Unit 8:

Information Management Systems

Markup Languages and
Information Management Systems

ies SERPIS

INDEX

01 Introduction

02 ERP

03 CRM

04 BI

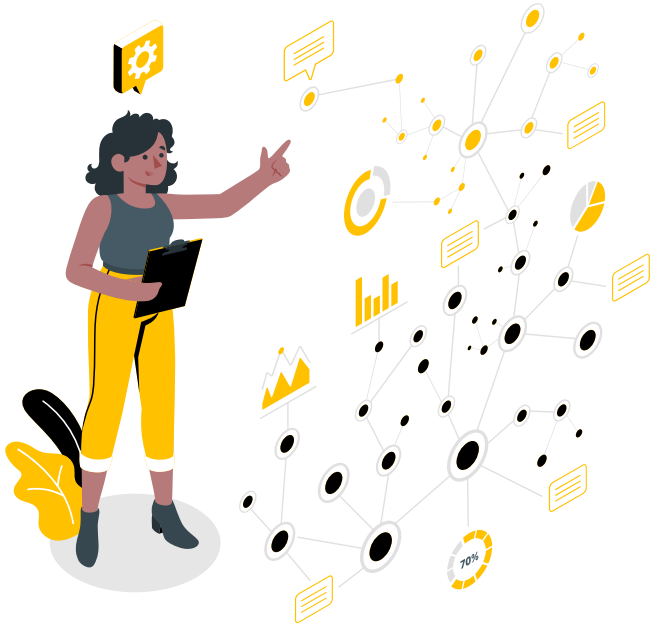
05 Other IMSs

06 SaaS and Cloud Computing

07 Secure Access Mechanisms to Information

Introduction

01



Introduction

The goal

To improve productivity

The trend

To use a software product that integrates all management, divided into modules to maximize the efficiency of managing each area

The past

Different software products used in each department of a company

Introduction

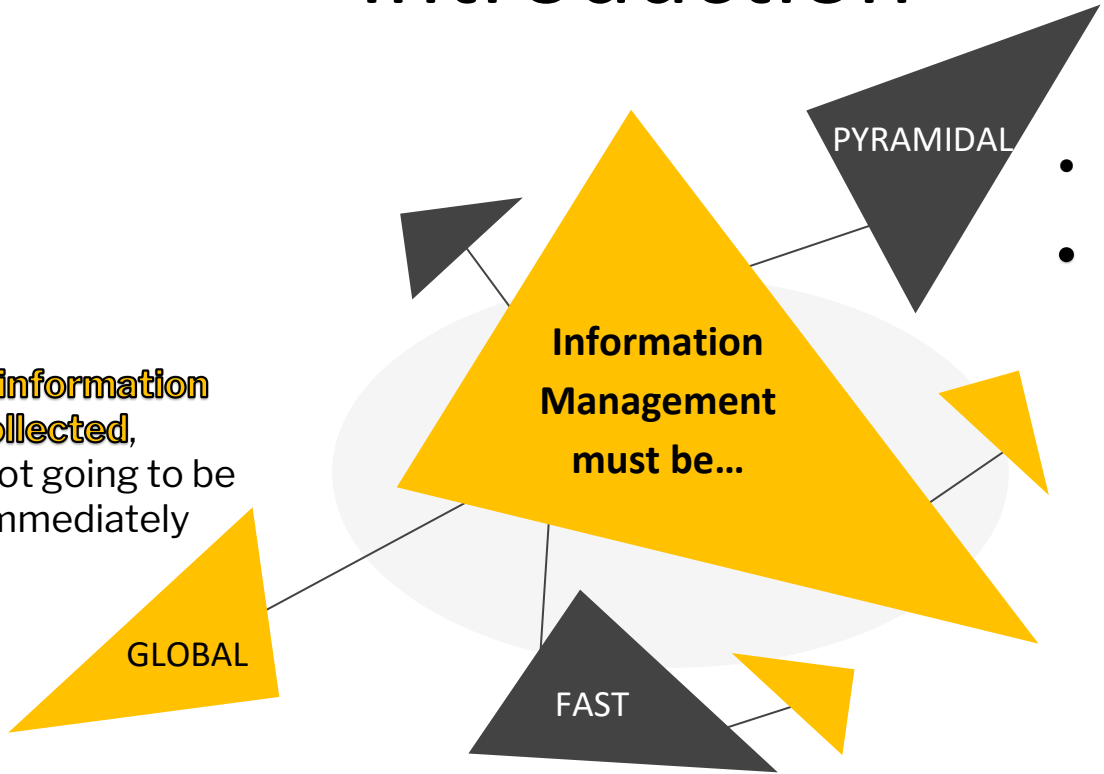
IMS (Information Management System)

Computer program designed to **completely cover any process** carried out in a company.

