



Business Performance Analytics & Business Intelligence

Module II

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Module Goals

- ❑ Be aware of the Information System role
- ❑ Know the types and composition of modern Information Systems
 - Business Application Portfolio
 - ERP, CRM, Scada, IoT, Big data
- ❑ Exploit data produced by Information System to create a data-driven company
 - Design a KPI
 - Design & Implement a Data Warehouse

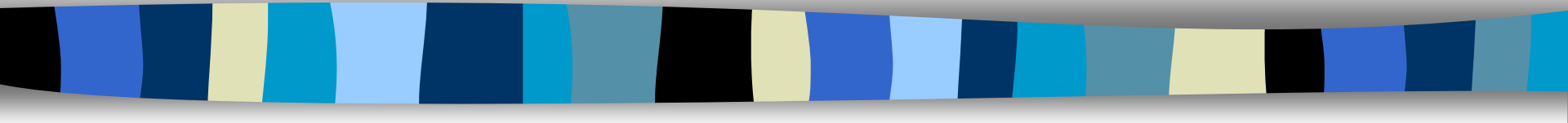
Didactic material and information

- ❑ Handouts are available at the course pages
<http://bias.csr.unibo.it/golfarelli/BPA&BI/>
<https://virtuale.unibo.it/>
- ❑ Book on DW Design: Data Warehouse Design: modern principles and methodologies, McGraw-Hill, 2009
- ❑ Communications will be sent through a teacher-student list to which it is possible to register from the aforementioned site
 - Time changes
 - Cancellation of lessons
 - Publication of the examination results

Assesment Method

- ❑ Written test with open questions and exercises

Introduction



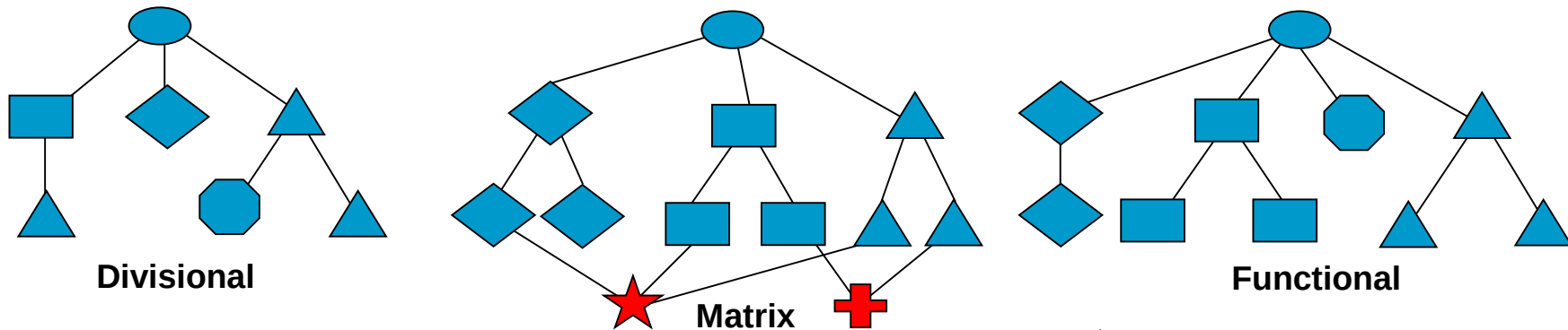
Understanding companies

- ❑ Each company or institution, whether public or private, is structured and organized according to its mission and to achieve the identified **goals**, for instance:
 - Private company: gain profits by producing and selling a well-defined class of products to a class of customers.
 - Public service company : provide a set of services to a class of users, maximizing the quality of the service and minimizing its cost at the same time.
- ❑ To reach its goals a company structures itself by defining its own **organizational structure** and a set of **functional processes** that define its behavior.
- ❑ To understand a company it is essential to know its **goals**, **organizational structure** and **functional processes**.

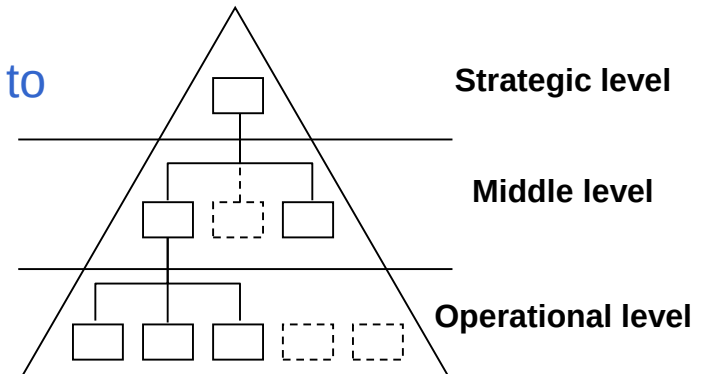
Processes & Organizations I

- ❑ **Organizational structure:** the company is organized in different units to which specific tasks and goals are assigned. Units cooperate through hierarchical and functional links

- We can describe hierarchical relationships through graphs which outline responsibilities and functions



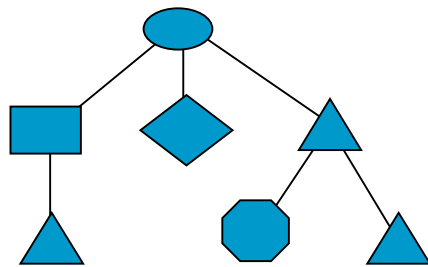
- A the three-level corporate split is useful to understand the type of tasks carried out



