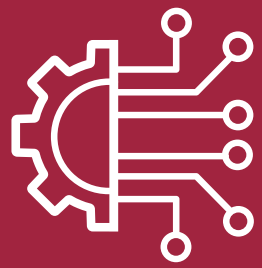
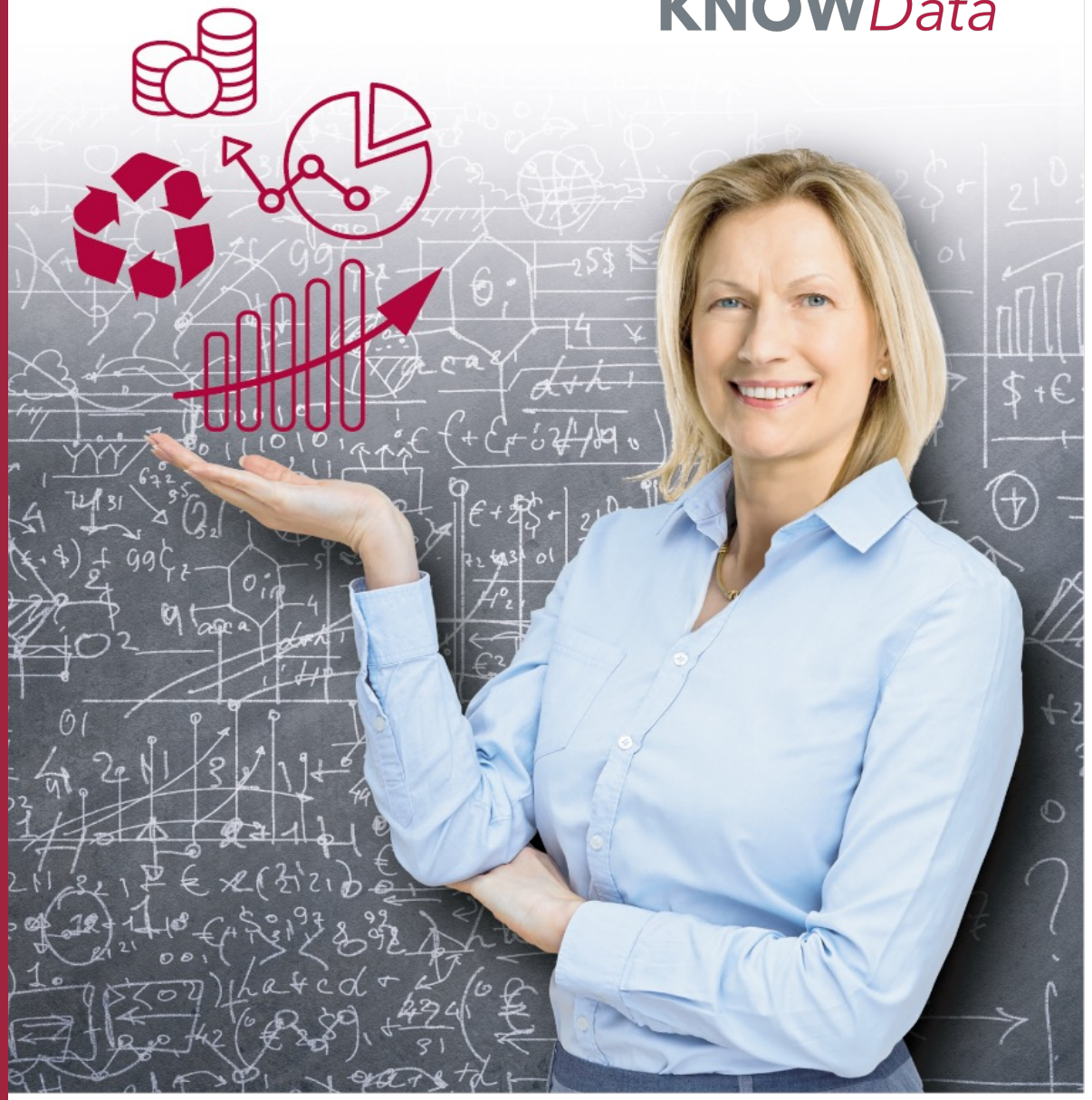
Data Integration



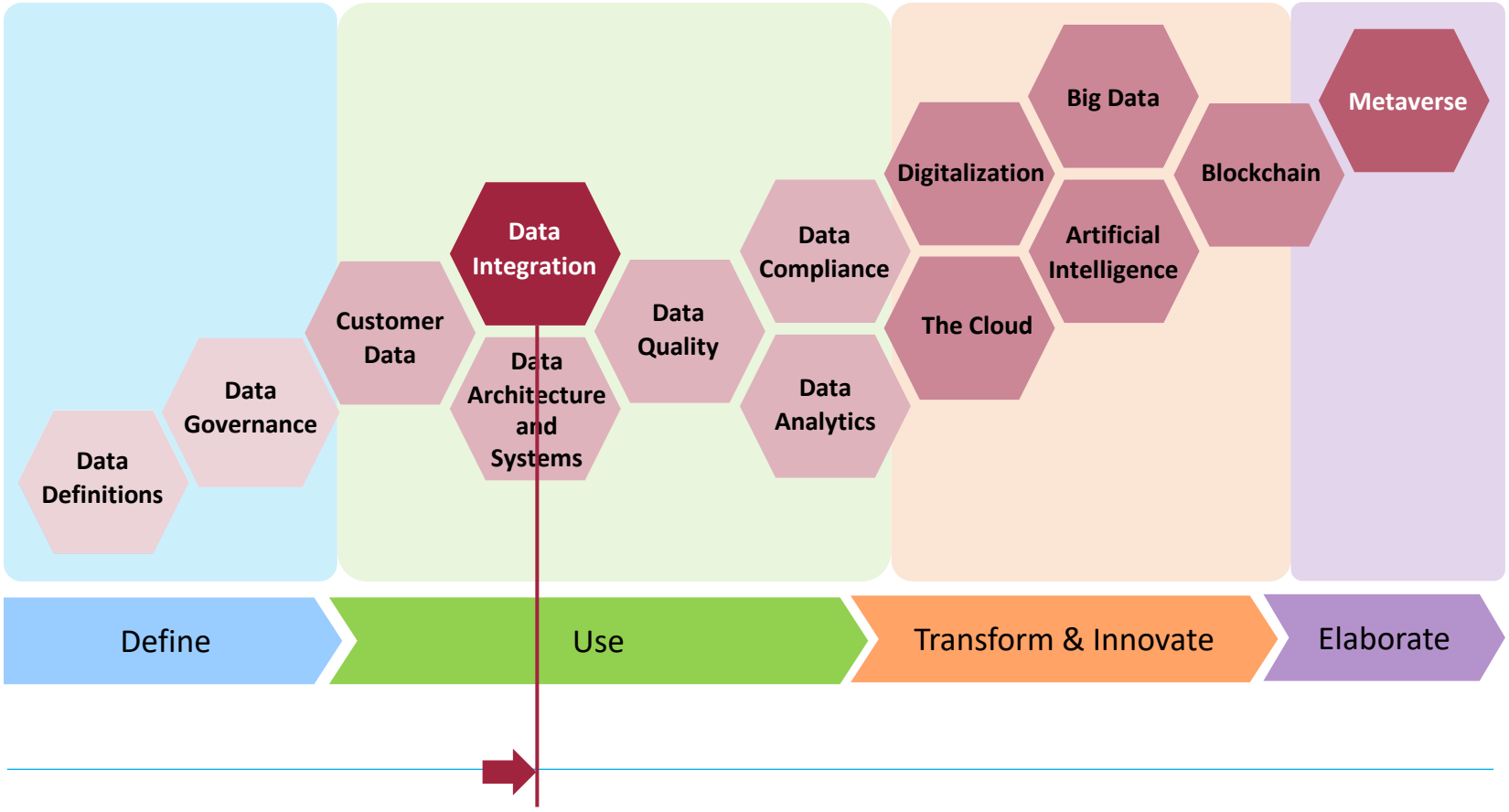
KNOWData



April 17, 2026

Lionel Pilorget

Lesson 4


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 lesson 4

Data Integration

Enterprise Resource Planning (ERP)

- Heterogeneous Environments → All-in-One → Data Migration

Data-Driven Manufacturing

- Y-CIM Model → Digital Twins → IoT

Inter-company Connectivity

- Data Transfer → API → Platform

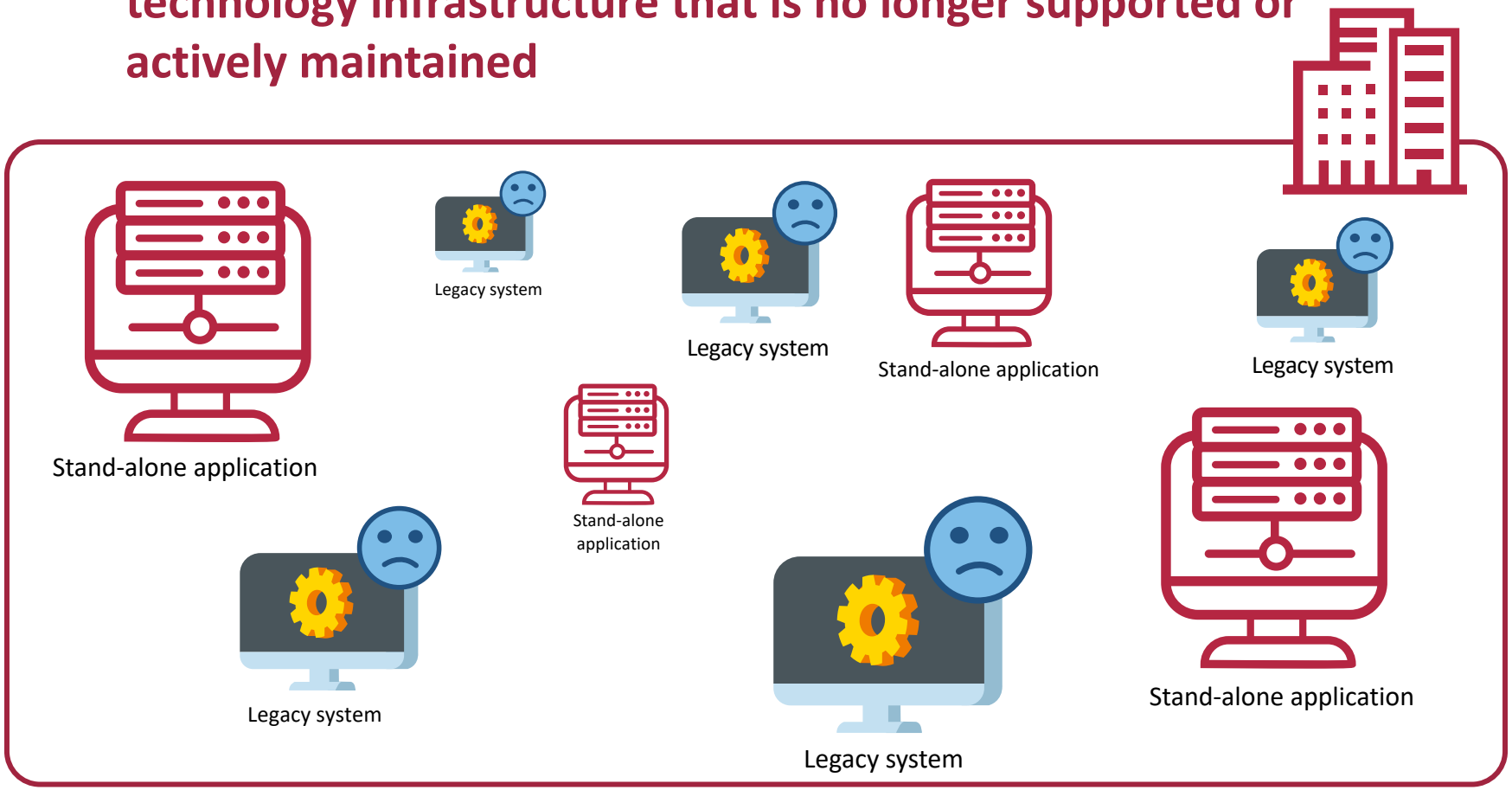
Data as a Service (DaaS)

- Use Cases → Delivery Models → Future Evolutions

Heterogeneous IT Environments

Stand-alone = runs independently and is not connected to any other system or network

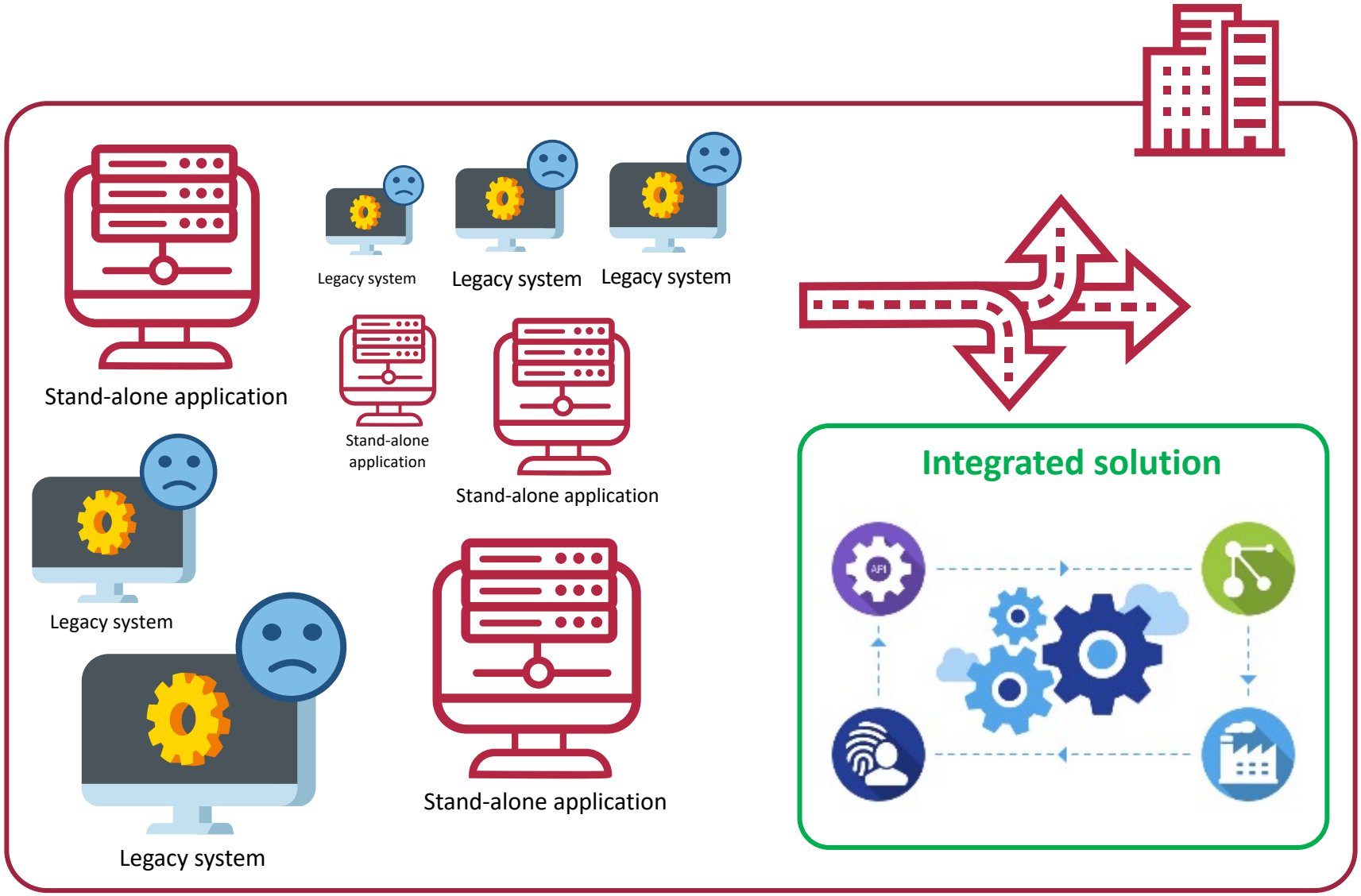
Legacy = outdated computer system, software program, or technology infrastructure that is no longer supported or actively maintained



The Challenges are…

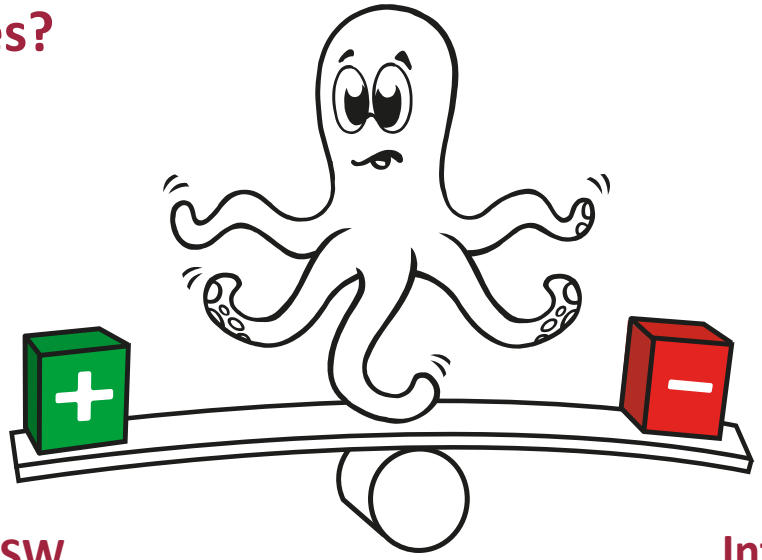
- Sharing data
- Integrating processes
- Encouraging collaboration
- Extracting information for Business purposes
- Maintaining consistent and synchronized data
- Being able to scale
- Being able to manage a big volume of data

How to Integrate Applications?