Processes

- Production
- Commercial (purchases and sales)
- Logistics (storage and transport of materials and products)
- HR management
- Data-driven decision-making
- …

Introduction

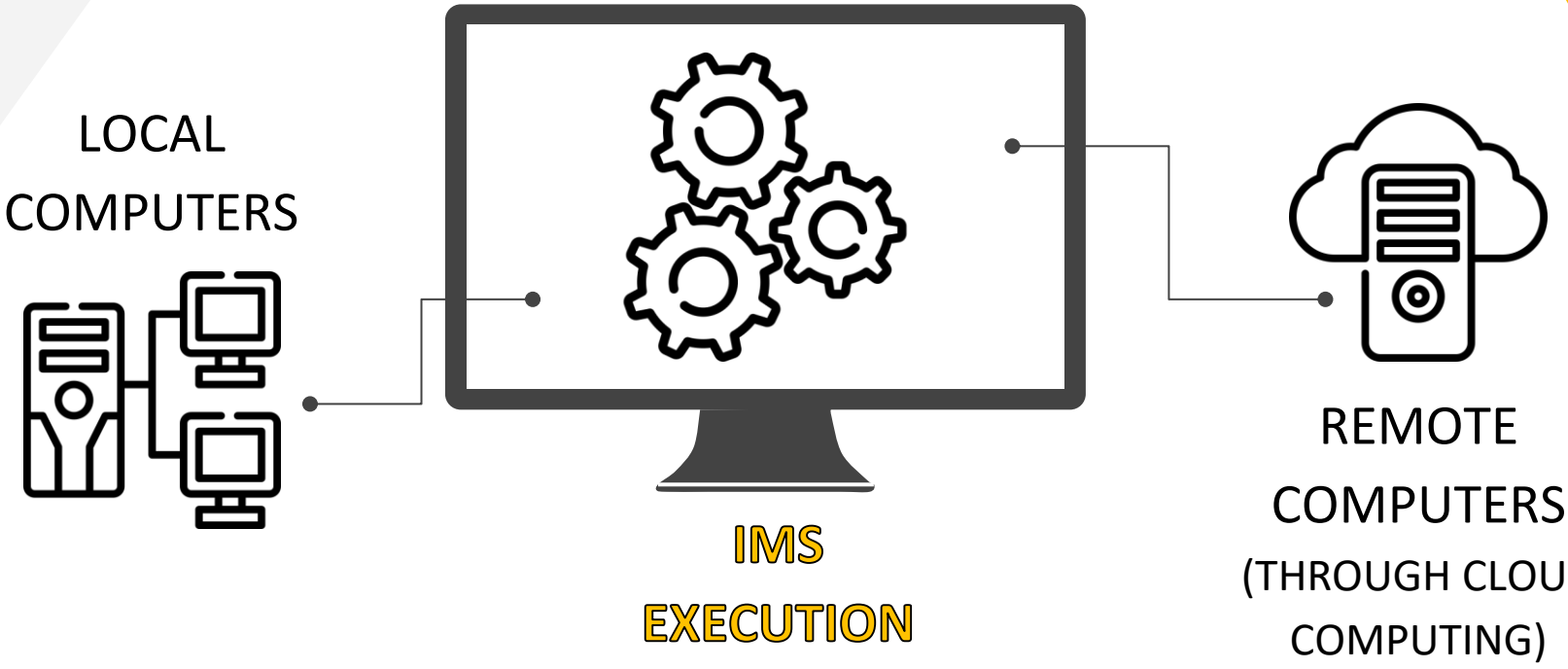


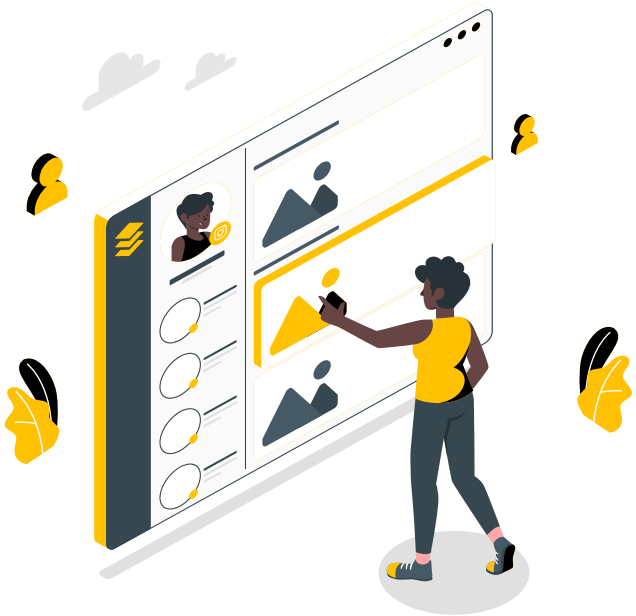
- Data classified by levels of importance
- **Access levels** for staff

All possible information should be collected, even if it is not going to be processed immediately

