IoT Academy

Digital Transformation: Enhancing IoT-driven Solutions for Smart Islands

Digital transformation concept: emerging digital technologies (IoT, AI, AR and etc.) and their role in transformation

Dr. Farzad Ebrahimi
CEO of IoT Academy
ITU Expert

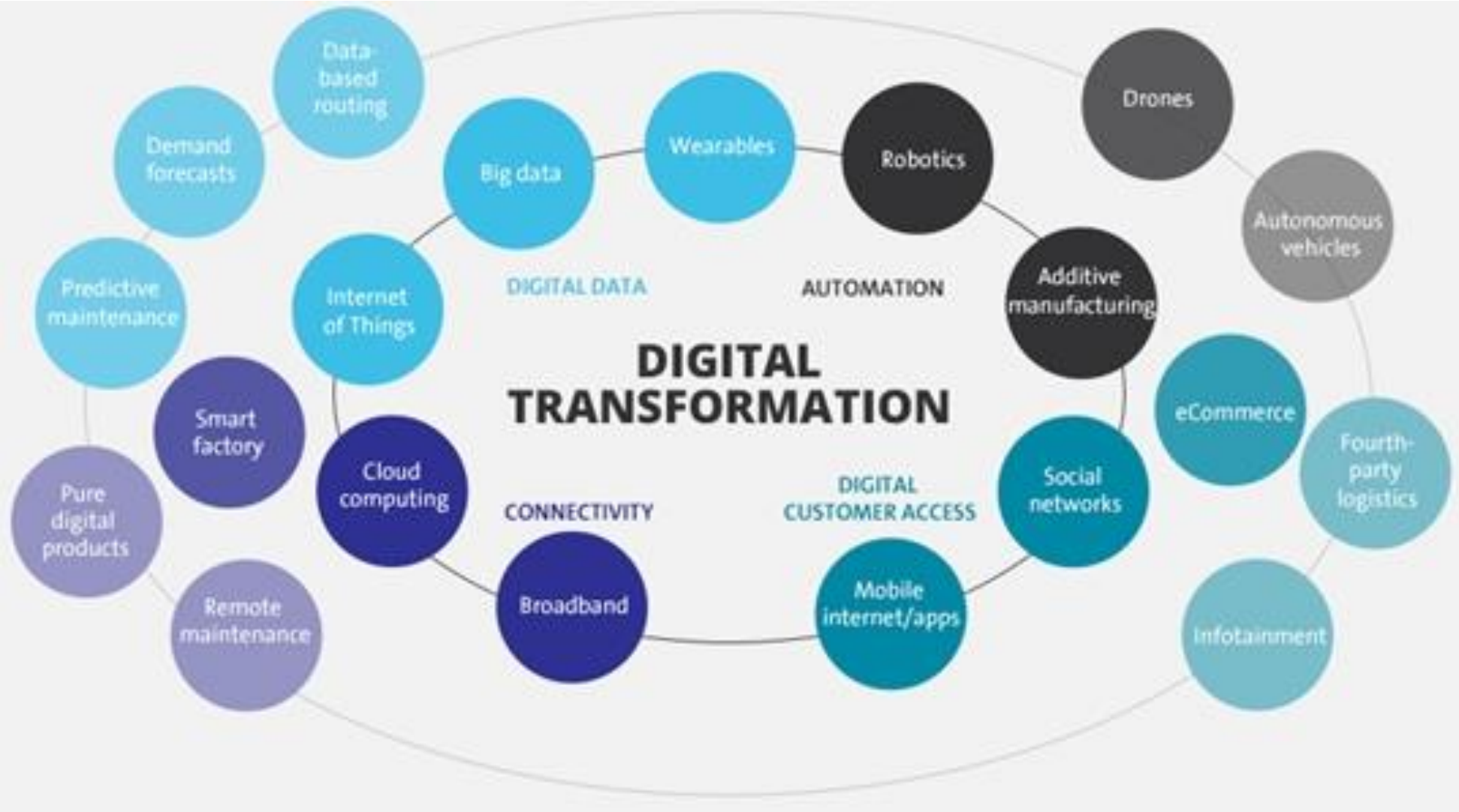
ebrahimi@iotaci.com

Farzad Ebrahimi

- CEO of IoT Academy (ITU Academia Member & ITU IoT Center of Excellence in Asia-Pacific)
- Faculty Member in ICT Research Institute
- International Internet of Things (IoT) Speaker & Lecturer
- International Telecommunication Union (ITU) Expert
- Chairman of The corresponding ISO/IEC JTC1 SC41 (Internet of Things and related technologies Standards) in Iran
- Chairman, Member of the founding board and the board of trustees of Non-Commercial Institute (as a NGO) of “Promoting the Internet of Things and data science” at national level.
- Doctor of Business Administration from the University of Tehran, MBA, M.Sc in Electrical Engineering-Telecommunication systems, B.Sc in Electrical Engineering- Electronics.