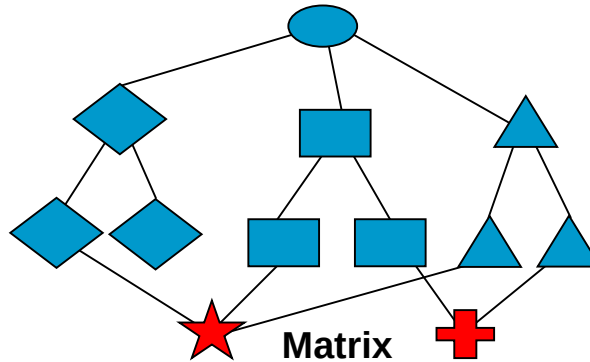
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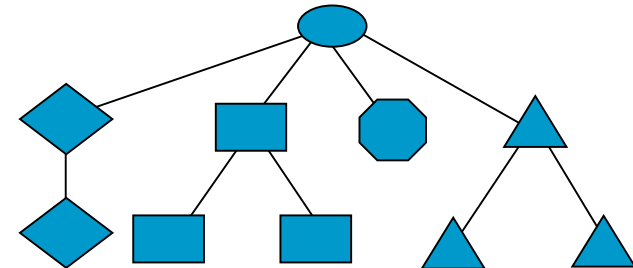
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Divisional



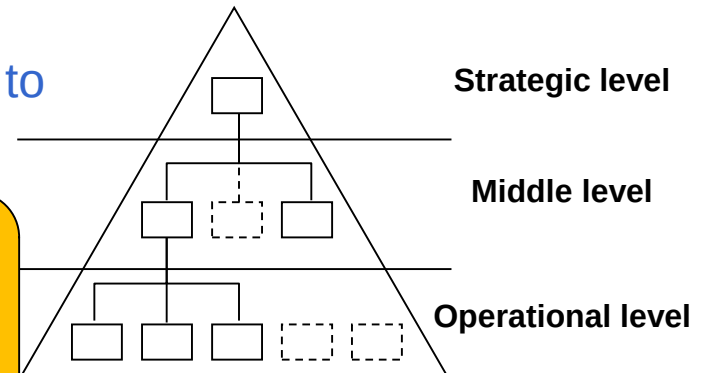
Matrix



Functional

- A three-level corporate split is useful to understand the type of tasks carried out

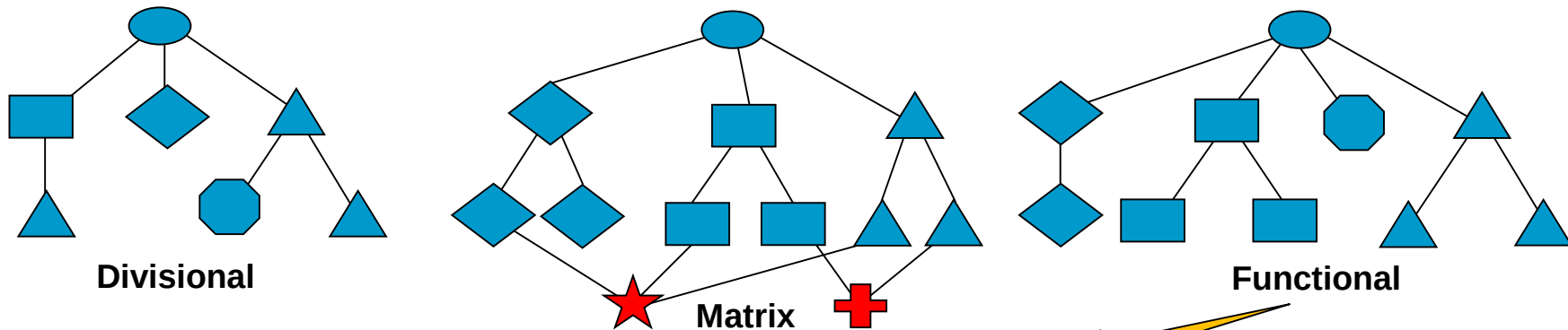
People are grouped together based on the product or service they provide, not the work they do. For example, a large corporation such as General Electric has divisions for electronics, transportation, and aviation, each with its own team of accountants, marketers, etc.



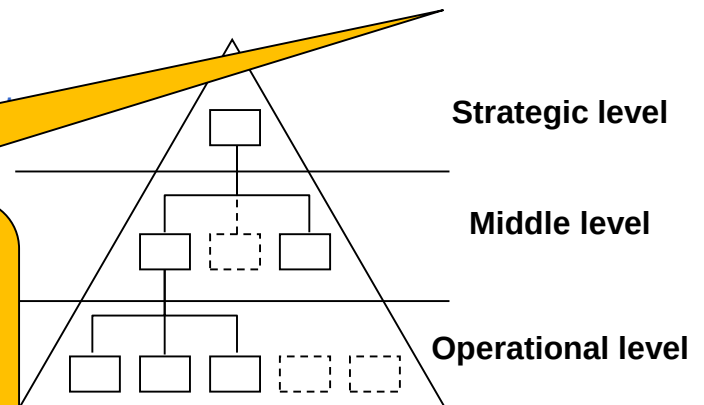
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- A the three-level corporate split is useful to understand the type of task and the type of output

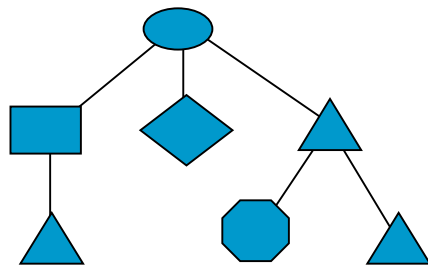


It calls for grouping together people who do similar tasks based on their area of specialty. In other words, you'll find all the accountants in finance and all the marketers in marketing. Managers led each area and report up to a director or executive who may oversee multiple departments.