Ideally, in real time

Introduction





ERP

02

ERP

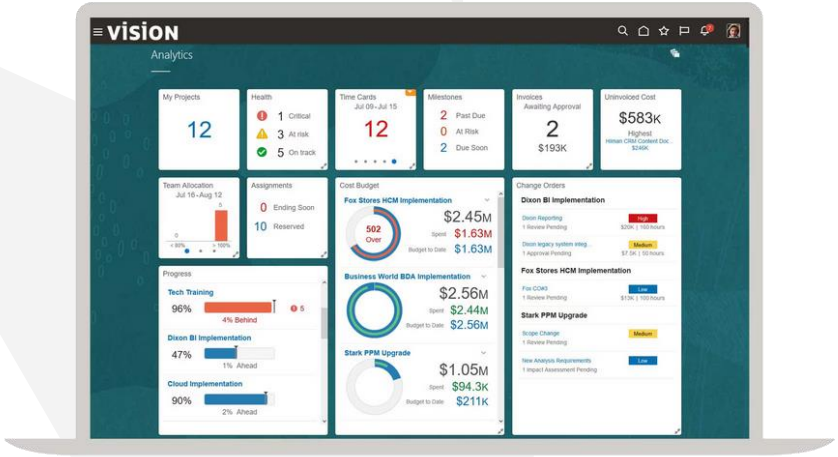
- The digitalization process of a company is usually gradual, using specific software applications for certain **independent** tasks.
- However, this **independence is a limitation**, since all daily activities in a company have consequences in related areas.
- If these software applications are independent, **interconnecting them is costly** in time, effort and resources.

Activity	Impacts on
Product sales	Stock in warehouse
Payroll payment	Treasury
Quality of product manufacturing	Customer service

Enterprise Resource Planning

Modular software product that integrates applications for all the specific processes a company needs

ERP



- ERPs are created **generic** by their development companies.
- They are **later adapted** for their specific customers...
  - ...by the customer company's employees.
  - ...by external consultants (experts).

ERP

FEATURES

- **Functional**: solutions for all the business processes
- **Modular**: the modules for each process must be able to be integrated optionally and independently
- **Centralized**: a single DB as the sole source of data
- **Robust**: with mechanisms that guarantee the reliability of the data
- **Secure**: with mechanisms that guarantee access to information only by authorized persons
- **Maintainable**: allowing update, improvement and expansion
- **Adaptable**: generic solution, able to be implemented in an adaptable manner in any company

ERP

Types of ERP, attending to the **degree of adaptation** to the customer's company:

GENERIC

Zero or very limited capacity to adapt to the company

CONFIGURABLE / PARAMETERIZABLE

With plenty configurable parameters that facilitate the adaptation of all modules to the specific processes of the company

CUSTOM-MADE

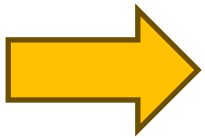
Fully developed from scratch based on the company's specific requirements

cheaper ⟷ more expensive

ERP

Companies considering implementing an ERP should take into account:

- Their own **needs**.
- The capacity of their **Systems department**
- Their **budget**



Medium to large-sized companies

ERP

BENEFITS

- Optimization of **management processes**.
- Improved **productivity**.
- Simplification of the company's **IT**.
- Improvement of **decision-making processes** (due to real-time access to centralized information).
- Reduction of information management **costs**.
- Improvement of system **scalability**.
- Increased information **security**

ERP

Market leader

Commercial manufacturers

Free

ERPNext

- Usually sufficient for SMEs.
- When both local and cloud versions are offered, only the local one is free.
- Support is always paid.

CRM

03

CRM

- A company's **customers** are its **most important asset**.
- With a purchase, a customer can be

Satisfied

Not satisfied

complaint and/or **product return**

- **Contact channels**: in person, phone, email, social media, web form...
- The customer could even use **multiple channels** and contact with **different employees** for **the same incident**.

CRM

Undesirable situations generate customer **dissatisfaction**, which could lead to their **loss**.
Some examples:

- A customer makes contact to modify their order, but it is not registered.
- A customer has to provide their data to each employee who serves them.
- An employee agrees to call back with information, but when their shift ends, their replacement doesn't either.

Customer Relationship Manager

Specific IMS for managing customer relationships

CRM

FEATURES

- **Contact management**: all customer information, gathered and easily accessible
- **Customer classification**: enables effective marketing actions
- **Unification of channels**: the flow of interactions with the customer must be unique, regardless of the channel(s), to ensure continuity of communication
- **Automation and workflow tracking**: when customer service involves several related actions, the CRM can organize them and automate the process so that it is carried out completely and correctly
- **Social media management**: some CRMs also allow this

CRM

BENEFITS

- Increased **sales opportunities** because customers are better known (profiles, purchase history…)
- Effective **marketing actions** are possible (due to customer classification)
- Improvement of **decision-making processes** (due to real-time access to centralized information)
- Contribution to the **continuous improvement process**: the analysis of incidents, the level of satisfaction and queries allows the company's weak points to be detected

