Lean Production & Digital Agency Model

04 September 2023

Introduction to LEF

LEF Digital Capability Center offers national and local industries consulting and training for Lean Transformation and Digital Innovation

Mission

LEF provides manufacturing and service companies with the **skills** needed to achieve **operational excellence** and successfully implement **Lean & Digital transformation** through an effective combination of **scientific approach** and **practical experience**

Vision

Instill in everyone an **awareness** of **their own potential** and strengthen the capacity for **continuous improvement**

100+
on-site and remote learning modules

150+
technology and start-up partnerships

250+
internal and external experts involved

250+
organizations served annually

2,000+
participants inspired annually

2011
Model Factory

2012
Model Office

2013
Quality Control Lab

2014
R&D Lab

2016
Digital Model Factory

2021
Digital Company

2023
Resilient and Sustainable Company

We help clients solve some of their most critical challenges and create sustainable value

1 LEF Digital Capability Center is part of a global **network of model companies** that help clients **envision their "from-to" journey**

2 We inspire **sustainable performance improvements** from operational excellence and tech-enabled transformations with our 150+ use cases

3 We provide **in-person workshops** and **live broadcasting**. We also provide **expert transformation support,** and our **Technology Search Accelerator** helps to search, find and compare technology solutions, vendors and experts

4 We have **successfully served clients across industries** in both physical and remote environments

5 We have a **highly dedicated team** to make your next workshop an **unforgettable experience**

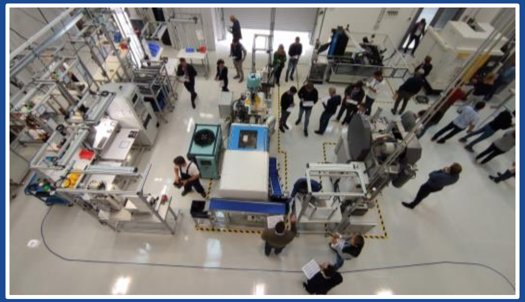
LEF Digital Capability Center...

We offer **innovative and immersive learning environments** that inspire and equip organizations to deliver sustainable performance improvements from operational excellence and tech-enabled transformations

In short, **we help clients live the change**

... is designed to empower organizations through capability building and innovation

Be inspired by the art of the possible
The most advanced technologies integrated into new ways of working for better performance, engagement and sustainability



Experience a successful end-to-end transformation journey
Before-and-after scenarios covering each stage of a transformation and addressing all functions and enablers

Equip your people to lead the change
Equip your team, from top executives to front line operators, with the skills, mindsets and pattern recognition they will need to deliver the change in your organization

We take clients on a “from-to” journey, independent from their organization’s maturity and operations environment

Pre-lean

Legacy state of operations

We help clients to develop the **culture** and **skills** they need to operate in a **lean**, **agile** and **innovative** way

Lean

Lean state of operations

Digital & analytics

Technologically advanced state of operations

We support clients to master their **digital transformation** by letting them experience the **power of data** and **AI**, modernizing **IT infrastructure**, streamlining and automating **operations**, and building **tech talent**

Sustainable & resilient

Green and resilient state of operations

We enable clients to establish a **green and resilient organizational and operational environment** by supporting them on their entire sustainability journey, from **decarbonizing** their value chain to building **resilient operations**

Introduction to Lean Manufacturing

What is Lean? – The original definition

"Lean production is 'lean' because it uses less of everything compared with Mass Production – half the human effort, half the manufacturing space, half the investment in tools ….

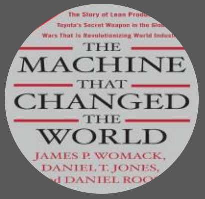
Also, it requires keeping far less than half the needed inventory on site, results in many fewer defects …."

John Krafik (Toyota's first American Engineer), International Motor Vehicle Program, 1985

SOURCE: McKinsey

The Lean History

1949 – Toyota 1.000 car/day
GM – 1.000 car/day



1933 — II GM — 1946 — 1950 — 1960 — 1970 — 1980 — 1984 — 1990 — 2000

- Toyota Automated Loom Company from chassis production to automobile production
- Japanese auto market small and highly diversified
- Scarcity of resources

NUMMI Factory (USA)
Freemont (California)

"Reaching and surpassing the U.S. auto industry within 3 years."

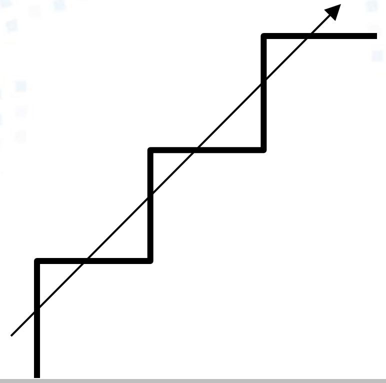
Lean manufacturing was born on the basis of the “Toyota Production System”

Clients

Quality | **Cost** | **Lead Time**

Just-in-time
- Pull systems
- Takt Time
- Continuous flow processes

Kaizen (continuous improvement)



Jidoka
- Machines with automatic error identification tools
- Manual error identification mechanisms

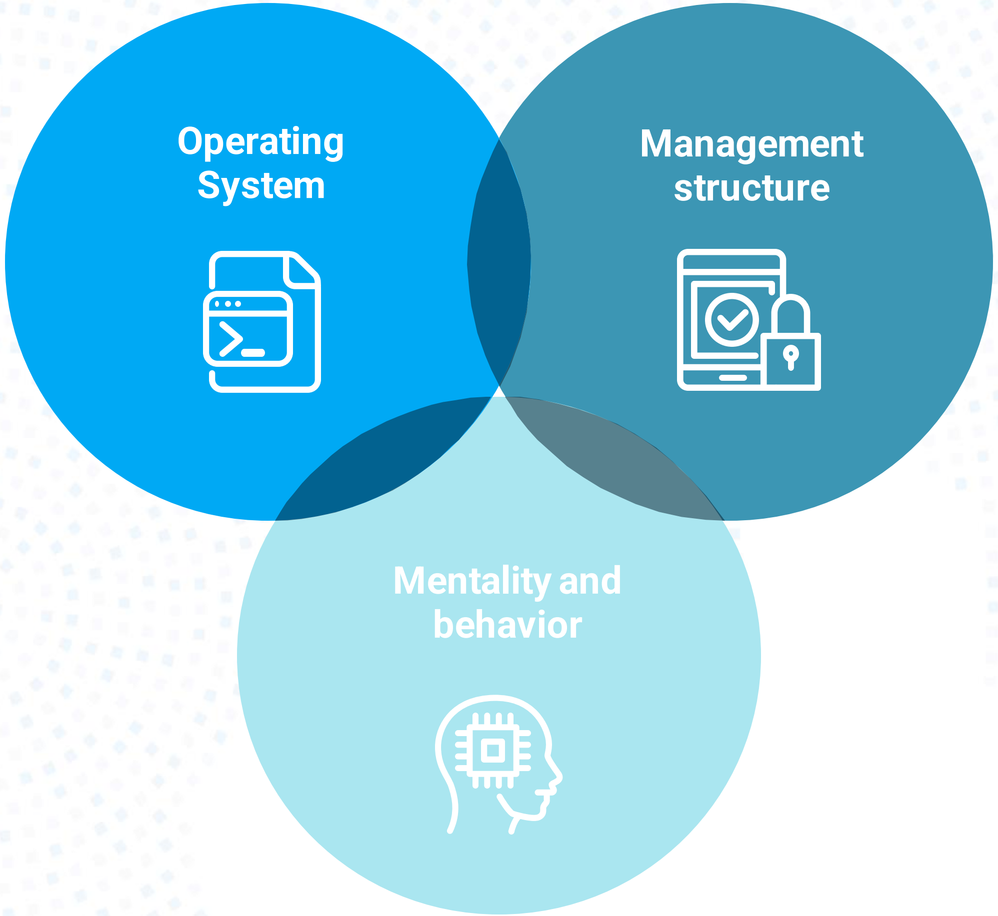
Standardized work

Stability factors: Heijunka, 5S, Performance management, TPM

Team satisfaction

The Lean approach intervenes on 3 dimensions

The way in which **activities and resources** are used and optimized in order to create value while minimizing loss factors