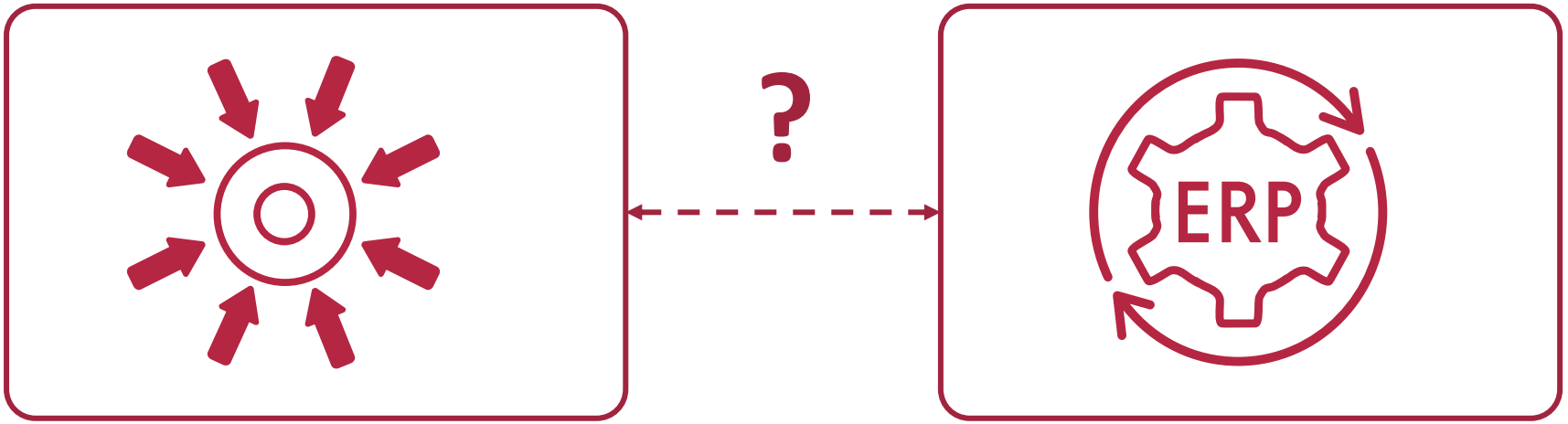
“Best-of-Breed” versus “all-in-One”?

Which advantages?
Which disadvantages?



Specific “niche” SW

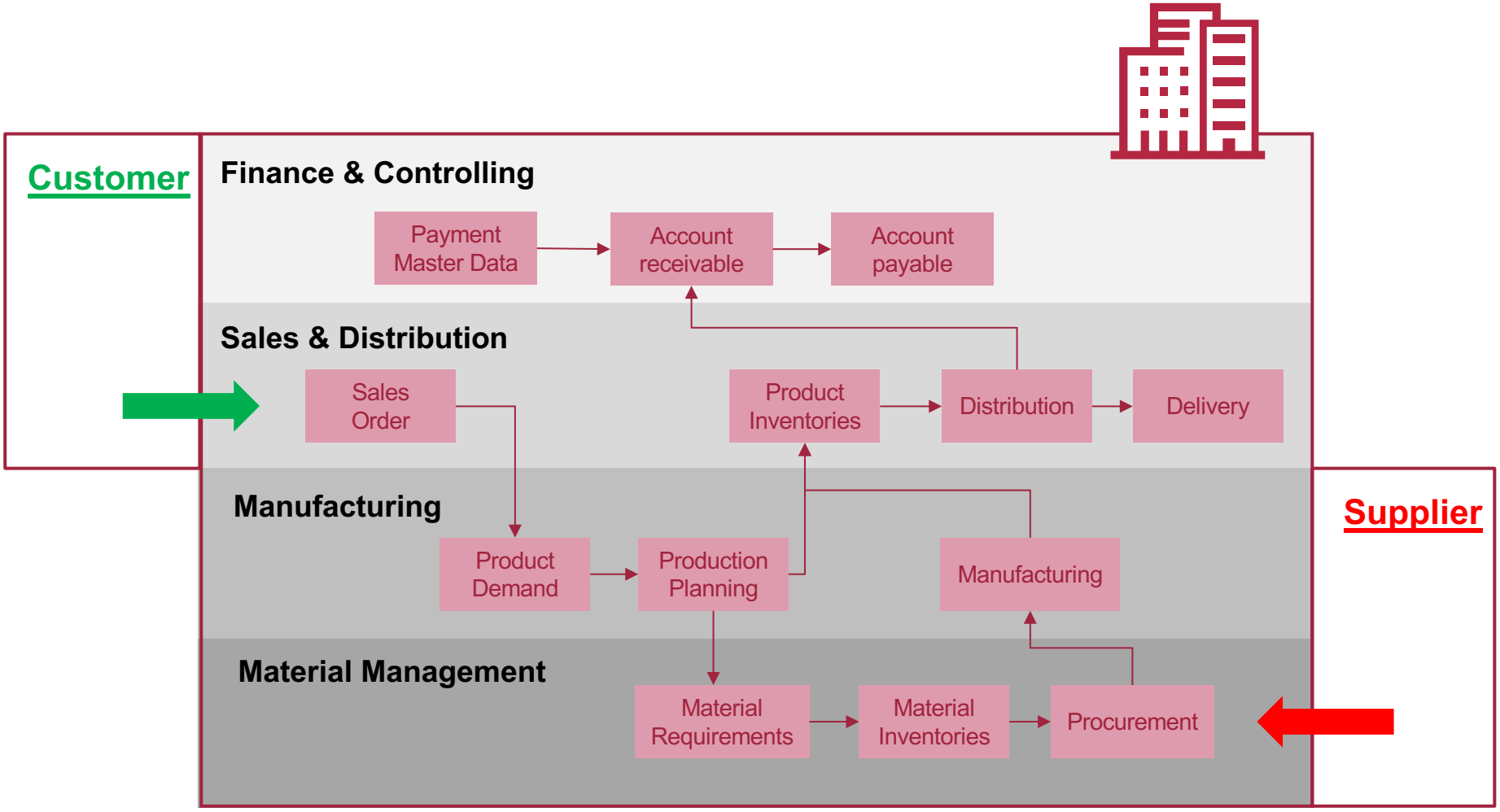
Integrated solution



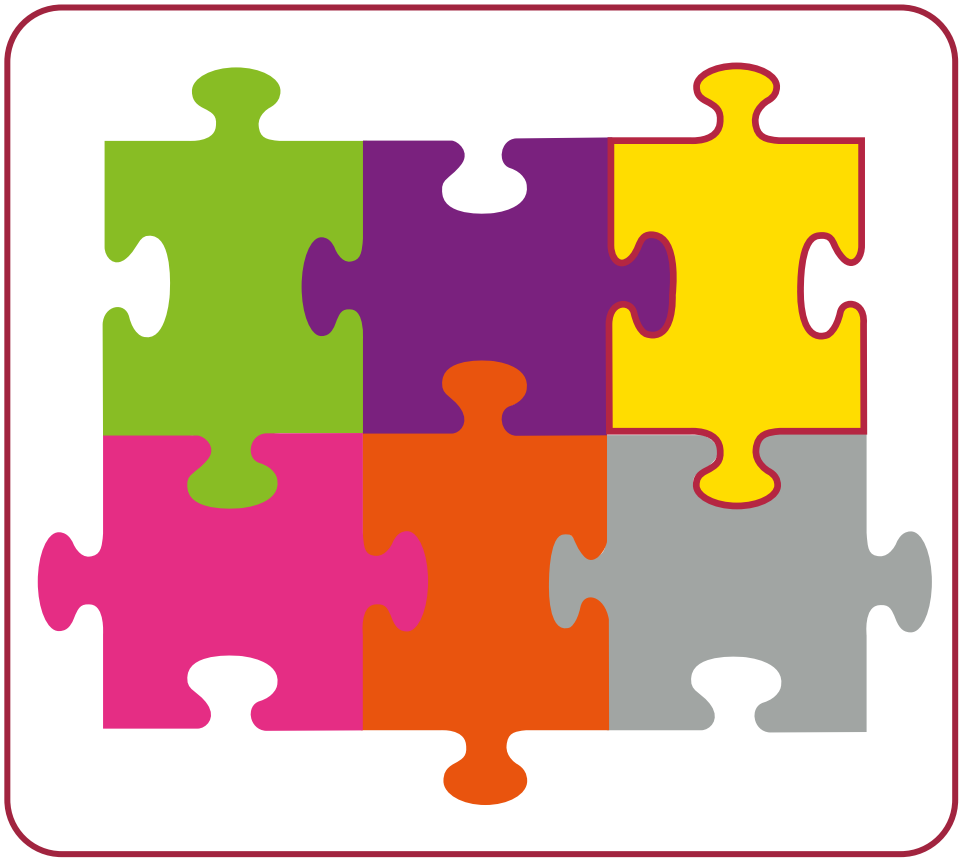
Enterprise Resource Planning (ERP)

An ERP is a single software which unifies and integrates business activities

Business Process Integration (BPI)



Modular Design



An ERP module is usually geared towards one business area.

All ERP modules share a common database through which they are connected and can communicate with each other.

ERP systems automate workflows between modules, reducing manual intervention and errors.

ERP Modules

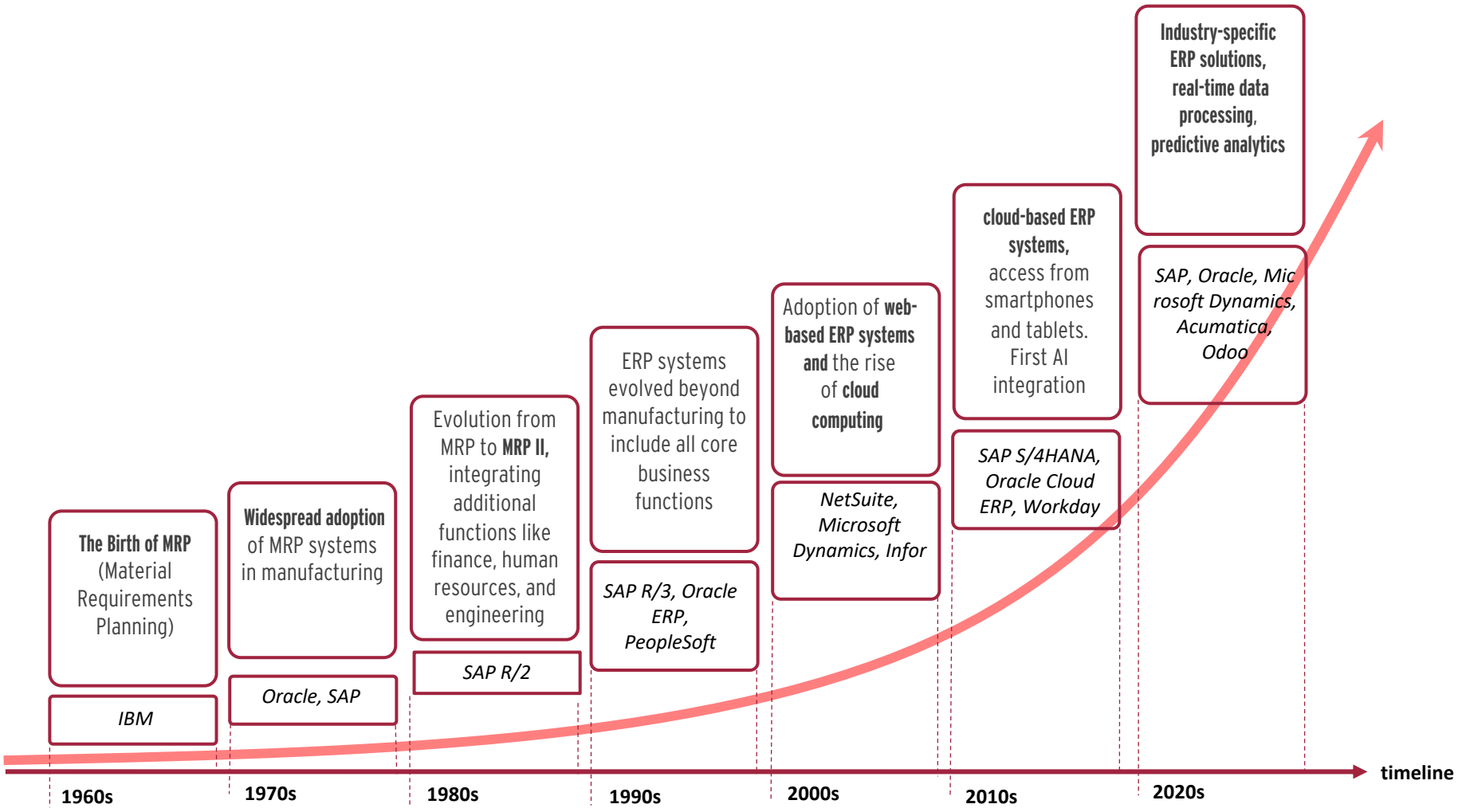
An ERP system includes the major functionalities of a company

Module	Primary Function	Example of Integration with Other Modules
Finance and Accounting	Manages financial transactions, budgeting, and reporting	Receives sales data from CRM to generate invoices; updates payroll expenses from HR
Human Resources (HR)	Handles payroll, recruitment, and employee management	Sends payroll data to Finance; updates workforce costs for project budgeting in Project Management
Customer Relationship (CRM)	Tracks customer interactions, sales, and marketing	Shares sales data with Finance for invoicing; updates order details in Inventory Management
Sales and Distribution	Handles sales orders, pricing, and shipping	Updates inventory levels; sends invoicing data to Finance
Supply Chain Management	Manages inventory, procurement, and logistics	Updates inventory levels for Sales; triggers purchase orders in Procurement based on stock levels
Manufacturing	Oversees production planning, scheduling, and quality control	Receives production requirements from Sales; updates inventory levels post-production
Procurement	Manages supplier relationships and purchase orders	Updates inventory levels; sends cost data to Finance
Inventory Management	Tracks stock levels and warehouse operations	Updates Sales and Manufacturing modules with real-time stock availability

The Most Widely Used ERP Modules

Module	Primary Function	Key Features
Finance and Accounting	Manages financial transactions, budgeting, and reporting	General ledger, accounts payable/receivable, financial reporting, tax management
Human Resources (HR)	Handles payroll, recruitment, and employee management	Payroll processing, employee self-service, recruitment, performance management
Customer Relationship (CRM)	Tracks customer interactions, sales, and marketing	Sales pipeline, customer support, marketing automation, customer analytics.
Supply Chain Management	Manages inventory, procurement, and logistics	Inventory tracking, order processing, supplier management, logistics
Procurement	Manages supplier relationships and purchase orders	Purchase order management, supplier performance tracking, contract management
Inventory Management	Tracks stock levels and warehouse operations	Real-time inventory tracking, warehouse management, stock replenishment alerts

The History of ERP



The SAP Success Story

1972

THE EARLY YEARS

On April 1, 1972, five former IBM employees – Dietmar Hopp, Hasso Plattner, Claus Wellenreuther, Klaus Tschira, and Hans-Werner Hector – started the company *SystemAnalyse Programmentwicklung* (System Analysis Program Development). Their idea was to create standard enterprise software that integrated all business processes and enabled data processing in real time.
SAP´s founders and employees worked closely with customers – often sitting side-by-side with employees in customers' offices to learn their business needs and processes. By 1975, they had built applications for financial accounting (RF), invoice verification, and inventory management (RM). Some of their early customers were the nylon factory belonging to ICI in Östringen, Germany, Knoll, Burda, Linde, and Schott. The blend of real-time data processing, standardization, and integration were the basis for SAP's transformation from a small German company into a global leader in business software. In 1979, the company started developing R/2, the second generation of its software. In 1980, SAP´s roughly 80 employees moved into their first own office building in Walldorf, Germany.

1987-1999

FROM R/3 TO GLOBAL PLAYER

Even while R/2 was enjoying huge sales success and one year before SAP went public with an IPO in 1988 – the company's managers were looking ahead to its third generation of software. The SAP R/3 success story began in 1992, with the client-server software smoothing the path to a globalized economy, turning SAP into a global player with subsidiaries and development centers across the world.
In 1999, SAP responded to the Internet and new economy by launching its mysap.com strategy. Ten years later, the company branched out into three markets of the future: mobile technology, database technology, and cloud. To rapidly become a key player in these new domains, SAP acquired some of its competitors, including Business Objects, Sybase, Ariba, SuccessFactors, Fieldglass, and Concur.

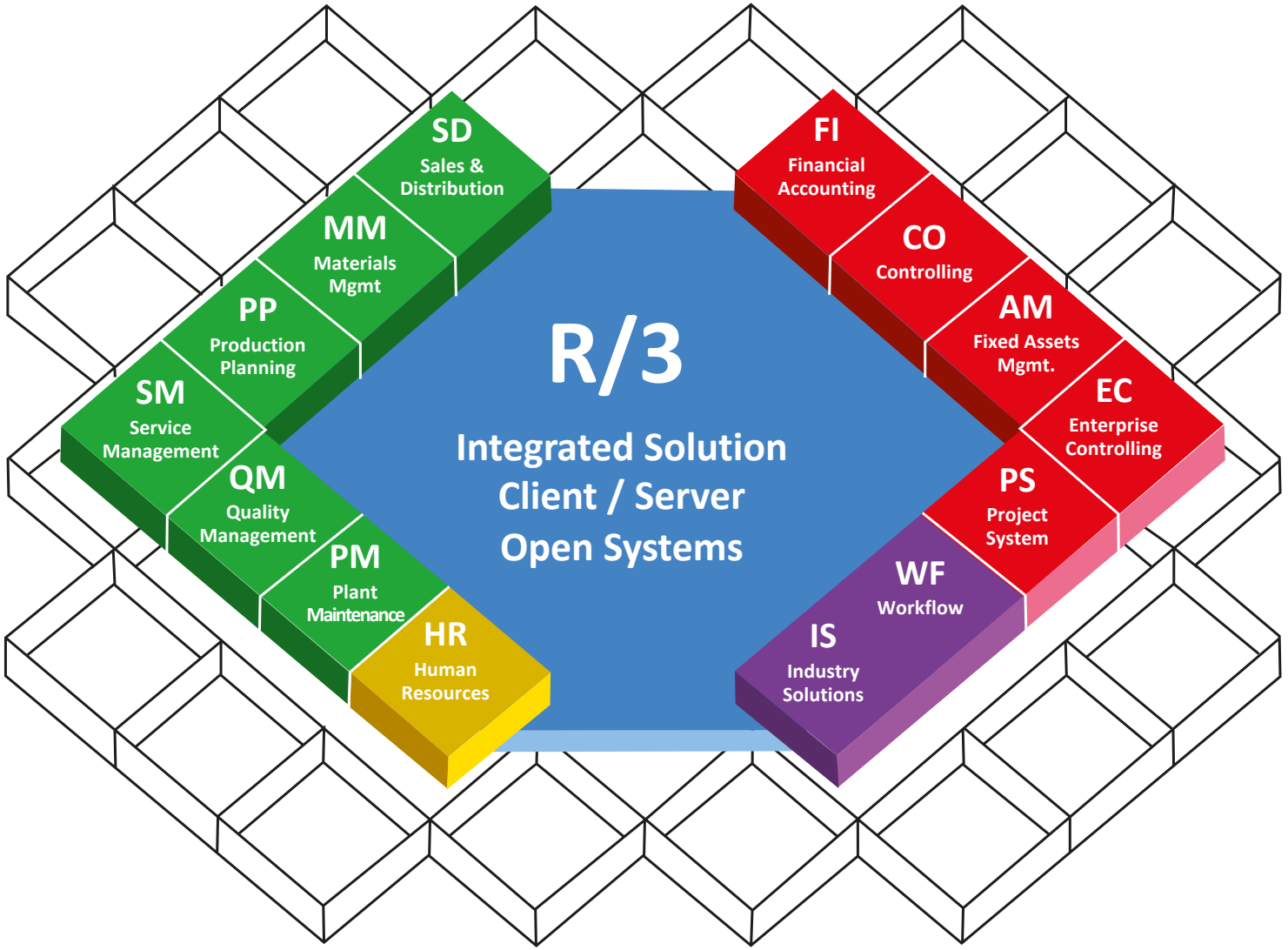
2011-2022

INTO THE CLOUD WITH SAP HANA

In 2011, the first customers started using the in-memory database SAP HANA. Data analyses that used to take days or even weeks were now completed in seconds. Four years later, SAP launched SAP S/4HANA, its latest generation of business software, running entirely on SAP HANA. SAP is committed to enabling every enterprise to become intelligent, networked, and sustainable – bringing together the solutions, technology, and best practices needed to run integrated, digital business processes in the cloud.
SAP offers choice across the four largest hyperscale cloud vendors. The company's integrated applications connect all parts of a business into an intelligent suite on a digital platform. SAP Business Technology Platform brings together application development, data and analytics, integration, and AI into one platform. It is a central element of SAP's "RISE with SAP" offering.
SAP has more than 240 million cloud users currently, more than 100 solutions covering all business functions, and the largest cloud portfolio of any provider. SAP operates 65 data centers at 35 locations in 16 countries.