Most popular CRMs

Market leader

Has a restricted free version, valid for SMEs

Some can be integrated as a module in ERPs

BI

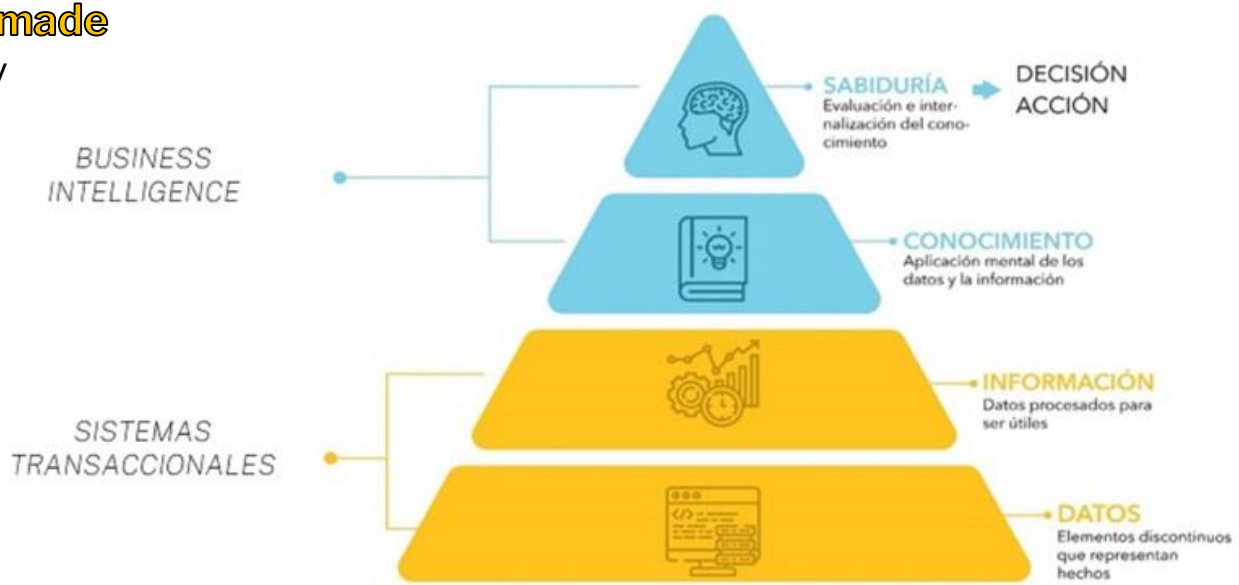
04

Business Intelligence

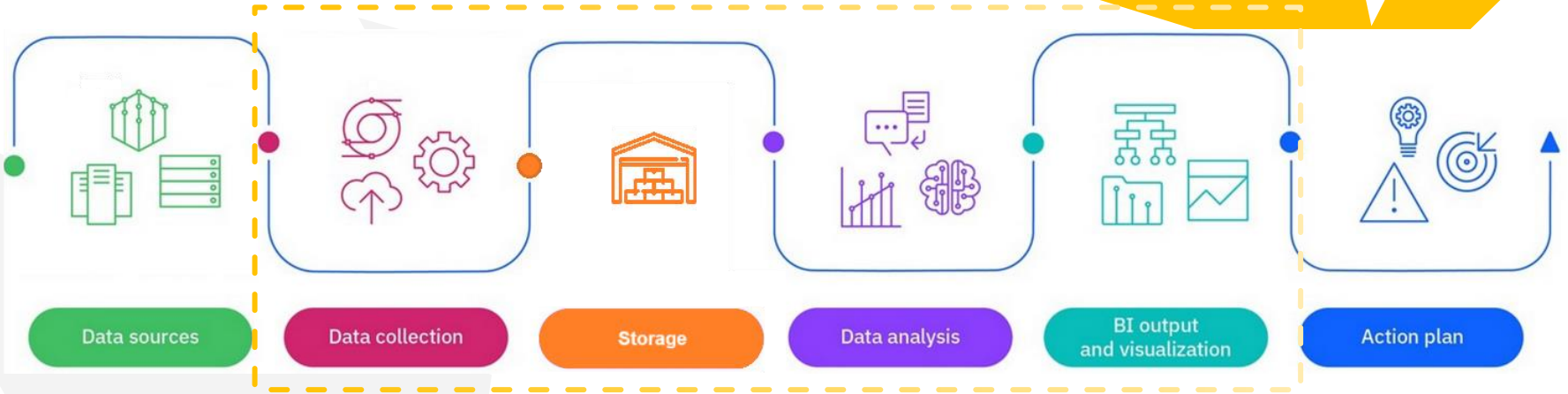
Set of technologies that favor a company's management process by unifying the processing of data generated because of its activity

BI goes beyond

Transforms *data information* into **actionable insights** and **strategic recommendations**, allowing **decisions to be made** that benefit the company



BI



BI subdivision
(subprocesses and subsystems)