Other Records:

- Counselor of the Director of ICT Research Institute
- Superintendent of IT Faculty in Iran Telecom Research Center
- Deputy of IT Faculty in Iran Telecom Research Center
- Head of Multimedia Systems Research Group in Iran Telecom Research Center
- Project Manager, Consultant and Observer of more than 50 Regional and National ICT related Projects.

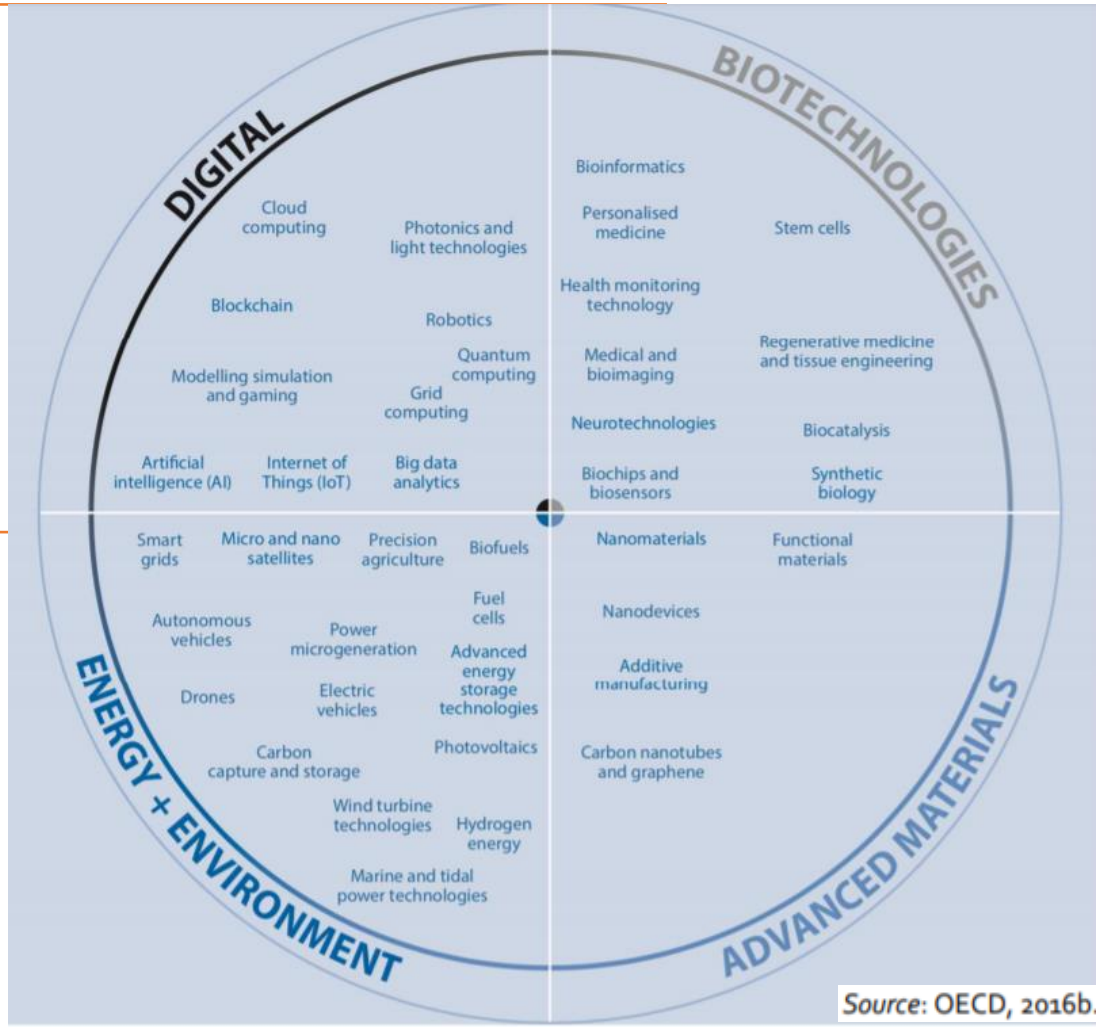

DIGITAL TRANSFORMATION
DIGITAL DATA
AUTOMATION
CONNECTIVITY
DIGITAL CUSTOMER ACCESS
Data-based routing
Demand forecasts
Predictive maintenance
Smart factory
Pure digital products
Remote maintenance
Big data
Internet of Things
Cloud computing
Broadband
Wearables
Robotics
Drones
Autonomous vehicles
Additive manufacturing
eCommerce
Fourth-party logistics
Social networks
Mobile internet/apps
Infotainment

What are the most important technologies for a digital transformation?