Source: www.sap.com/about/company

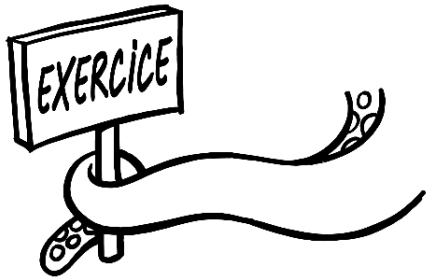
SAP R3 Modules

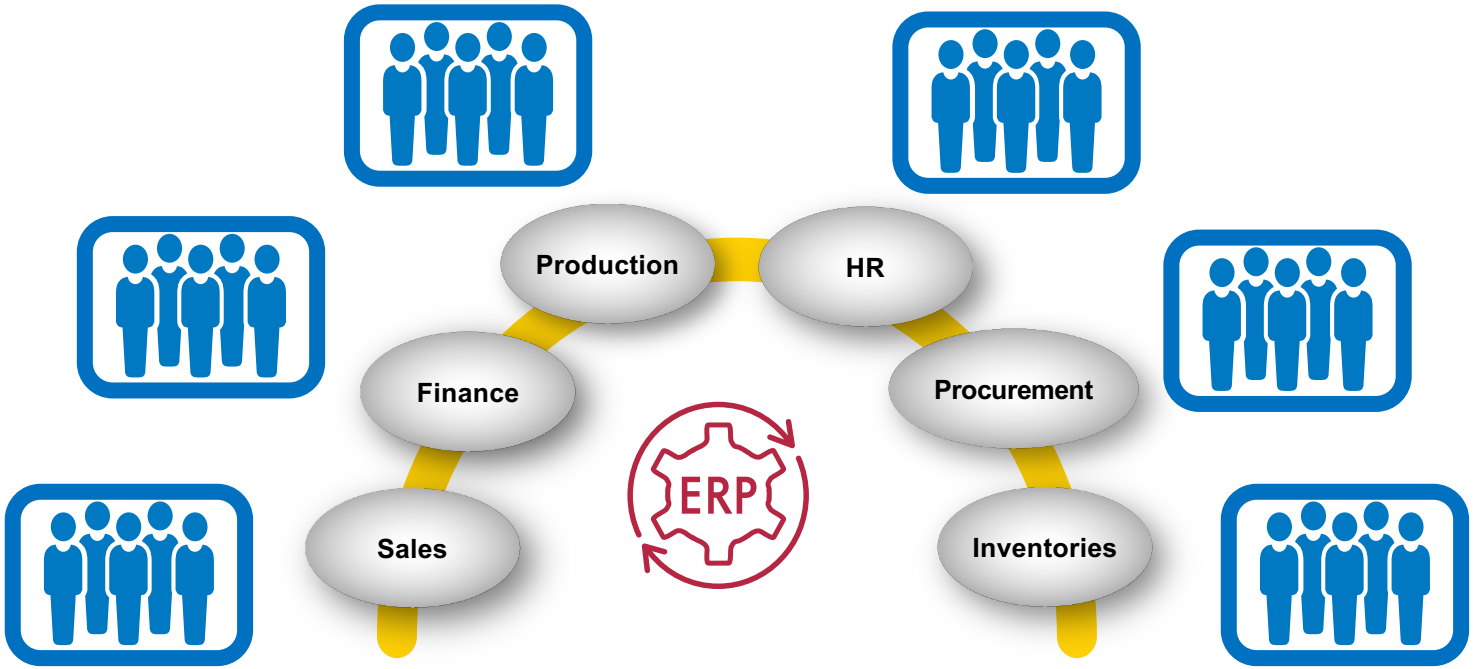


Which Data for Which ERP Module?

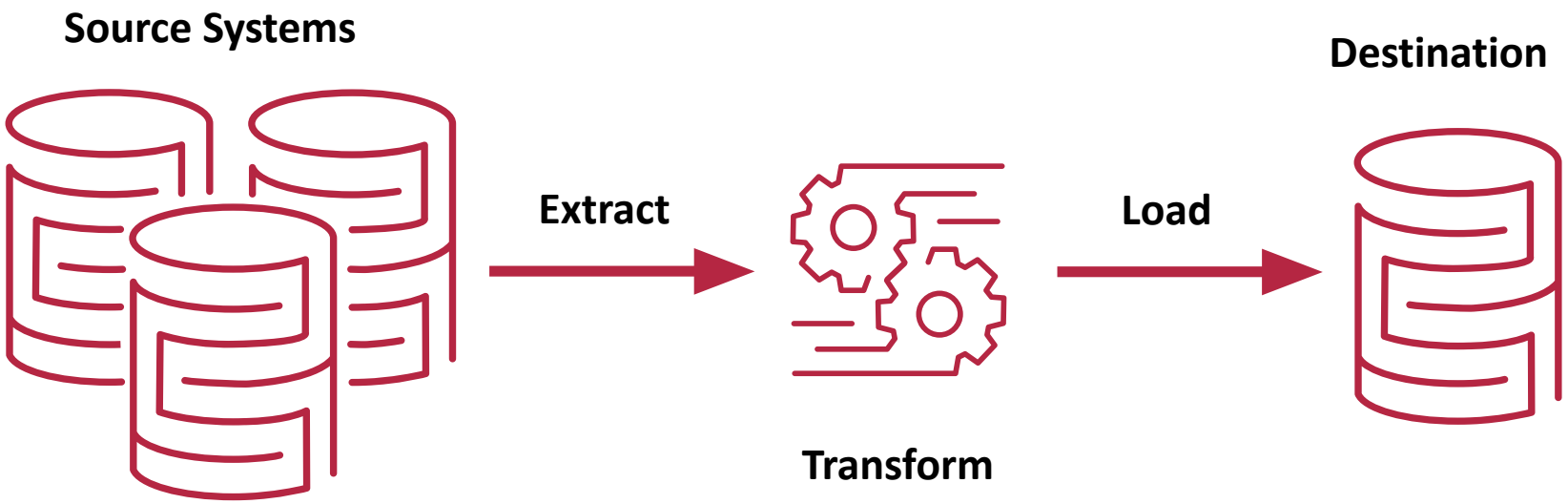
List the data needed for:

- Sales
- Finance
- Production
- HR
- Procurement
- Inventories / Warehouse

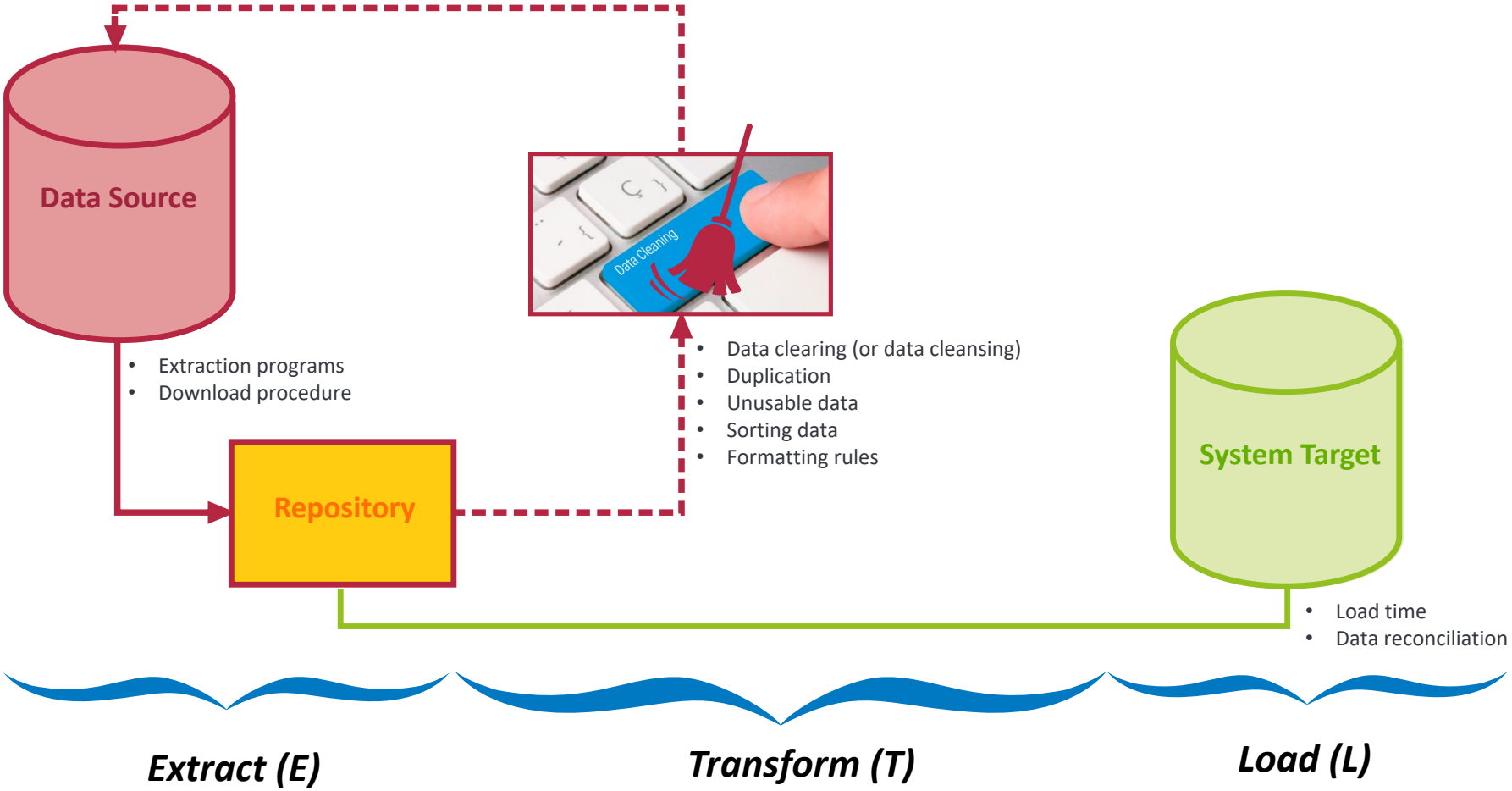




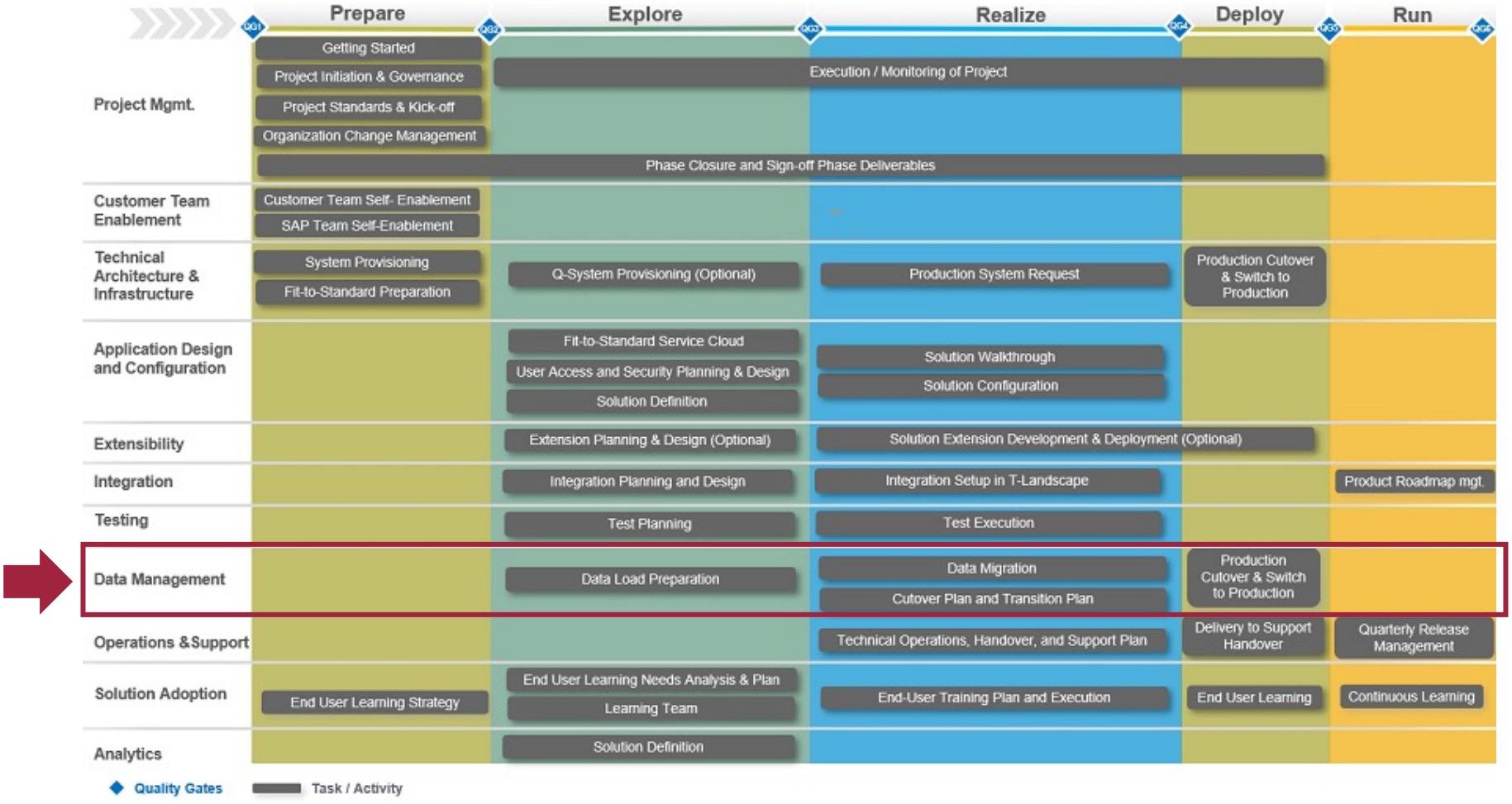
Extract, Transform and Load (ETL)



Data Migration



The SAP S/4HANA Cloud Implementation



Source: go.support.sap.com/roadmapviewer

CSFs for ERP Implementation

- **Selection of the Right ERP System**
  - Choose an ERP system that aligns with the organization's needs, size, and industry
  - Evaluate vendors based on functionality, scalability, support, and cost
  - Consider cloud-based vs. on-premise solutions based on organizational requirements

- **Alignment of Business Processes**
  - Re-engineer and standardize business processes to align with best practices supported by the ERP system
  - Avoid forcing the ERP system to conform to outdated or inefficient processes

- **Data Quality and Migration**
  - Ensure data is clean, accurate, and consistent before migration
  - Develop a robust data migration plan to transfer data from legacy systems to the new ERP
  - Validate and test data after migration to ensure integrity

- **Customization vs. Configuration**
  - Minimize excessive customization to avoid complexity and cost overruns
  - Leverage the ERP system's standard functionalities and configure it to meet business needs
  - Balance customization with the need for future upgrades and scalability

- **Vendor and Consultant Support**
  - Partner with experienced ERP vendors and consultants
  - Ensure vendors provide adequate support during and after implementation
  - Establish clear service level agreements (SLAs) for ongoing support

- **Testing and Quality Assurance**
  - Conduct thorough testing (unit testing, integration testing, and user acceptance testing)
  - Identify and resolve issues before going live
  - Ensure the system meets performance and functionality requirements

- **Training and User Adoption**
  - Provide comprehensive training to all users, including hands-on sessions
  - Develop user manuals, FAQs, and other support materials
  - Ensure users understand the benefits of the ERP system and are motivated to use it

- **Post-Implementation Support and Continuous Improvement**
  - Provide ongoing support to address issues and answer user questions
  - Monitor system performance and user satisfaction
  - Continuously improve processes and system usage based on feedback

How to Integrate Different Manufacturing Components?