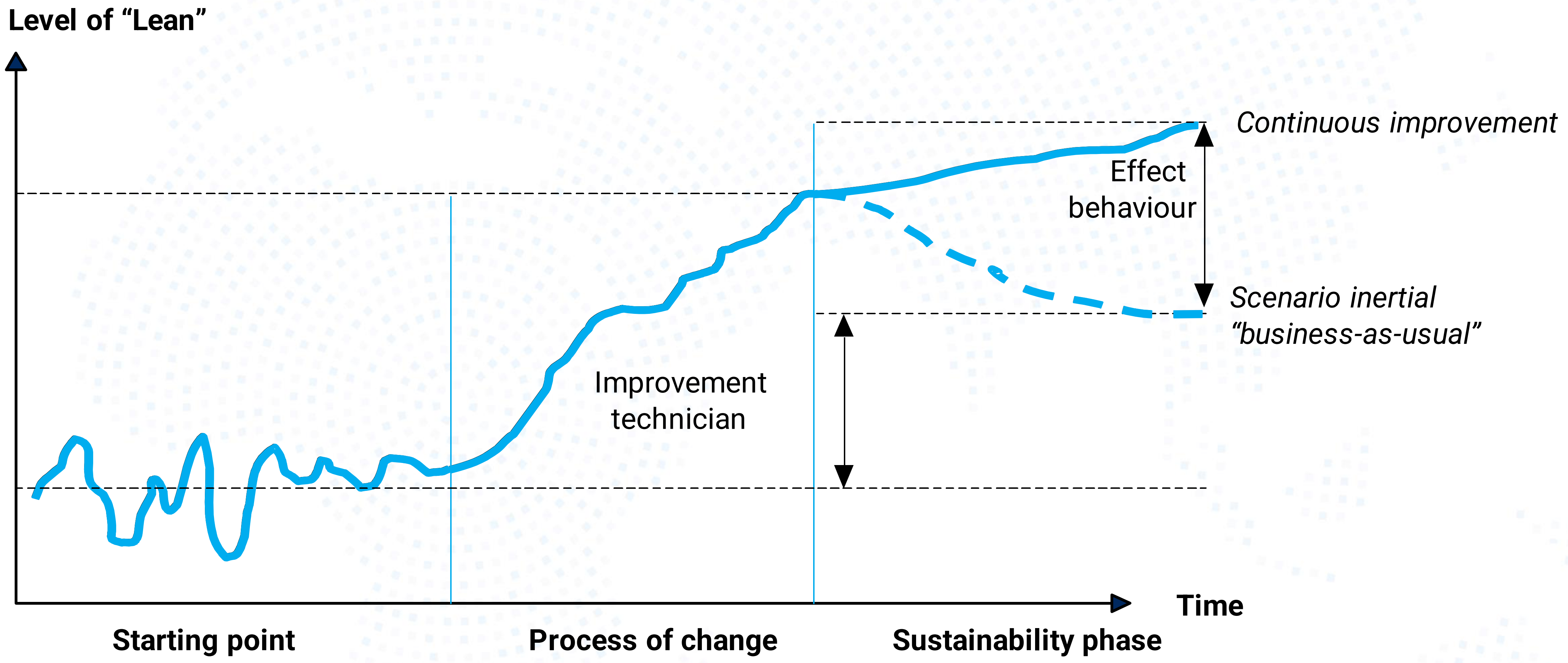


Structures, processes and systems necessary to manage and optimize resources in order to achieve shared objectives

The way people **thinks and acts at work**, both individually and in groups

Fonte: McKinsey & Company

To sustain results, the 3 key elements should always be remembered

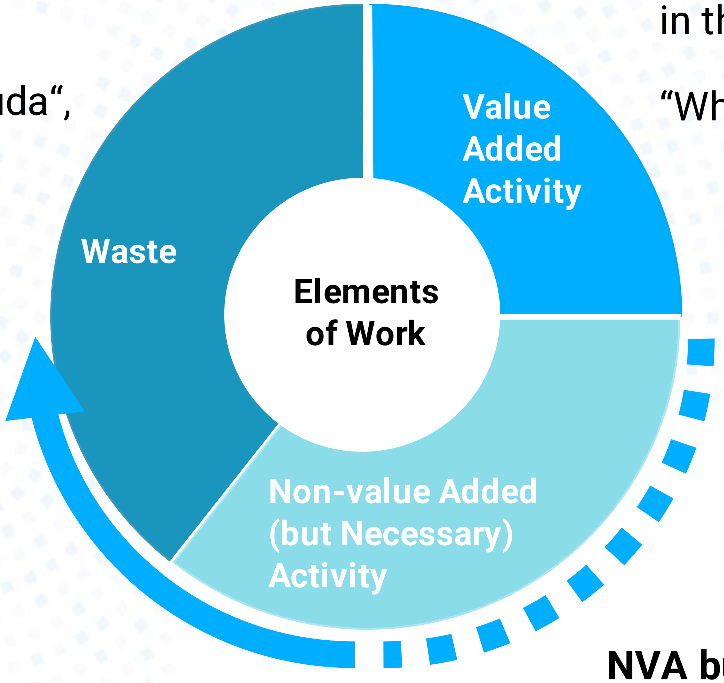


Fonte: McKinsey & Company

Types of activities observed

Non-value-added (waste)
Work or use of resources that does not add any value to a product

Waste is sometimes called "muda", from the Japanese for waste



Value-added activity
Work that directly increases the value of the product in the eyes of the customer (e.g. Assembly of parts)

"What the customer is willing to pay for!"

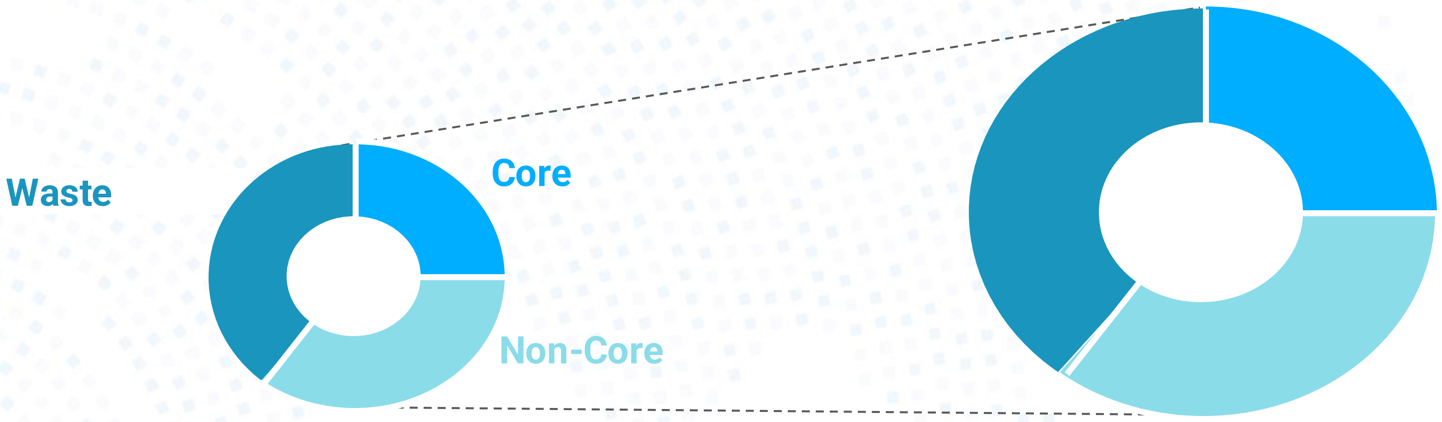
Target
Minimize waste and non-value-added activities

