Lecture 2: **Business Motivations and Drivers for Big Data Adoption**

DSC650: Data Technology and Future Emergence

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Lecture 2: **Business Motivations and Drivers for Big Data Adoption**

2.1 Marketplace Dynamic
2.2 Business Process Management
2.3 Data Analytics and Data Science
2.4 Digitization
2.5 Internet of Everything

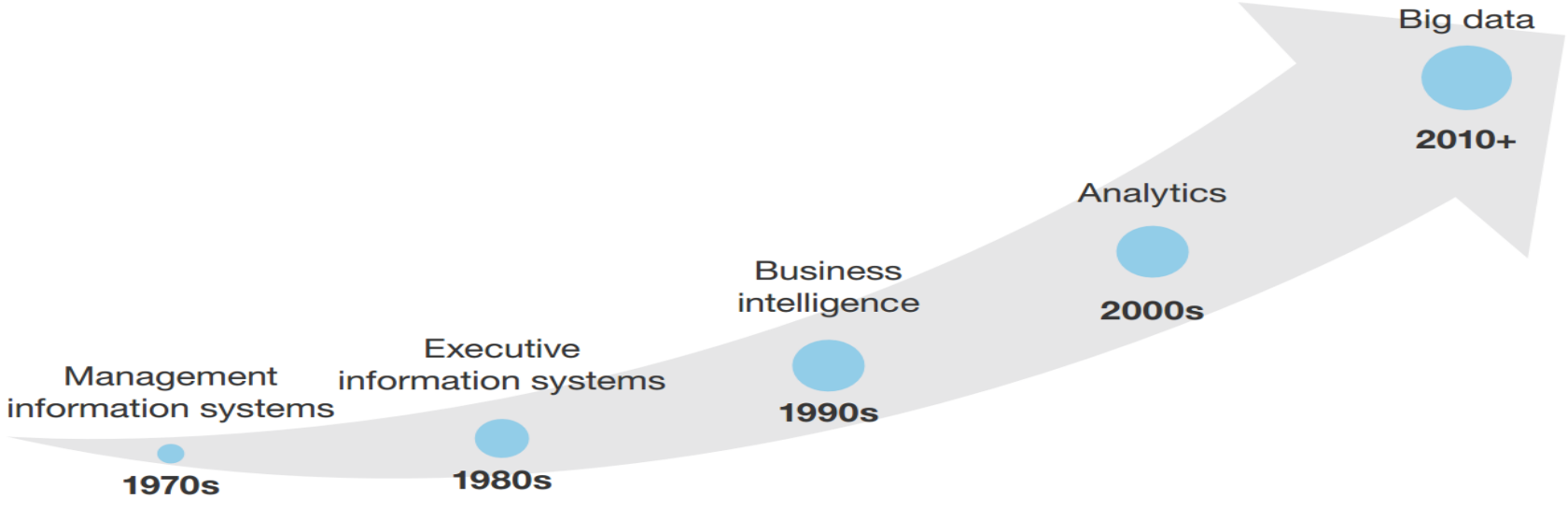
At the end of the lecture, students should be able to;

- CLO1: Demonstrate an understanding on the basic concepts and practices of big data technology

Business Motivations and Drivers for Big Data Adoption

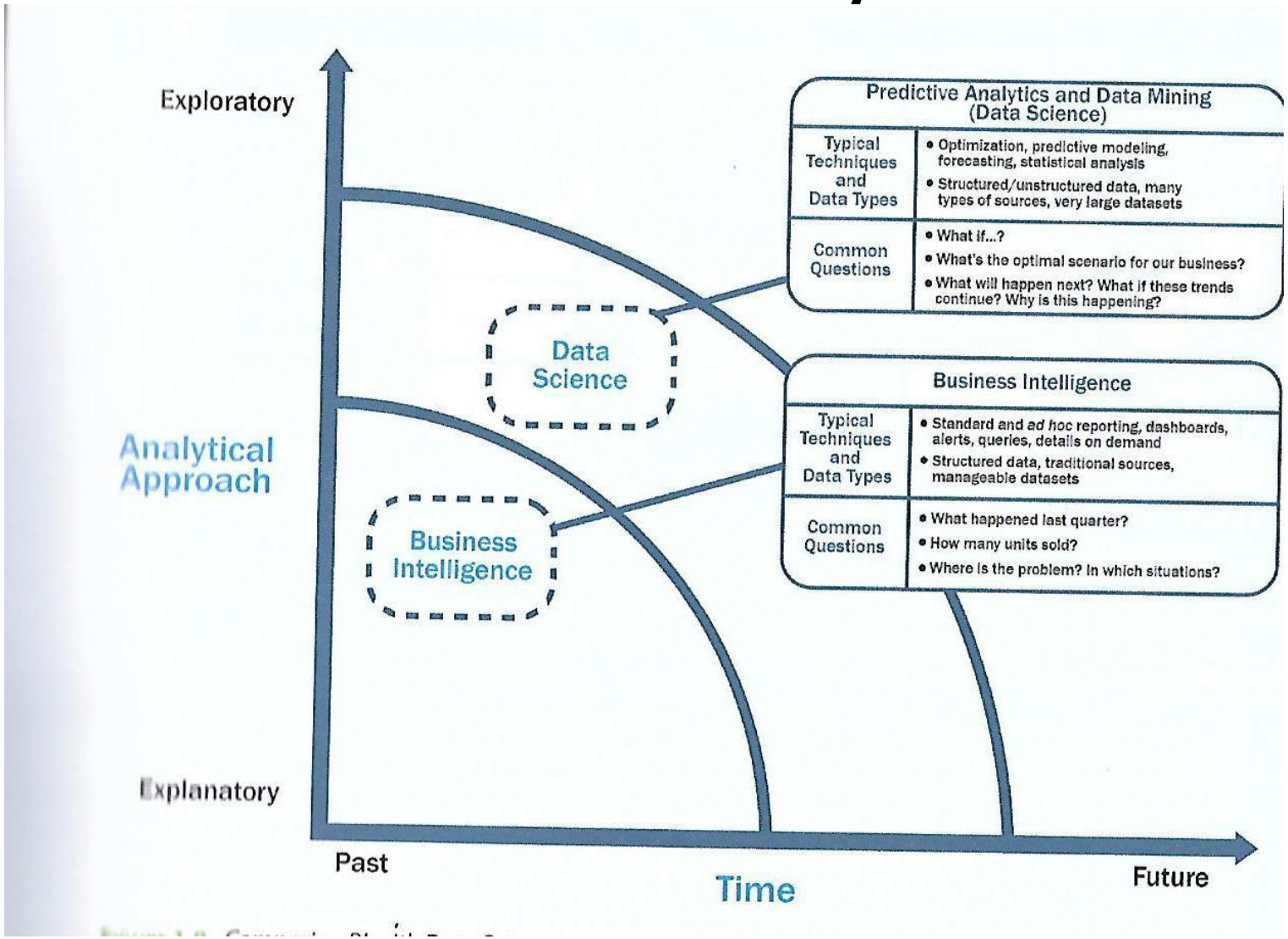
2.1 MARKETPLACE DYNAMIC

Marketplace Dynamics



	1970s	1980s	1990s	2000s	2010+
✓ Functions	Operational reporting	Executive dashboards	Operational, tactical, strategic, historical, and predictive reporting, analytics, and data visualization	What-if analysis, includes historical, operational (real time), and predictive	Data democratization, more data to more people with better and faster insights
! Limitations	• Information silos • No integration between data sources • Few strategic and historical reporting capabilities • Mostly printed reports and crosstabs	• Information silos • No integration between data sources • Few strategic and historical reporting capabilities • Mostly static data visualizations	• Limited predictive capabilities • Mostly standalone applications • Complex and inflexible • Based on RDBMS, SQL	• Mostly standalone applications • Mostly used by data scientists	• Mostly standalone applications • Mostly used by data scientists