Manual work

Industrial robots

Process control system

numerically controlled machine tool

chemical reactor

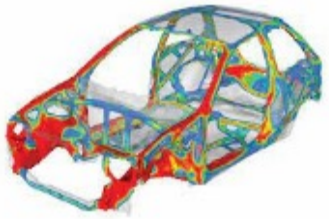
packaging machine

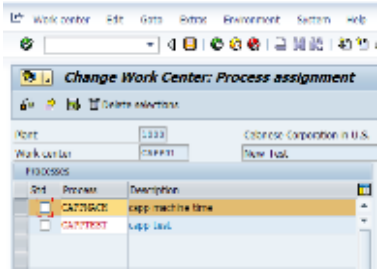
Integrate Manual Activities and Production Machines

Computer Integrated Manufacturing

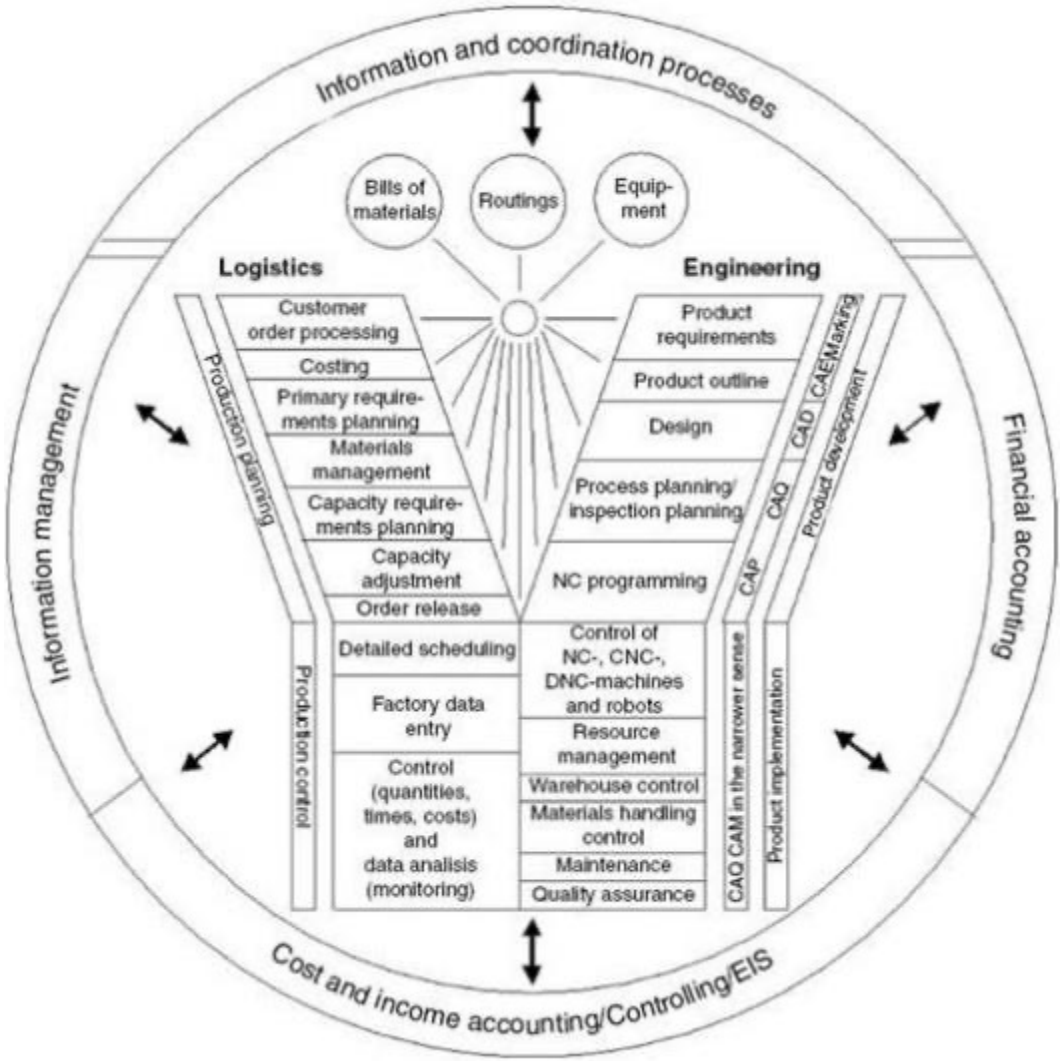
Computer-Aided Techniques

- Computer-Aided Design (CAD)
- Computer-Aided engineering (CAE)
- Computer-Aided Manufacturing (CAM)
- Computer-Aided Process Planning (CAPP)
- Computer-Aided Quality Assurance (CAQ)
- Production Planning and Control (PPC)





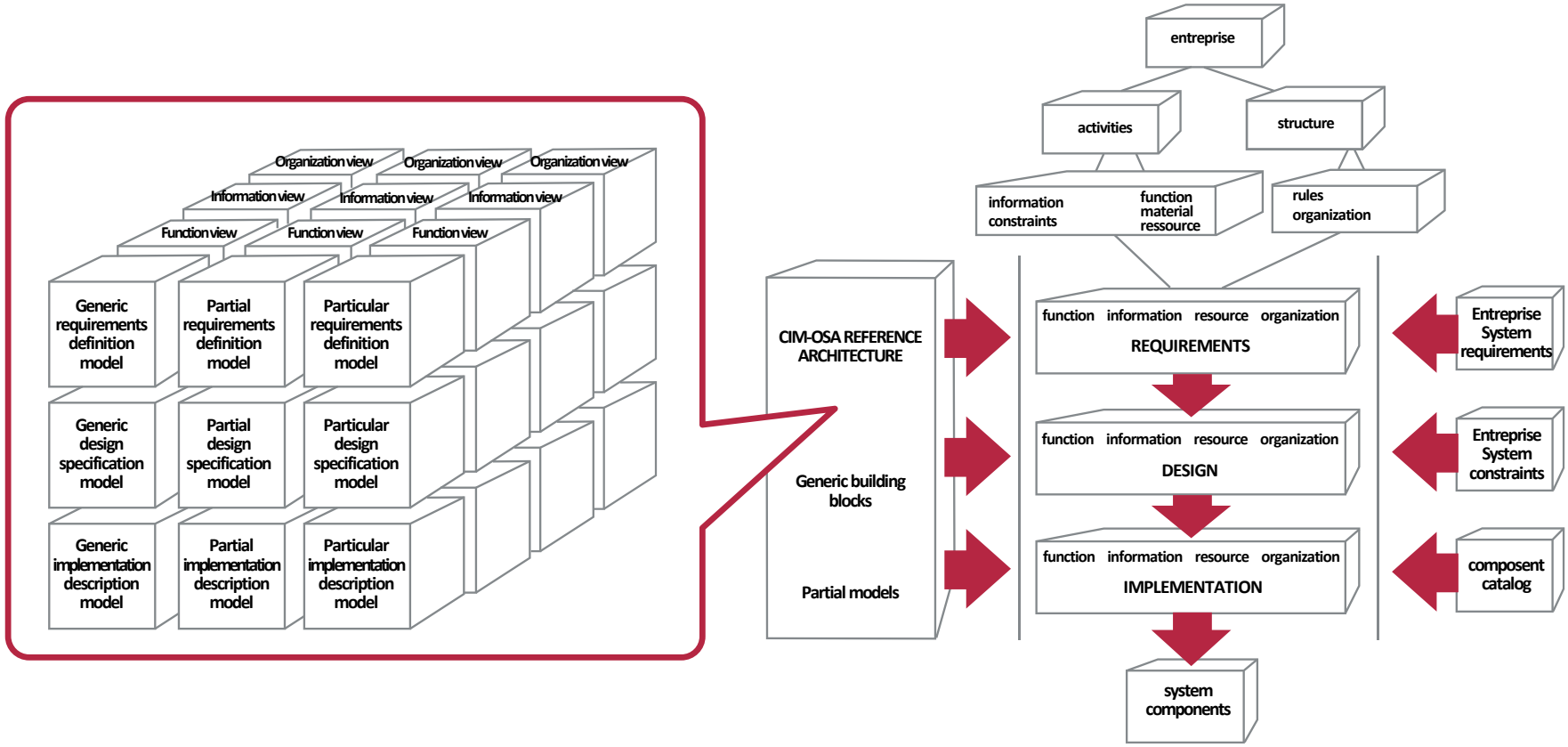
Y-CIM-model Information Systems in Production



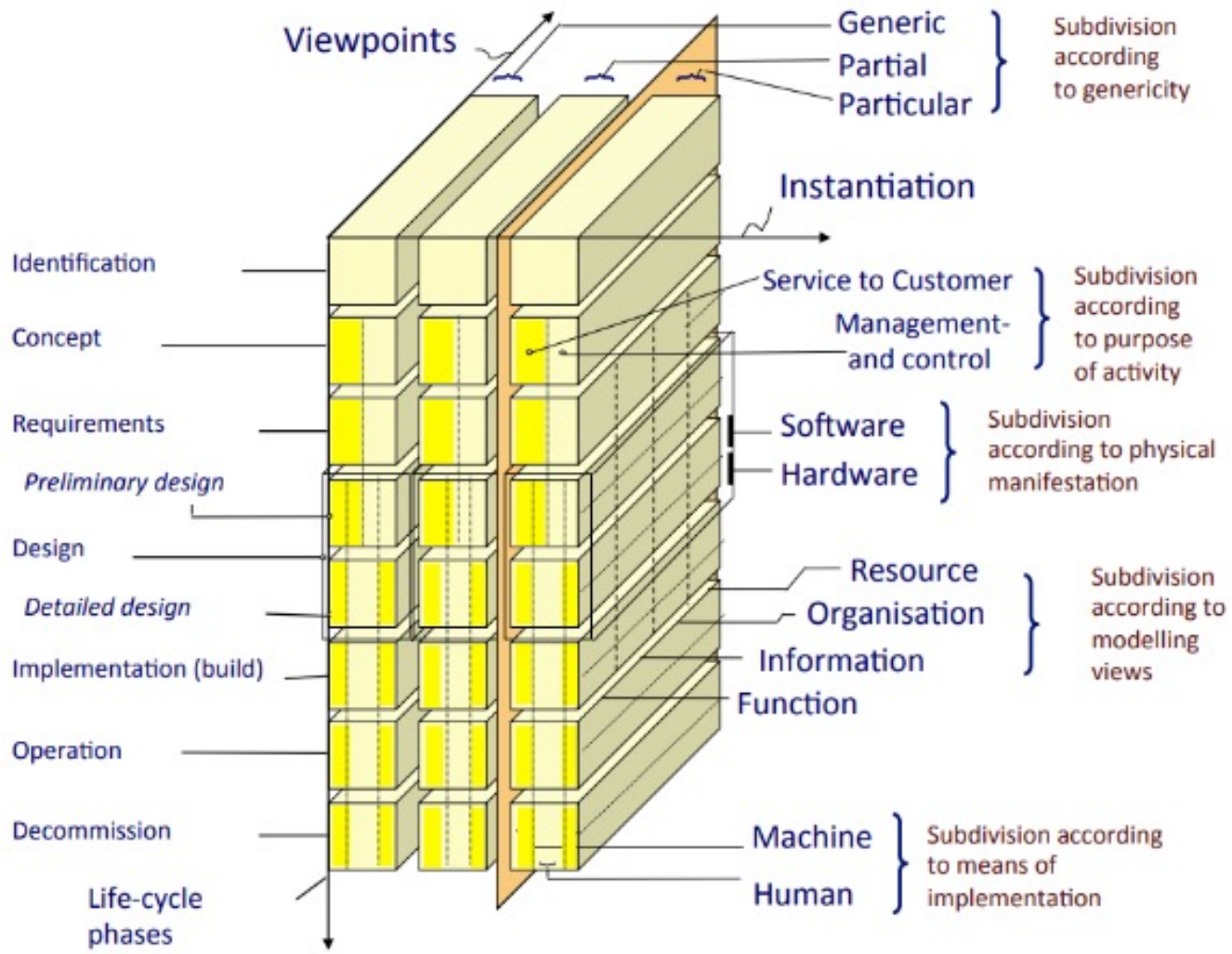
Source: Scheer, 1994
www.researchgate.net/figure/General-Scheme-of-the-Y-CIM-Model_fig6_283520951

CIMOSA: Computer Integrated Manufacturing Open System Architecture

Developed by the European CIM Architecture (AMICE Consortium) within the ESPRIT program



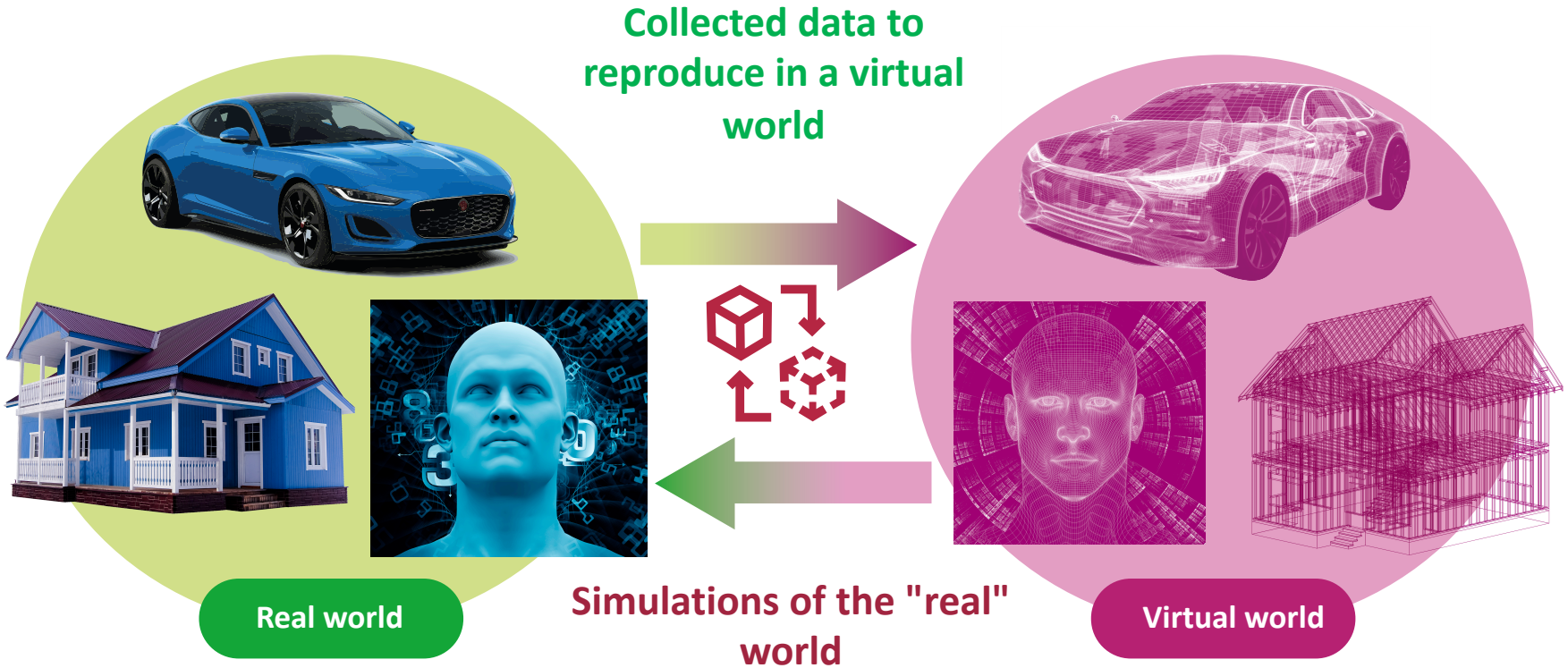
Architecture and Methodology



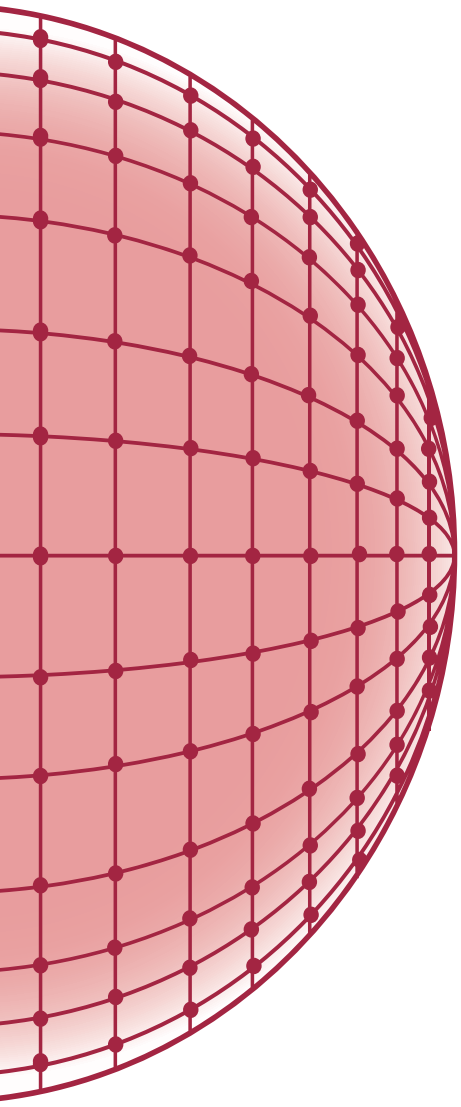
Source: www.ict.griffith.edu.au/teaching/6118ICT/videos/2.Modelling-Framework-Models-and-Languages.pdf

Digital Twins

A Digital Twin is the reproduction of an object of the real world in a virtual world based on collected data



Rationale for Digital Twins



Training

- Train personnel in a virtual environment without risking real-world assets

Simulation and Predictive Analysis

- Predictive Maintenance to optimize maintenance schedules and fewer unexpected breakdowns
- What-If Scenarios for testing various scenarios without risk to the physical system

Optimizing Performance and Efficiency

- Performance Optimization by simulating different configurations or adjustments to a system or process such as reducing energy consumption, improving production processes, or enhancing product quality
- fine-tuning operations, leading to efficiency gains and cost reductions

Product Development and Innovation

- Design and Testing enable virtual testing of products and can reduce the need for physical prototypes
- Innovation Acceleration to innovate faster and more safely, reducing time-to-market for new products or services