NVA but necessary
Work that does not directly add customer value, but which is currently necessary to maintain operations (e.g. small movements to reach for material for assembly)

The goal is to increase the portion of value-added work

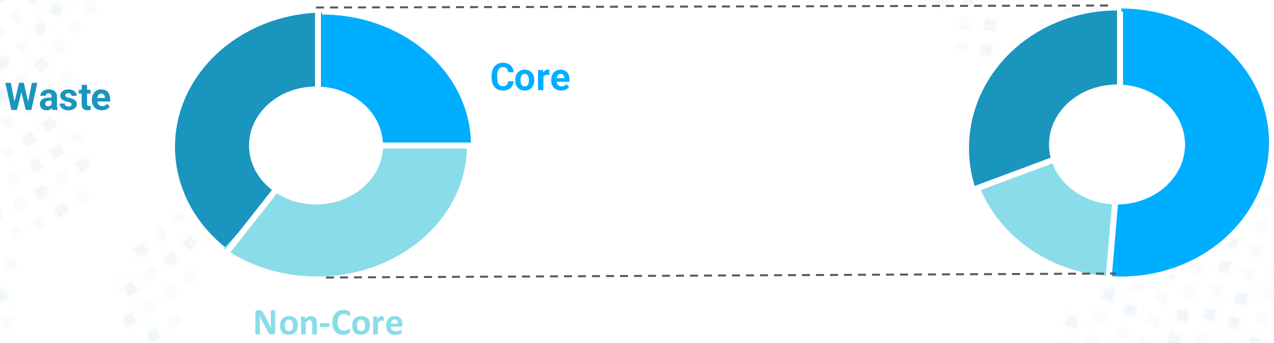
Overloading the process

The "Modern Times" Syndrome. :
Work harder to produce more!



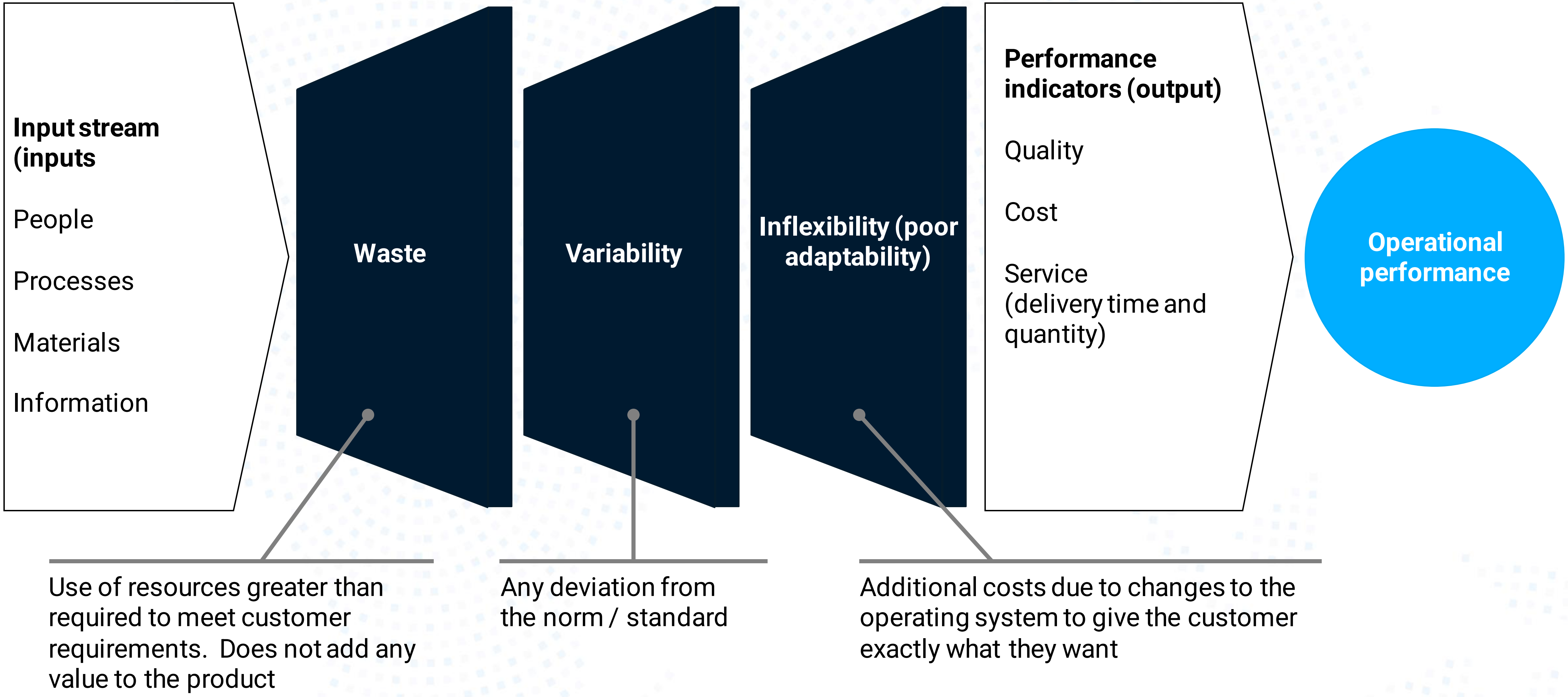
Improve the process

Eliminate waste before adding value: the operator uses the same amount of time and effort to add more value:
Work better!



Fonte: McKinsey & Company

The three "elements of loss of efficiency"



Fonte: McKinsey & Company

Typically there are 8 categories of waste

Motion

Maintenance technicians walking between machine and workshop/ searching for files, extra keystrokes

Overprocessing

Producing with higher specifications than customer wants, redundant approvals, creating reports with too much information

Overproduction

Producing more volume than needed of a given product/reports or information nobody uses

Transportation

Moving raw materials several times, traveling between locations, handoffs, movement of documents

Defect/scrap/ rework

Products not meeting quality standards/incomplete forms, missing information, errors in documents

Waiting

Waiting for parts, waiting for the next process step, waiting for review or approval

