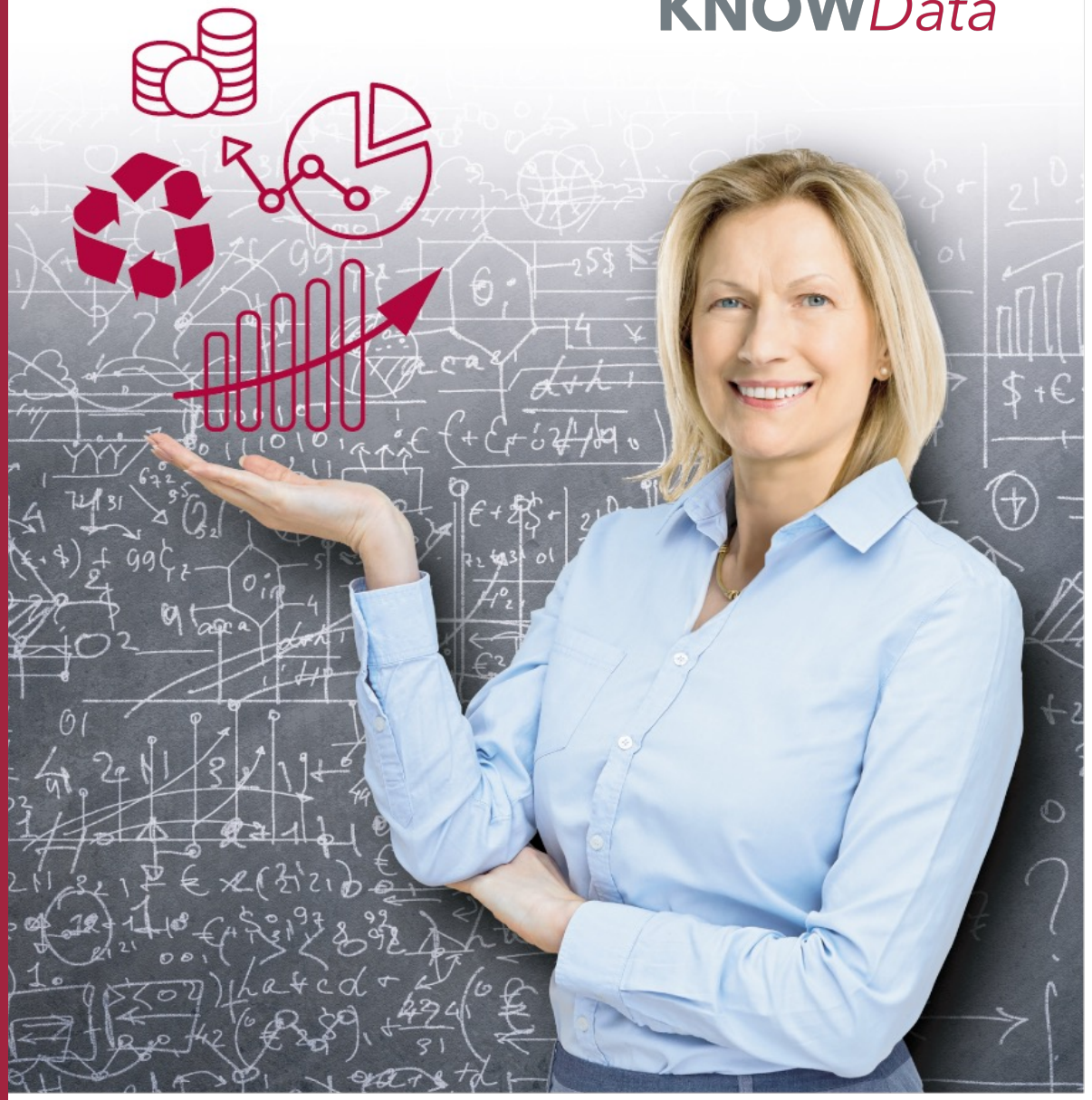
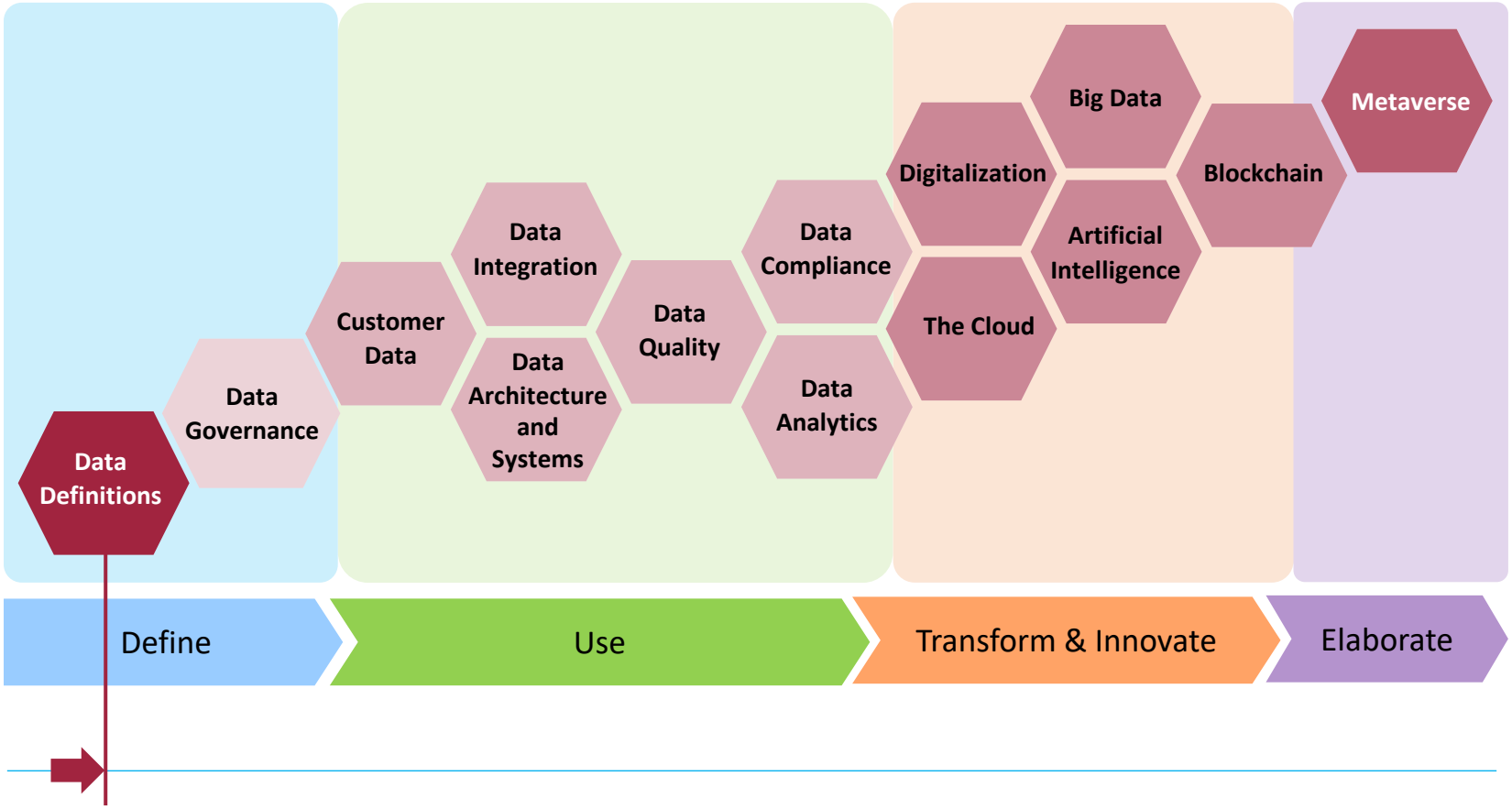
Data Definitions