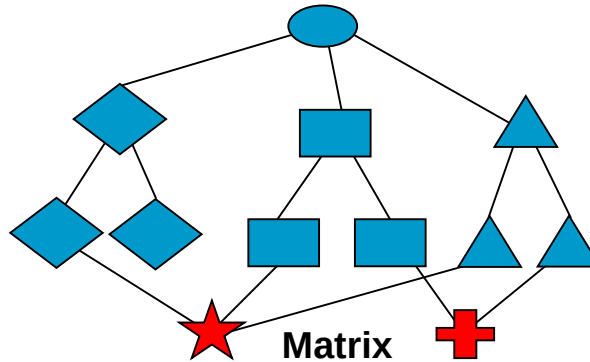
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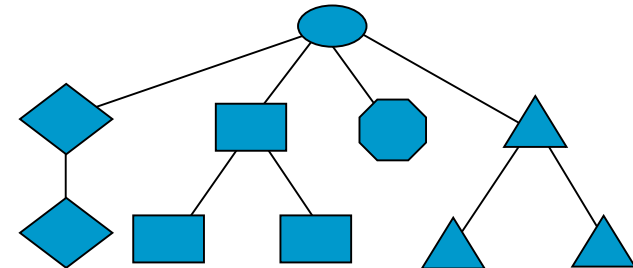
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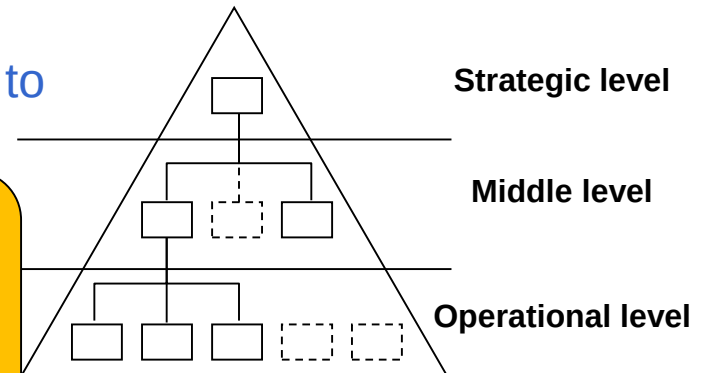


Matrix



Functional

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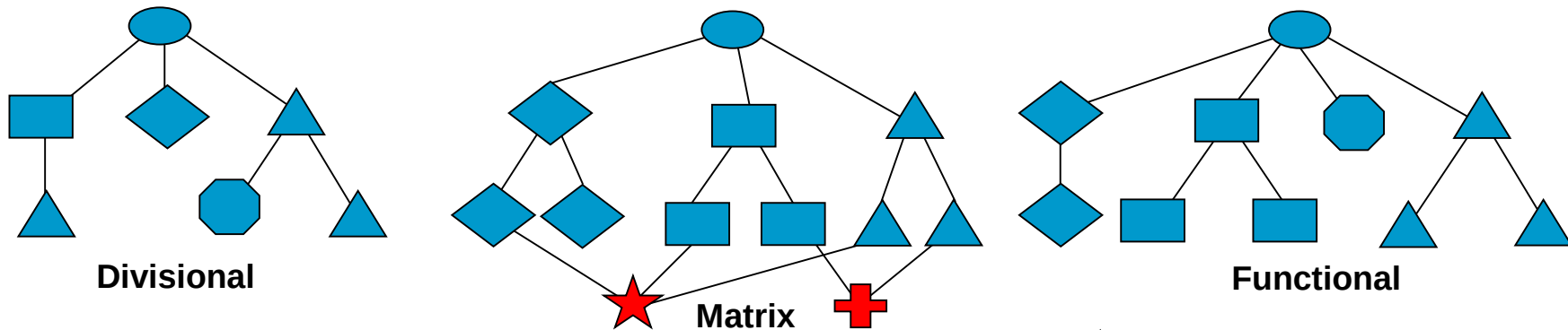


Is a hybrid of the functional and divisional structures. It may involve employees reporting to different bosses depending on their current assignment. For example, a software design specialist may report to her boss in IT, but she's also brought onto specific projects because of her expertise. When that happens, she will report to a different bosses as long as that project continues.

Processes & Organizations I

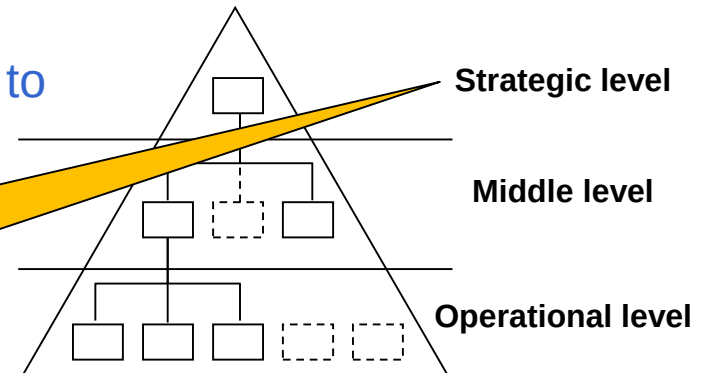
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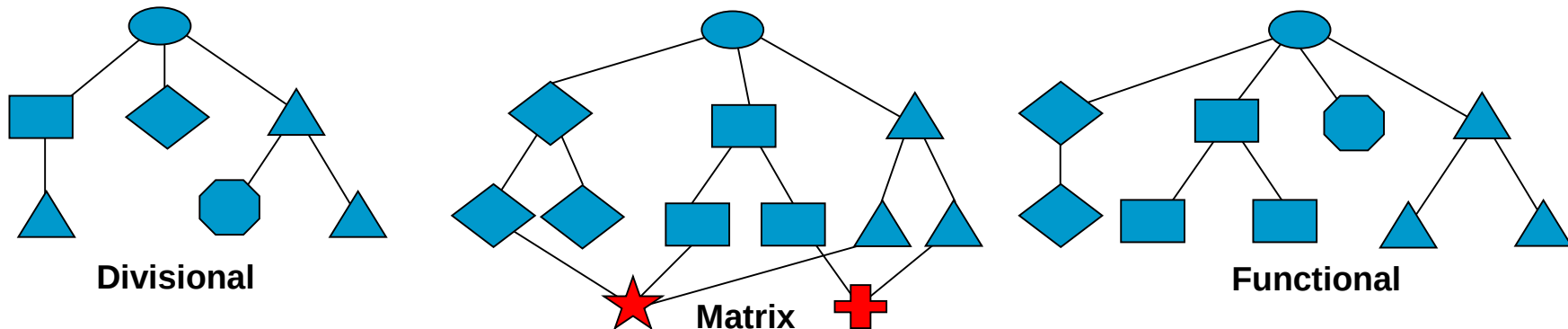
Focuses on activities necessary to ensure competitive positioning and long term strategy