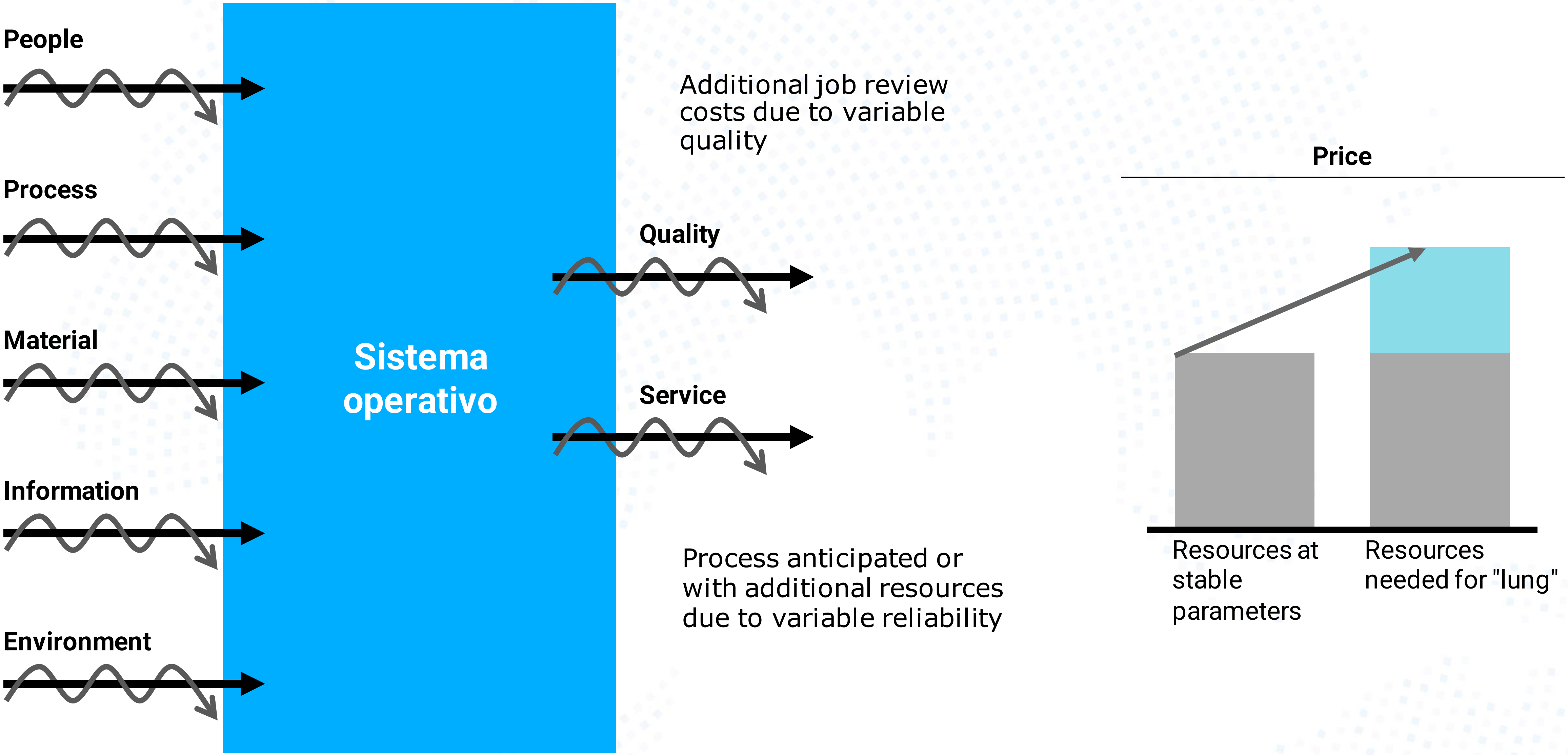
Inventory

High inventory, back logs in work queues, open projects or open tickets

Intellect

Not fully utilizing team skills, not soliciting ideas from people who do the work, not transferring learning

Variability increases operating costs



Fonte: McKinsey & Company

There are 4 factors of inflexibility

Demand Mix

Inability to adapt to changes in customer demand mix

Product

Inability to offer the customer the desired product or service

Volume Changes

Inability to adapt to volume changes in customer demand

Service Level

Inability to adapt to customer needs

Fonte: McKinsey & Company

Environmental variability concerns aspects that can influence the process

Extreme peaks in temperature or humidity can affect the yield of the process (e.g., conditioning, painting ...

Winter conditions could make some work areas (e.g., outdoor areas) hazardous

Rain can damage electronics (especially if some IP xx protections are damaged ...).

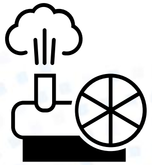
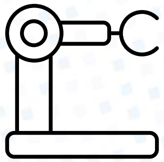
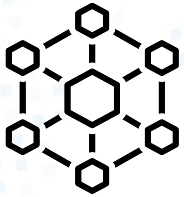
Fonte: McKinsey & Company

A Lean Example…

Fonte: The Founder

Introduction to Digital Transformation

The Fourth Industrial Revolution

	1a revolution (water / steam)	2nd revolution (electricity)	3rd revolution (automation)	4th revolution (interconnection)
				
Percentage of installed base	100	~10 - 20	~80 - 90	~40 - 50
Replacement of equipment	Replacement of the complete frame needed	Small replacement, since it is possible to keep the equipment for tooling, only the conveyor belt is needed	High levels of substitution as tool equipment have been replaced by machines	Existing machines will be connected, only partial replacement of equipment

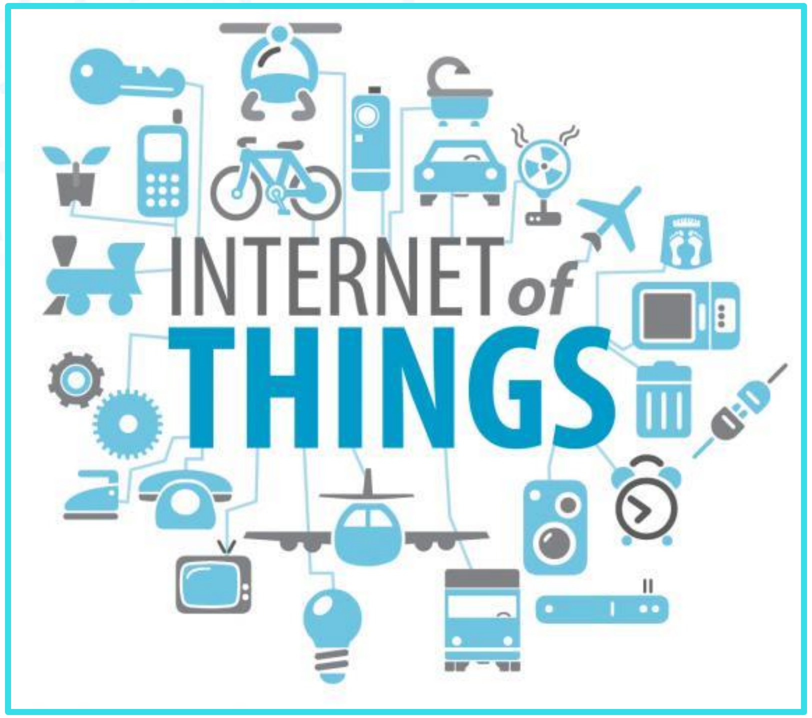
SOURCE: Statistisches Bundesamt; Deutsche Bundesbank; Prognos; Thomas Nipperdey; McKinsey

The definition of Industry 4.0

The term Industry 4.0, or Fourth Industrial Revolution, defines a new stage of development in the organization and management of the value chain in the manufacturing industry.

Products and processes interconnected thanks to the use of the internet of things and new digital technologies in the factory.

Industry 4.0 is the theorization of a manufacturing paradigm based on the concept of "Cyber Physical System" (CPS), that is, computer systems capable of interacting with the physical systems in which they operate, which are equipped with computational, communication and control capabilities.