KNOWData

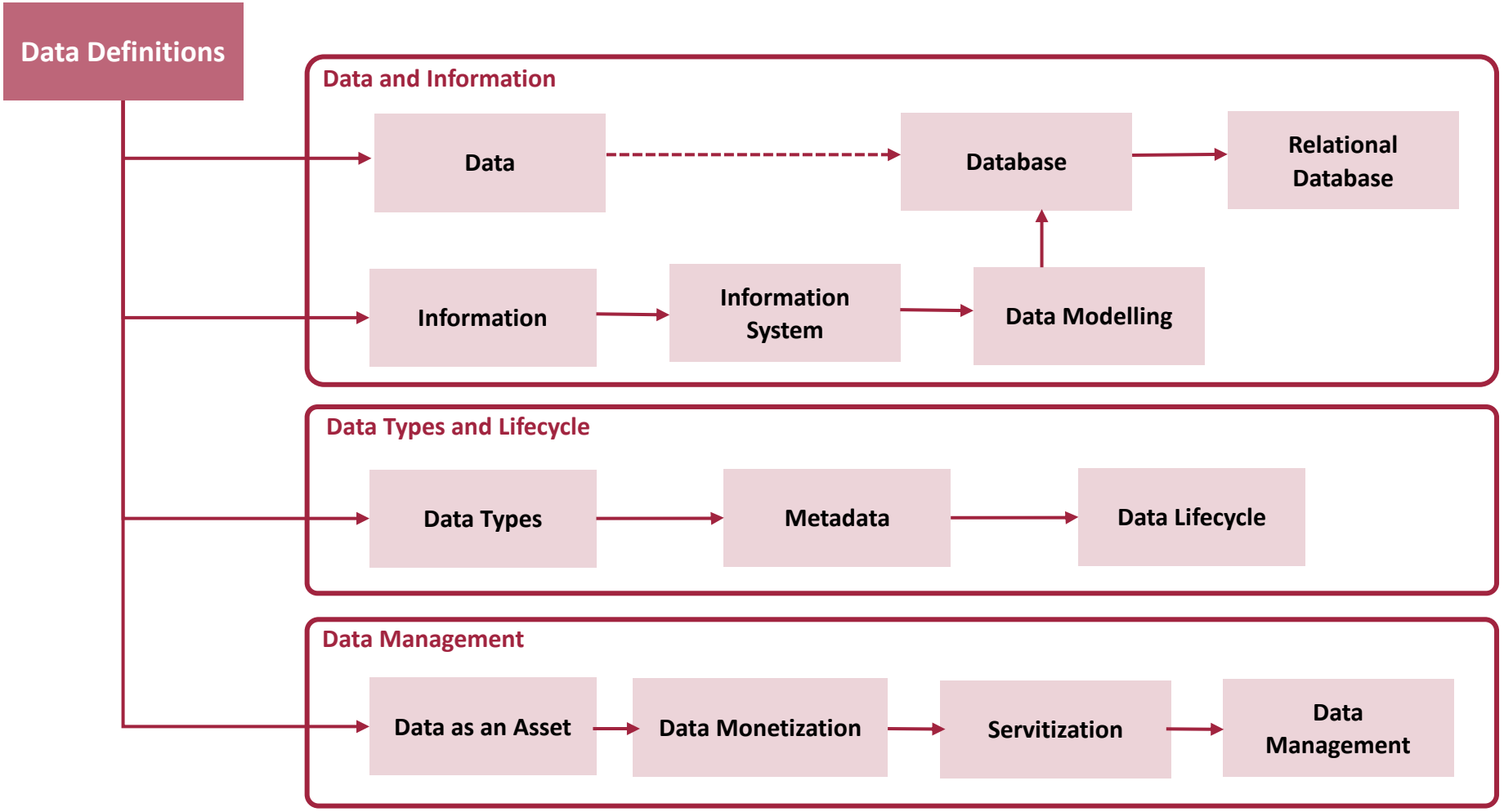


January 11, 2026

Lionel Pilorget


Data Definitions
Data Governance
Customer Data
Data Integration
Data Architecture and Systems
Data Quality
Data Compliance
Data Analytics
Digitalization
The Cloud
Big Data
Artificial Intelligence
Blockchain
Metaverse
Define
Use
Transform & Innovate
Elaborate

Structure of the presentation



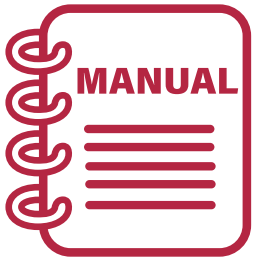
What are Data?

- Data are raw facts or figures collected from various sources
- Data can be in the form of numbers, text, images, sound, or video

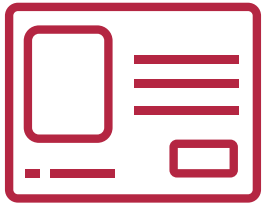
Which Data in a Company?

Printed reports

Printed reports

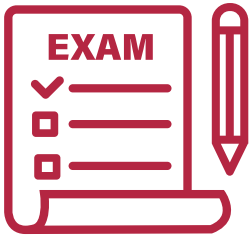


Manual



Official IDs

Prescription



Printed questionnaire for test

Photographs printed on paper

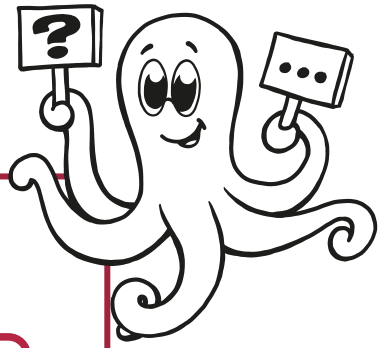
Poster

Book

Soft Copy Data => in a Digital Format

Type of data	most common file extensions
Text	.txt , .rtf, .doc, .docx, .pdf
Image	.bmp, .jpg, .jpeg, .gif, .png, .tif, .tiff, .webp
Audio	.mp3, .wav, .aac, .flac
Video	.mp4, .avi, .mov, .wmv, .mkv
Spreadsheet	.xls, .xlsx, .csv, .ods
Presentation	.ppt, .pptx, .odp, .pdf
Web	.html, .htm, .css, .js, .json, .xml
3D and CAD Files	.dwg, .obj, .stl, .blend
System and Configuration	.ini, .cfg, .log, .sys, .reg
Executable and Script	.exe, .app, .bat, .sh, .py, .js

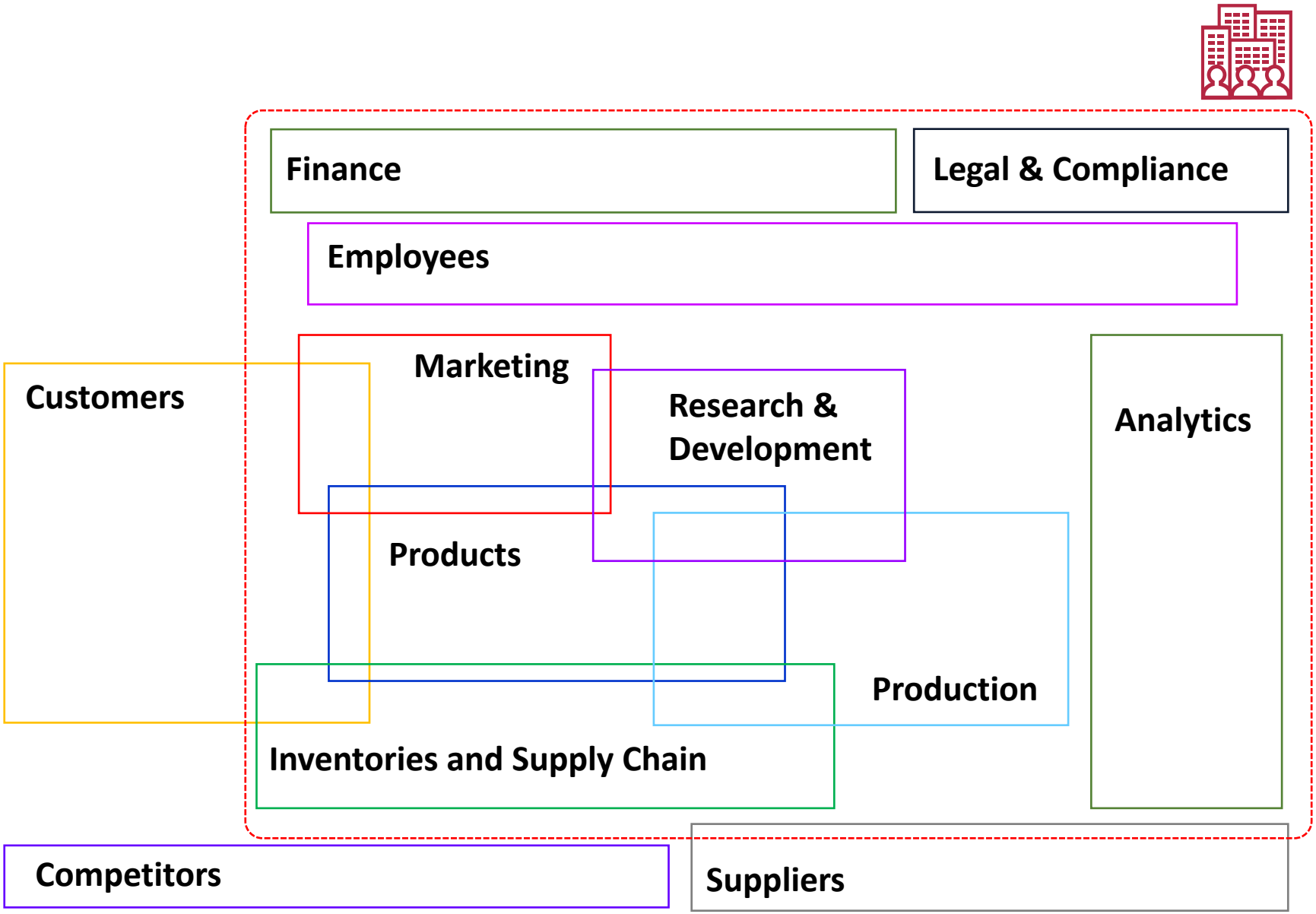
Which data do you use?



For private purposes

In your job

Key Data Areas in a Company



Examples of Business Data

Customer (Person)

- Full Name
- Date of Birth
- Gender
- Contact Information
- Age
- Occupation
- Preferences
- Payment Methods
- …

Customer (Company)

- Company Name
- Company Size
- Headquarter / Branch Locations
- Invoices and Payment Records
- Noga Code
- Contract Agreements
- …

Products

- Product Information
- Purchase Details
- Pricing and Payment Terms
- Product Delivery
- Support and Maintenance
- …

Suppliers

- Supplier Name
- Contact Information
- Product Catalogue
- Price Lists
- Minimum Order Quantities
- …

Marketing

- Audience
- Campaign Performance
- Content
- …

Employee

- Personal Information
- Employment Details
- Payroll and Compensation
- …

R&D

- Technology Development
- Research Outputs
- Collaboration
- …

Competitors

- General Information
- Product Information
- Financial Data
- Online Presence
- Competitive Advantages
- …

Legal

- Contracts
- Litigation and Dispute
- …

Supply Chain

- Inventory Management
- Logistics and Transportation
- …

Production

- Production Planning
- Bill of Materials
- Equipment and Machinery
- …

Finance

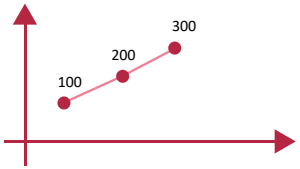
- Income and Revenue
- Debt and Financing
- Financial Statements
- …

But what is the use of Data?