Some Use Cases for Digital Twins

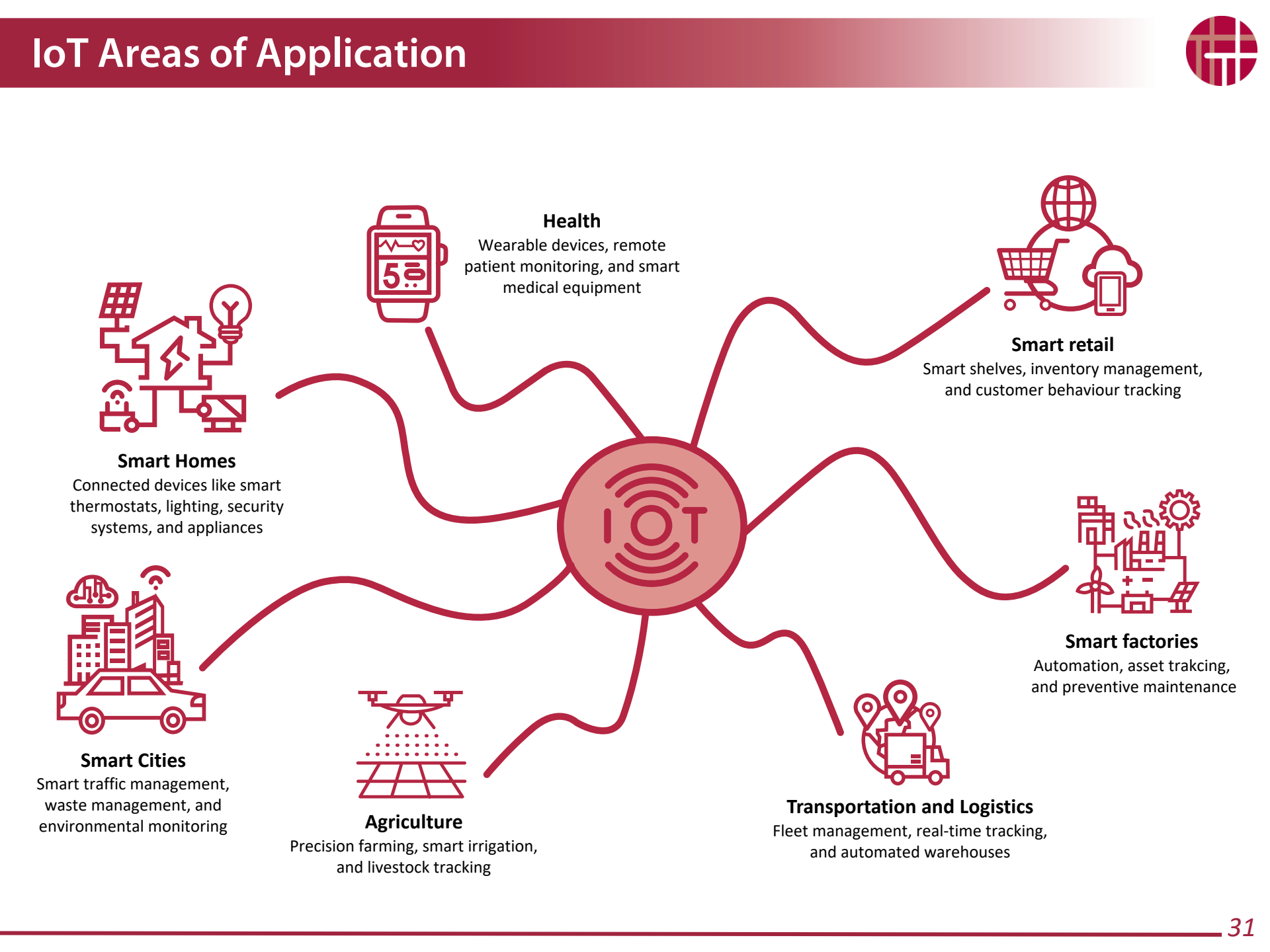
Use Case	Description	How Digital Twins Make Data Valuable
Predictive Maintenance	Predicting equipment failures before they occur	Analyse sensor data to identify patterns and anomalies, enabling proactive maintenance and reducing downtime
Autonomous Vehicles	Testing and improving self-driving car systems	Use real-world driving data to simulate scenarios, improve algorithms, and ensure safety
Disaster Response Planning	Simulating emergency scenarios for better preparedness	Model disaster scenarios to optimize response strategies and resource allocation
Water Management	Monitoring and optimizing water distribution systems	Simulate water flow to detect leaks, predict demand, and ensure efficient distribution
Pharmaceuticals	Simulating drug development and testing processes	Model biological and chemical data to accelerate drug discovery and reduce trial risks
Telecommunications	Optimizing network performance and reliability	Simulate network traffic to predict congestion, optimize bandwidth, and improve service quality
Environmental Monitoring	Tracking and mitigating environmental impacts	Combine data from sensors (e.g., air quality, water levels) to predict and address environmental risks
Financial Systems	Simulating market conditions and risk scenarios	Model financial data to predict market trends, assess risks, and optimize investment strategies
Product Lifecycle Management	Tracking and optimizing a product's lifecycle	Analyse usage and performance data to improve product design and extend lifespan

IoT: Internet of Things

The Internet of Things (IoT) describes the network of physical objects -“things” - that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet.

INTERNET OF THINGS

IoT Areas of Application



Health
Wearable devices, remote patient monitoring, and smart medical equipment

Smart retail
Smart shelves, inventory management, and customer behaviour tracking

Smart Homes
Connected devices like smart thermostats, lighting, security systems, and appliances

Smart factories
Automation, asset trakcing, and preventive maintenance

Smart Cities
Smart traffic management, waste management, and environmental monitoring

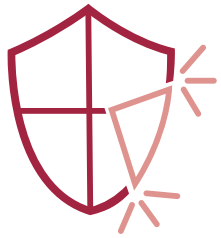
Agriculture
Precision farming, smart irrigation, and livestock tracking

Transportation and Logistics
Fleet management, real-time tracking, and automated warehouses

XIoT: Extended IoT

IoT Category	Full Name	Description / Application
CIoT	Consumer IoT	Smart home devices, wearables, smart appliances
IIoT	Industrial IoT	Predictive maintenance, automation, smart factories
BIoT	Blockchain IoT	Secure data sharing, decentralized IoT networks
VIoT	Vehicular IoT	Connected cars, smart traffic management, fleet tracking
SIoT	Social IoT	Smart social networking, IoT-enabled collaboration
HIoT	Healthcare IoT	Remote patient monitoring, smart medical devices
MIoT	Military IoT	Defence systems, battlefield surveillance, drone networks
Agri-IoT	Agricultural IoT	Smart irrigation, precision farming, livestock monitoring
BMS-IoT	Building Management IoT	Smart HVAC (Heating, Ventilation, Air Conditioning), lighting control, energy efficiency
EIOT	Energy IoT	Smart grids, energy consumption monitoring, renewable energy management
RIoT	Retail IoT	Smart shelves, inventory tracking, automated checkout
SIoT	Smart City IoT	Traffic management, waste collection, public safety

IoT Challenges

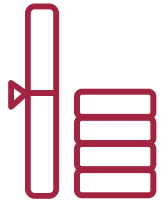


Security Gaps

Interoperability

Uninterrupted coverage

Bandwidth availability



Scalability

Limited Battery Life

The Future of IoT

Influencing Factors

AI & IoT Convergence (AIoT)
- Predictive Maintenance
- Personalized Consumer Experiences

Edge Computing & IoT
- Faster Data Processing
- Lower Costs & Bandwidth Usage
- Improved Security

5G & IoT Expansion
- Ultra-Fast, Low-Latency Connectivity

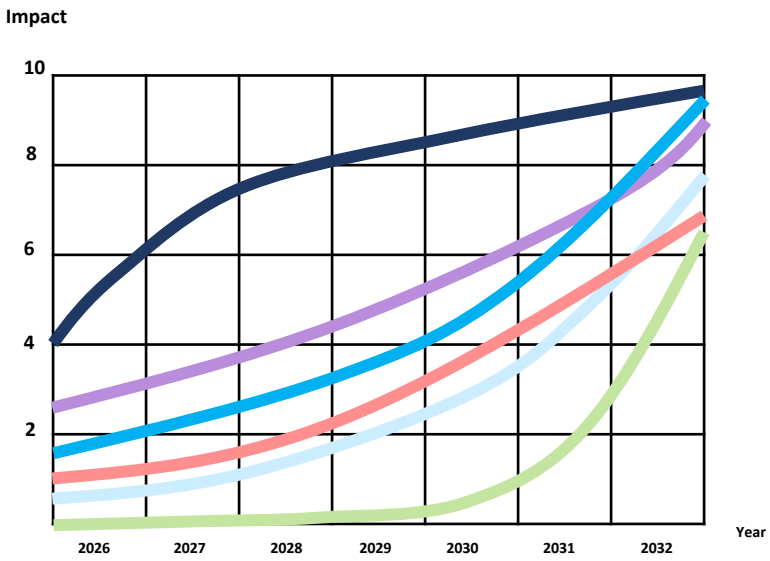
.

IoT Security & Blockchain Integration
- Decentralized Security
- Automated Smart Contracts

Sustainable & Green IoT
- Energy-Efficient Smart Grids
- Eco-Friendly Smart Cities
- Self-Sustaining Devices

Autonomous IoT (Self-Organizing Networks)
- Self-Healing IoT Systems
- Swarm Intelligence
- Zero-Touch IoT Management

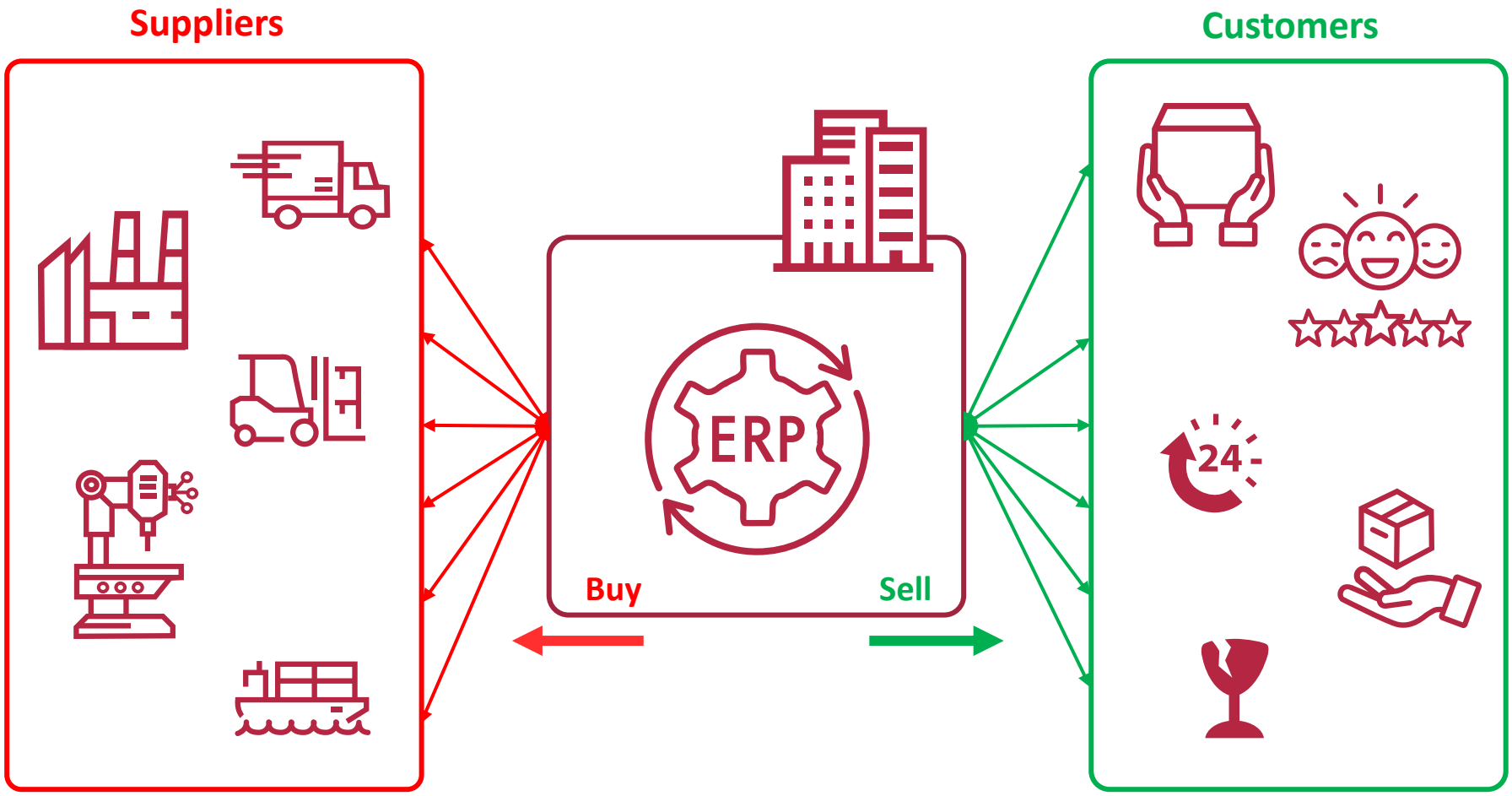
Possible Trends



Impact Scale (1-10)

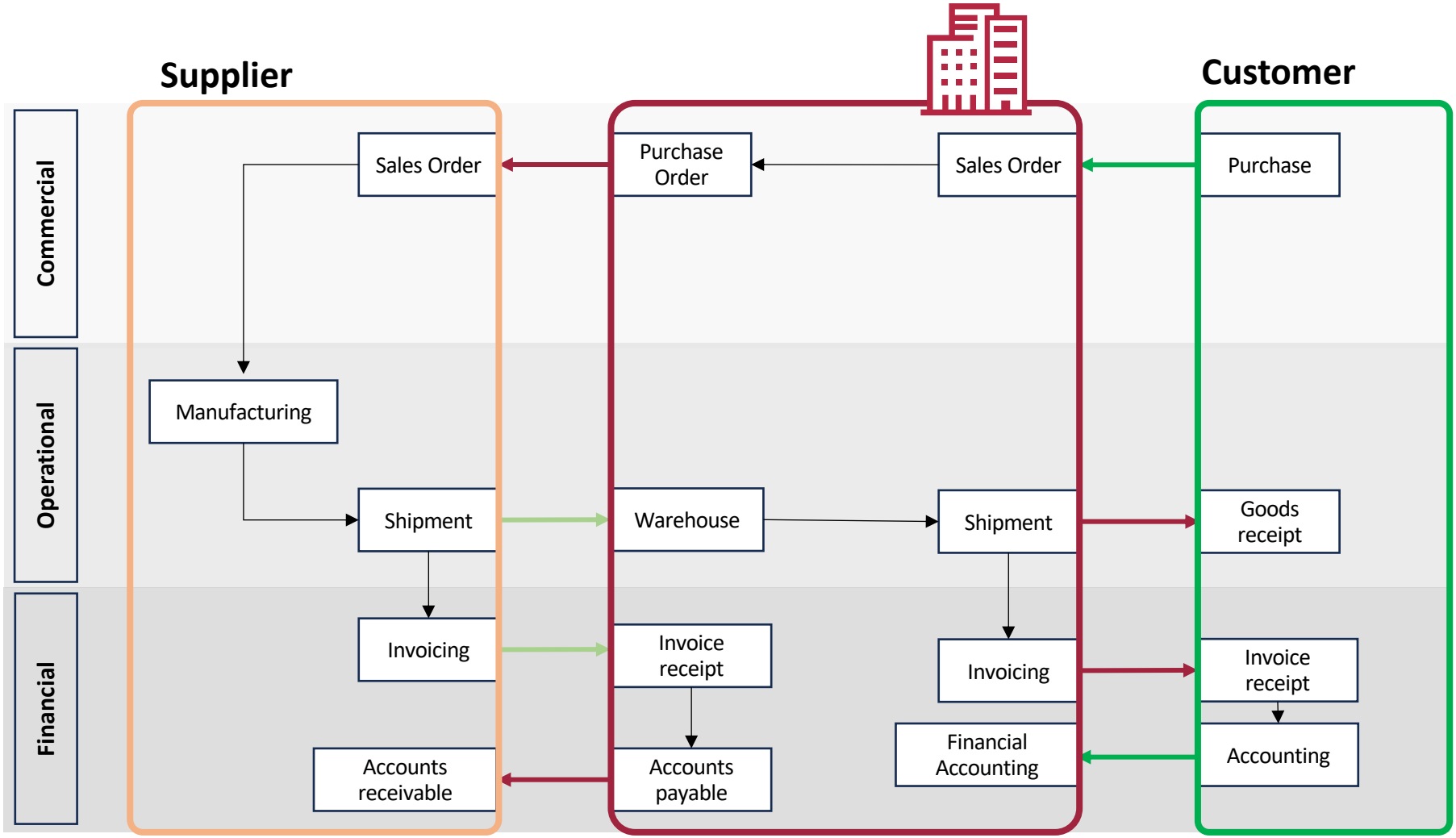
1-2: Emerging technology, limited adoption, mostly experimental
3-4: Early-stage adoption, some industry use cases, growing investments
5-6: Mid-level adoption, clear benefits, rapid industry adoption
7-8: Widespread use, standard across multiple industries
9-10: Dominant technology, essential in everyday applications, global impact

How to Communicate with Other Companies?

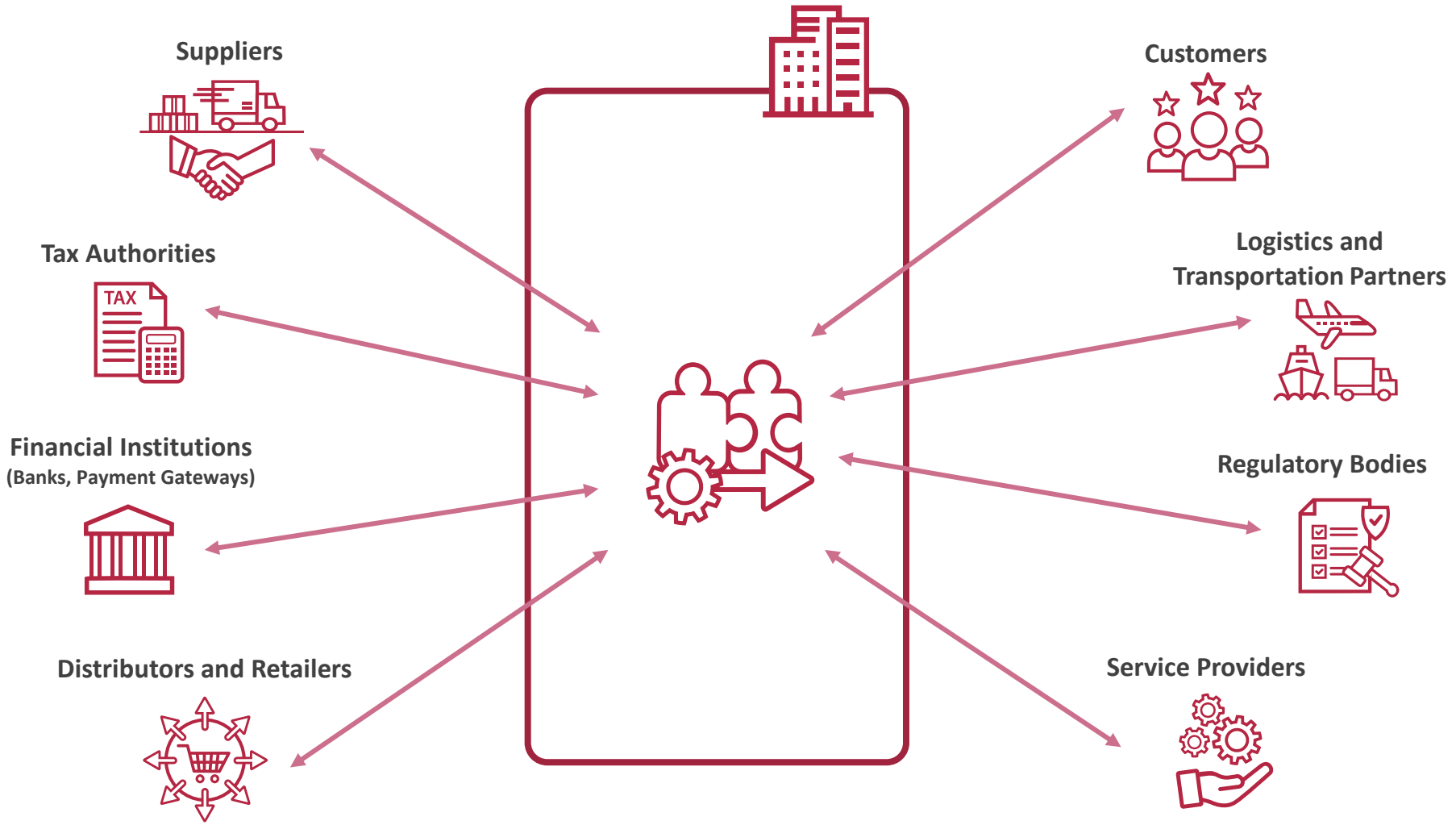


Integration between Companies

Simplified view



Which Further Integrations Are Needed?