Fonte: Assinform, Capitani – Perego, 2016

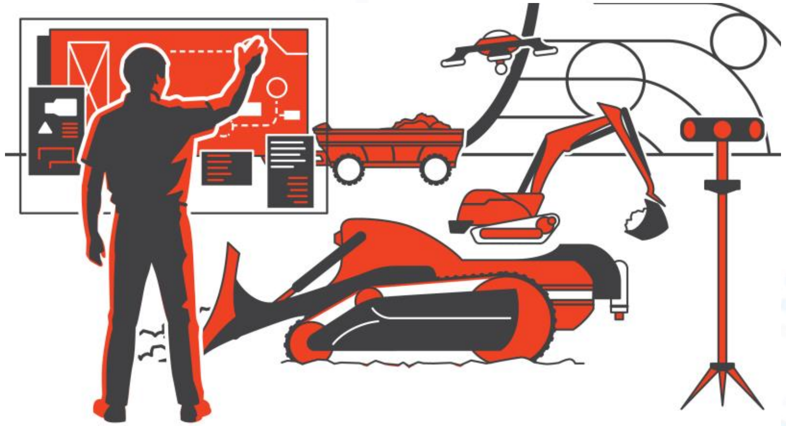
The digital revolution in industrial sectors

What happens when
2 BILLION PEOPLE
are they connected to each other?

Digitizing Entertainment
Dynamic communications
Social collaboration platforms as mainstream
Emergency of Social Marketing
Infrastructure IT in cloud
Exploding App Market
Ecosystems dominated by recently emerging top-players

What happens when
50 BILLION MACHINES
Are they connected to each other?

Maintenance and dynamic monitoring
Machines that adapt and correct automatically
Troubleshooting and shared and dynamic continuous improvement
Analytics predictive
Infrastructure IT in cloud
Exploding Industrial App Market
Creating ecosystems in place



Fonte: McKinsey & Company

The digital revolution is creating multiple opportunities along the value chain

R&D

70-80%

Reduce time through **3D printing and virtual prototyping**

Supply chain management

2-3%

Increase profit with **reduced inventory** and **increased forecast reliability**

Production

10-25%

Reduction of operating costs through the use of advanced robotics

Distribution

50-70%

Reduce planning time by analyzing large amounts of data

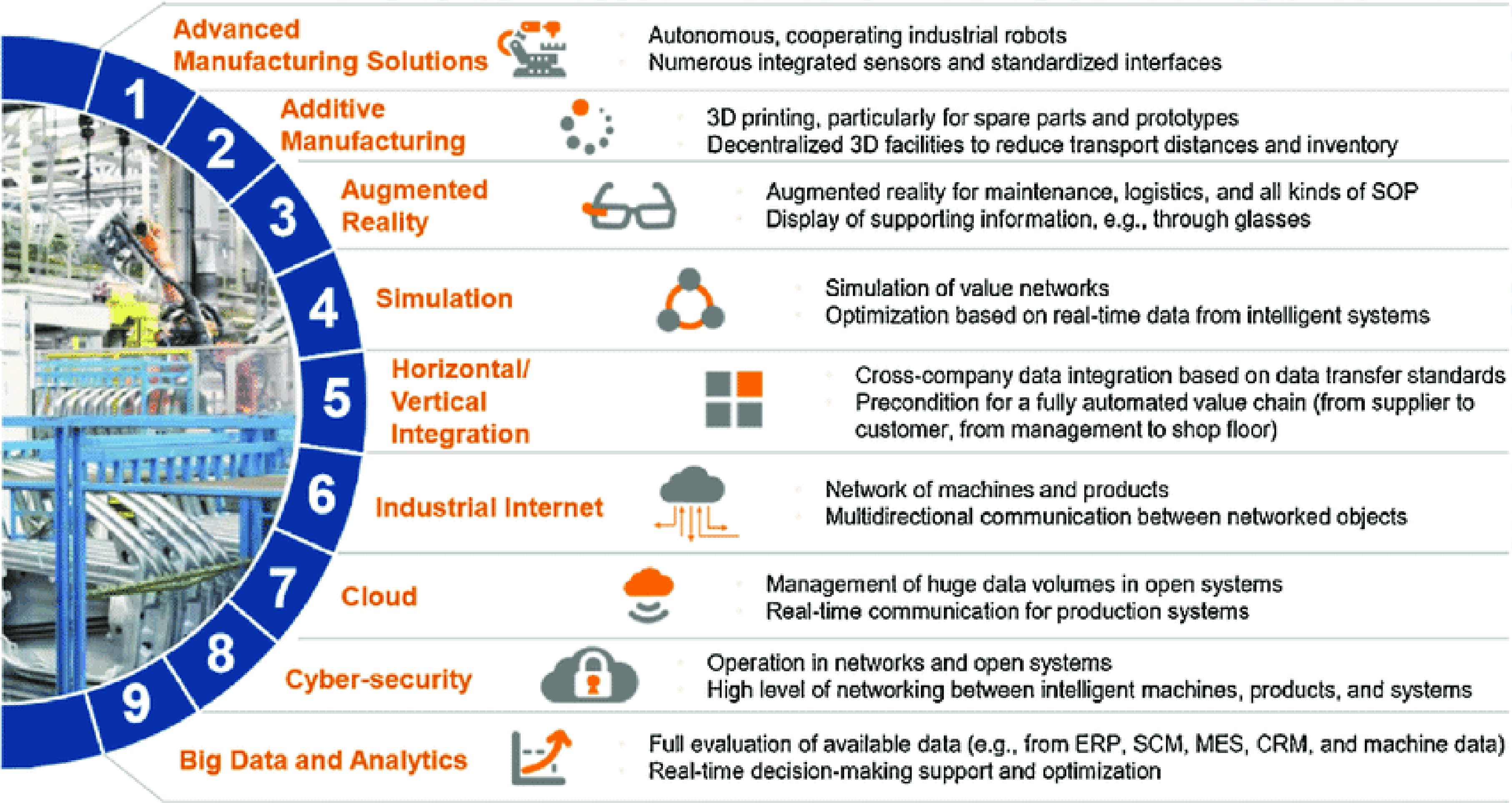
Service

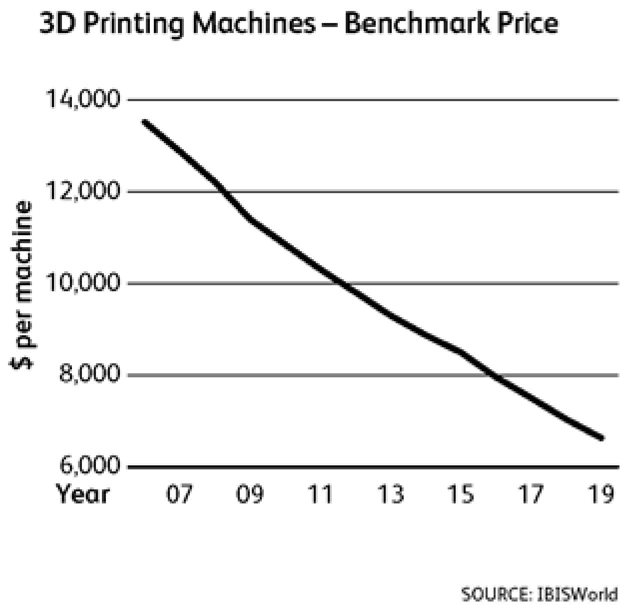
10-40%

Reduce maintenance costs through predictive maintenance

The key is accessibility of enabling technologies

Never before have enabling technologies been so widely available, accessible at competitive prices, and within the reach of any enterprise.