Processes & Organizations I

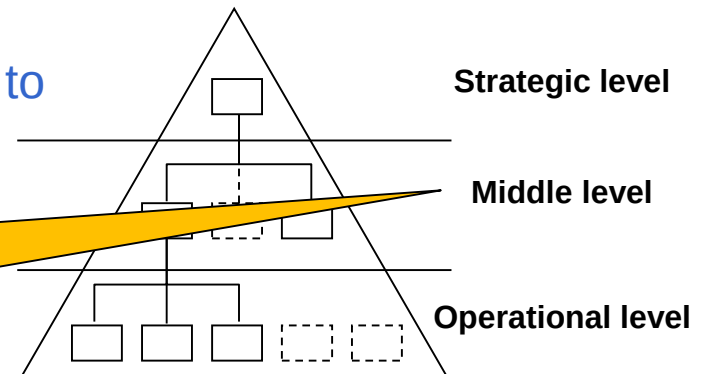
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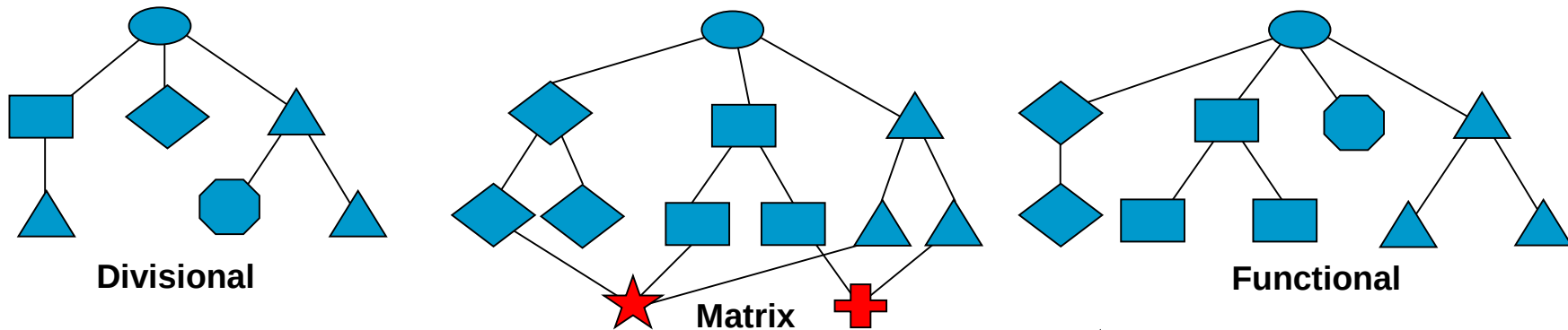
Implement strategic plans and ensure that day-by-day activities conforms to the corporate strategy



Processes & Organizations I

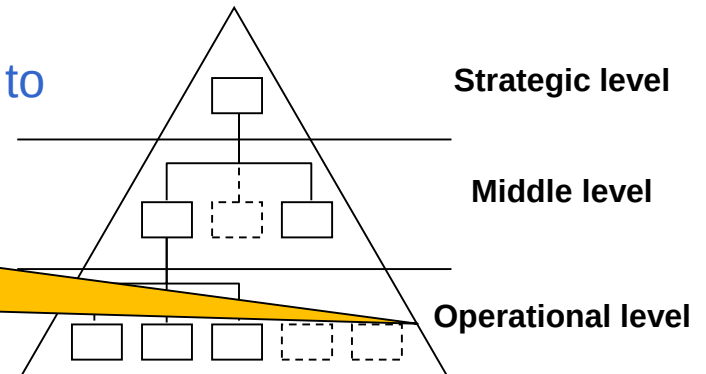
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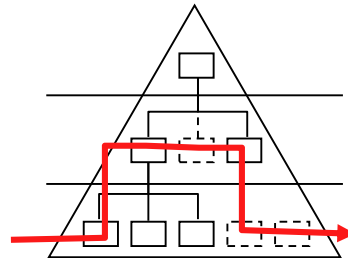
- A the three-level corporate split is useful to understand the type of tasks carried out

Is related to the short-term operations of a company, concerns the implementation of goods and services



Processes & Organizations II

- ❑ **Process:** set of interrelated activities, aimed at achieving a defined and measurable result that contributes to the achievement of the company's mission.
 - The making of products/services generally requires the involvement of several organizational units, through a distribution of tasks and responsibilities, often coded through rules that define the process. The process, in this sense, is therefore a link between units.