Digital transformations that leverage multiple technologies at the most effective points will be the most successful. For example, IoT, AI, AR/VR, cloud computing for data connection and extraction. The combination of these technologies allows customers to perform powerful analytics on extremely large and complex business data on the back end while providing a simple web-based front end that makes results easy to understand and actions easy to execute.

Key Emerging Technologies for the Future

ICT

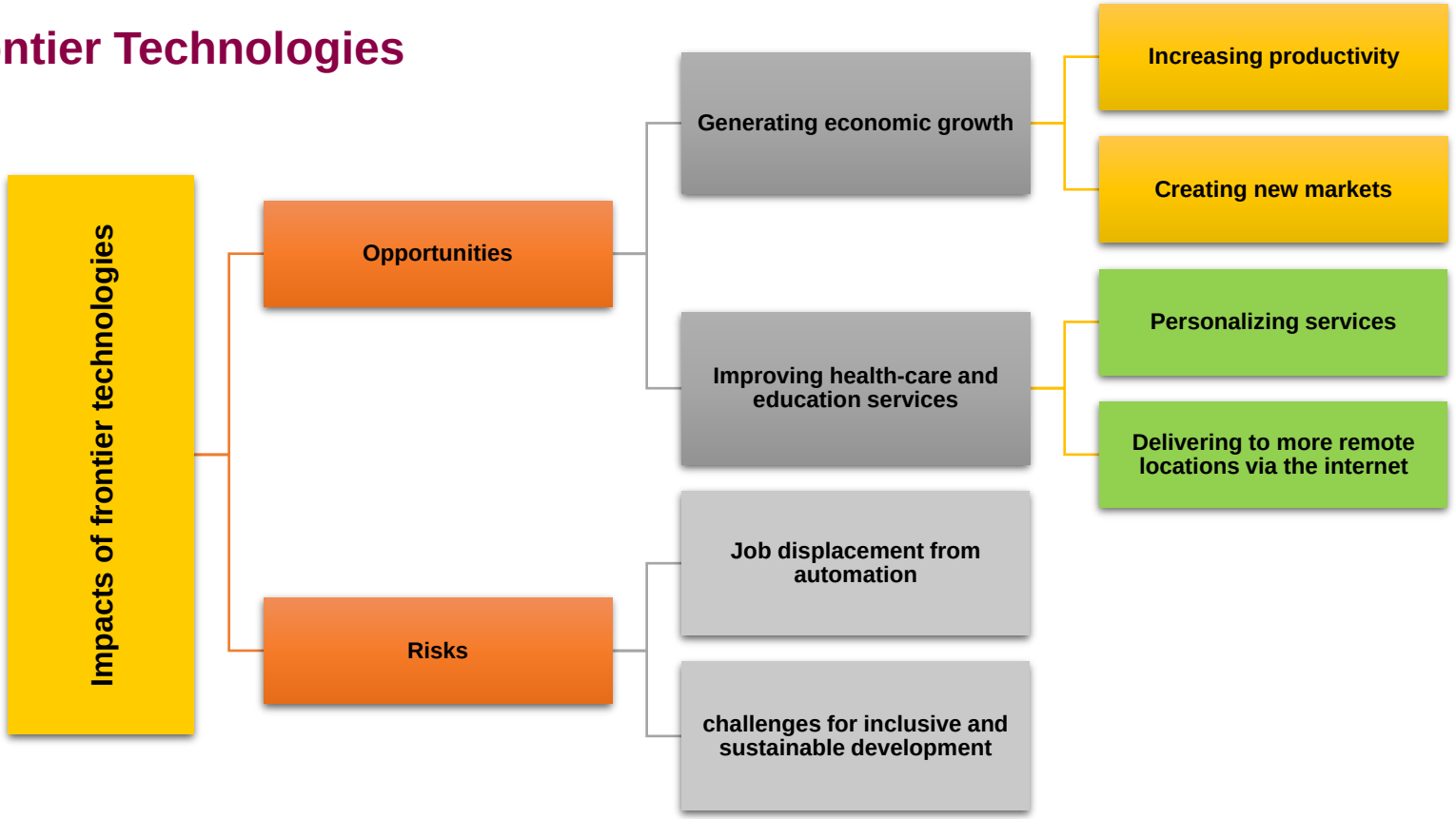


Emerging Frontier Technologies In ICT

(Source: Capacity Building in a Changing ICT Environment, ITU, 2018)