Professional 3D Printers:da $14,000 to $6,000 in a decade

The three spheres of change in a Lean & Digital perspective

Leverage digital technologies **along the value chain**

Improve operations with advanced analytics

Improve people's efficiency with collaborative robots, AR/VR technologies, etc..

Increase agility with advanced 3D printing and planning/programming

Adopt **performance management** and "digital" troubleshooting, incorporating real-time **data availability**

Rethink your **KPI structure** to take advantage of new real-time features

Encourages the digital revolution and an agile **"learn fast, fail fast" approach** across the organization

Empower people to take ownership and **decisions based on data**

Create **professionals** across the organization with new digital skills

Advanced Manufacturing and cobot

"Advanced manufacturing" refers to process optimization through the introduction of robots and cobots to support humans

- Robots: are automated machines suitable for performing cyclical and repetitive tasks within a process
- Cobots: also known as collaborative robots, are designed to work directly with humans

The main impacts achieved by the introduction of "Advanced Manufacturing" are.

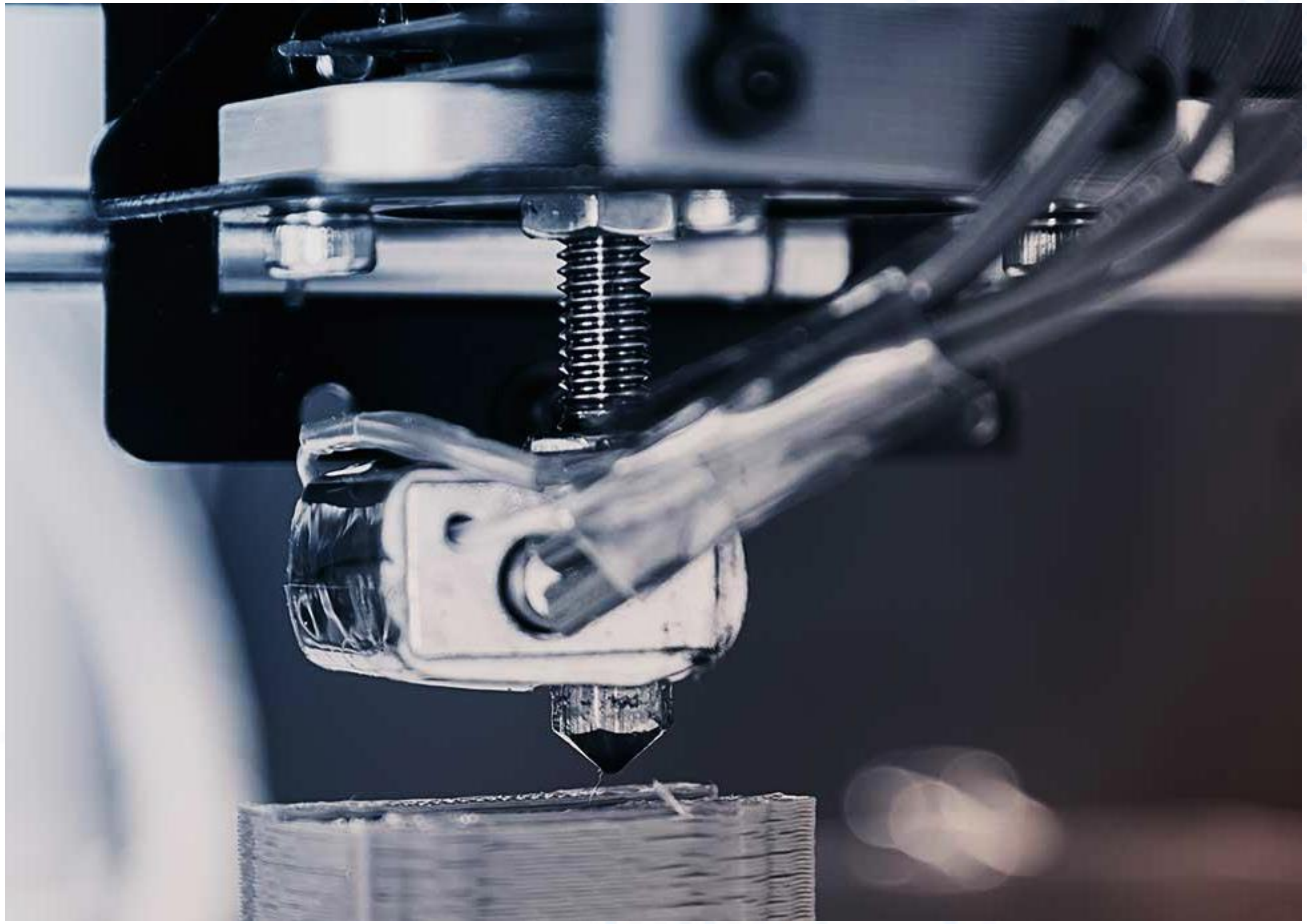
- Increased operational efficiency
- Reduction in error and waste
- Reduction in cycle times

Advanced Manufacturing

With the emergence of Covid-19, the need to accelerate the production and drug testing phase emerged.
During this period, the demand for collaborative robots in the market grew exponentially.
Thanks to robots, it was possible to speed up the dosing and testing phases while maintaining quality and precision at the highest level.
This made it possible to significantly reduce the time for vaccine creation and release

FONTE: estratto di un'intervista di Jim Shimano, Program Manager di Precise Automation

Advanced Materials



"Advanced Materials" refers to a process that involves prototyping and creating components and objects through tools that enable optimization of the design and material used for production

The impacts achievable through the adoption of '"Advanced Materials" are.

Reduction in prototyping time and cost

Reduction in the cost of production

Optimization of the product in terms of material used, lightness and performance

Advanced Materials

To improve the backpack containing the life support functions that astronauts use on the ISS, the U.S. company Jacobs adopted generative design solutions offered by PTC.

Through these solutions, it was possible to optimize the design of the backpacks while maintaining the level of performance and reducing weight.

This not only allows the astronauts to have better balance and stability, but also saves on the fuel used to move

FONTE: PTC Case Studies

Augmented Reality

"Augmented Reality" refers to a technology based on a visual method that enables the visualization of digital models and reproductions superimposed on the real environment