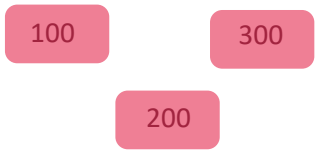
Data lead to Information, Information to Knowledge and Knowledge to Wisdom

Developing a new product line based on anticipated customer needs and societal trends

Understanding that targeting specific target groups leads to higher sales



Sales increased last quarter



List of sales numbers

Wisdom

Apply insights with judgment and foresight

Knowledge

Analyse and contextualize information for actionable insights

Information

Organize raw facts to reveal patterns

Data

What's the best course of action?
Ability to apply knowledge effectively, ethically, and with foresight to make sound judgments

How to use it?
Analyzing and synthesizing information to draw insights or make decisions

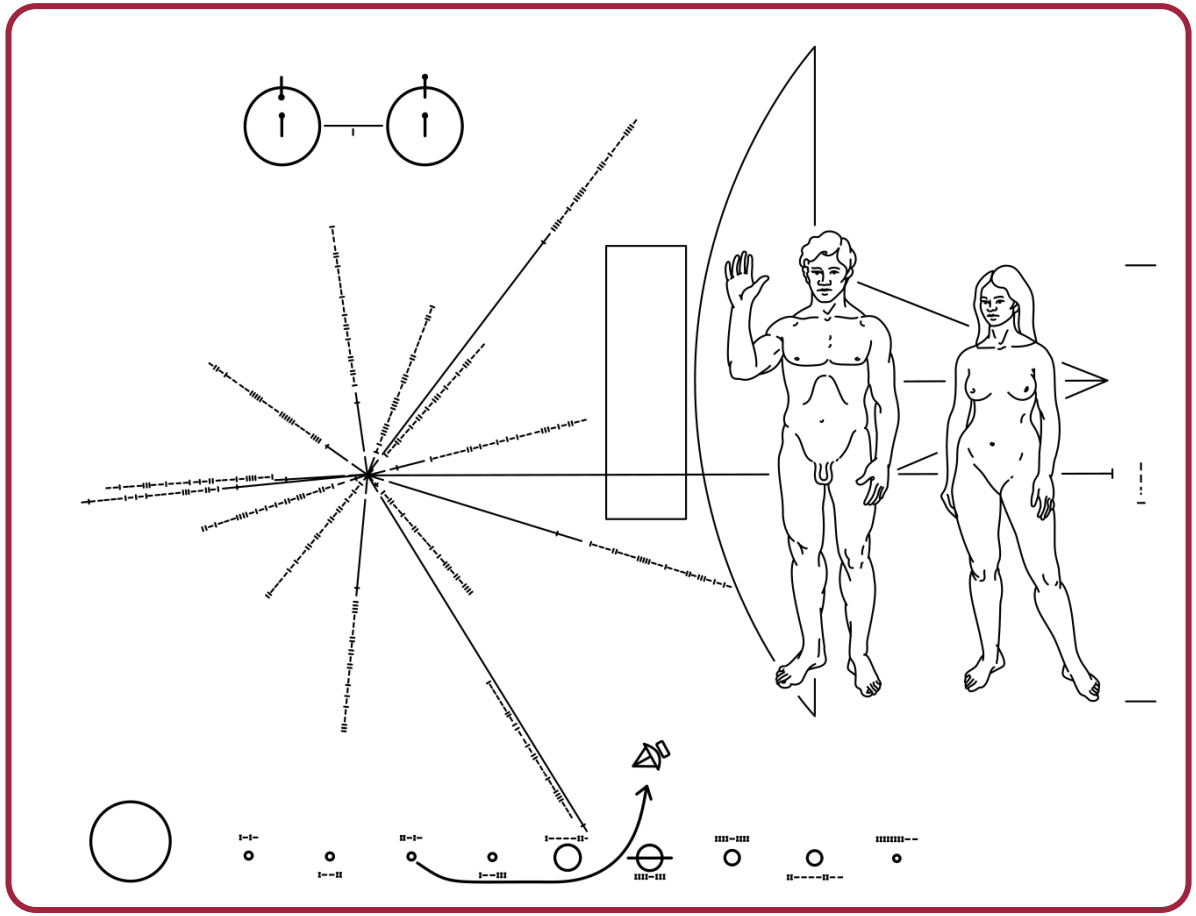
Why did it happen?
Processed, structured, or presented data to provide context and relevance

What happened?
Unprocessed, raw facts or figures without any context or meaning

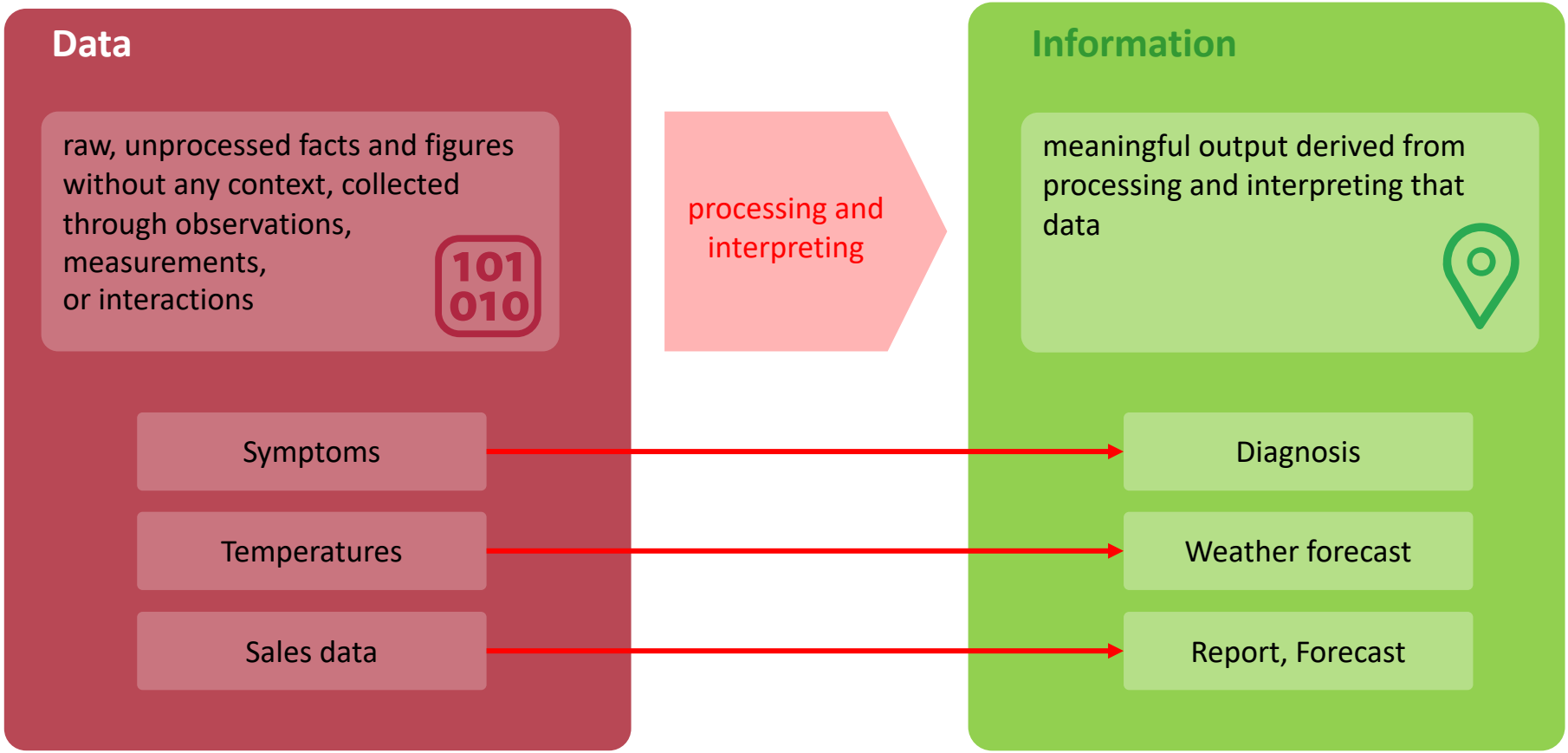
What is Information?

Information is data that have been processed, organized, and presented in a meaningful way to answer questions, solve problems, or make decisions

The **Pioneer plaques** are a pair of gold-anodized aluminum plaques that were placed on board the 1972 *Pioneer 10* and 1973 *Pioneer 11* spacecraft, featuring a pictorial message, in case either *Pioneer 10* or *11* is intercepted by intelligent extraterrestrial life



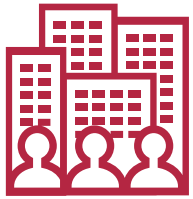
Difference between Information and Data



What does this train ticket tell us?

Data	Information	Extra Information
date	When do I have to leave? What is my flexibility?	Purpose
City names	Distance and duration	Frequency
		Accompaniment
		extra Luggage
Ticket number		Travel Details
		Disability assistance
Figure	Travel class	
		Weather
Currency, Figure	Ticket cost	
		Disruptions

Information Management (IM)



Employees need different information to do their jobs. They will have different needs when accessing, processing, and archiving that information.

IT tools support the creation and use of information. It must be ensured that each piece of information is secured to minimize data breach risk and maintain compliance with necessary regulations, all while reducing the potential for friction in accessing this information throughout the workday

People

Technologies

Processes

Processes must ensure that staff members have the requisite data to complete their job accurately, efficiently, and securely while facilitating intra-department and intra-organization collaboration.