BI

Data collection

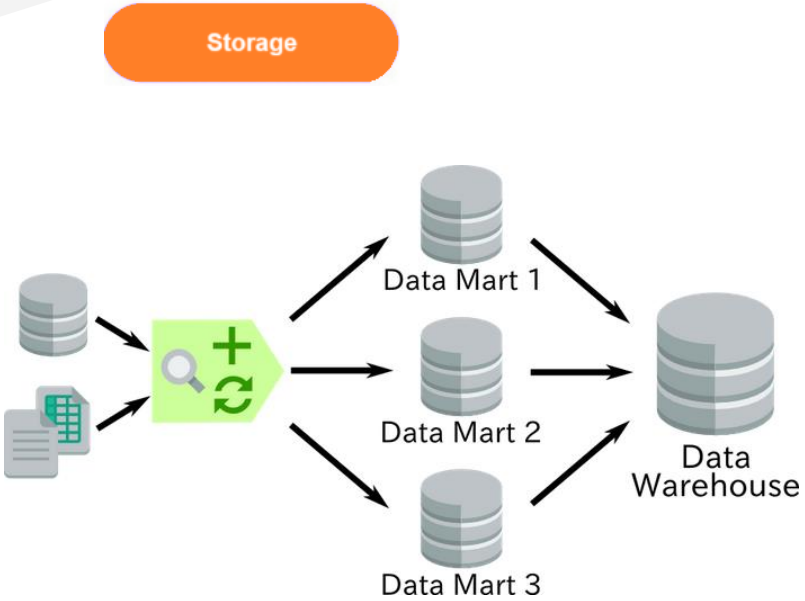
- **ETL**: **E**xtraction of raw data from transactional systems, **T**ransformation into grouped data and storage (**L**oad) in a warehouse.
- The data generated by a company's daily operations are on the order of 10^5 or 10^6 events.
  - **Direct real-time queries are too time-consuming → unacceptable**.
- Thus, **queries are made before being used**, with the data being available at the time one wants to access it.
- **Not real-time** (ETL is performed daily, weekly…)
  - No problem: decisions are made considering a long period of time.

BI

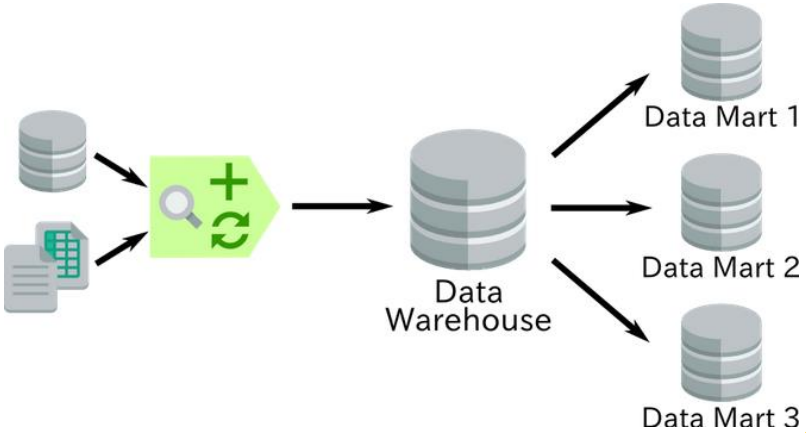
Storage

- **Data Warehouse** (DW): where the processed data obtained by ETL is stored.
- Does not contain real-time data, but from past events: **permanent data**.
- **Data is stored grouped and processed** to facilitate access for decision-making.
- **Data Marts** (DMs) are implementations of a DW with a **scope restricted** to a functional area, particular problem, department, topic… They can be:
  - The previous step to integration in a DW (**bottom-up**).
  - Created from specific data from the DW (**top-down**).

BI



bottom-up

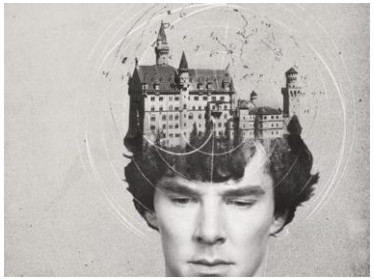


top-down

BI

Data analysis

- In this stage, the stored data is processed and analyzed **to reveal patterns, trends and insights.**
  - Many analytical approaches and algorithms are used for this: **OLAP**, Machine Learning, Natural Language Processing, **Data Mining**...
- Data is organized into **multidimensional structures** (i.e., according to different perspectives) to generate information (forecasts, trends) using statistical techniques and artificial intelligence.
- Like a detective working on a case.



