses on adaptability and continuous improvement.



Case Study: Kanban

- **Kanban** visualizes work items on **boards** and limits Work In Progress (**WIP**). *(Boards and WIP circled in red)*
- Emphasizes gradual improvements, flow management, and continuous delivery. *(Gradual improvements, flow management, and continuous delivery circled in red; 'Scrum' written below 'flow management')*
- Ideal for **projects** requiring **flexibility** with **minimal iteration planning**. *(Projects, flexibility, and minimal iteration planning circled in red)*



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Thanks!

Questions?



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