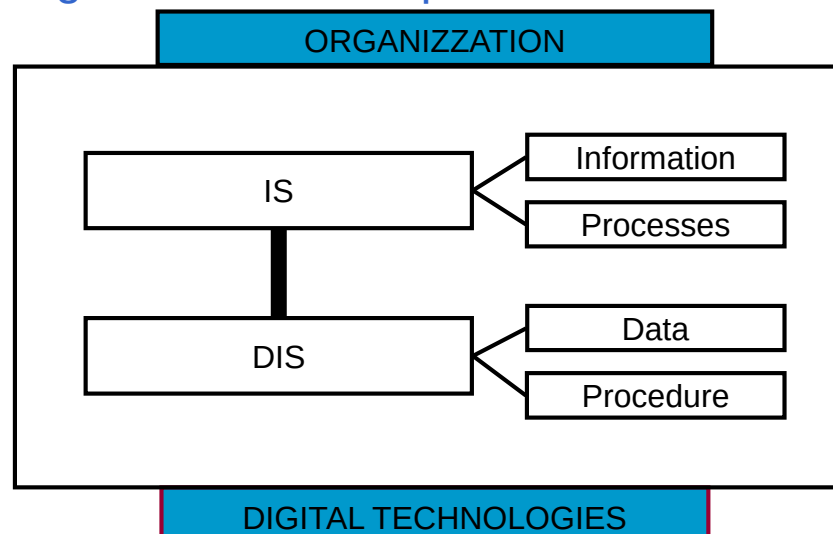
The analysis of the company as a set of processes determines an orthogonal view with respect to that based on its units

The Information System

- ❑ Processes need to know the resources they work with, in other words they need information.
- ❑ The set of information managed - generated, used, processed - by business processes and the methods for their management constitutes the **information system**.
- ❑ Information system is not a computer science term
- ❑ The portion of the information system in which information is collected, processed, stored and exchanged through the use of information technology constitutes the **digital information system**.

The Role of Digital Information System

- ❑ The DIS role has radically changed from the early 70s to the present day. DIS have been transformed from simple tools to **improve the efficiency** of processes, to central elements of the business organization capable of **revolutionizing** the structure of business processes by drastically **increasing** the effectiveness of the company system
- ❑ Computer science takes on a double role :
 - it continues to be a technology with its own evolutions
 - it becomes an organizational discipline.



Digitalization of Information System I

- ❑ **Step I:** digitalization of data ingestion, storing and querying of data at the operational level (e.g. wages, order management, billing, etc.).

- **Features:**

- Repetitiveness of the operations to be checked
- Structured nature of the processes to be managed
- Large amounts of data

- **Benefits:**

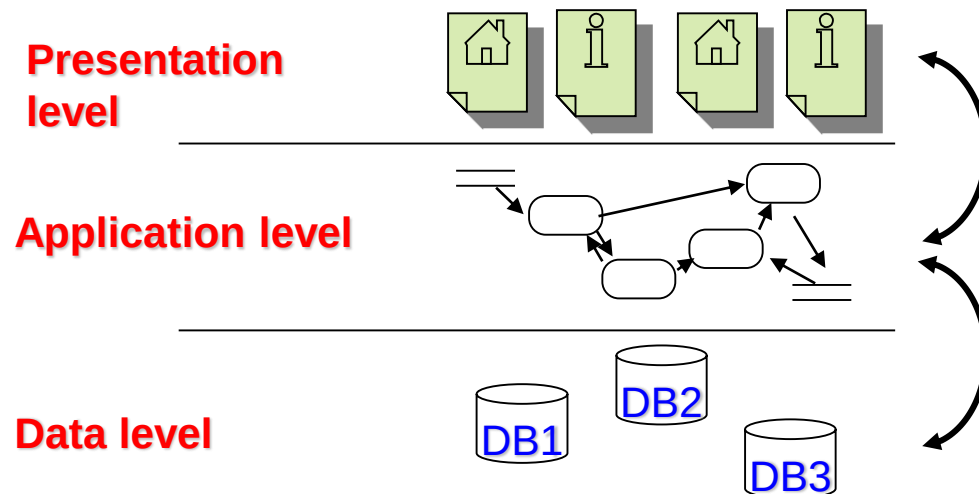
- Reduction of the time and costs of processing the information resource
- Less chance of error

Digitalization of Information System II

- ❑ **Step II:** Digitalization of monitoring activities and business performance evaluation (e.g. production monitoring, what-if analysis, budgeting, etc.)
 - **Features:** DIT assumes an active role by supporting managers.
 - **Benefits:**
 - Reduction of coordination and control costs
 - Advanced analysis can be carried out
- ❑ **Step III:** integration between sectoral applications, computerization of communications
 - **Features:**
 - No redundancies and inconsistencies
 - Greater possibility of cooperation between different roles.
 - **Benefits:**
 - Higher quality data
 - Processes synchronization through digital information flows
 - Avoid Information Silo

DIS VS Database

- ❑ Designing a Digital Information System includes modeling of application logic (i.e. implementing processes)
- ❑ The definition of the database must disregard as much as possible the logic of the applications and must instead encode only the reality of the information.
 - Data are more stable than application logic: *typically business procedures change along time while using the same data*
- ❑ This is why DIS are *three-tier* systems



Let's broaden the border to Digital Transformation

- ❑ With DT more and more corporate areas/activities are supported by digital tools
- ❑ The border of DIS gets larger and blurred
- ❑ DT aims to improve the efficiency and effectiveness of companies by exploiting the possibilities offered by new technologies.
- ❑ All public and private business sectors will be involved in this transformation, albeit with different times and methods
- ❑ It is important to experiment and understand where and when to digitize
- ❑ DT is not just a technological issue!
 - ✓ It requires a long-term strategy and a step-by-step path
 - ✓ It needs changes in people's mindsets and in the search for digital talent