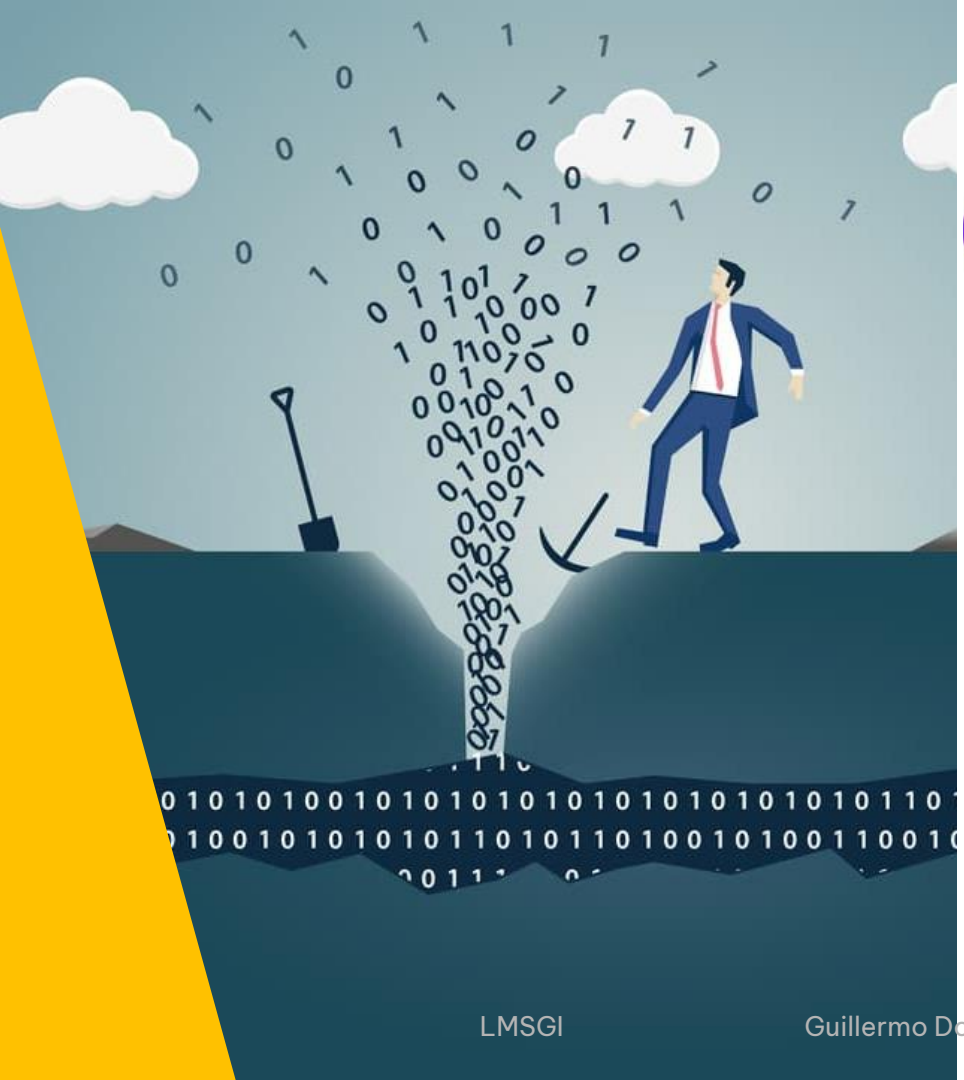
BI

Data analysis

OLAP

(On Line Analytic Processing)

- Structures information into **OLAP cubes**: **multidimensional data structures** (not relational).
- These cubes are perfect (more agile) to represent events:
  - Occurred in different locations or time segments.
  - Related to different entities in the system.



BI

Data analysis

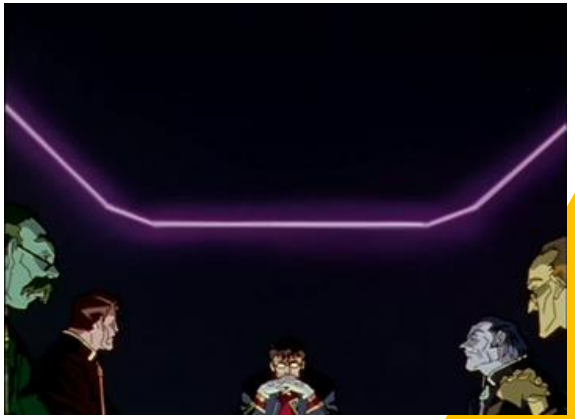
Data Mining

- Search for **repetitive patterns** in large volumes of data.
- It usually discovers **non-obvious information**: trends and rules that explain the evolution of the data → **Forecast**.
- The discovered information is **not the result of a directed search** (not to be mistaken for ETL).

BI

BI output and visualization

- BI subprocesses considerably reduce the volume of the data that needs to be queried to understand the state of the company.
  - Even so, it could still be very large.
  - Mainly numerical values.
- That information should be **presented** in a way that **managers and/or analysts can consult it, with little effort, to make decisions**.



BI

BI output and visualization

Reports

- **Detailed** and **structured summary** of the data.
- Tables, graphs and narrative analysis.
- For analysts and auditors.
- Generation **configurable** by the users themselves.

BI

BI output and visualization

Dashboard

- **Quick and visual summary of the status** of a company, or a process, based on **KPIs** (**K**ey **P**erformance **I**ndicators).
- Shows developments, alerts, trends and statuses.
- Maps, graphs, meters… even interactive elements.
- For managers.
- Can be configured to adapt to the needs of each company.