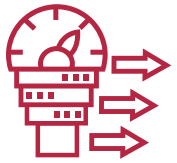
The Challenges for Data Transfer

Volume: the amount of data

In total considerable amounts of data that must be stored in powerful systems as Production plants are being equipped with more sensors, which permanently supply real-time data on a wide variety of production parameters like temperature, pressure, energy consumption, material flow or warehouse management

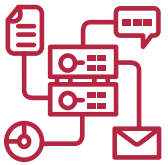
Velocity: the transmission speed

The aspect of response time is also of central importance. For predictive maintenance, for example, i.e., for predicting and avoiding plant failures, the information must be transmitted to the maintenance staff in a timely manner.



Variety : the diversity of data

Probably the biggest challenge is the variety of data. In many areas, there is no standard at all, and data is exchanged via a variety of formats and protocols. Powerful and flexible data integration and flexible data integration tools are required.



Some interesting technological developments in programming (API) and network (IoT)

Some Standard Interface Technologies

Data transfer technology	Features	Use Cases
Electronic Data Interchange (EDI) A standardized format for exchanging business documents electronically *Best for standardized, high-volume B2B transactions*	• Highly secure and reliable • Reduces manual errors • Speeds up transactions • Industry-standard compliance	• Supply chain management (e.g., purchase orders, invoices) • Retail and logistics • Healthcare (e.g., patient records)
File Transfer Protocol (FTP) Standard network protocol for transferring files between systems *Ideal for bulk file transfers, especially in legacy systems*	• Simple and widely supported • Can handle large files • Easy to set up and use	• Bulk file transfers (e.g., large datasets, backups) • Sharing non-sensitive data • Legacy system integrations
Application Programming Interface (API) A set of protocols for building and integrating software applications *Perfect for real-time, modern, and flexible integrations*	• Real-time data exchange • Highly flexible and customizable • Supports modern, cloud-based systems	• E-commerce integrations (e.g., payment gateways, shipping) • Mobile and web applications • IoT (Internet of Things) data exchange
Message Queuing Telemetry Transport Lightweight protocol for IoT and real-time messaging.	• Low bandwidth usage • Ideal for IoT devices • Real-time communication	• IoT (e.g., smart devices, sensors) • Real-time monitoring systems
Simple Mail Transfer Protocol (SMTP) Protocol for sending emails.	• Widely used for email communication • Simple and reliable.	• Email notifications • Automated email workflows.
WebSocket Enables real-time, two-way communication	• Real-time data exchange • Low latency • Ideal for interactive apps	• Chat applications • Real-time notifications • Online gaming

What is an API?

API: Application Programming Interface

- first appeared in the early 2000s
- set of protocols and tools used to build software applications
- allow applications to communicate with each other and access data that is external to the application
- no single creator of APIs, as they have been developed over time by many different software developers
- constantly being created, updated, and retired

Create or Search for an API

Example: API for animals

Endpoint: /animals

Request: GET

Response:

```
[
 {
  id: 1,
  name: "lion",
  habitat: "savanna"
 },
 {
  id: 2,
  name: "tiger",
  habitat: "jungle"
 },
 {
  id: 3,
  name: "giraffe",
  habitat: "savanna"
 },
 {
  id: 4,
  name: "elephant",
  habitat: "savanna"
 },
 {
  id: 5,
  name: "polar bear",
  habitat: "arctic"
 }
]
```

Created by beta.openai.com/playground

API Technologies

SOAP (Simple Object Access Protocol)

SOAP is a messaging protocol that allows programs that run on different operating systems, such as Windows and Linux, to communicate using Hypertext Transfer Protocol (HTTP) and its Extensible Markup Language (XML). It is a platform-independent, language-independent protocol to exchange information over a network.

REST (Representational State Transfer)

REST is a software architecture style for creating distributed systems. It is based on a client-server model and uses HTTP methods to send and receive data. It is a simpler and more lightweight alternative to SOAP.

RPC (Remote Procedure Call)

RPC is a protocol that allows a program to make a request to a remote server to execute a procedure on its behalf. It is used to enable distributed computing, where a client program can request a service from a server program located in another computer over a network without having to understand the network's details.

GraphQL

GraphQL is a query language for APIs that provides a more efficient way to query data than traditional REST APIs. GraphQL allows clients to request specific data rather than the entire dataset, reducing the amount of data returned from the server and improving the performance of the API.

JSON-RPC

JSON-RPC is a lightweight remote procedure call protocol that uses JSON for data serialization. It is like XML-RPC but uses a much simpler syntax, making it easier to use and more efficient. It is an alternative to SOAP and is often used for web services.

Many API Suites Are Available

Most popular API suites include:

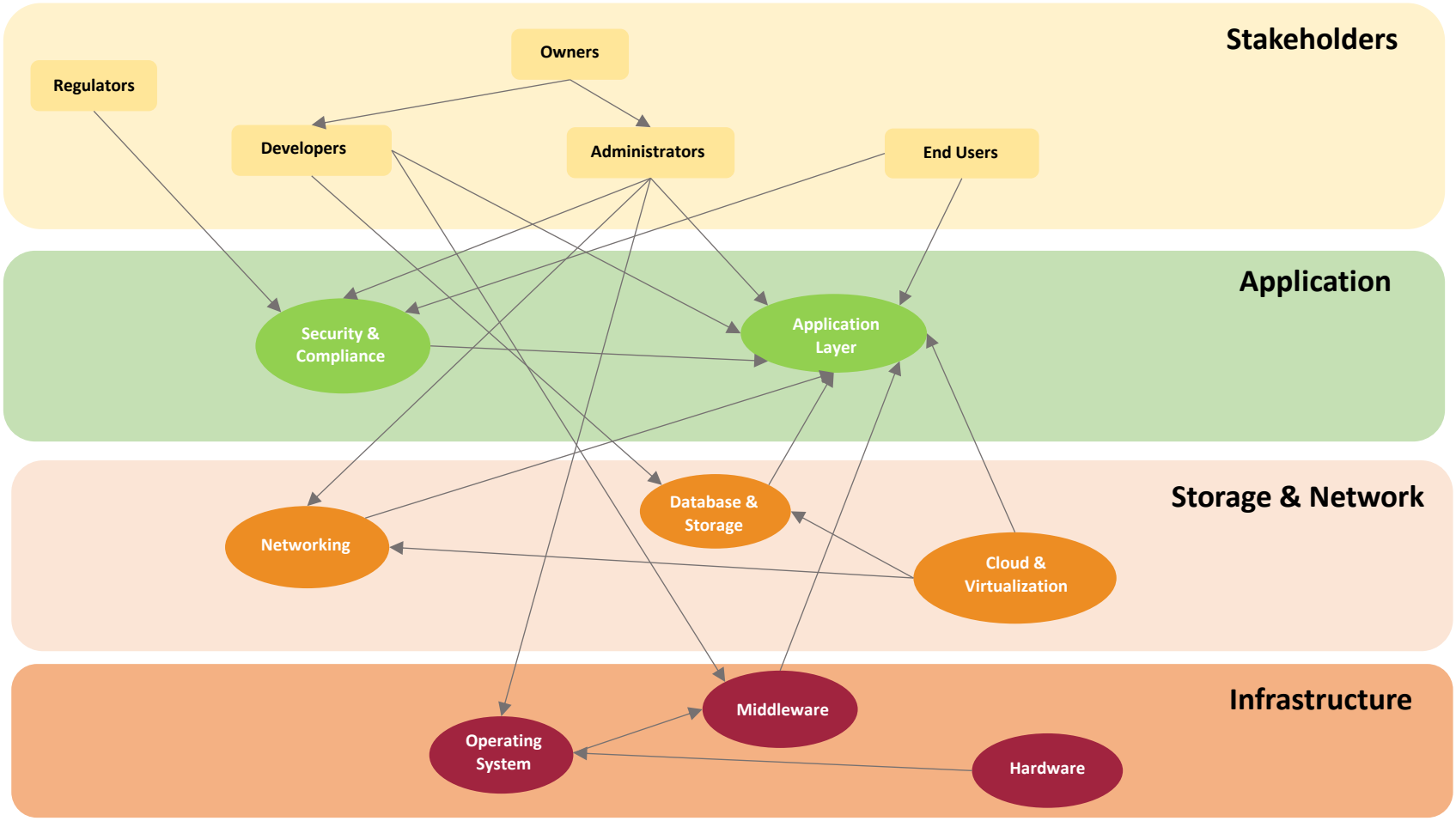
1. Google Cloud Platform APIs - https://cloud.google.com/apis
2. Microsoft Azure APIs - https://azure.microsoft.com/en-us/services/api-management/
3. Amazon Web Services APIs - https://aws.amazon.com/api-gateway/
4. IBM Cloud APIs - https://www.ibm.com/cloud/api-management
5. Oracle Cloud Infrastructure APIs - https://www.oracle.com/cloud/api-gateway/
6. Salesforce APIs - https://developer.salesforce.com/apis
7. Stripe APIs - https://stripe.com/docs/api
8. Twilio APIs - https://www.twilio.com/docs/api

Definition of “Platform” over Time

- **1500s**: Physical raised surface
  Derived from the French word "plateforme" (flat form), it referred to physical structures like stages, decks, or platforms for standing or displaying objects
- **1600s**: Architectural or structural base
  Describe the base of a building or a raised area for machinery
- **1800s**: Political or ideological stage
  Set of principles or policies (e.g., a political platform)
- **Early 1900s**: Technological or industrial base
  Base structure for machinery, vehicles, or systems
- **1950s-1960s**: Computing hardware/software base
  Combination of hardware and operating systems that software runs on
- **1990s**: Digital space for services
  eBay is an online platform for buying and selling goods
- **2000s**: Digital ecosystem for applications
  Include ecosystems like app stores or software frameworks (e.g., iOS, Android)
- **2008**: Social media platform for user interaction
  Websites or apps that enable users to share content, connect, and communicate like Facebook

Definition of an IT Platform

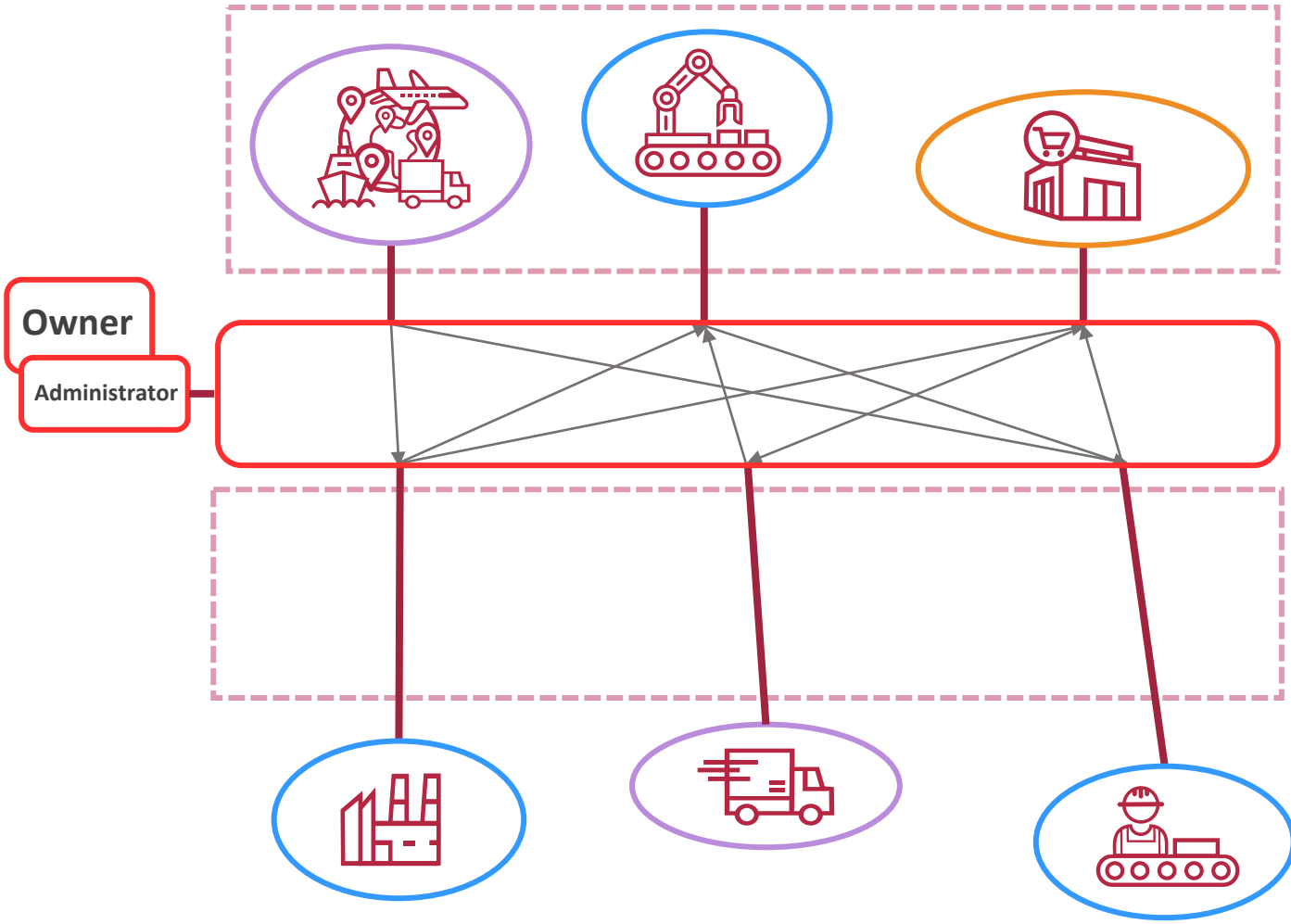
A centralized and standardized technological framework that enables seamless interaction, integration, and collaboration among multiple participants, systems, and applications



Top10 Social Media Platforms

Rank	Platform	Parent Company	Monthly Active Users (MAU)	Monthly Organic Traffic (Approx.)
1	**Facebook**	Meta (formerly Facebook)	~2.96 billion	~22 billion visits
2	**YouTube**	Google (Alphabet)	~2.5 billion	~34 billion visits
3	**WhatsApp**	Meta	~2 billion	N/A (Messaging app)
4	**Instagram**	Meta	~2 billion	~6 billion visits
5	**WeChat**	Tencent	~1.3 billion	N/A (Messaging app)
6	**TikTok**	ByteDance	~1.05 billion	~1.5 billion visits
7	**LinkedIn**	Microsoft	~930 million	~1.2 billion visits
8	**Snapchat**	Snap Inc.	~750 million	~1 billion visits
9	**Twitter (X)**	X Corp. (Elon Musk)	~550 million	~6.5 billion visits
10	**Pinterest**	Pinterest, Inc.	~465 million	~1 billion visits

B2B Integration Platforms



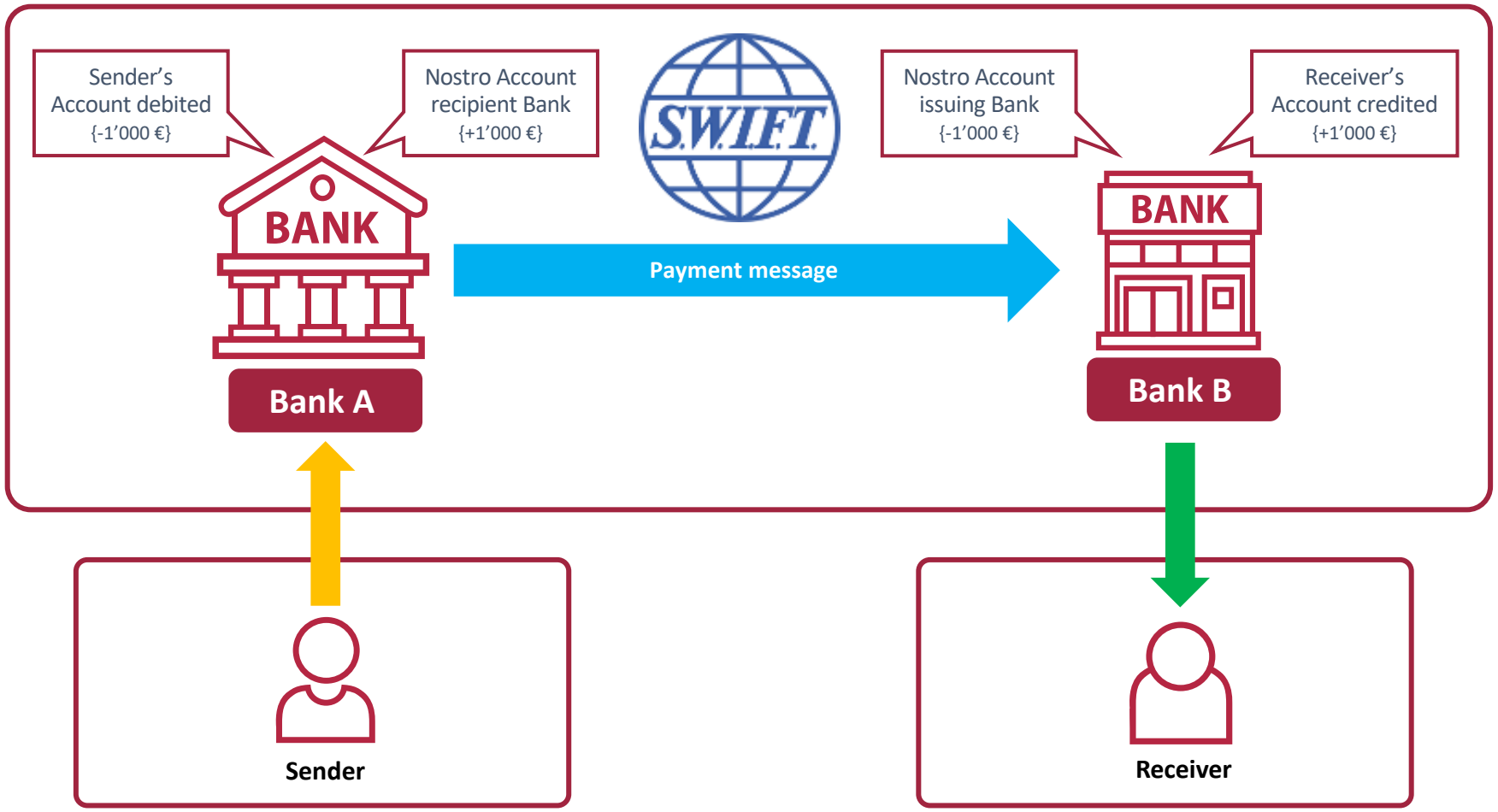
Stakeholders

- Business Partners & Trading Partners
- Customers & End Users
- System Integrators & Managed Service Providers (MSPs)
- Regulatory & Compliance Authorities
- Technology & Cloud Service Providers