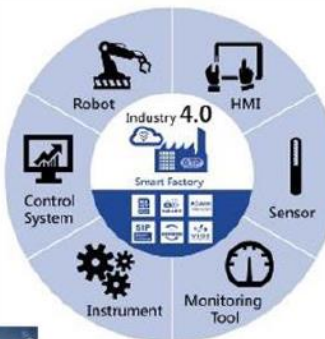
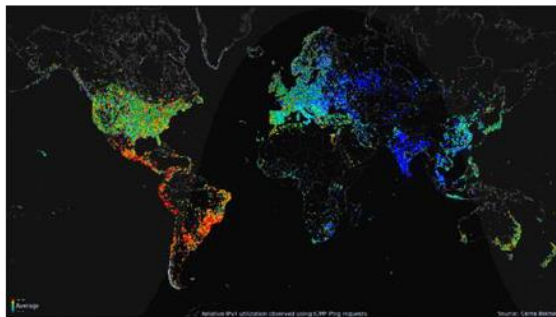


Data Revolution

- ❑ Data is the fuel that powers digital transformation
- ❑ Digitization began in the 1970s with the progressive spread of computers, starting the process of digitizing processes and information that continues to accelerate even today by changing its name but not its objective.
 - ✓ Post-industrial society
 - ✓ Information technology revolution
 - ✓ Digital age
- ❑ **Digital Age** started around 2002, when more digital than analog information has been stored around the world.
 - ✓ At the end of the 1980s, less than 1% of information was in digital format,
 - ✓ In 2012 the percentage had risen to 99% with an annual increase of about 30%, which leads to a doubling of the information stored in less than 3 years.

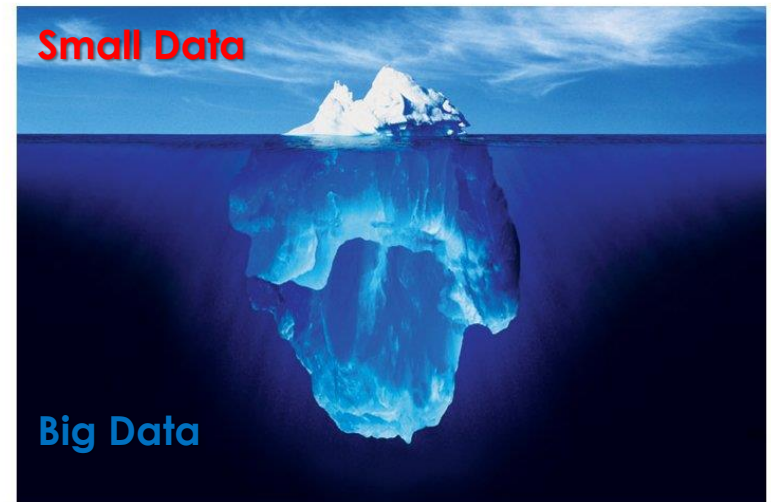
Who are the data producers in the digital age?

- Information systems are no longer limited to the data produced by business processes. They must be rethought to allow the exploitation of all the data useful to the company and to support internal and external processes



Big Data vs Small Data

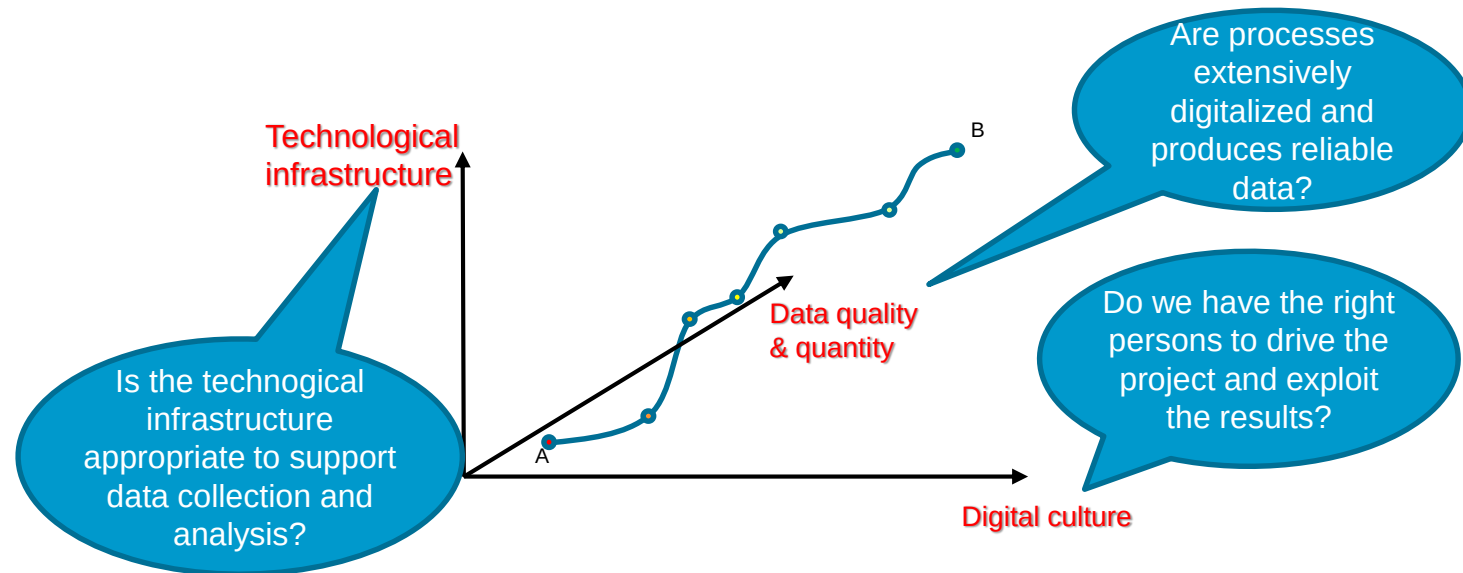
- ❑ The progressive digitalization of services and systems generates an enormous mass of heterogeneous and real-time data
- ❑ Big Data must be transformed into Small Data so that it can be exploited for decision-making purposes
- ❑ It is not possible to manually analyze and exploit all the available data, and the next challenge is about systems that do it autonomously
 - ✓ Auto machine learning (AutoML)
 - ✓ Automated data collection
 - ✓ Robotic process automation (RPA)