BI

BI output and visualization

Solved exercise: designing a dashboard

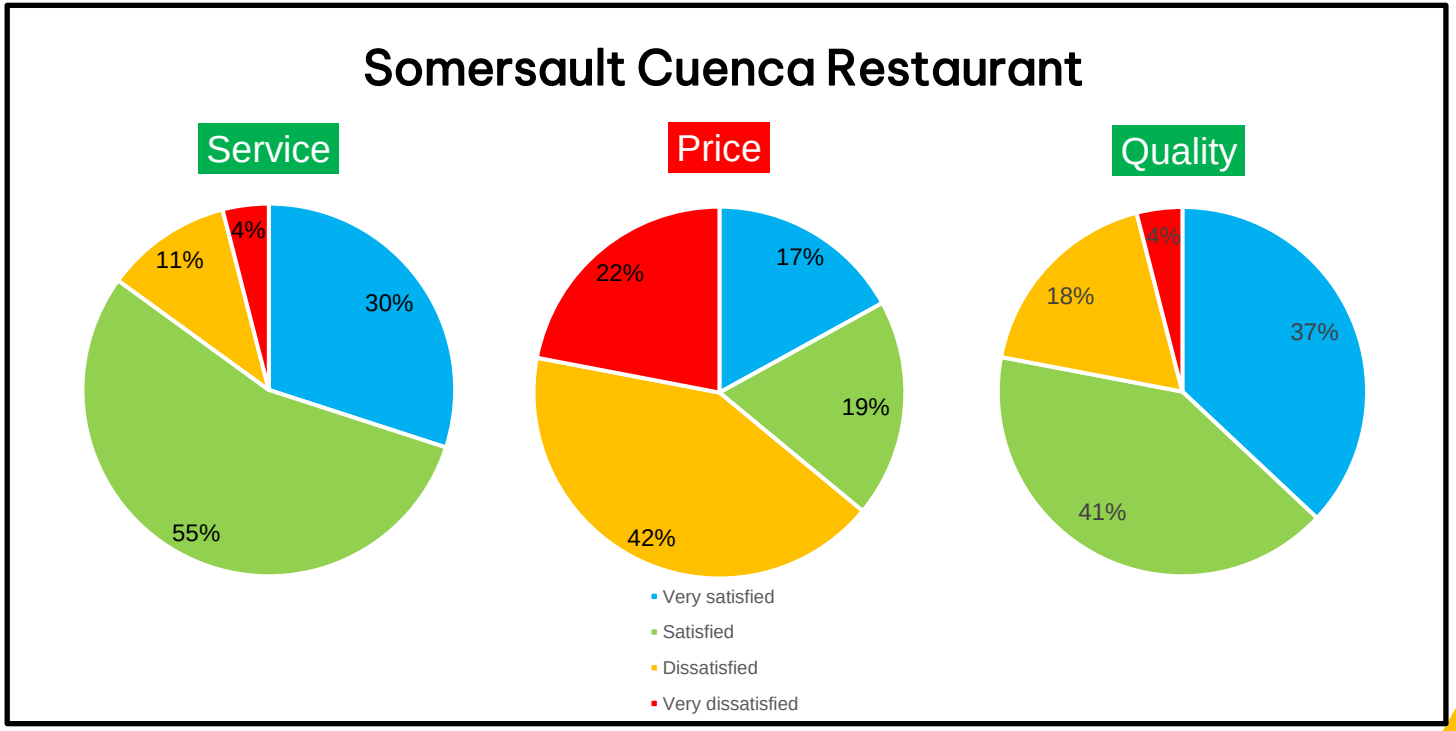
Design a dashboard that meets the requirements described for a company that owns several restaurants.

- The dashboard will show information for one restaurant at a time.
- It will show the degree of customer satisfaction in 3 aspects: **service**, **price** and **quality**.
- A **green rectangle** will show the **name of the aspects** in which the percentage of 'very satisfied' or 'satisfied' customers is greater than those 'dissatisfied' or 'very dissatisfied'.
- A **red rectangle** will show the **name of the aspects** in which the negative rating percentages are greater than the positive ones.

BI

BI output and visualization

Solved exercise: designing a dashboard



Most popular BIs

tableau from Salesforce

Qlik Sense

SAP Business Objects

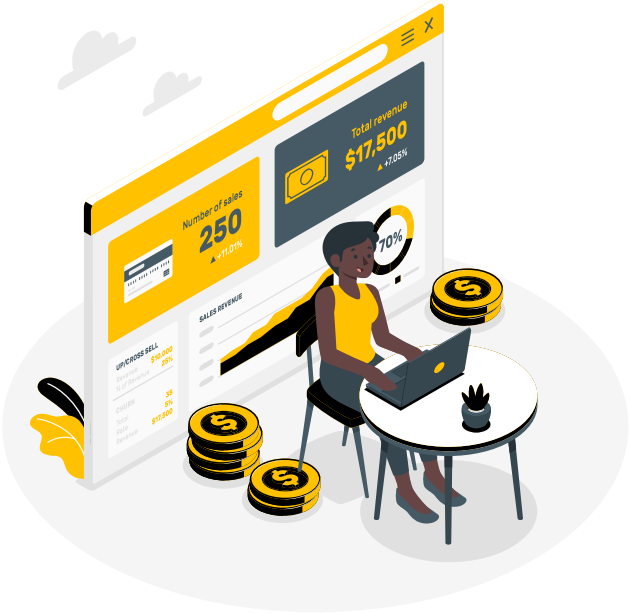
Market leader

Microsoft Power BI

IBM Cognos Analytics

Other IMSs

05



Other IMSs

SCM
(**S**upply **C**hain **M**anagement)