BI vs Data Analytics

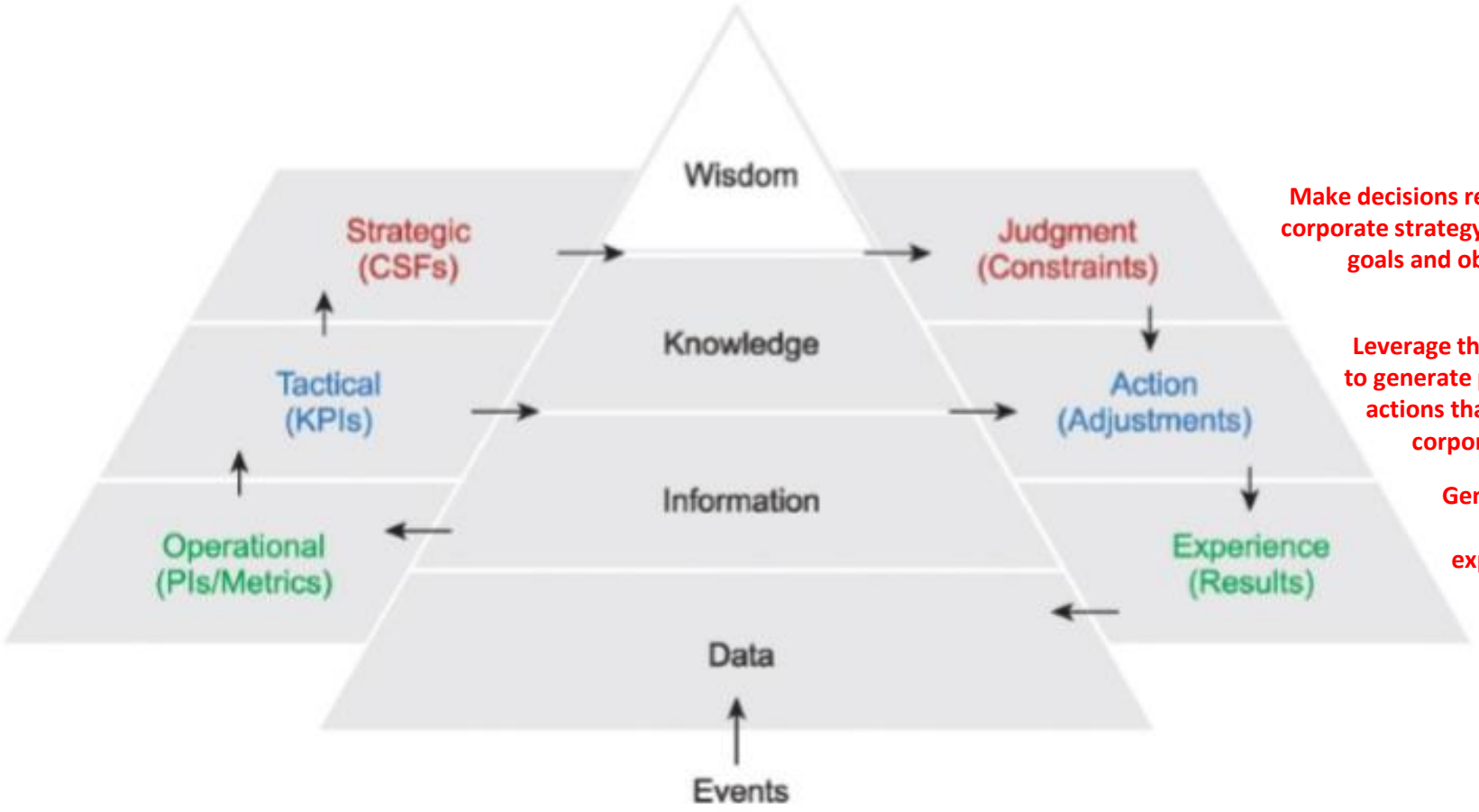


BI vs Data Analytics

	BI	Analytics
Purpose	Information gathering	Problem solving
Orientation	Historical, backward-looking	Predictive, forward-looking
Data	Aggregated	Detailed
Presentation	Passive	Interactive, iterative

Table 1. The differences between BI and analytics – historical vs. predictive.

Marketplace Dynamics



Make decisions regarding corporate strategy, policy, goals and objectives

Leverage this knowledge to generate priorities and actions that conform to corporate direction

Generate measureable change in the experience of internal stakeholders and external customers

The creation of a virtuous cycle to align **an organization across layers via a feedback loop**