Improve decision-making
Enhance customer satisfaction
Increase operational efficiency
Ensure compliance
Reduce risks
Enhance scalability

Information System (IS)

The purpose of a system is what it does (POSIWID by Stafford Beer)

Storing data
-> Efficiency
-> No redundancy

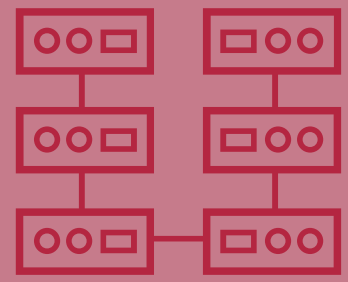
Transmitting data
-> Efficiency
-> Security

Processing data
-> Efficiency
-> Availability

Improving Resilience
-> Compliance
-> Security

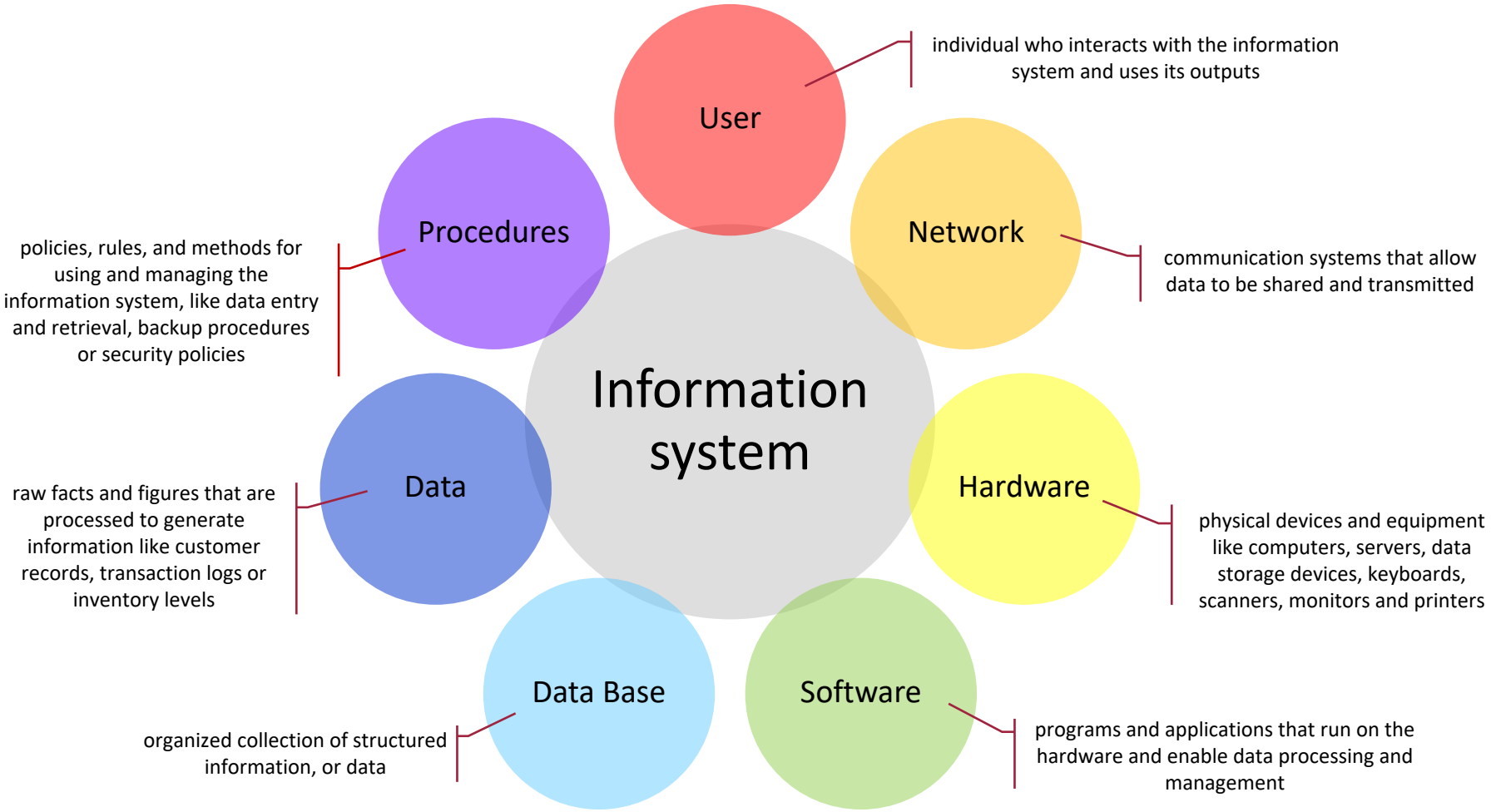
Enhancing collaboration
-> Efficiency
-> Customer satisfaction

Information System



Collection, processing, storing, and distribution of information

Elements of an Information System

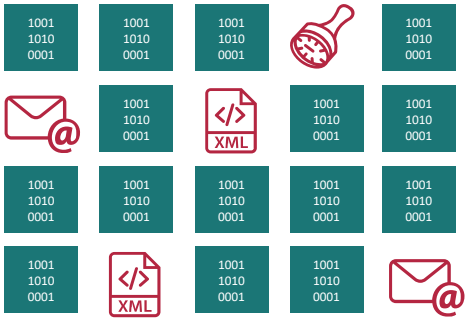


Structuration of data

Structured Data

- Customer Relationship Management (CRM)
- Inventory Management
- Transactional Systems
- Business Intelligence and Reporting

Semi-structured Data



- Web Data
- IoT Devices
- Log Analysis
- Email Storage

Unstructured Data

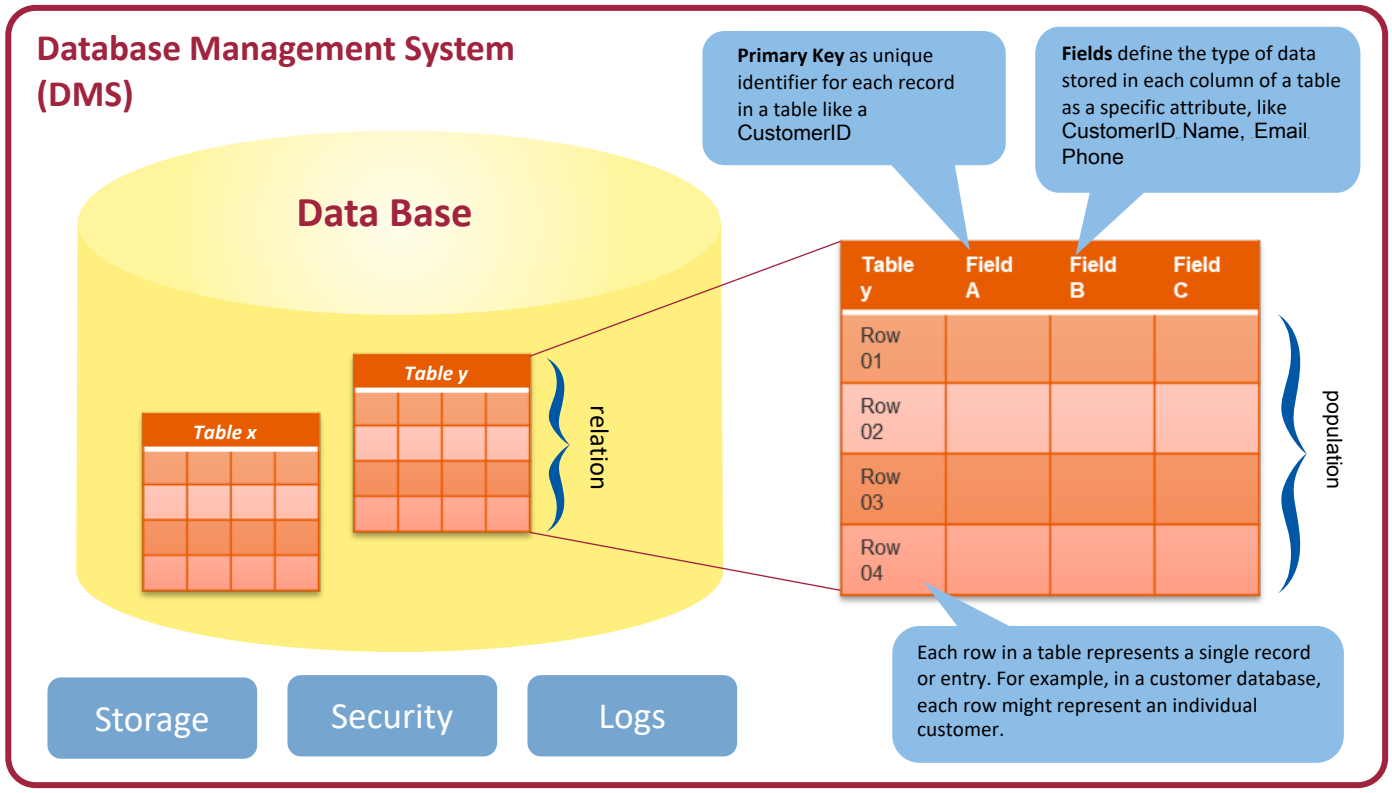
- Social Media and Sentiment Analysis
- Multimedia Analytics
- Customer Support
- Big Data Processing

Data Base (DB)

DBs are used to store, organize, analyze and retrieve data and information, as a structured collection of data, generally stored and accessed electronically from a computer system.