Platform Connection

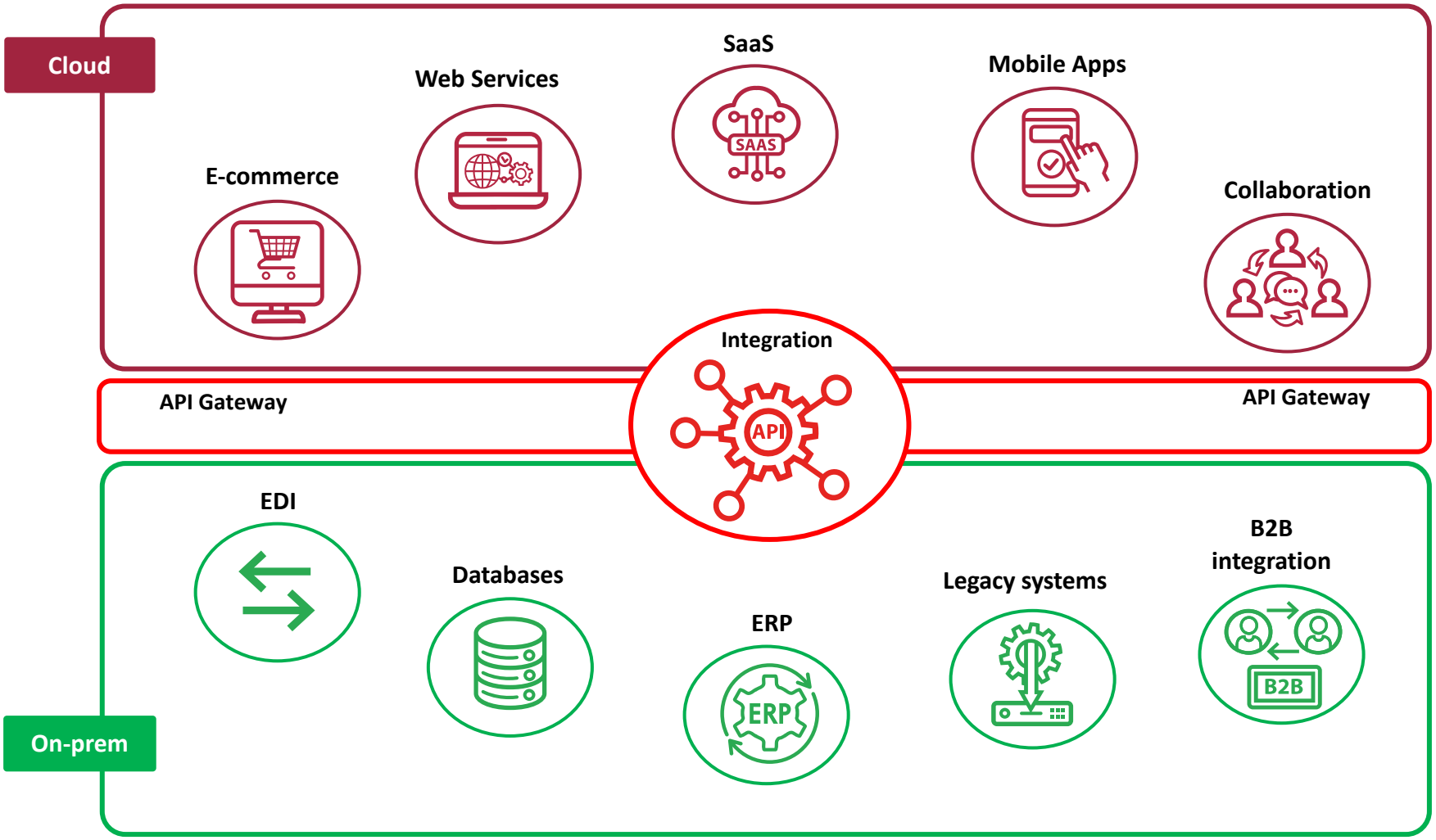
- Multi-Protocol Support
- Prebuilt Connectors & Adapters
- Data Transformation & Mapping
- API Gateway & Management
- Security & Compliance
- Workflow Automation & Orchestration
- Monitoring & Analytics

Example: the SWIFT Global Financial Messaging



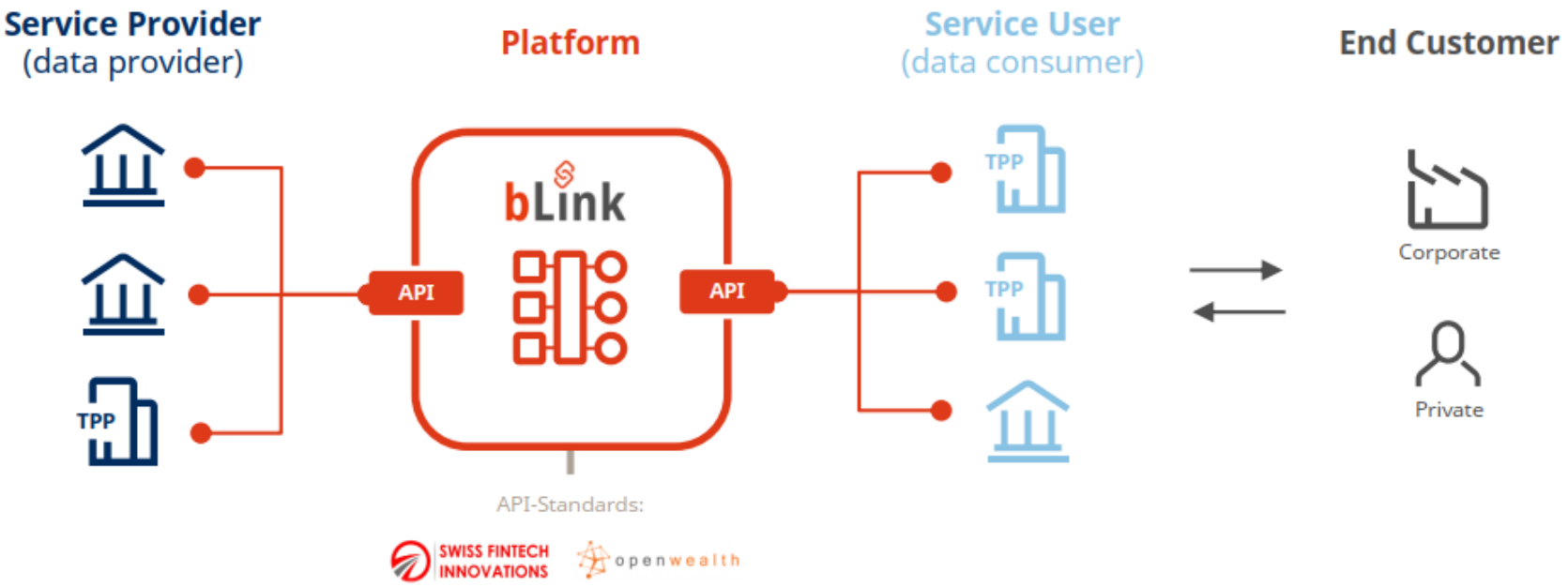
API Integration Platform

Unified platform to build, manage, and secure API-driven integrations across cloud and on-premise applications



Emergence of API-based Integration Platforms

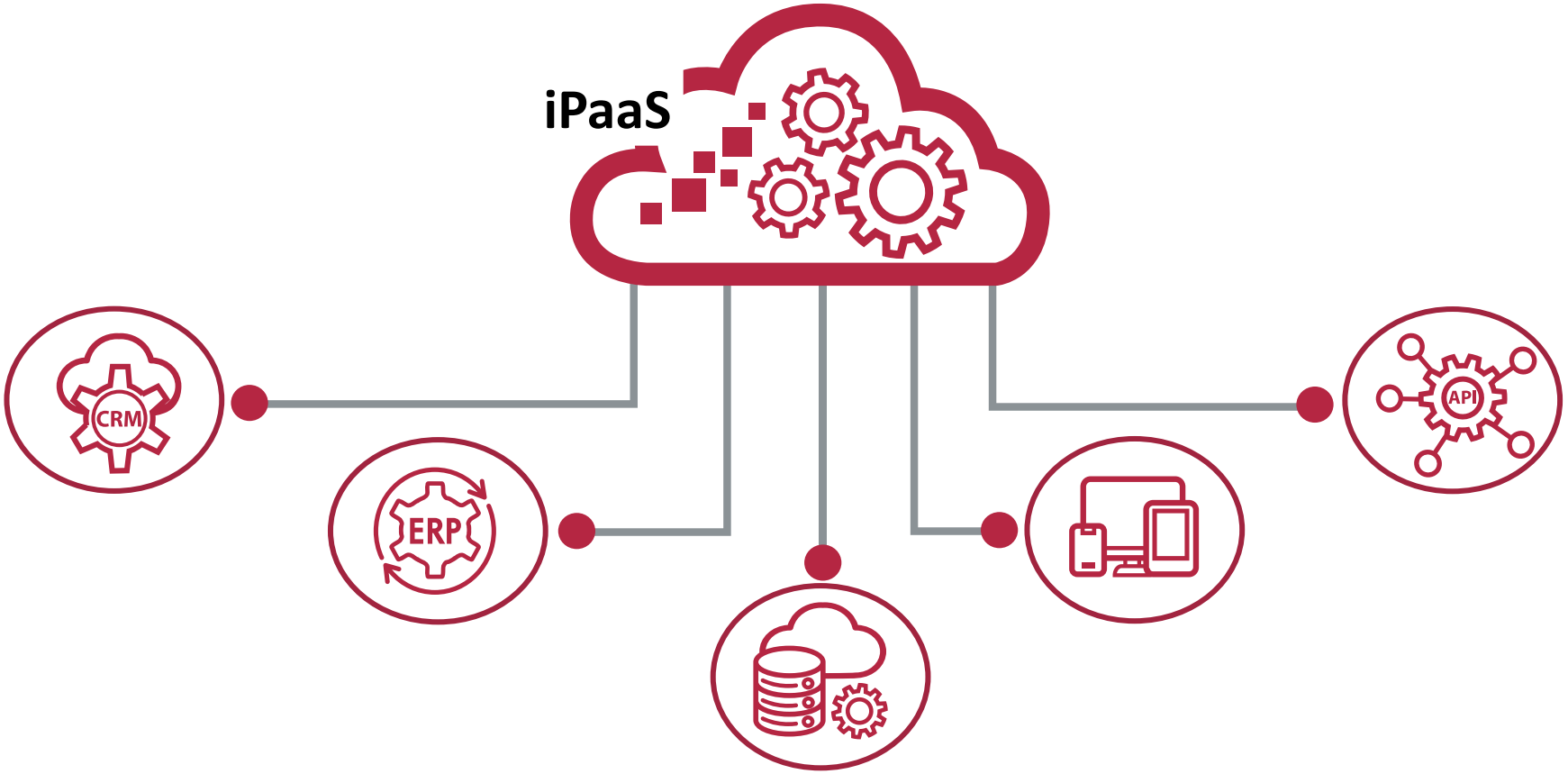
Example: blink in the financial area



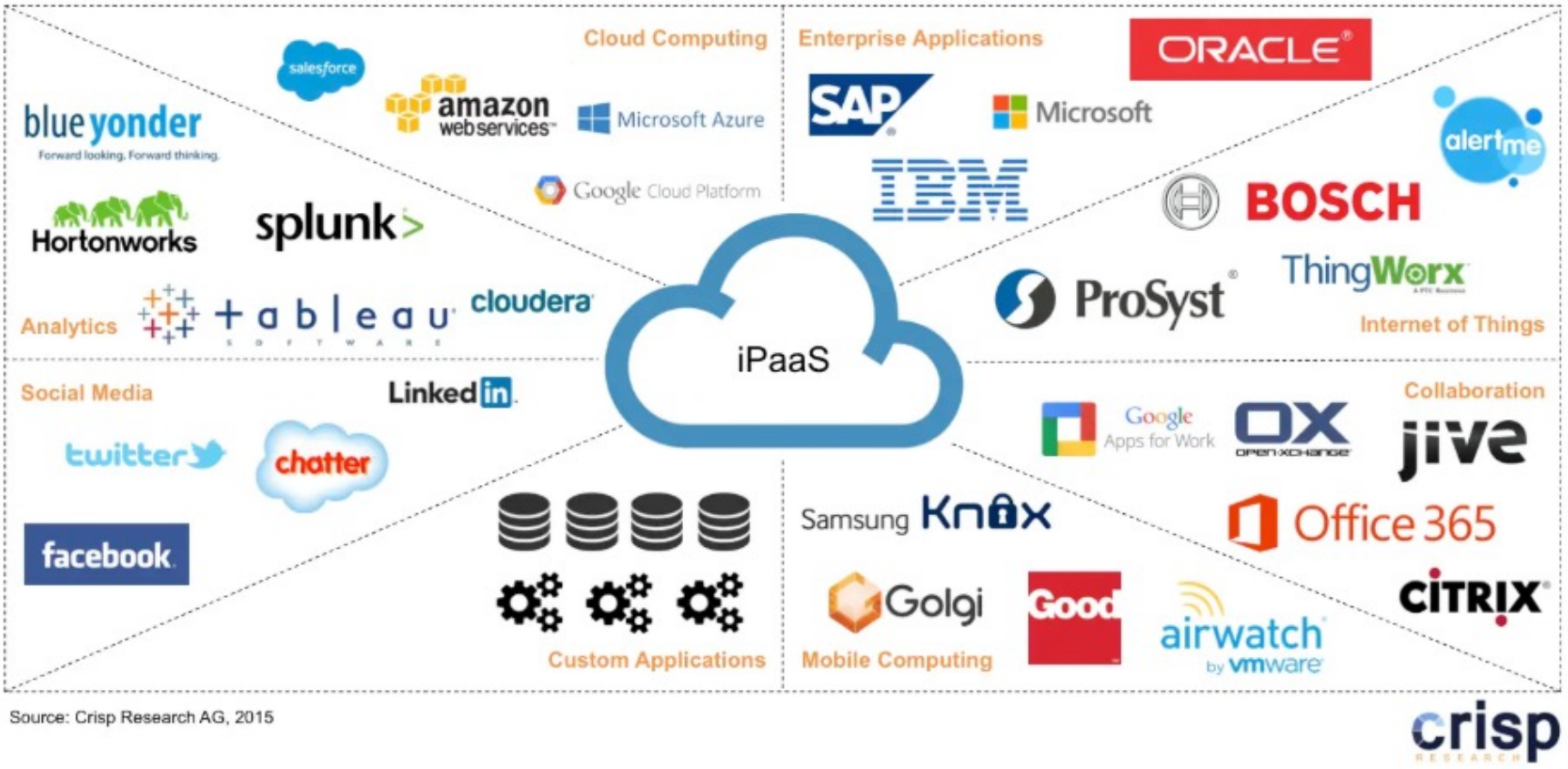
Source: docs.blink.six-group.com/docs/whats-blink/

Integration Platform-as-a-Service (iPaaS)

Cloud-based service that provides businesses with an integrated and centralized platform to connect applications, data, and services across cloud, on-premise or hybrid environments



The API-Economy



CSFs for Platform Adoption

In our view, the success of a platform strategy is determined by three factors:

1. **Connection**: how easily others can plug into the platform to share and transact
2. **Gravity**: how well the platform attracts participants, both producers and consumers
3. **Flow**: how well the platform fosters the exchange and co-creation of value

Successful platforms achieve these goals with three building blocks:

1.The Toolbox creates connection by making it easy for others to plug into the platform. This infrastructure enables interactions between participants. For example, Apple provides developers with the OS and underlying code libraries; YouTube provides hosting infrastructure to creators; Wikipedia provides writers with the tools to collaborate on an article; and JC Penney provides stores to its boutique partners.

2.The Magnet creates pull that attracts participants to the platform with a kind of social gravity. For transaction platforms, both producers and consumers must be present to achieve critical mass. Apple needed to attract both developers and users. Similarly, eBay needed both buyers and sellers. Platform builders must pay attention to the design of incentives, reputation systems, and pricing models. They must also leverage social media to harness the network effect for rapid growth.

3.The Matchmaker fosters the flow of value by making connections between producers and consumers. Data is at the heart of successful matchmaking and distinguishes platforms from other business models. The Matchmaker captures rich data about the participants and leverages that data to facilitate connections between producers and consumers. For example, Google matches the supply and demand of online content, while marketplaces like eBay match buyers to relevant products.

Source: Mark Bonchek and Sangeet Paul Choudary, HBS

What do you think of the benefits and challenges?

- For companies
- For Start-ups

Data as a Service (DaaS)

DaaS is a cloud-based platform that enables customers to access and analyze data from multiple sources

Use Cases of DaaS

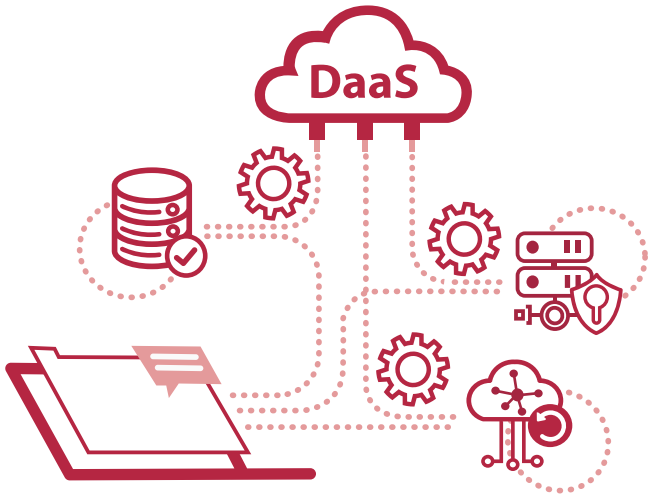
1.Business Intelligence (BI): Providing real-time data for analytics and reporting.

2.Customer Insights: Aggregating and analyzing customer data to improve marketing and sales strategies.

3.IoT Data Management: Handling large volumes of data generated by IoT devices.

4.Compliance and Reporting: Ensuring data meets regulatory requirements and generating reports for audits.