Business Motivations and Drivers for Big Data Adoption

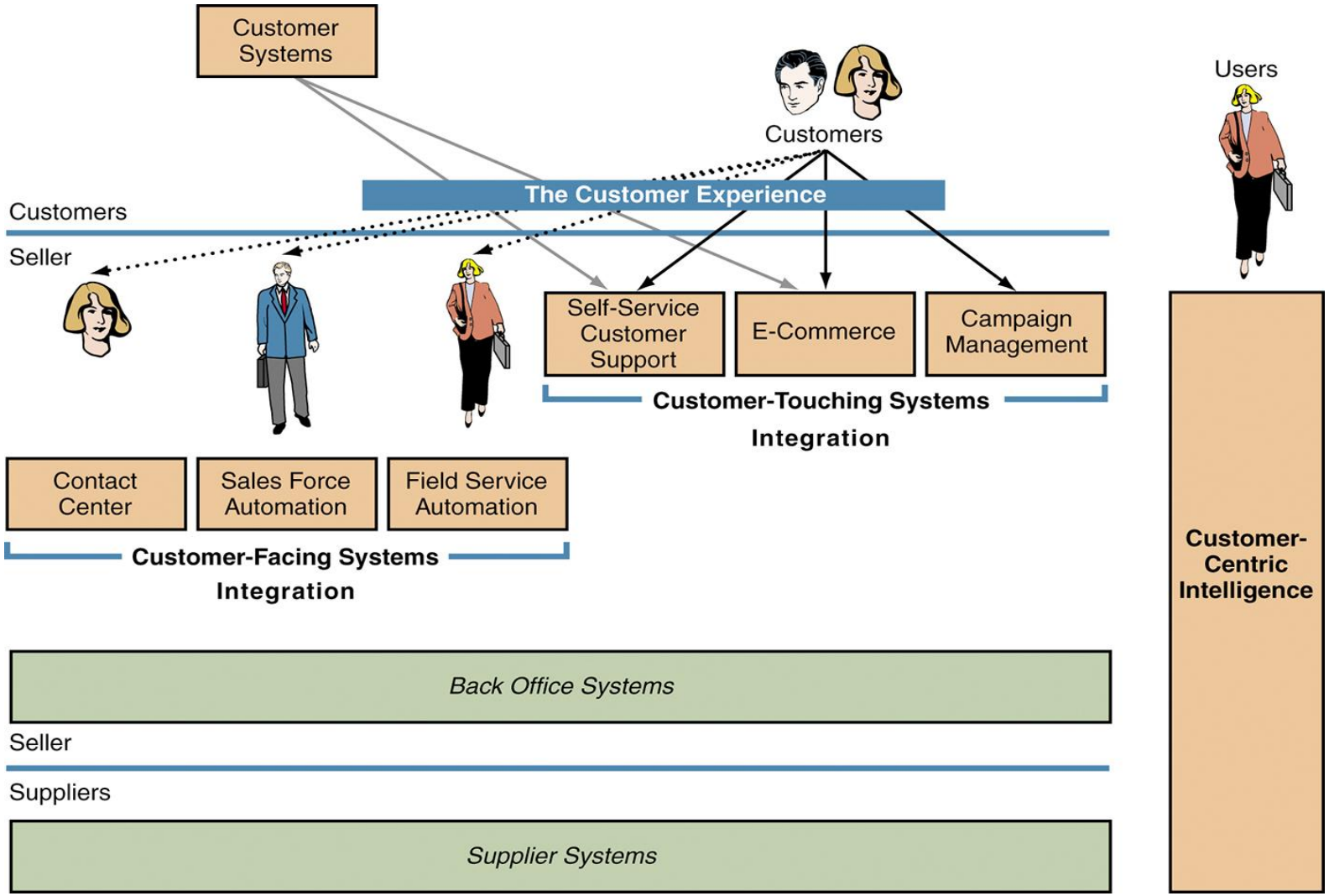
2.2 BUSINESS PROCESS MANAGEMENT

2.3 Business Process Management

- Business process – description of how work is performed in an organization.
- All work-related activities and their relationships, aligned with the organizational actors and resources.
- Models of a business process are joined with -models of organizational **roles and structure**, **business entities** and **their relationships**, business **rules** and the **user-interface**.

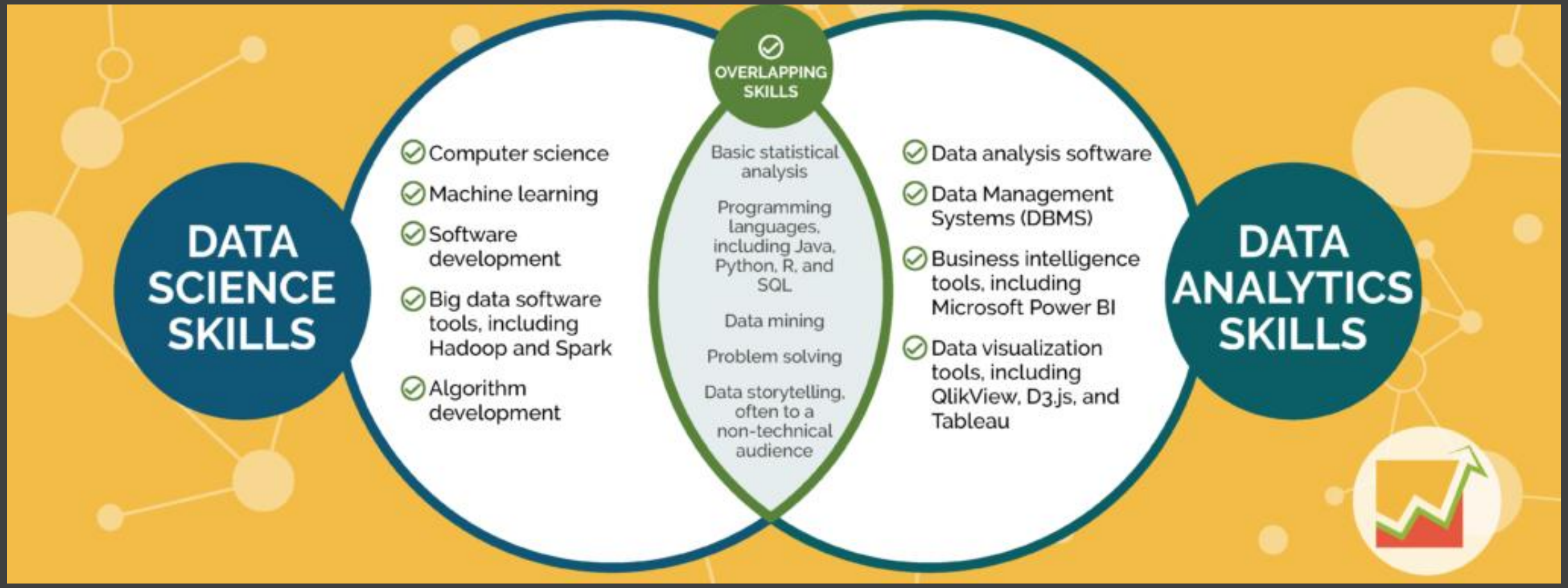
Business Process Management

Detailed analysis could leverage customer clustering, which would assign individual customers to groups where one of the cluster dimensions is the contact method.



Business Motivations and Drivers for Big Data Adoption

2.3 DATA ANALYTICS & DATA SCIENCE



2.3 Data Analytics & Data Science

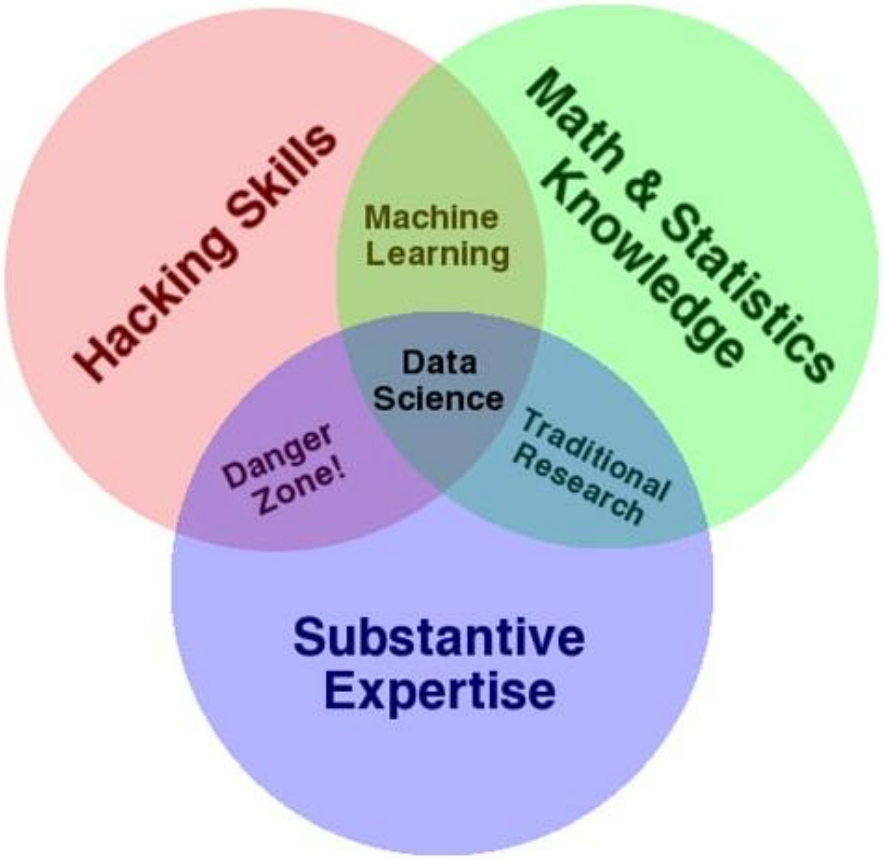
- The need for **techniques and technologies** that can **extract meaningful information and insights** has increased.
- **Computational approaches, statistical techniques and data warehousing have merged**, each bringing their specific techniques and tools that allow Big Data analysis.