- Queries
- Transactions
- API Input

- Outcomes
- Records
- Reports



Most used Data Bases

- **Relational Databases** (MySQL, Oracle Database, Microsoft SQL Server, SQLite)

  Use Cases: Banking, e-commerce, content management, and transactional systems

- **NoSQL Databases** (MongoDB, Redis, Apache Cassandra, Neo4j)

  Use Cases: Real-time analytics, IoT, content personalization, and big data applications

- **Cloud Databases** (Amazon Aurora, Google Cloud Spanner, Azure SQL Database, Snowflake)

  Use Cases: Scalability, distributed systems, and reducing infrastructure management

- **In-Memory Databases** (Redis, Memcached)

  Use Cases: Caching, real-time analytics, and session management

- **Analytical and Data Warehousing Databases** (Snowflake, Google BigQuery, Amazon Redshift, Apache Hive, Teradata)

  Use Cases: Business intelligence, reporting, and big data processing

- **Time-Series Databases** (InfluxDB, TimescaleDB, Prometheus)

  Use Cases: Monitoring, IoT, and financial systems

- **NewSQL Databases** (CockroachDB, Google Spanner, TiDB)

  Use Cases: Modern applications requiring ACID compliance and scalability

- **Object-oriented Databases** (ObjectDB, db4o)

  Use Cases: Engineering applications, simulations, and object-based modeling

- **Graph Databases** (Neo4j, Amazon Neptune)

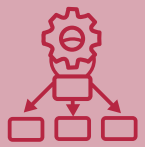
  Use Cases: Social networks, recommendation engines, and fraud detection

Data Models (DM)

Graphical systems used to capture the nature and relationships among data

Process Models → **Conceptual**  →

Conceptual Data Model
High-level model that outlines the overall structure and major entities and relationships without concern for technical details

Requirements → **Logical**  →

Logical Data Model
Model that defines entities, attributes, and relationships, but still independent of a specific database technology

Data → **Physical**  →

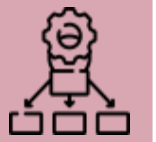
Data Base
Model that includes the actual implementation of the database, including tables, columns, data types, indexes, and constraints

Easy examples of different Data Models

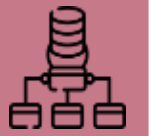
Business understanding > Technical design > Database implementation

Conceptual

Logical



Physical



```
Entities:
- Book
- Author
- Member
```

```
Relationships:
- A Book is written by one or more Authors.
- A Member borrows zero or more Books.
```

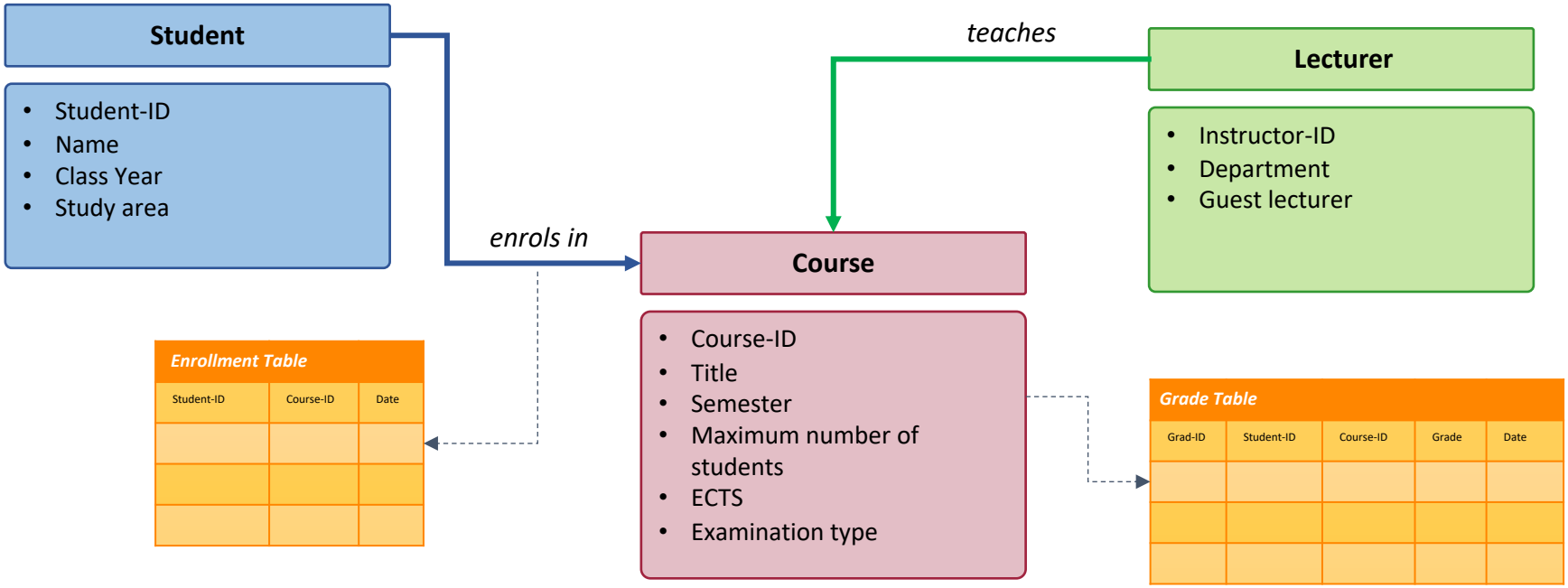
```
Book (BookID [PK], Title, ISBN, PublishedDate)
Author (AuthorID [PK], Name, BirthDate)
Member (MemberID [PK], Name, Email, JoinDate)

BookAuthor (BookID [FK], AuthorID [FK])  ← Junction table for many-to-many
Borrow (BorrowID [PK], BookID [FK], MemberID [FK], BorrowDate, DueDate)
```

```sql
CREATE TABLE Book (
  BookID INT PRIMARY KEY AUTO_INCREMENT,
  Title VARCHAR(100) NOT NULL,
  ISBN VARCHAR(13) UNIQUE,
  PublishedDate DATE
);

CREATE TABLE Author (
  AuthorID INT PRIMARY KEY AUTO_INCREMENT,
  Name VARCHAR(50) NOT NULL,
  BirthDate DATE
);
```

```sql
-- Junction table for Book-Author (many-to-many)
CREATE TABLE BookAuthor (
  BookID INT REFERENCES Book(BookID),
  AuthorID INT REFERENCES Author(AuthorID),
  PRIMARY KEY (BookID, AuthorID)
);

-- Borrow transaction table
CREATE TABLE Borrow (
  BorrowID INT PRIMARY KEY AUTO_INCREMENT,
  BookID INT REFERENCES Book(BookID),
  MemberID INT REFERENCES Member(MemberID),
  BorrowDate DATE NOT NULL,
  DueDate DATE NOT NULL,
  INDEX (BookID, MemberID)  ← Added for query performance
);
```

Entity Relationship Diagram (ERD)

An ERD illustrates how “entities” such as people, objects or concepts relate to each other within a system



Relational Database

Relationships between tables are done via foreign keys which refer to the primary key of another table. This establishes a link between the two tables and enforces referential integrity. One-to-One, One-to-Many, and Many-to-Many are the primary types of relationships in a relational database.

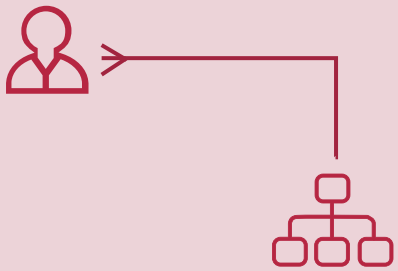
Employee

Department

Project

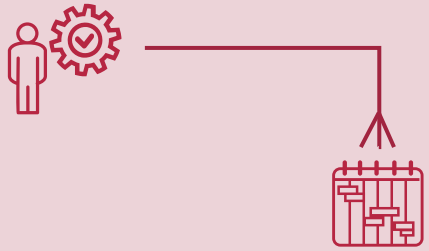
Project Leader

Many-to-One



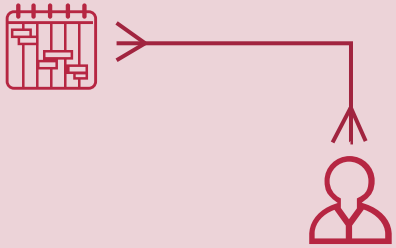
One department can have many employees, but each employee belongs to only one department

One-to-Many



A single project leader can manage multiple projects simultaneously, but just one person is responsible for a project, the project leader

Many-to-Many



Employees can work on multiple projects and each project can have multiple employees

Modeling a purchase order

Customer - Order - Article - Order Item

One-to-Many Relationship

*A **customer** can place **many orders**. Each order is associated with exactly one customer.*

Customer Table

customer_ id	customer_ name	email	phone_n umber
C01	John Smith	js@examp le.com	123-456-7890
C02	Lara Croft	lc@exam ple.com	987-654-3210
C03	…	…	…

Order Table

order_ id (PK)	customer_ id (FK)	order_ date	total_ amount
O_01	C01	2024-12-13	2000.00
O_02	C02	2024-12-14	75.00
O_03	C03	…	…

Legend:
PK: Primary Key
FK: Foreign Key

Article Table

Artikel_ id (PK)	Article_ name	price	stock_ quantity
A_01	Laptop	1000.00	20
A_02	Smart-phone	500.00	65
A_03	…	…	…

Many-to-One Relationship

*An **order item** refers to one **article**. Each article can appear in many order items.*

One-to-Many Relationship

*An **order** can contain **many order items**. Each order item is associated with exactly one order.*