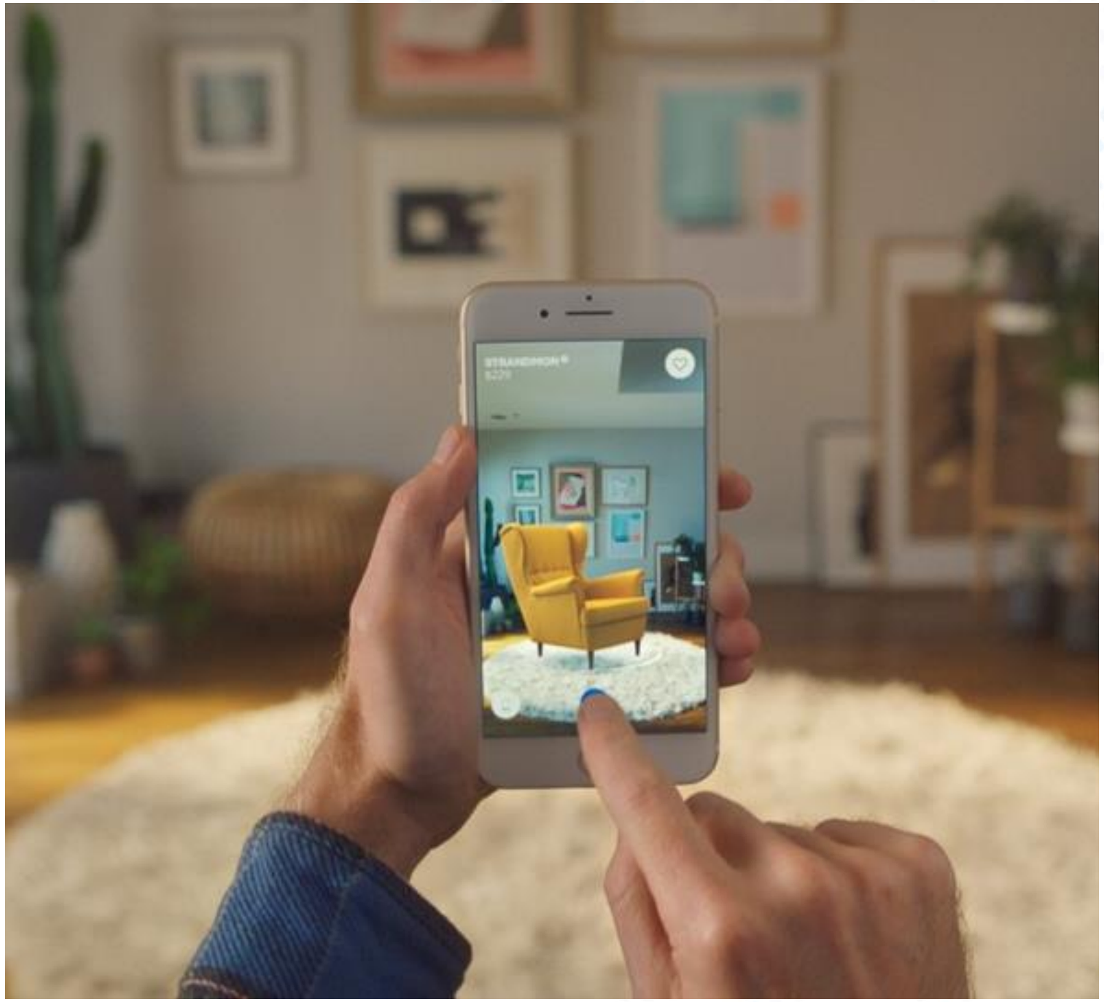
The impacts achievable through the adoption of "Augmented Reality" are.

Real-time interaction between the virtual and real worlds for communication of data and information

Reduction in problem identification and maintenance time

Increased learning capabilities.

Augmented Reality: Ikea e la rivoluzione del mondo dell'arredamento

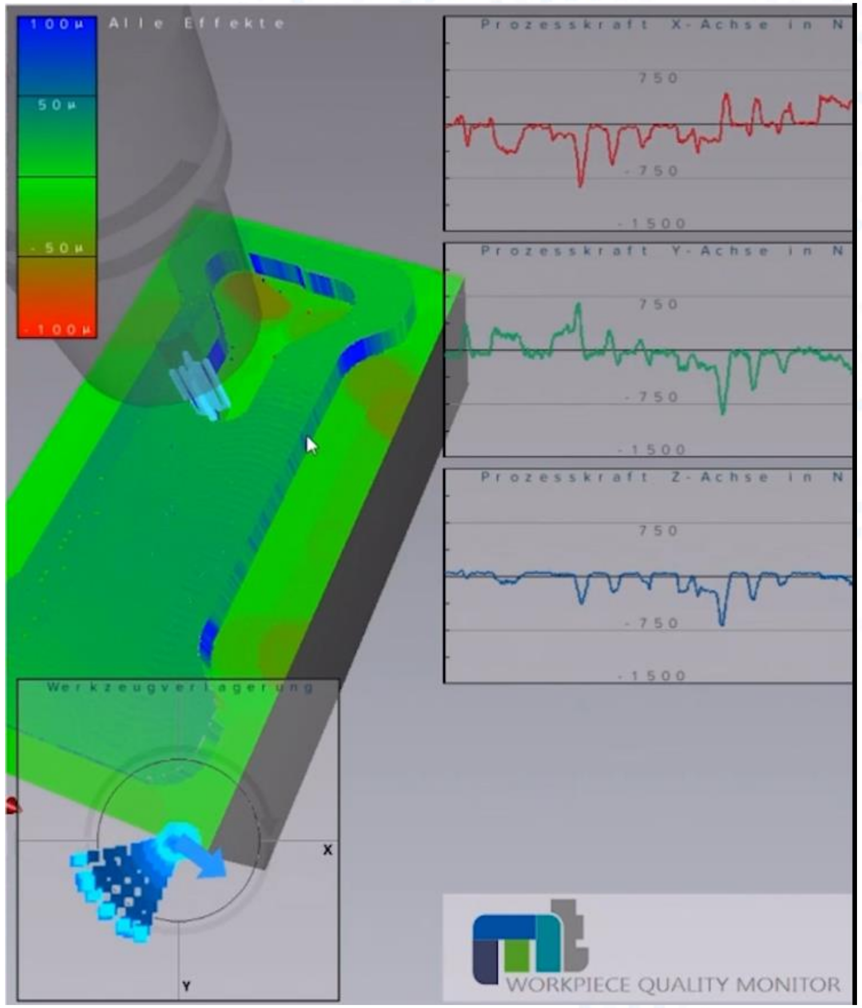


Swedish giant Ikea has recently developed an augmented reality-based application that allows objects to be placed within any environment to be visualized on a 1:1 scale

The solution has facilitated the purchasing process and increased customer satisfaction levels

FONTE: Architect Magazine

Simulation



"Simulation" refers to an engineering technology that allows a product or process to be simulated throughout its entire life cycle, from design to actual operation

The impacts achievable through the adoption of "Simulation" are.

Real-time monitoring of the condition of a product or process

Optimization of products and processes automatically

Reduction of downtime due to downtime or product malfunctions

Simulation

The Ducati Corse team collects data from their bikes through a system of 100 sensors that monitor every component of the bike.

Behind these sensors is a team of technicians and engineers who use the data collected to simulate new scenarios useful for understanding how the bike would behave on different tracks and in different environmental conditions.

Through simulation, it has been possible to reduce testing time and costs as well as maintenance time

FONTE: intervista a Luigi Dall'Igna, general manager di Ducati Corse

Artificial Intelligence

"Artificial Intelligence" refers to technology that enables machines to perform complex operations and reasoning in a manner similar to the human intellect

The impacts achievable through the adoption of "Artificial Intelligence" are.

Reduction in human error

Speeding up the decision-making process

Execution of highly complex operations in a short period of time

Horizontal/Vertical Integration

Per “Horizontal/Vertical Integration” si intende l’**integrazione** totale di tutte le funzioni aziendali in un unico **sistema centralizzato**.

Gli impatti ottenibili attraverso l’adozione della “Horizontal/Vertical Integration” sono:

- Creazione di trasparenza e comunicazione in tempo reale tra le varie funzioni aziendali
- Riduzione del lead time
- Ottimizzazione delle risorse necessarie a soddifare un cliente

Horizontal/Vertical Integration: Oracle per l'integrazione delle funzioni aziendali

Cloud

"Cloud" refers to the set of services, platforms, and infrastructure that are not physically hosted within the enterprise but can be accessed anywhere via an Internet connection

The impacts achievable through the adoption of the "Cloud" are.