Data Analytics & Data Science

- Collecting secondary **data in digitised medium** is important for businesses because mining this datacan allow for customized marketing, automated recommendations and the development of optimized product features.
- Technology capable of storing and processing large quantities of diverse datahas become increasingly **affordable**.
  - combination of commodity hardware and open source software
- Businesses are increasingly interested in incorporating publicly available datasets from **social media and other external data sources**.
  - Analysis of “voice of the customer” for better service, increase sales, targeted marketing and create new products and services.
- Vast collection of smart **Internet-connected devices** resulted in a massive increase in the number of available data streams.
- **Leveraging cloud computing** to create on premise clouds to more effectively utilize infrastructure via virtualization.
  - Infrastructure, storage and processing capabilities.

What is Data Science?

- Data science is a concept used to tackle big data and includes data cleansing, preparation, and analysis.
- A data scientist gathers data from multiple sources and applies machine learning, predictive analytics, and sentiment analysis to extract critical information from the collected data sets.
- They understand data from a business point of view and can provide accurate predictions and insights that can be used to power critical business decisions.



What is a Data Analytics?

- A data analyst is usually the person who can do basic descriptive statistics, visualize data, and communicate data points for conclusions.
- They must have a basic understanding of statistics, a perfect sense of databases, the ability to create new views, and the perception to visualize the data. Data analytics can be referred to as the necessary level of data science.

Data Science vs. Data Analytics

- Data science is an umbrella term that encompasses data analytics, data mining, machine learning, and several other related disciplines.
- While a data scientist is expected to forecast the future based on past patterns, data analysts extract meaningful insights from various data sources. A data scientist creates questions, while a data analyst finds answers to the existing set of questions

Data Analytics & Data Science

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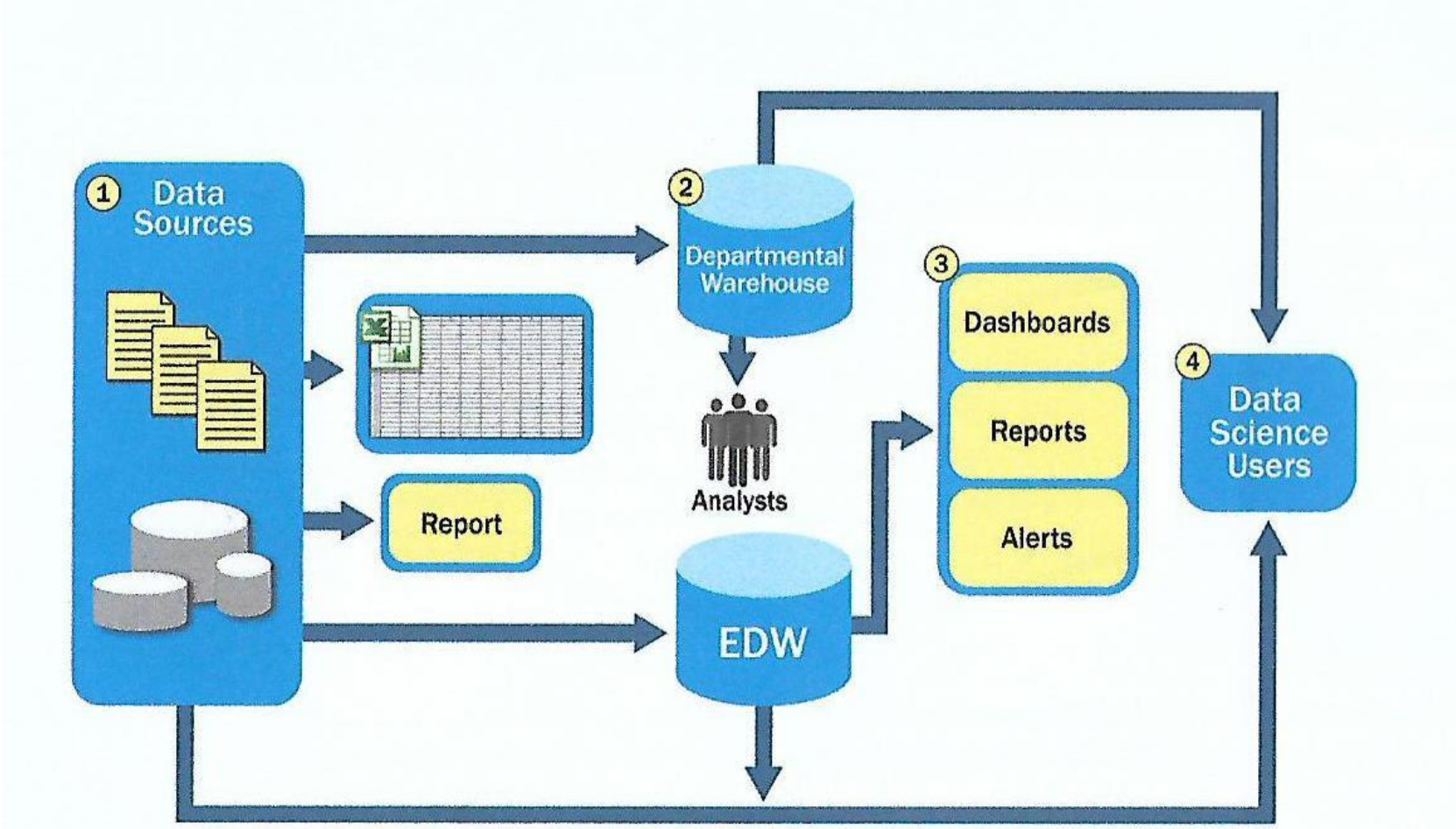
Business Process Management

Analytics Architecture

Data flow from left to right (in a typical organization)



2.4 DIGITIZATION

Digitization

- For many businesses, digital mediums have replaced physical mediums as the de facto communications and delivery mechanism.
- The use of digital artifacts **saves both time and cost** as distribution is supported by the vast pre-existing infrastructure of the Internet.
- **As consumers connect to a business through their interaction with these digital substitutes**, it leads to an opportunity to collect further “secondary” data; for example, requesting a customer to provide feedback, complete a survey, or simply providing a hook to display a relevant advertisement and tracking its click-through rate.
- Collecting secondary data can be important for businesses because mining this data can allow for customized marketing, automated recommendations and the development of optimized product features

A visual representation of examples of digitization.