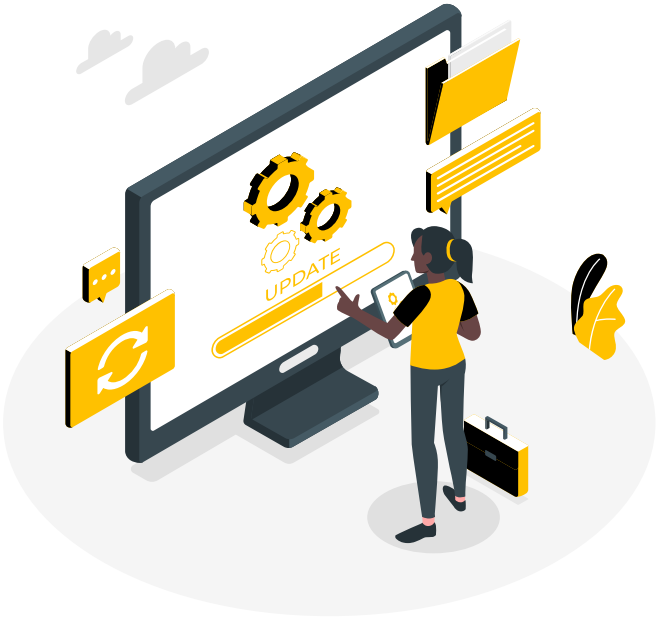
- Optimization of the **supply, storage and distribution of merchandise processes**.
- It usually includes a Logistics Management System (LMS).

Other IMSs

HCM
(**H**uman **C**apital **M**anagement)

Includes:

- **HRMS**
  (**H**uman **R**esource **M**anagement **S**ystem): administrative management of personnel (payrolls, contracts, benefits, vacations…).
- **HRIS** (**HR I**nformation **S**ystem): personnel information management (personal data, work history, training, evaluations…).



SaaS and Cloud Computing

06

SaaS and Cloud Computing

Cloud Computing

- Using **computing resources provided by another company**, rather than your own equipment.
- CPU, storage, security schemes, software…

SaaS (Software as a Service)

- CC model in which the **resource provided is a software product**.
- IMS vendors typically offer their products in SaaS mode.

SaaS and Cloud Computing

Advantages

Cost reduction:

- Pay-per-use.
- No data center.
- No specialized personnel

Security:

The supplier company has expert and competent employees.

Availability:

A very high percentage is guaranteed, difficult or expensive to achieve with own equipment.

SaaS and Cloud Computing

Disadvantages

Legal:

For an external company to be able to manage the personal data of a company's customers, it must **comply with** the European **GDPR** and the Spanish **LOPDGDD**.

Security:

Delegating the storage of critical information for a company can raise suspicions.

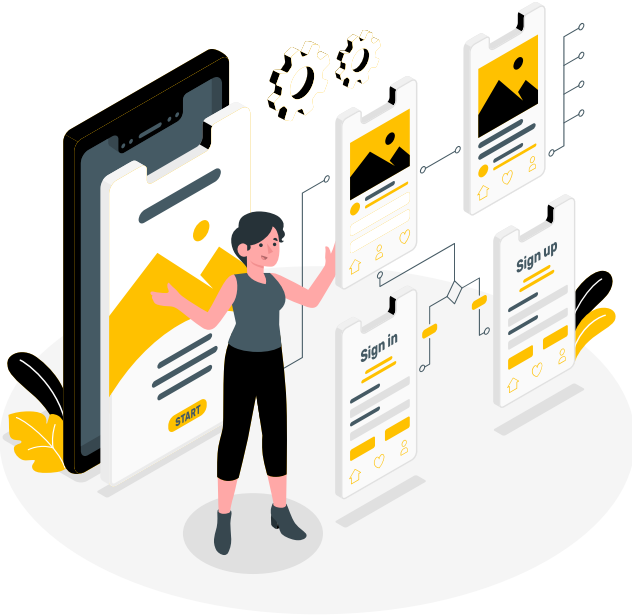
Others:

The company providing the service, eventually could:

- Go bankrupt.
- Modify its contractual clauses.
- Modify its fares.
- …

Secure Access Mechanisms to Information

07



Secure Access Mechanisms to Information

- In certain business sectors, access to information has more implications than in others.
  - Financial institutions.
  - Insurance companies…
- To a greater or lesser extent, **all businesses must protect the data their IMSs store**.
- Also, for **legal reasons**: GPDR and LOPDGDD.
- Holders of personal data must ensure their **integrity, security and confidentiality**, guaranteeing the digital rights of individuals.

IMSs must meet certain **requirements regarding the security of the data** they store: **access control** and **traceability**

Secure Access Mechanisms to Information

Access control and privacy

User access to IMSs and the data they store must be **limited and controlled**

- **System access control**: authorized users only.
- **Access control to system functionality**: with permissions that limit user access to only the features required by their profile.
- **Data access control**: with permissions that limit user access to only data within their scope of responsibility.
  - Example: an area manager should only have access to the data of their subordinates; but not from employees in other areas.

Secure Access Mechanisms to Information

Access control and privacy

- Restrictions should be organized into **roles**.
  - Different roles with **different access levels**.
  - Assignment to users.
  - Exceptions could be created (**flexible roles**).

- **PoLP** (**Principle of Least Privilege**):
  users should be granted only the minimum access rights necessary to perform their tasks, with every other permission denied by default.

Secure Access Mechanisms to Information

Traceability and auditing

Traceability:
logging records for all actions on the stored data:

- Who was accessing?
- When was the access?
- What was consulted?
- What was modified?
- How was it modified?

These notes are called **audit logs**.

- In files, DBs or other persistent media.
- Always useful for detecting and correcting errors.
- Sometimes required by Law.
  - Public entities
  - Financial institutions
  - Insurance companies
  - ...

Thanks!

Do you have
any questions?

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