Order Item Table

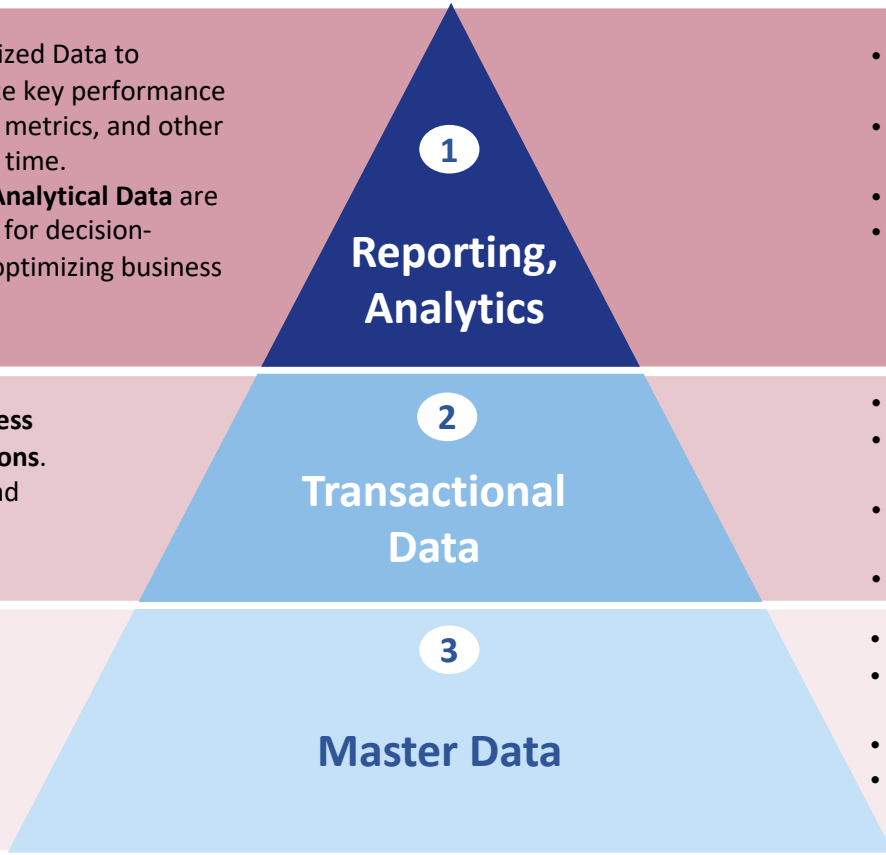
order_ item_ id (PK)	order_ id (FK)	article_ id (FK)	quantity	item_ total
PO_01	O_01	A_01	1	1000.00
PO_02	O_01	A_02	2	1000.00
PO_03	O_02	…	…	

In summary:

- **Customer table**: Stores customer details.
- **Order table**: Stores orders placed by customers.
- **Article table**: Stores details of products available for purchase.
- **Order Item table**: Links orders to articles, specifying which articles were bought and in what quantity.

Types of Data

Reporting Data are organized Data to monitor, track, and analyze key performance indicators (KPIs), business metrics, and other relevant information over time.
Collected and processed **Analytical Data** are used for in-depth analysis for decision-making, forecasting, and optimizing business processes



- **Financial Reports:** income statements, balance sheets, and cash flow statements
- **Compliance Reports:** environmental impact reports
- **Sales Trends:** Sales patterns over time
- **Customer Segmentation Data:** Grouping customers based on purchasing behaviour

Data **generated by business operations and transactions**. Such data are dynamic and frequently updated

- **Sales Orders:** Customer purchases
- **Invoices:** Billing information sent to customers
- **Payments:** Records of payments made or received
- **Shipments:** Information on goods shipped

Essential core data for operating a business. Such data are relatively static and don't change frequently

- **Customer Data:** Names, addresses, and contacts
- **Product Data:** Product IDs, descriptions, categories
- **Employee Data:** Employee IDs, names, job titles
- **Vendor Data:** Supplier information, contract terms

Reference Data

Currency | Noga Code | Postal codes | ...

Master Data within a Company

Essential core data about key business entities that provides context for business transactions and operations

SAP Master Data Governance:

A *single* application for enterprise master data management

Out-of-the-box, domain-specific solutions delivered by SAP


Customer


Supplier


Material


Financials


Retail Article


Technical Asset

Domains implemented by customers using SAP MDG's extensible application framework


Warehouse


Location


Legal Entity


Site

Country Code	Tax Code	Sales Organization	Material Group	Distribution Channel	Activity Type	Document Type
Order Type	Bank Code	Currency Code	Dunning Key	Divisions	Commodity Code	Inco Terms

Source: blogs.sap.com/2018/08/08/prepare-master-data-sap-s-4hana-implementation/

Company Master Data in Switzerland

Basic federal register

- Company name
- Unique Identification Number (UID)
- Type of Entity
- Registered office or domicile
- Address of the company
- Date of Incorporation
- Purpose
- Statutory Capital
- Share Structure
- Directors
- Authorized Signatories
- Auditors
- Status Active or Inactive
- Registration Details
- Branches
- Mergers, Acquisitions, and Liquidations

Thematic federal registers and federal information systems

- Business sectors (classified by NOGA codes)
- Employment statistics
- Registered trademarks, patents, and designs
- Company name protections and exclusivity
- Bids submitted for public procurement
- Status of insolvency proceedings
- Liquidators assigned to the case
- Permits for activities affecting the environment
- Compliance reports and violations
- Grants and subsidies received by businesses
- Purpose and outcomes of the financial aid

Cross-divisional information systems of the federal government

- Operational Licenses
- Export/Import Authorizations
- Regulatory Compliance Status
- Audit Results or Notices
- Sanctions and Restrictions
- Revenue/Turnover Bands
- Number of Employees
- Sector-Specific Indicators
- Foreign Affiliations
- Cross-Border Trade Data

Other federal or cantonal databases

- VAT (Value-Added Tax) Data
- real estate ownership and local levies
- Registration data for companies hiring foreign workers
- Local records of employees and businesses
- Company credit profiles, overdue payments, and liabilities relevant to financial transactions
- Licensing agreements and IP-related disputes
- Licensing and registration for companies operating transport services
- Pollution and Emission Registers
- Registries for farming cooperatives, subsidies, and land use data
- Data on companies generating, distributing, or trading energy

Transactional Data

Information recorded from transactions, as a transfer of goods, services, money, data, or information between two or more parties

Reporting Data

Collection, organization, and presentation of information or statistics related to a specific topic or event

Question: Which Data for which Type?

- Monthly sales numbers for each product category
- Sales order numbers
- Items purchased
- Energy consumption levels
- Supplier contact details
- Payment terms
- Website traffic
- Trades executed on stock exchanges
- Project progress
- Physical locations of stores
- Company vehicles
- Online purchase
- Patient visits
- Equipment maintenance schedules
- Call records
- Compliance with safety regulations
- Training completion rates

☐ Master Data

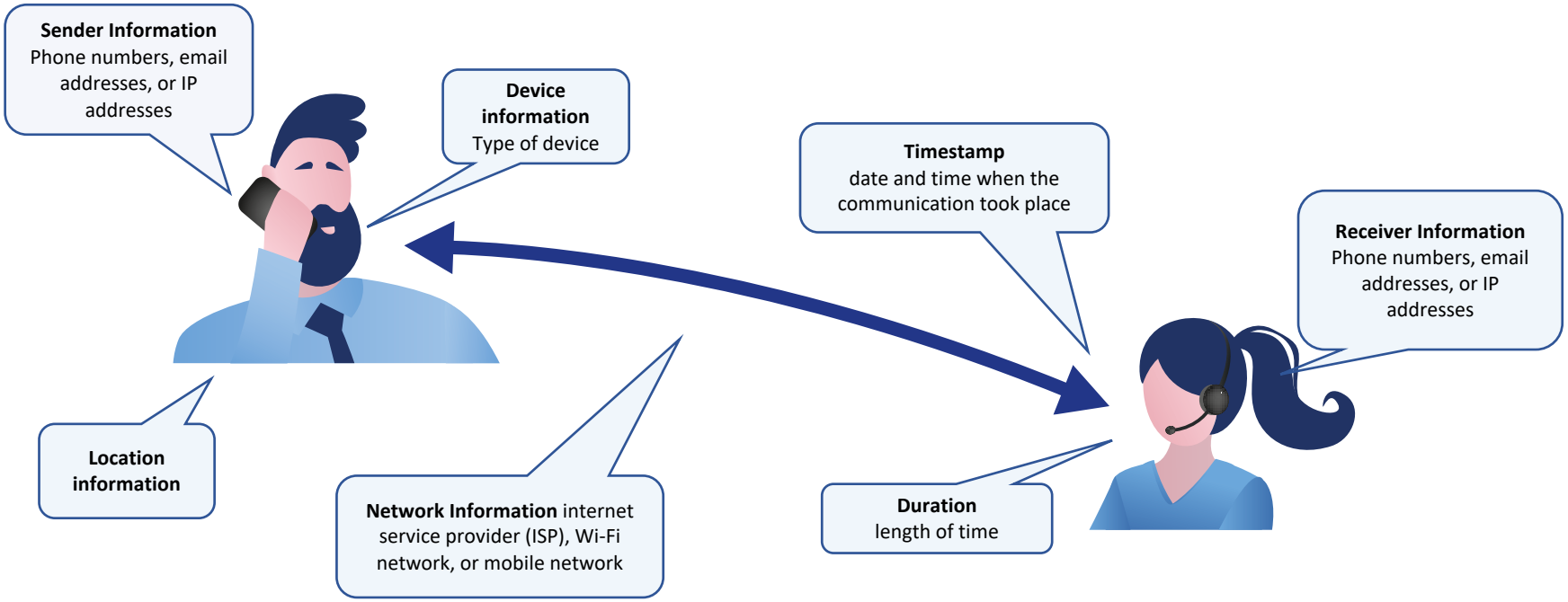
☐ Transactional Data

☐ Reporting Data

Metadata: Data about Data

It provides information about other data, helping to understand, manage, and use it effectively

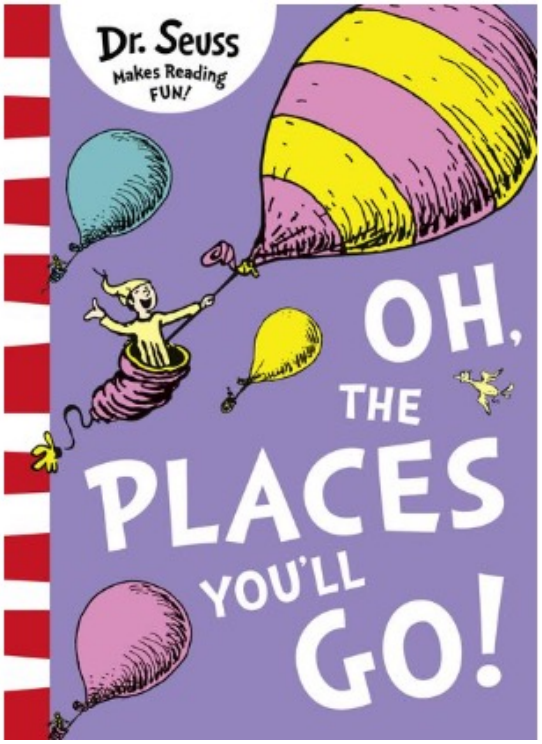
Communication metadata include various details about a communication event, such as who was involved, when it occurred, and how it was transmitted and do not provide information about the actual content of the communication itself.