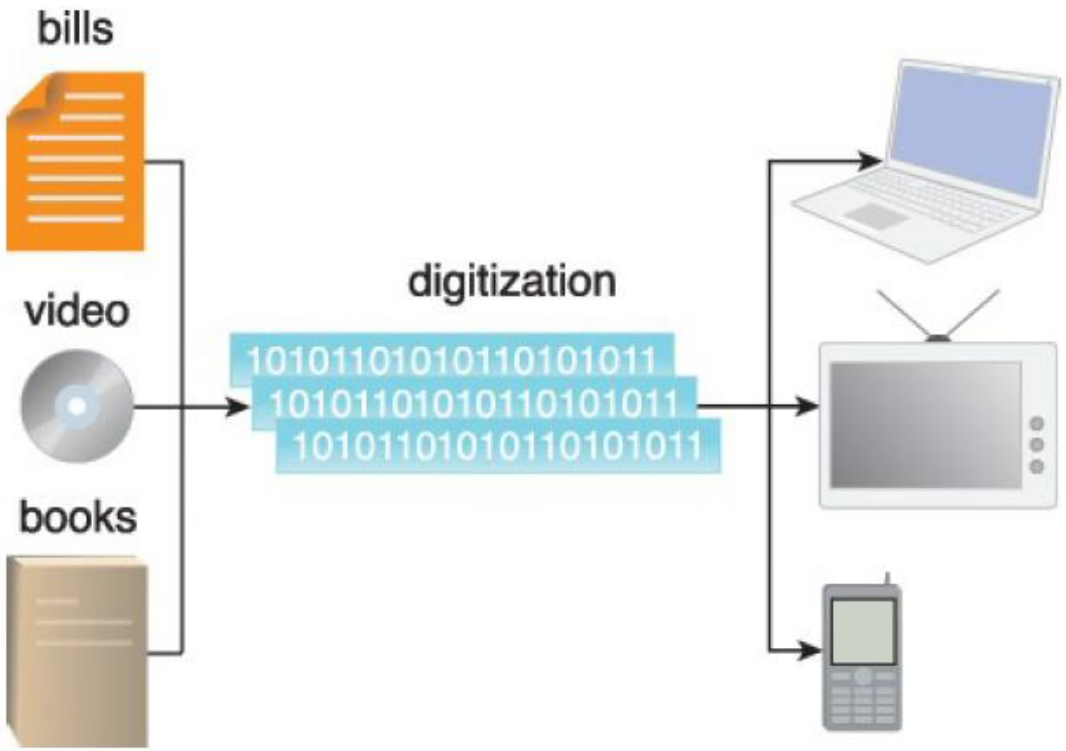
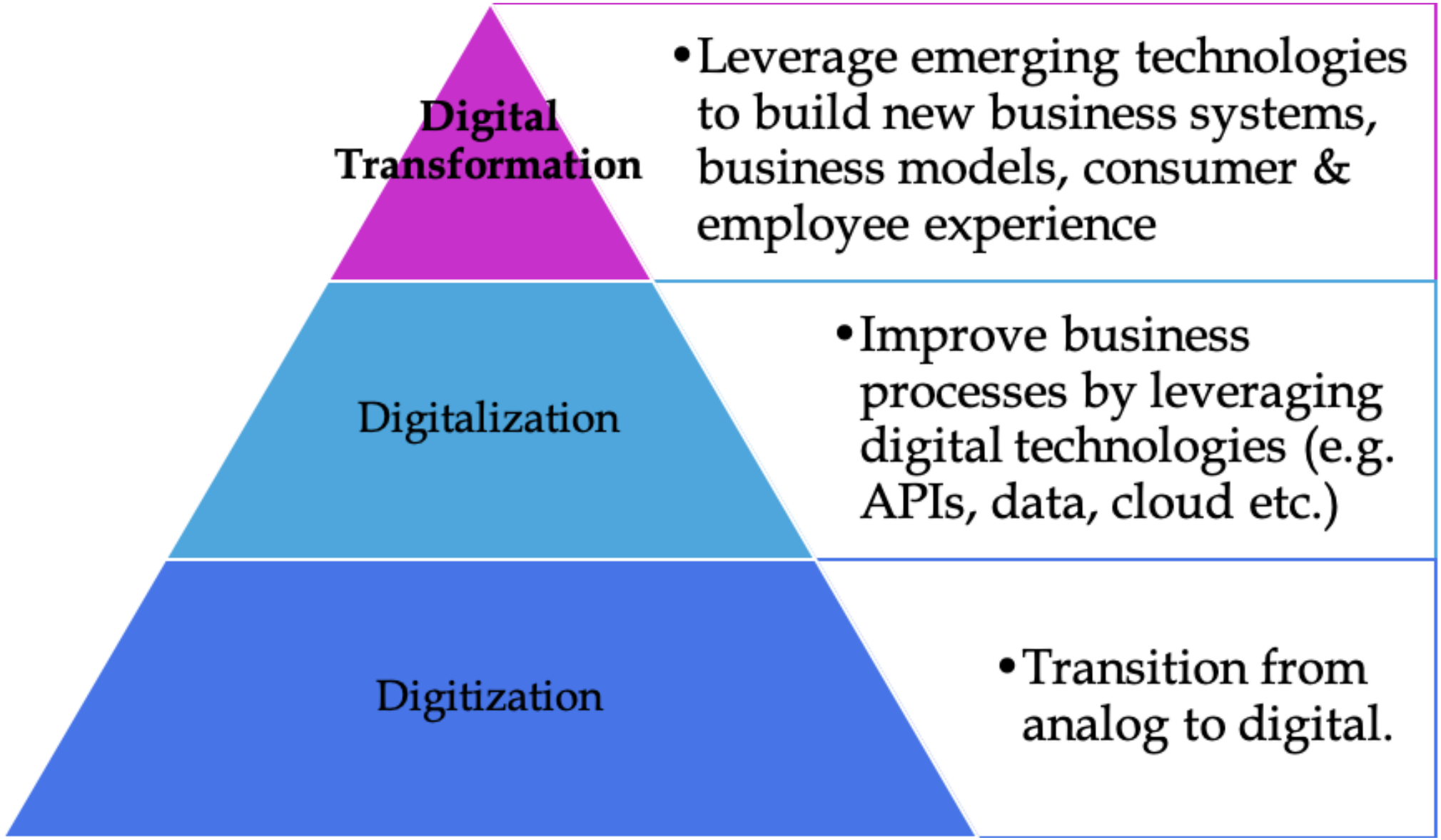
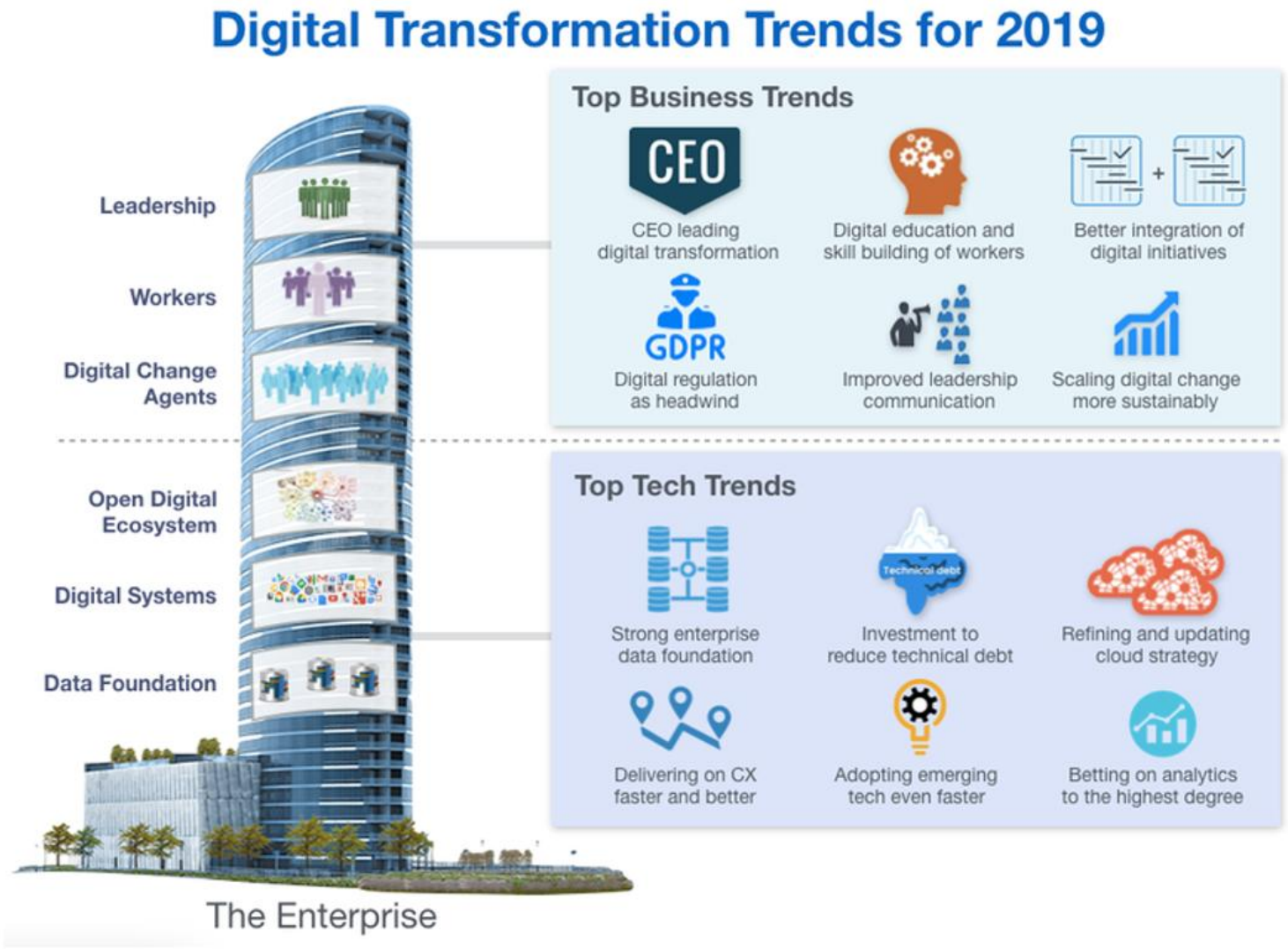