Turning your company in a data-driven one

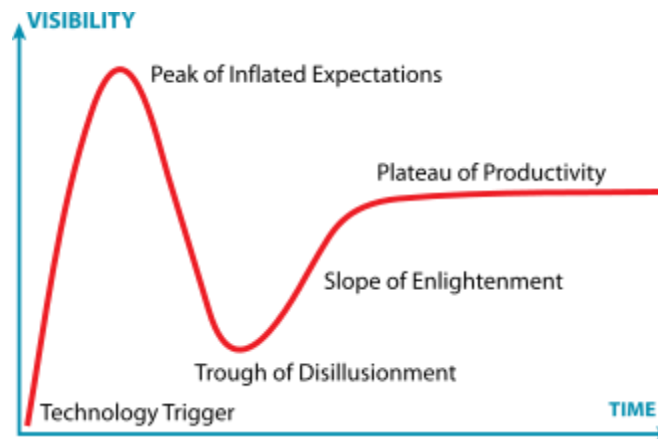
❑ **Digitalization** is a journey that involves three main dimensions. Moving from A to B is a multi-year process made of intermediate goals each of which must be feasible

- ✓ Solves a company pain and brings value
- ✓ Can be accomplished in a limited time range (typically less than one year)
- ✓ Costs must be economically related to gains
- ✓



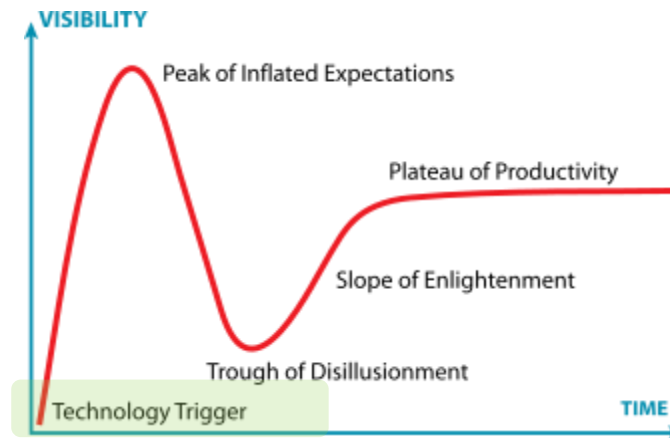
The technology adoption cycle

- The adoption of new technologies follows a standard path that involves (1) the maturation of one or more enabling technologies and (2) their diffusion
 - ✓ The first one is driven by researchers and engineers
 - ✓ The second from entrepreneurs
- The **Gartner Hype cycle** models such path



The technology adoption cycle

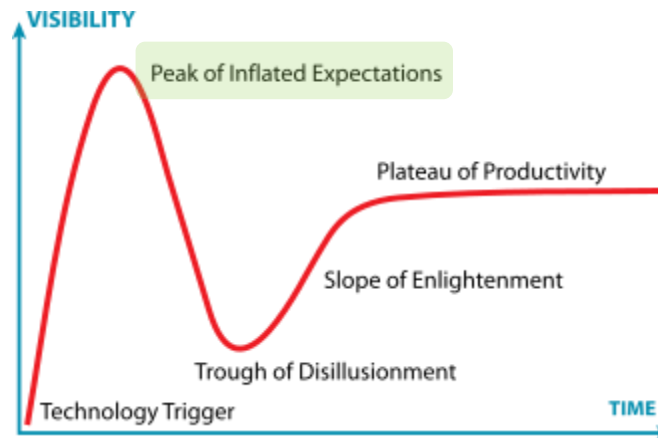
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- ✓ **Innovation triggers:** innovative subjects starts the adoption since they recognize the potential of the technology even in the absence of evidence of its usefulness

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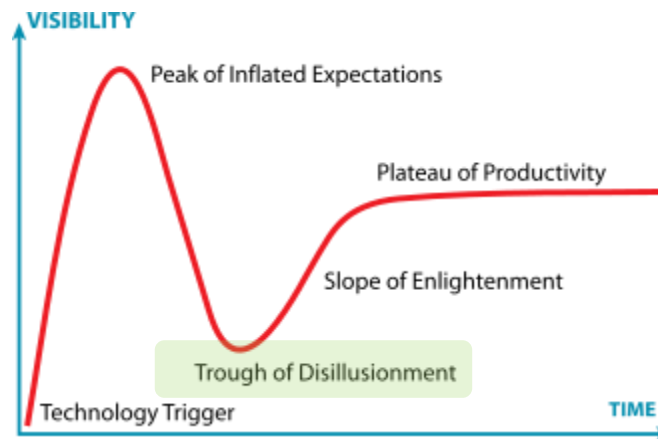
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- ✓ **Peak of inflated expectations:** media attention coupled with successful cases, often paired by many failed adoptions, lead to widespread use cases

The technology adoption cycle

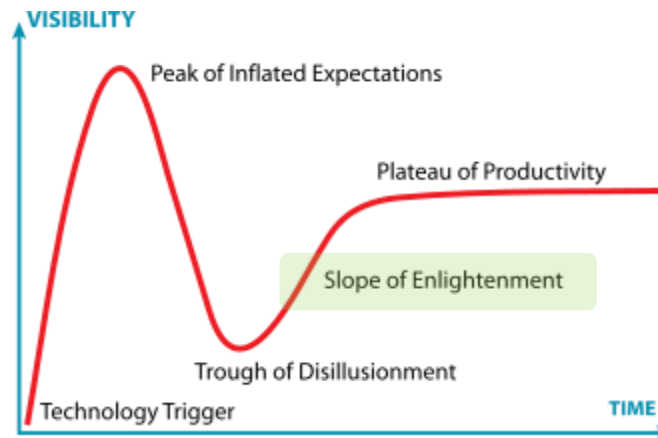
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- ✓ **Trough of disillusion:** the adoption of technology even in unsuitable contexts leads to an increase in failing cases