Availability and persistence of information accessible anywhere and on any device

Interoperability: the cloud makes it possible to break the barriers and limitations that made different systems incompatible

Improved level of information security

Cybersecurity

"Cybersecurity" refers to the set of methodologies and tools designed to preserve a company's cybersecurity and protect its data loss

The impacts achievable through the adoption of "Cybersecurity" are.

Protection of sensitive information and data by preventing unauthorized access

Reduction in time and cost of recovery of "infected" computer systems

Assurance of service continuity

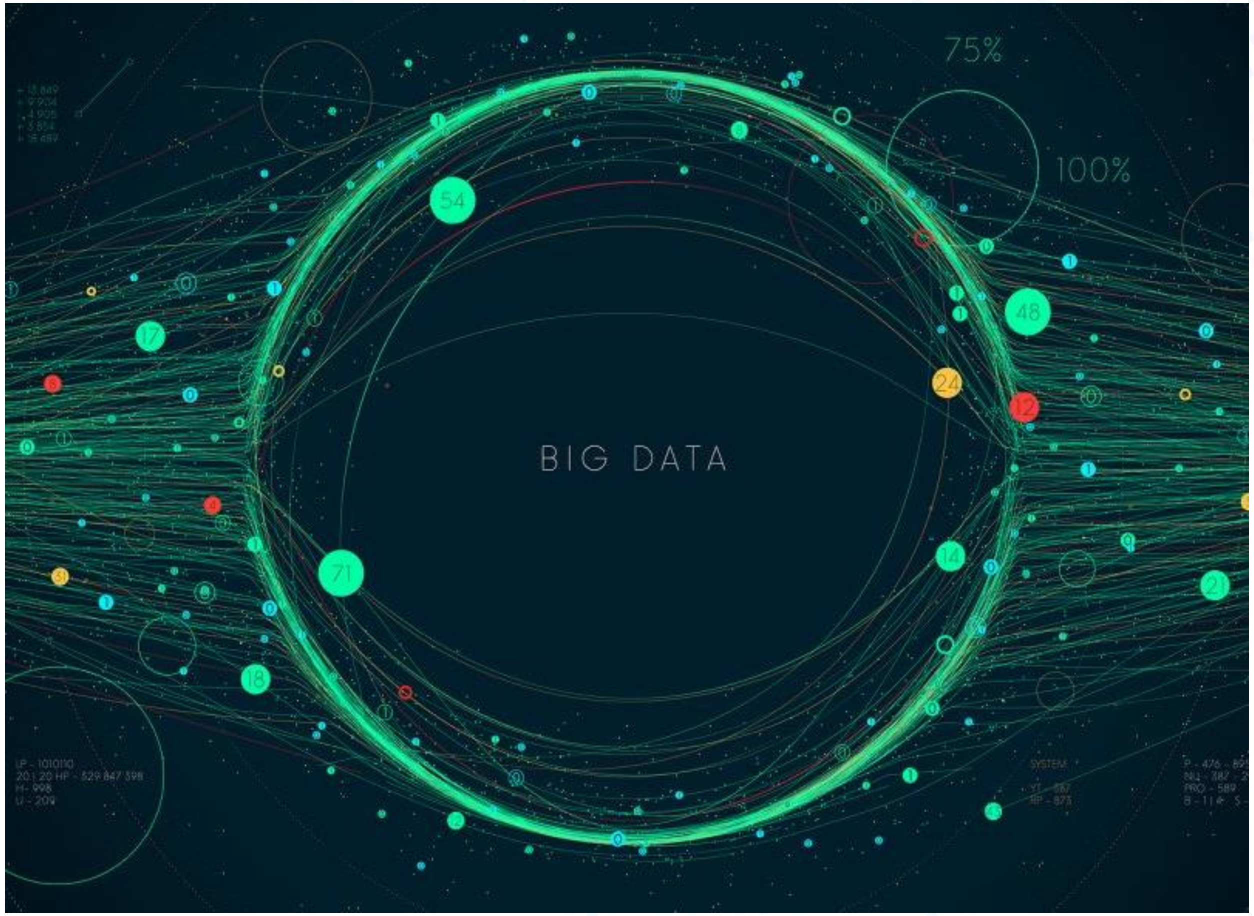
Cybersecurity: l’attacco che violò 3 miliardi di account

The popular Internet service Yahoo has suffered what is considered the largest hacking attack in history. In 2013 and 2014, data and credentials of 1.5 million users were stolen. A few years later, Yahoo claimed that all 3 billion accounts were impacted by this attack.

The poor cybersecurity coverage cost the company hundreds of millions of dollars and the shutdown of some services provided

FONTE: New York Times

Big Data Analytics



"Big Data and Analytics" refers to the set of processes aimed at collecting and analyzing large amounts of data.

The impacts achievable through the adoption of "Big Data And Analytics" are.

Centralization of data

Improved and faster decision making

Increased sales through targeted market choices obtained of customer preference analysis

Big Data Analytics: applicazioni nel settore della moda

Ralph Lauren, noto brand che opera nel settore della moda ha iniziato il processo di **digitalizzazione** dei camerini nei suoi punti vendita.

I camerini raccolgono dati su quali capi vengono provati e poi acquistati, sui colori e sui modelli preferiti e molte altre informazioni sulle scelte dei clienti.

Analizzando i dati di migliaia di camerini, l'azienda ha a disposizione tutte le informazioni utili per fare delle **campagne mirate** e **massimizzare le vendite**.

FONTE: Digiday Magazine

4 main trends regarding new business models

Business model as-a-service

Subscription/usage-based models for machine

- New payment models turn capital into opex for producers

- Perpetuate revenue streams instead of selling one-time assets to suppliers

Platforms

Provisioning in

- Technology platforms: ecosystems for developers based on open systems

- Broker platforms: industrial spot markets that connect third parties (for example, due to overcapacity)

IPR-based business models

IPR-based services:

- Recurring revenue models (e.g., licensing costs for data standards)

- Additional services for primary products (e.g. advice on the best use of products)

Modelli di business basati sui dati

Use of data (crowd-sourced) for:

- Direct monetization of collected data instead of the main product (e.g. Google)

- Indirect monetization of insights from collected data (e.g., micro-segmentation for pricing or personalization)

Fonte: McKinsey & Company

John Deere Creates Sophisticated Online Services for Farmers

John Deere: They make tractors, right?

- It now uses **sensors** added to their latest equipment to help farmers manage their driving, reduce downtime of their tractors and save fuel
- The **information** is combined with **historical and real-time data** related to weather forecast, soil conditions, crop characteristics and many other data sets
- The information is presented in the MyJohnDeere.com platform and in the app for iPad and iPhone Mobile Farm Manager to help farmers understand which crops to plant where and when, when and where to plow, where the best return will be made with crops and also which path to follow when to plow

SOURCE: dichiarazioni di John Deere; DataFloq

Examples of new professions


Cloud Specialists


YouTube content creators


Agile Developers


Big Data Strategist


App Developers


Scrum Masters


Sustainability Manager


Drone instructors and operators


Millennium Generation Experts


Digital Marketing Specialists


Search Engine Optimizers


Mobile Service Technician


User Experience Specialists


Data Scientist


3D Designers


Offshore Windfarm Engineers


Web Analysts


Green Deal Assessors


Robot coordinator


New technologies

LEF

YOUR DIGITAL REVOLUTION