Figure 2.4 Examples of digitization include online banking, on-demand television and streaming video.


Digital Transformation
•Leverage emerging technologies to build new business systems, business models, consumer & employee experience
Digitalization
•Improve business processes by leveraging digital technologies (e.g. APIs, data, cloud etc.)
Digitization
•Transition from analog to digital.

Digital Transformation Trends




WHAT IS
DIGITAL TRANSFORMATION?

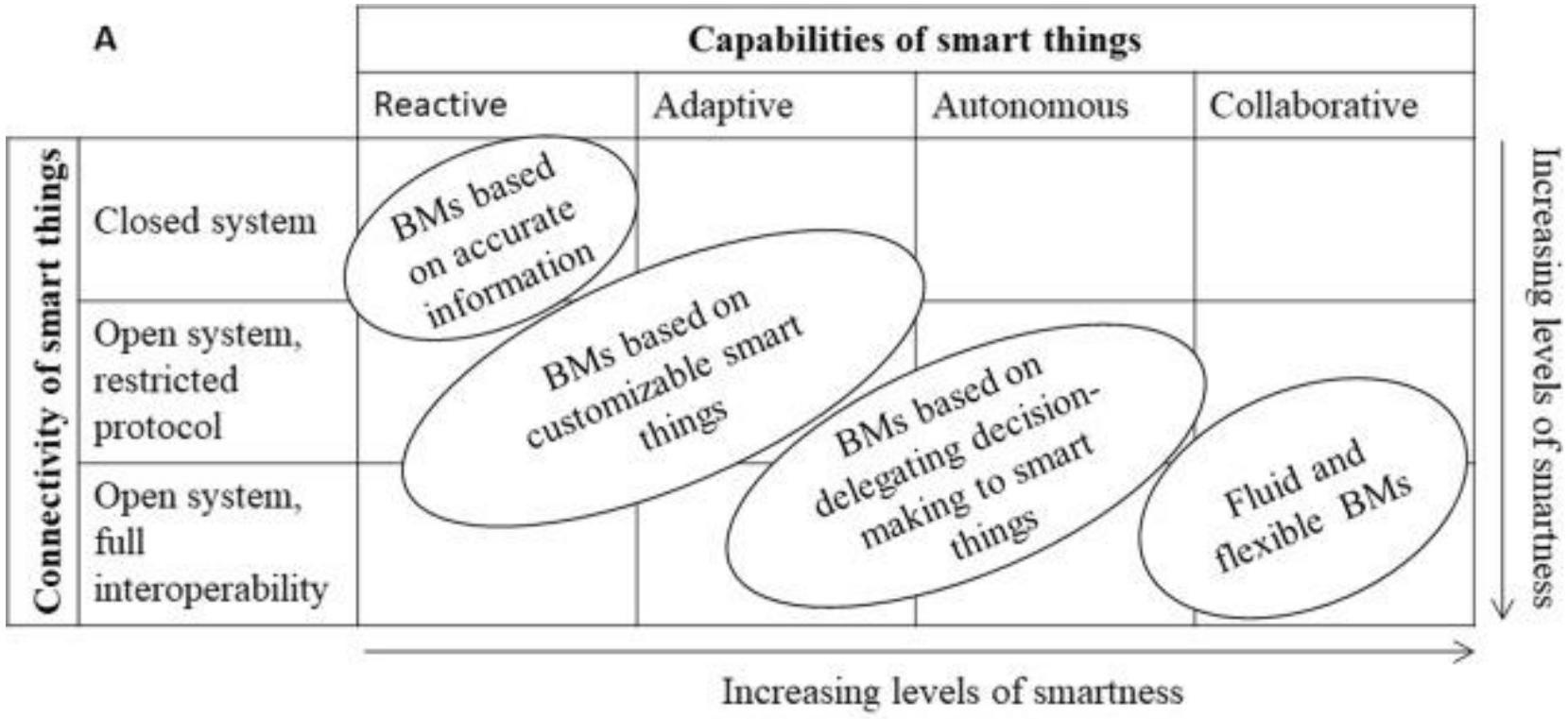
2.5 INTERNET OF EVERYTHING

Internet of Everything (IoE)

- The convergence of advancements in information and communications technology, marketplace dynamics, business architecture and business process management all contribute to the opportunity of what is now known as the Internet of Everything (IoE).
- Big Data is the heart of Internet of IoE.
- System of systems.
- IoE combines the services provided by smart connected devices of the IoT into meaningful business processes - to provide unique and differentiating value propositions.
- One example of IoE – precision agriculture
  - GPS-controlled tractors, in-field moisture and fertilization sensors, on-demand watering, fertilization, pesticide application systems and rate seeding equipment
  - Maximize field productivity ; minimizing cost.