Which Metadata for Dr. Seuss?

Today you are You,
that is truer than true.
There is no one alive
who is Youer than You.

–Dr. Seuss

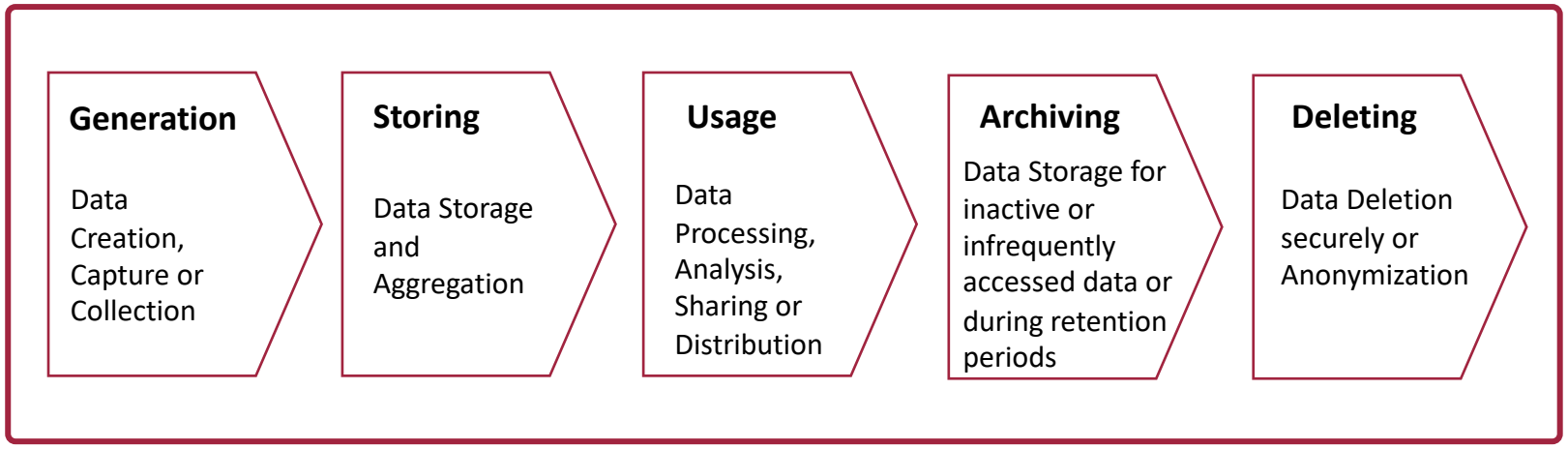


Data are changing over time

Data Lifecycle Management

Process of collecting, managing, storing, analyzing, and archiving data to keep them accurate and up-to-date

Compliance Requirements (Data Protection Act…)



Events and Triggers

(moving, turning 18-year-old, marital status, changing name…)

Examples of Data Lifecycle

Relevance of Data for Compagnies

Data are vital for organizations to drive efficiency, innovation, and progress

Economic Value

- Improving products and services
- Selling data
- Cost savings

Strategic Importance

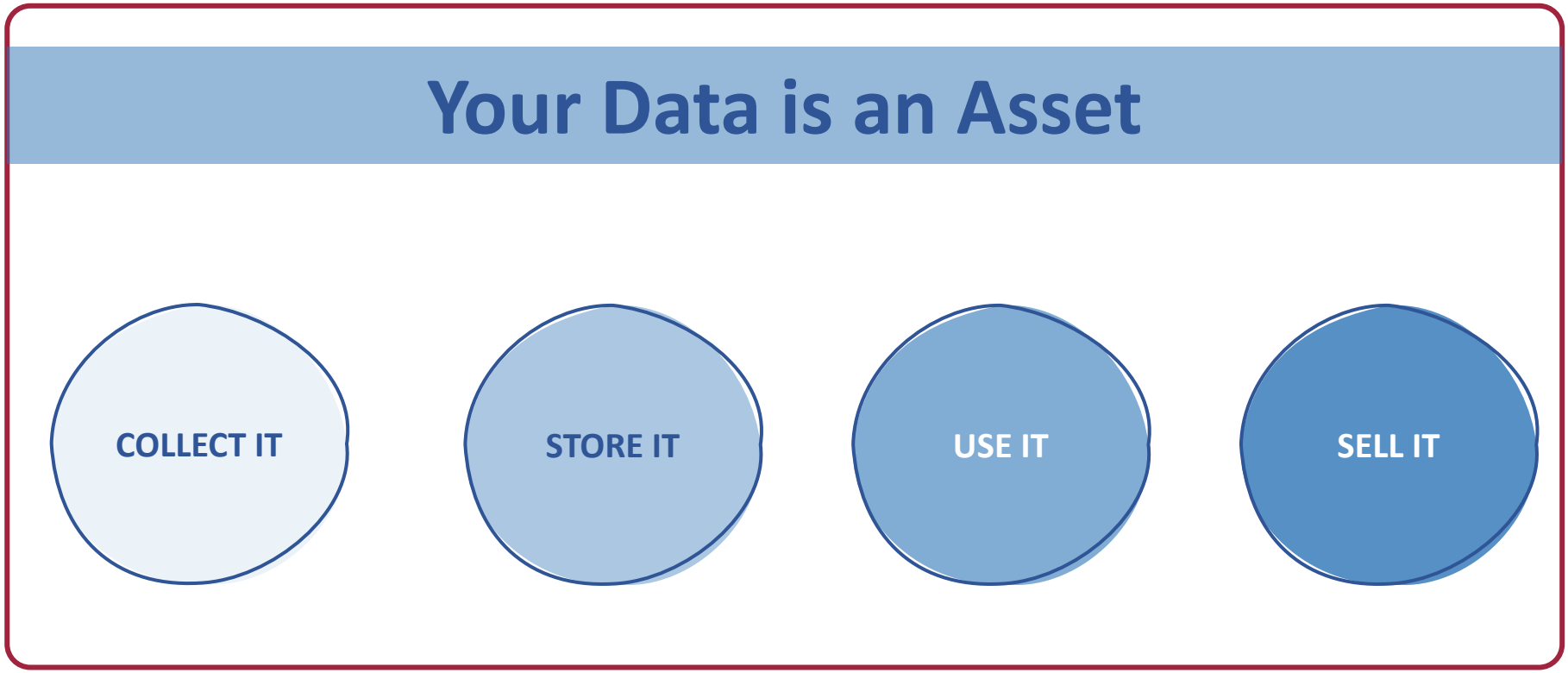
- Strategic decision-making
- Insights into market trends, customer behaviour
- Operational efficiency

Legal and Ethical Considerations

- Proper use of data
- Complying with data privacy regulations

Data as an Asset

By leveraging data, companies can improve their performance, reduce costs, increase customer satisfaction, and assure compliancy.



Data Monetization

Creating value with data

Business Improvements

Make existing business more efficient

- Customer orientation and personalization
- Efficiency increase (Process or Planning optimization)
- Risk reduction
- Assurance of being compliant

Selling Data as a Product

Sharing, selling, or licensing data to third parties for revenue

- Raw data
- Processed data
- Data-as-a-Service
- Insights or analytics
- Data aggregator
- Enriched data with metadata, machine learning models, or integrating demographic, geographic, or behavioral attributes

New Business Models

Create new business models

- New products or services
- Redefinition of the value chain
- Develop platforms or new data-enabled markets
- Leverage Innovation and Technology

Data Monetization

A step-by-step approach

Step 1: Preparation

- Understand the value of data as an asset
- Identify potential use cases
- Clarify the value the company data can offer to stakeholders
- Evaluate the available data, its quality, and relevance
- Ensure data usage adheres to privacy laws and industry standards
- Establish technical capabilities such as cloud storage, data integration platforms, and analytics tools