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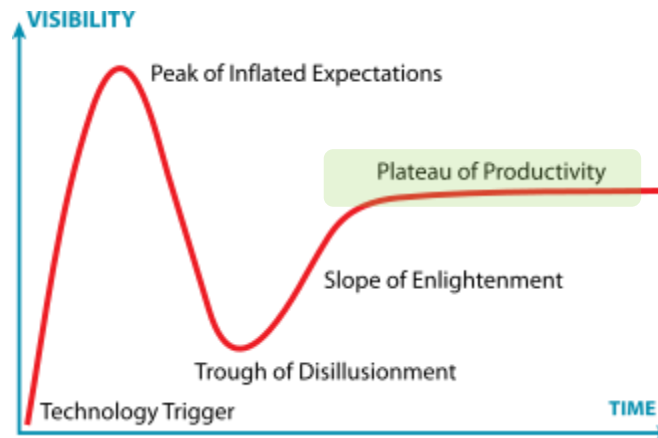
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- ✓ **Slope of illumination:** such a broad spectrum of applications allows to identify the fields of application in which the technology is effective and to make the technology itself evolve so that it can adapt to the contexts in which it is actually useful....

The technology adoption cycle

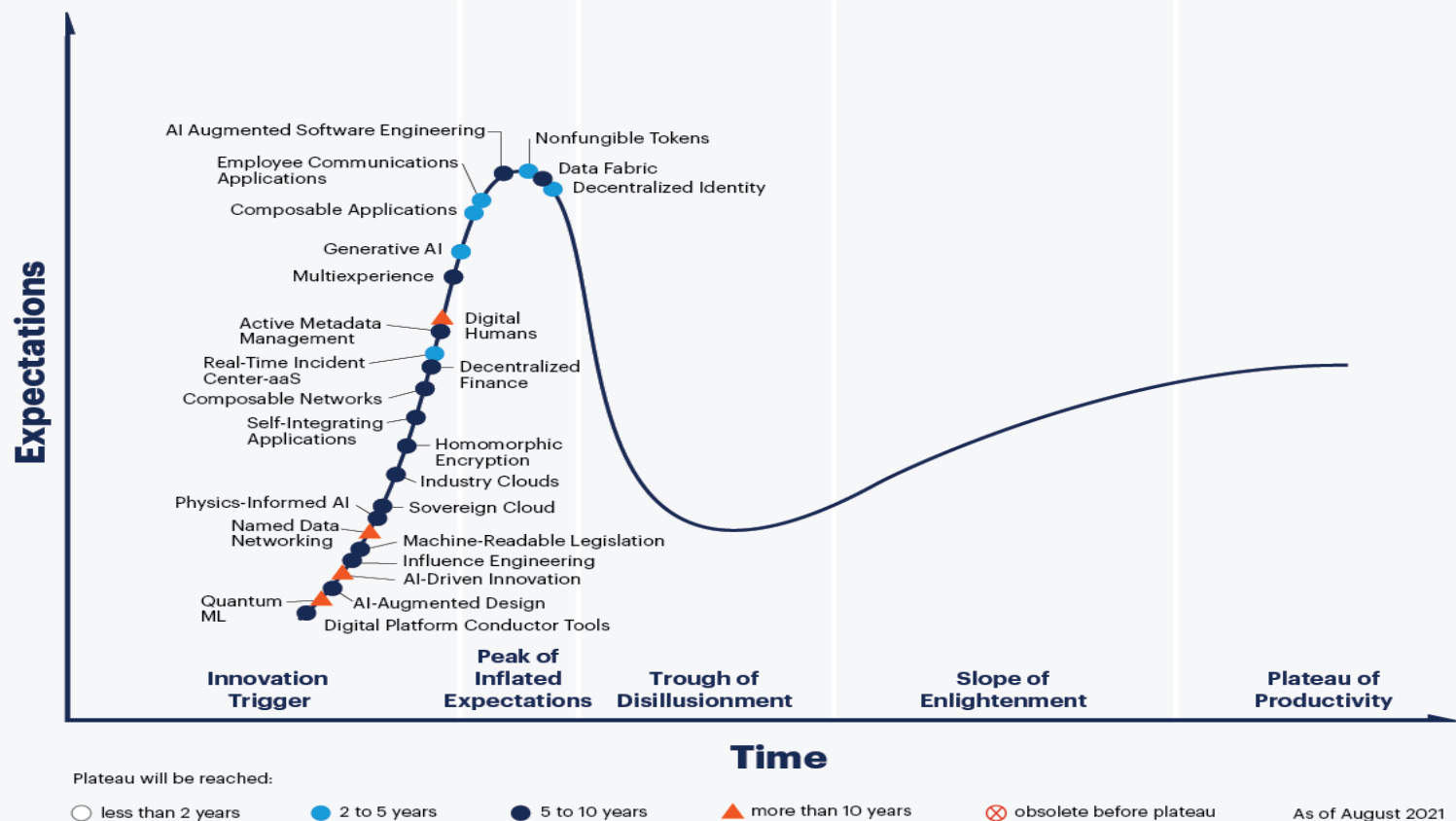
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- ✓ *Plateau of productivity: ... until it becomes mature, reliable and largely adopted*

Hype Cycle

Hype Cycle for Emerging Technologies, 2021



[gartner.com](https://www.gartner.com)

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