Internet of Everything

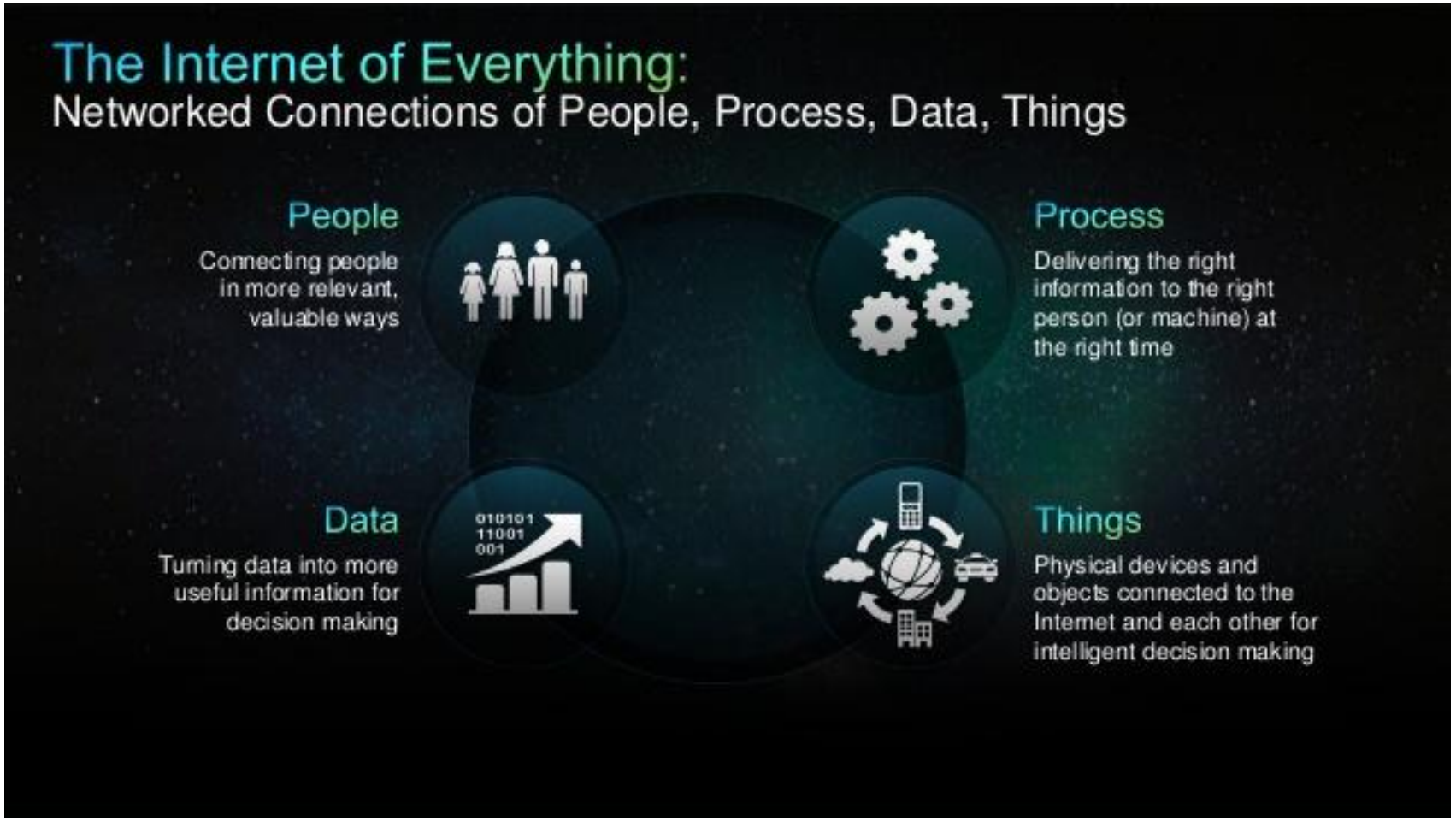
Taxonomy of the increasing levels of smartness for things in the Internet of Everything



*BM: business model

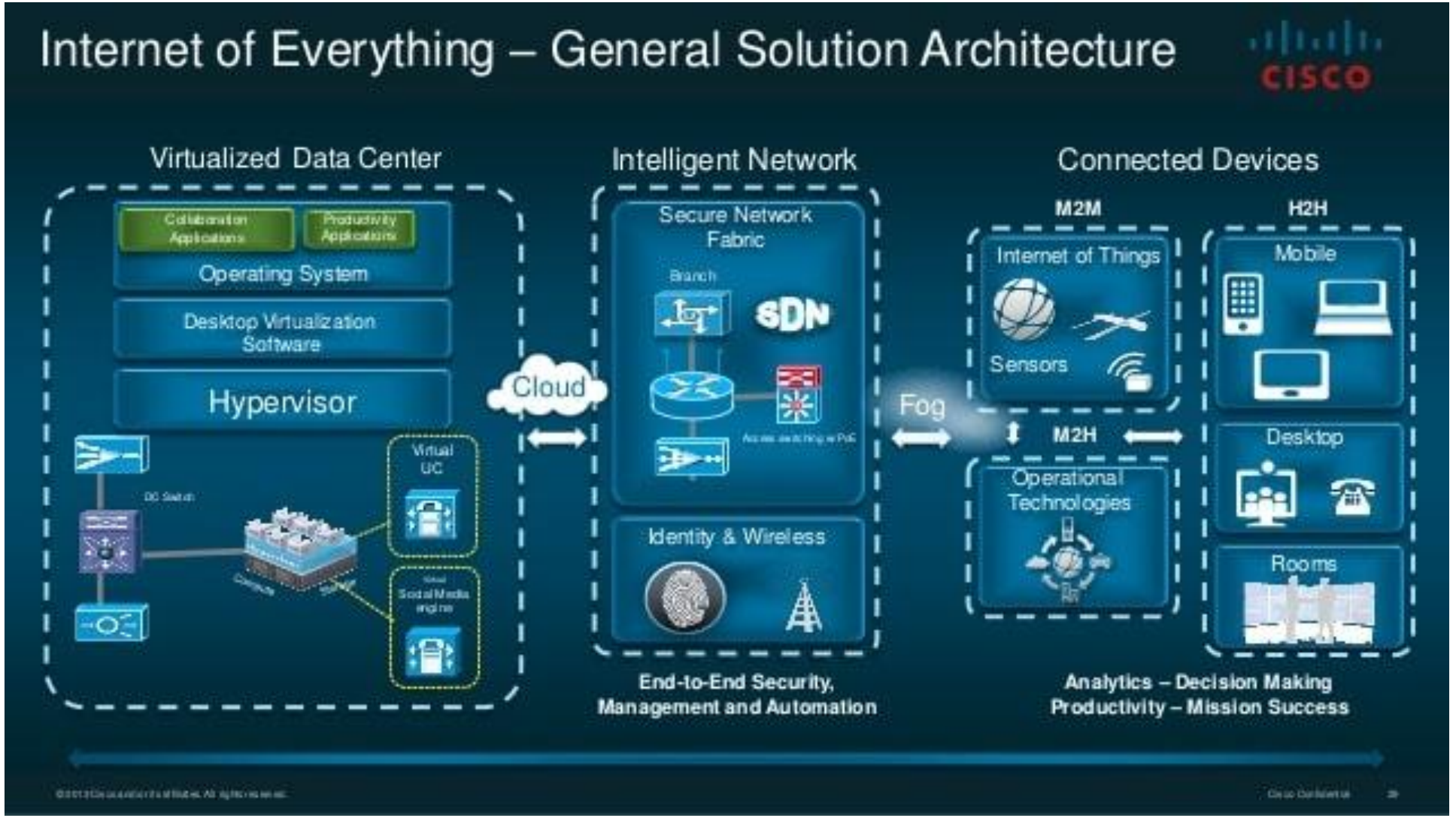
Source: David J. Langley, Jenny van Doorn, Irene C.L. Ng, Stefan Stieglitz, Alexander Lazovik, Albert Boonstra, The Internet of Everything: Smart things and their impact on business models, Journal of Business Research, Volume 122, 2021, Pages 853-863,

What is IoE?