Step 2: Piloting

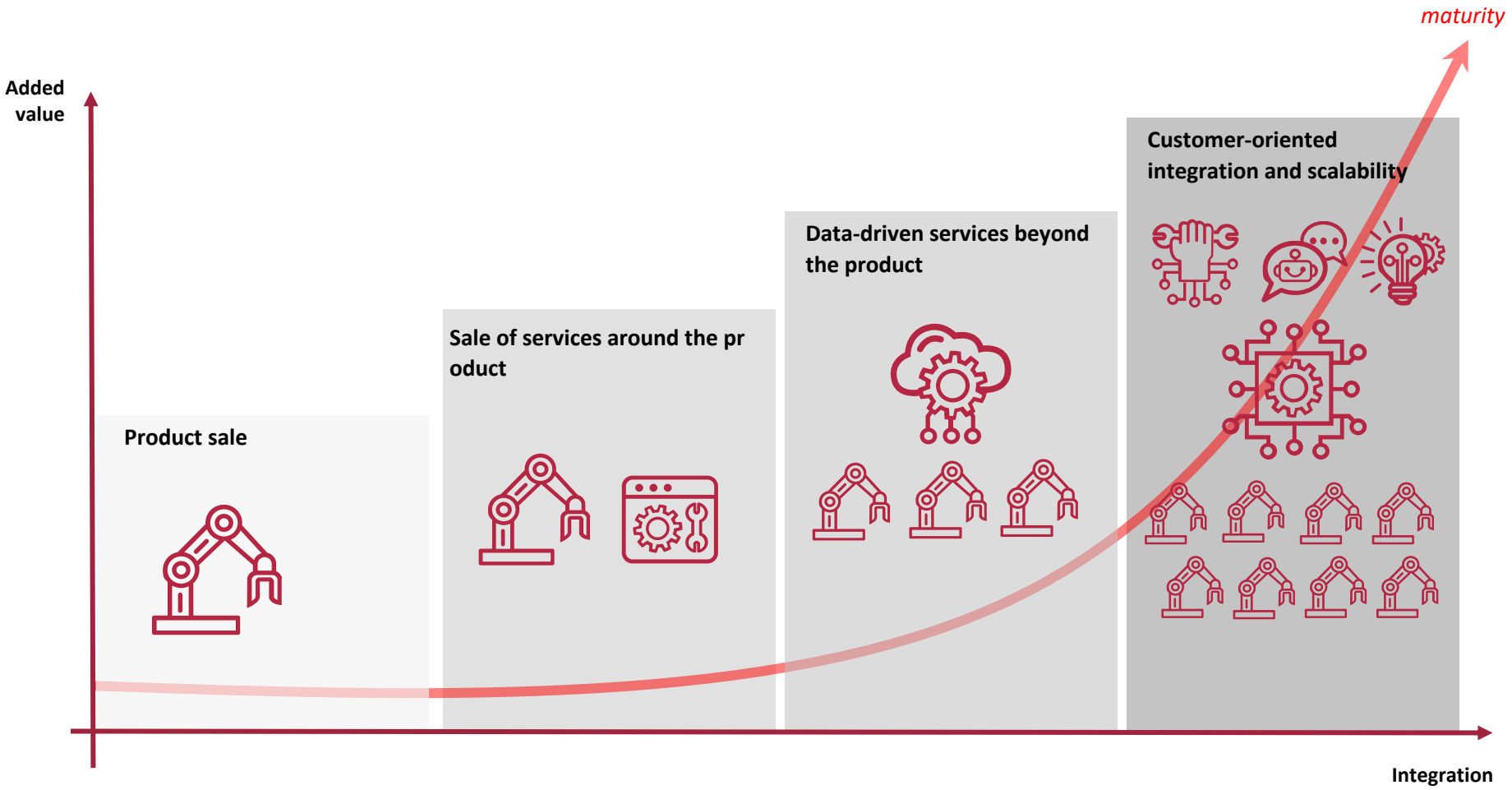
- Choose specific scenarios or business functions
- Build pilot solutions
- Validate data models and insights with initial datasets
- Deploy the pilot in controlled environments
- Gather feedback from stakeholders and refine models
- Assess key metrics and identify scalability potential

Step 3: Commercialization and Deployment

- Develop pricing models and packages
- Expand infrastructure to handle larger data volumes
- Automate and optimize processes for scalability
- Develop marketing and sales strategies
- Engage target customers through channels
- Gather ongoing feedback to enhance product offerings
- Explore new use cases, partnerships, or innovations

Servitization

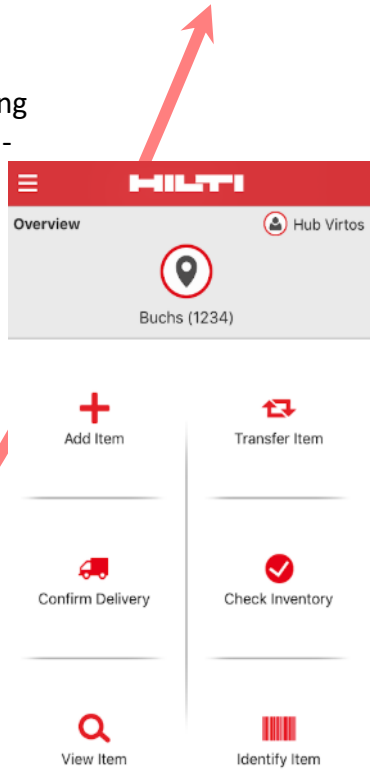
Transformational process whereby a company shifts from a product-centric to a service-centric business model



Hilti as Example

Added value

Fleet management: Complete solution providing devices combined with a full-service package - from free repairs to anti-theft protection



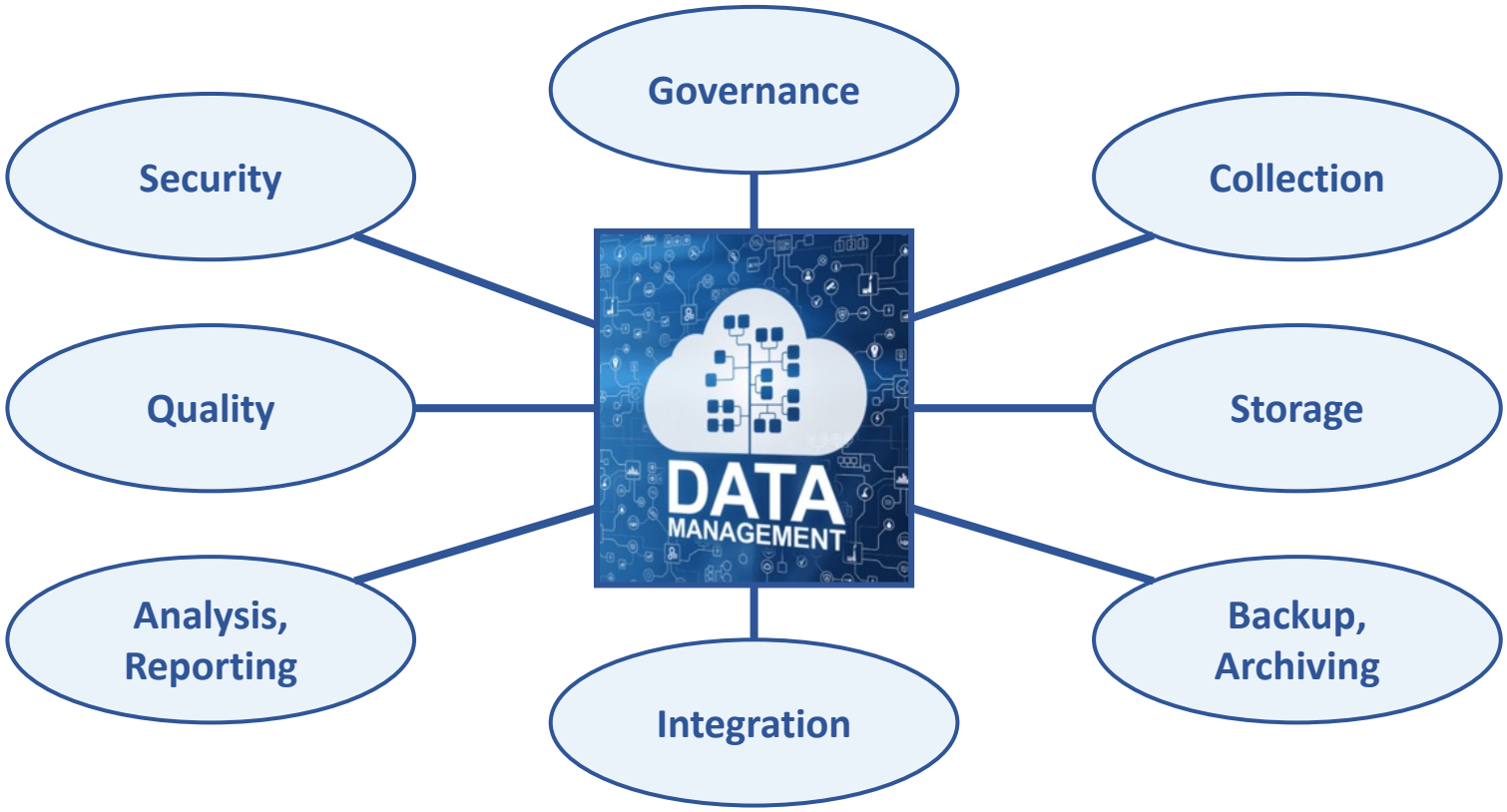
On!Track: Digital management of devices in terms of frequency of use, device status and other important tool information

Nuron: new battery platform with integrated connectivity

Integration

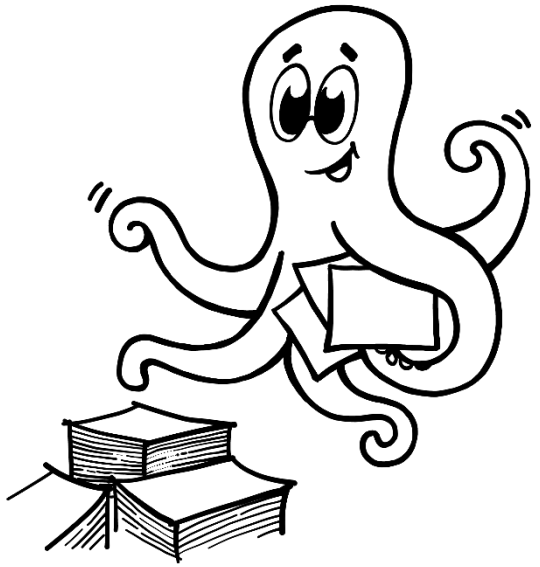
Data Management

Data Management is essential for improving efficiency, ensuring data accuracy and integrity, complying with regulations, protecting sensitive information, making informed decisions, enabling growth and scalability, and ensuring business continuity



Take away and must know!

- Difference between Information and Data
- Components of Information Systems
- Three Data Types
- Definition of Meta Data
- Data Lifecycle
- Relevance of Data Management



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