5.Data Monetization: Selling or sharing data with third parties to generate revenue



EASIER ACCESS TO BETTER DATA

Use Case 01: Risk Intelligence Platform

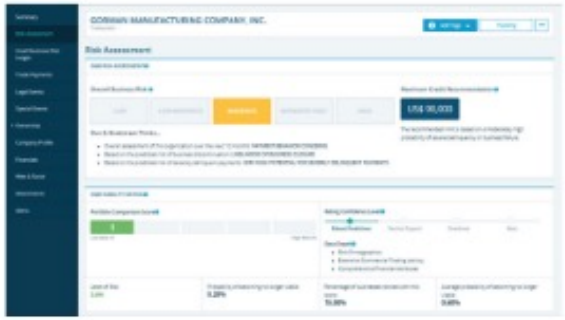
Dun & Bradstreet

D&B Credit

Next-generation Risk Intelligence Platform for modern finance and credit teams

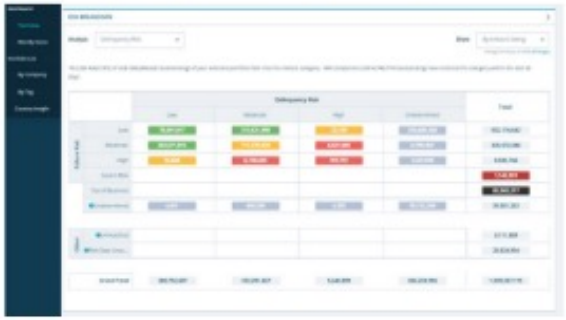
Company Risk Assessment

Quickly assess a company's creditworthiness and ability to pay on-time with Dun & Bradstreet's industry-leading risk scores and ratings.



Portfolio Overview

Leverage product dashboards to perform regular account reviews to proactively manage risk and opportunity across your account portfolio.



Source: www.dnb.com.hk/Resources_Center/files/dnb-credit-product-features-hk.pdf

Use Case 02: Customer Data

i-HUB (Banking Area in Luxembourg)

i-Hub is the operator of the first centralised KYC repository for Ongoing Due Diligence in Europe. I-Hub facilitates the updates and reviews of KYC files for professionals subject to AML laws through its innovative KYC Partner solution. Putting technology, compliance and human expertise at the heart of its business, i-Hub has launched its operations in December 2019 after having developed its system according to the need of its Clients. i-Hub operates as a regulated financial services professional under a 'Support PFS' licence granted by Luxembourg's Ministry of Finance and is a subsidiary of POST Luxembourg and BGL BNP Paribas.

Source: i-Hub – KYC Partner solution

Use Case 03: Real Estate Business

ImmoSparrow

Time saving

With ImmoSparrow Cockpit, it is no longer necessary to obtain data from various sources. All available data on over 3 million parcels of land throughout Switzerland, as well as over 170,000 current listing data including many years of history, are conveniently combined on just one platform. Instead of a partial view of the property and the real estate market, ImmoSparrow provides you with a complete overview through impressive additional information.

Always up to date

Be well informed about changes in your properties at any time and fully automatically. Get unique information about forecasts of market dynamics and location developments, which are only available to real estate professionals.

Decision support

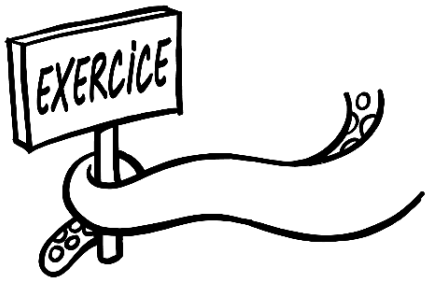
You have access to all data, which serve as a basis for a qualified parcel analysis. By means of the targeted search using search filters or on the map, an analysis of the potential of each parcel is conveniently possible online. Use the integrated price calculator to obtain a professional price estimate for any desired object effortlessly at the touch of a button.

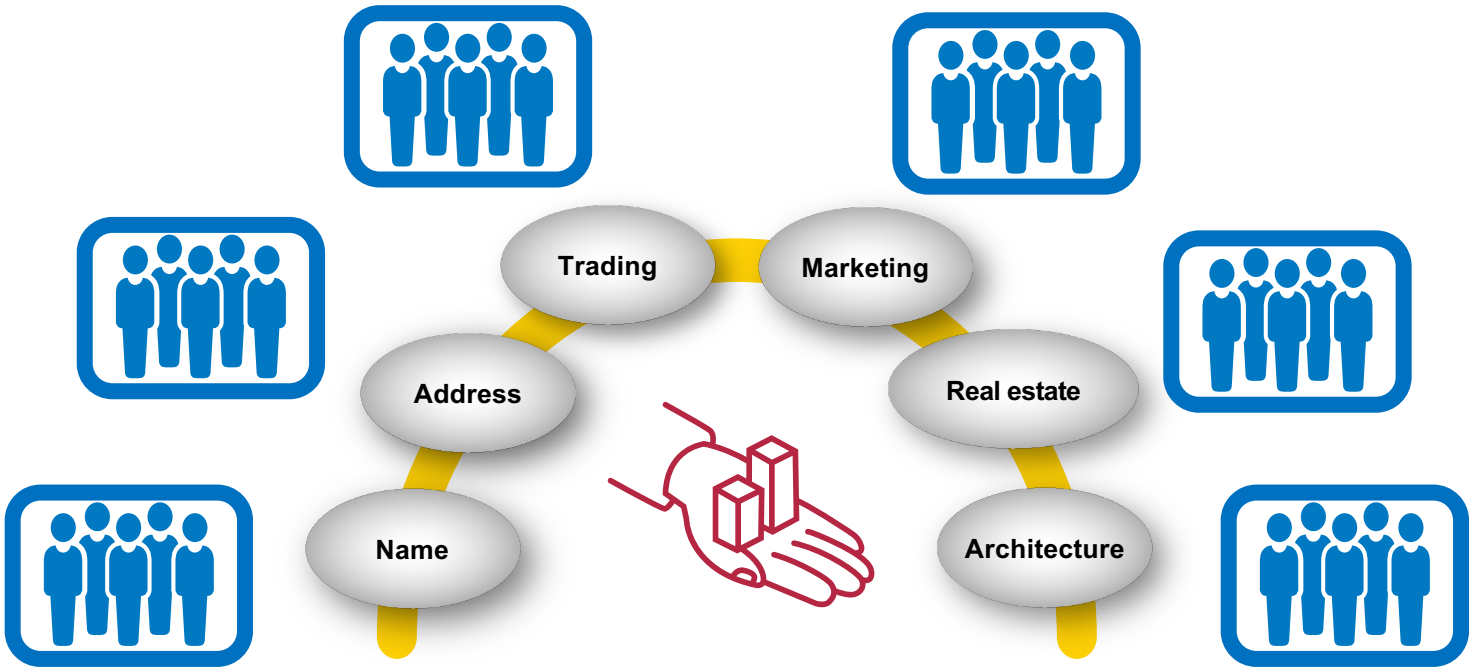
Source: www.immosparrow.ch

What Kind of Daas Services

Define possible Data-as-a-Services in the following area

- Name
- Address
- Trading
- Marketing campaigns
- Real estate
- Architecture





Conditions for DaaS

1. **A secure, stable, and reliable network infrastructure**
   A secure, stable, and reliable network infrastructure is essential to provide Data as a Service. This infrastructure should be able to handle the data traffic and provide the necessary security measures to protect the data being shared

2. **Data storage solutions**
   Data storage solutions are necessary for Data as a Service to store and organize the data. The solutions should be able to scale up and down to meet the changing demands of the organization

3. **Data access control**
   Data access control should be in place to ensure that only authorized users have access to the data. This helps to protect the data from unauthorized access and misuse

4. **Data security measures**
   Data security measures should be taken to protect the data from being accessed, altered, or deleted without authorization. This includes encryption, authentication, and access control

5. **Data analysis and reporting tools**
   Data analysis and reporting tools are necessary to make sense of the data and to generate insights from it. This helps the organization to make informed decisions based on the data.

6. **Data sharing and collaboration tools**
   Data sharing and collaboration tools are necessary to be able to share data

7. **Up-to-date and comprehensive Data**

The Opendatasoft Platform as “Universal Solution”

What if everyone could consume data like any other product?

With our data product marketplace solution, centralize and share your data products and assets in a simple, secure and interactive way.

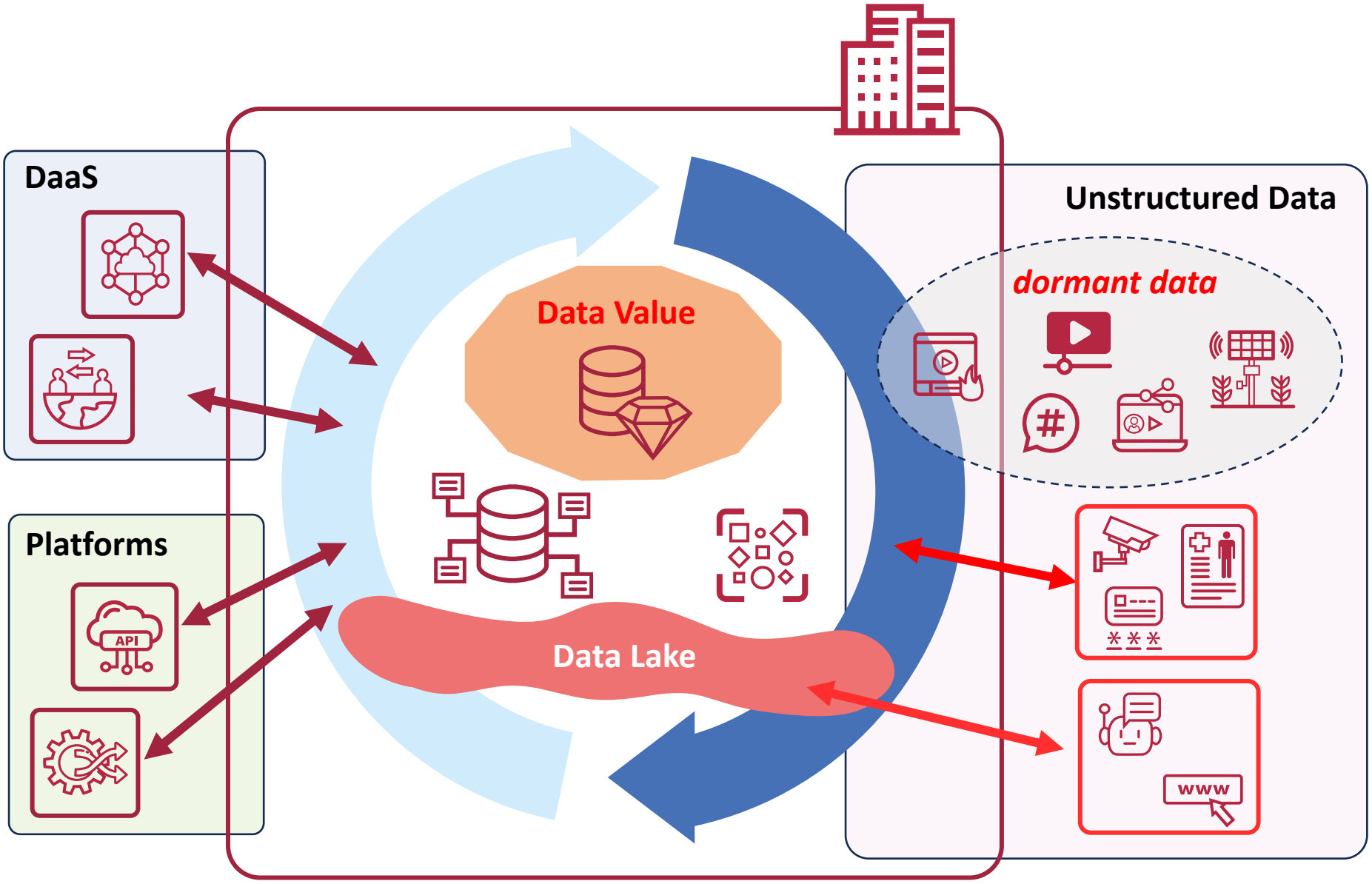
Now you can finally make your data easily consumable at scale by your business users or external stakeholders.

A data product marketplace solution for all your data consumers

- Single source of truth
- Self-service access for all
- User experience
- Data consumption at scale

Source: www.opendatasoft.com/

Hybrid Data Integration: The Future of Enterprise Data

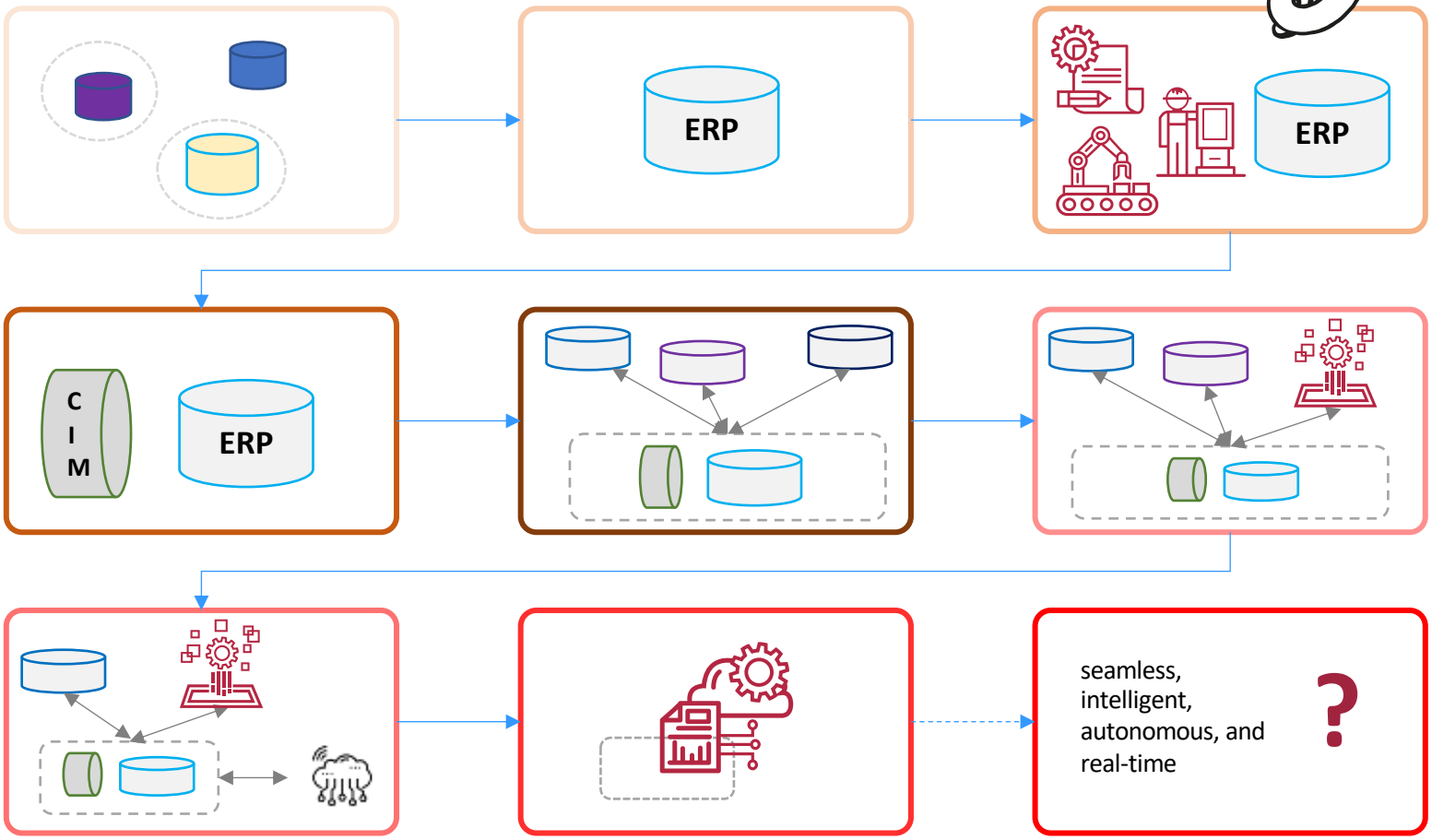


Our Future : the Integrated Human Being?

Having a digital twin connected with IoT

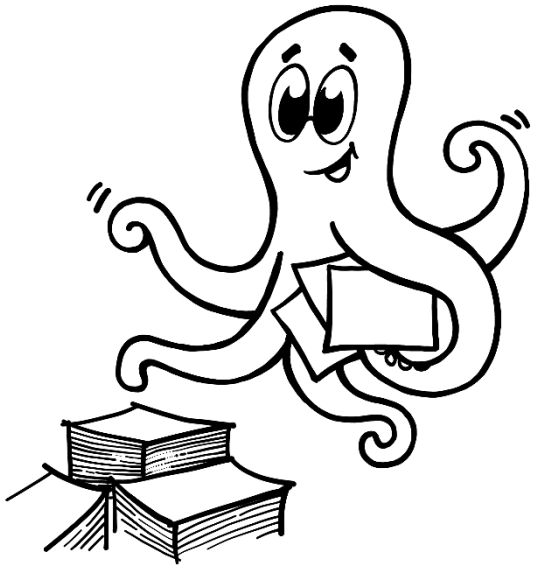
AI generated

What Do You Think about the Evolution of IT Systems?



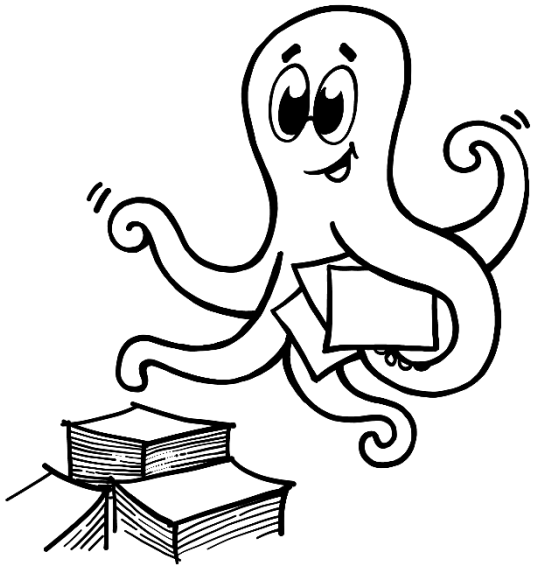
Take away and must know!

- To understand the importance of an ERP system
- To see that the data integration can be used in many business areas, especially in the manufacturing area with CIM
- To understand the new possibilities offered by technologies like API, Cloud or IoT regarding data integration
- To know about the challenges of data transfer
- To be able to assess new data-based services



Literature

- Bernus P., Nemes L., Williams T.J. (1996) Architectures for Enterprise Integration. Springer Science
- Magal S.R., Word J. (2012) Integrated Business Processes with ERP Systems. John Wiley& Sons, Inc.
- Bonchek M., Choudary S. P. (2013) Three elements of a Successful Platform Strategy. Harvard Business School



KNOWLEDGE

www. know-ledge.ch