The Internet of Everything:
Networked Connections of People, Process, Data, Things
People
Connecting people in more relevant, valuable ways
Process
Delivering the right information to the right person (or machine) at the right time
Data
Turning data into more useful information for decision making
010101
11001
001
Things
Physical devices and objects connected to the Internet and each other for intelligent decision making

IoT - Internet of Things | What is IoT? | IoT Explained in 6 Minutes | How IoT Works

IoE – General Architecture



The Growing of IoE

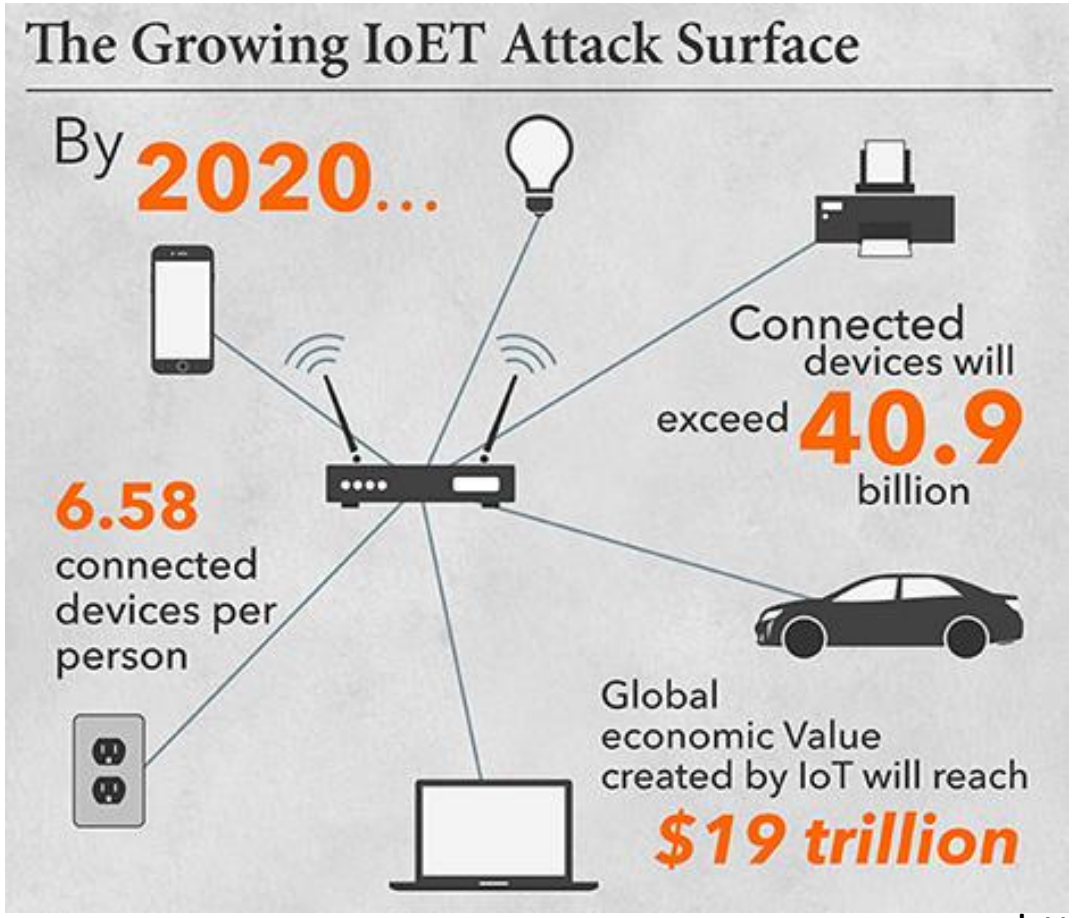
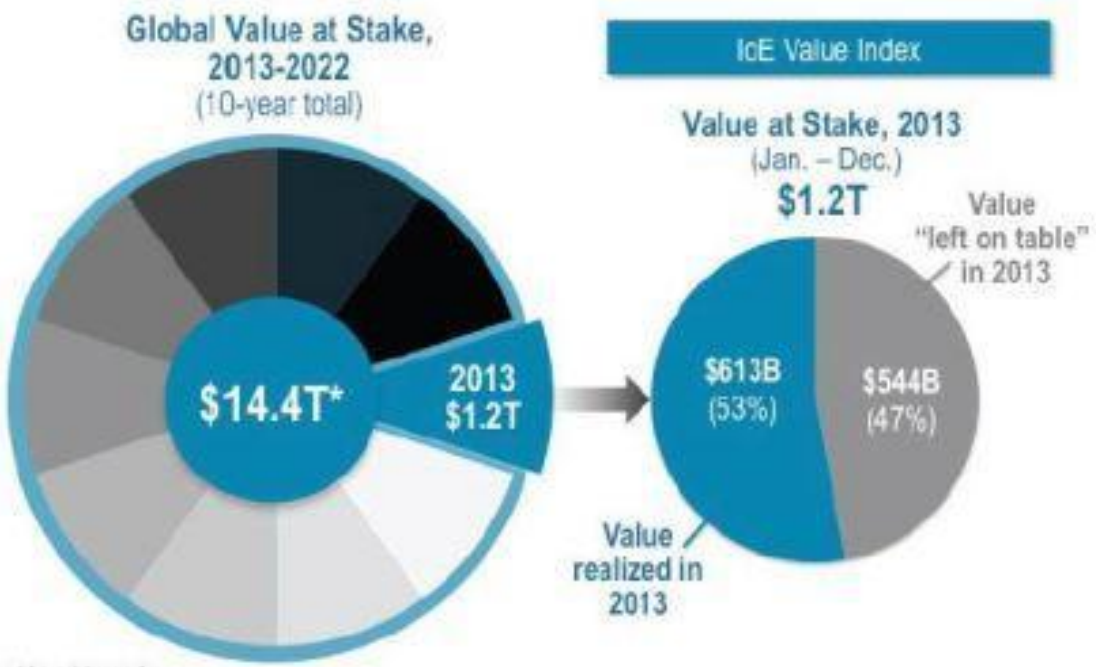


Figure 1. Cisco Estimates that Companies Will Realize 53 Percent of Potential IoE Value at Stake in 2013.



Note: chart is not to scale

* $14.4T is conservative because it is based on a set number (21) of private-sector use cases and discounts future cash flows due to uncertainty around privacy and regulatory issues

Source: Cisco, 2013

https://www.techzone360.com/topics/techzone/articles/2013/06/20/342857-cisco-internet-everything-ioe-study-says-profits-will.htm