- Broadband and ultra-broadband
- Mobile broadband and 5G
- Next Generation Networks (NGNs) and IPv6
- Internet of Things (IOT)
- Cloud Computing
- Big Data
- Artificial Intelligence (AI)
- 3D Printing
- Virtual Reality (VR) and Augmented Reality (AR)
- Machine Learning (ML)

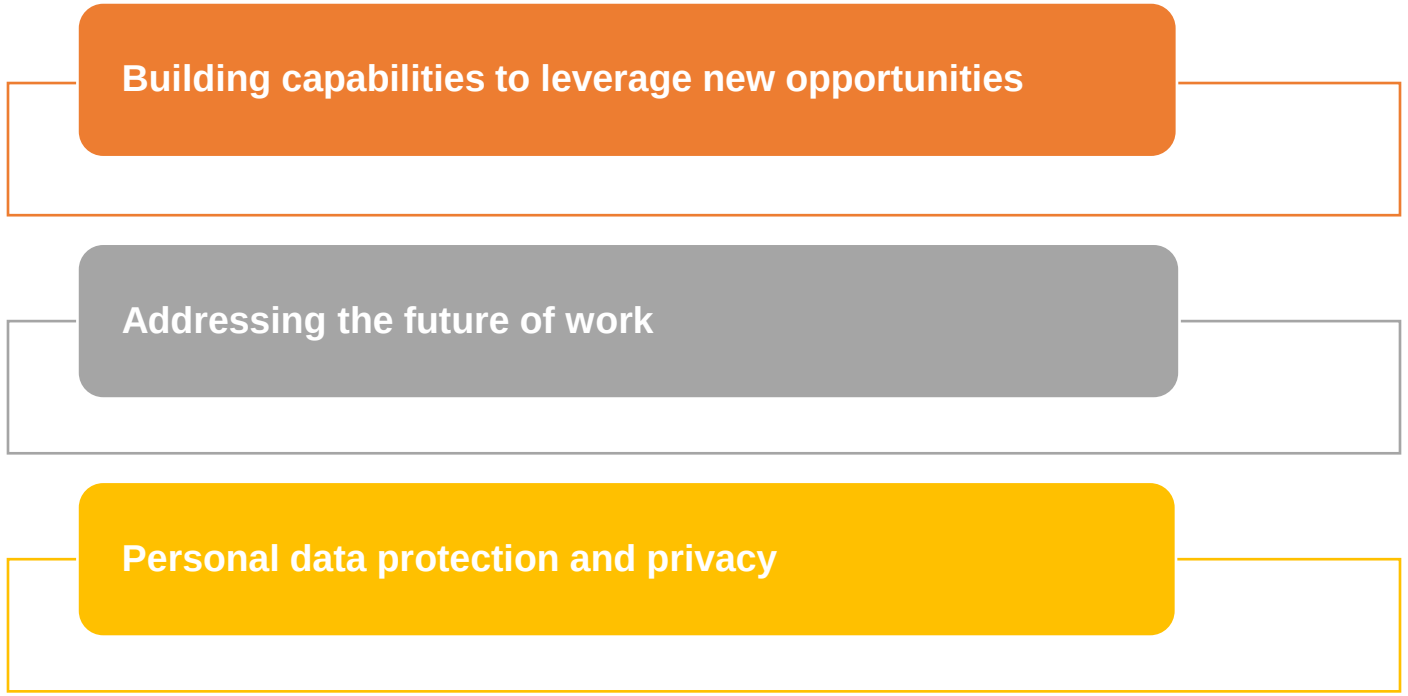
Impacts of Frontier Technologies



(Source: Evolution of Science, Technology and Innovation Policies for Sustainable Development: The Experiences of China, Japan, the Republic of Korea and Singapore, ESCAP, United Nations 2018)

Key Policy Issues in Frontier Technologies

Maximizing the benefits while minimizing the risks of frontier technologies.



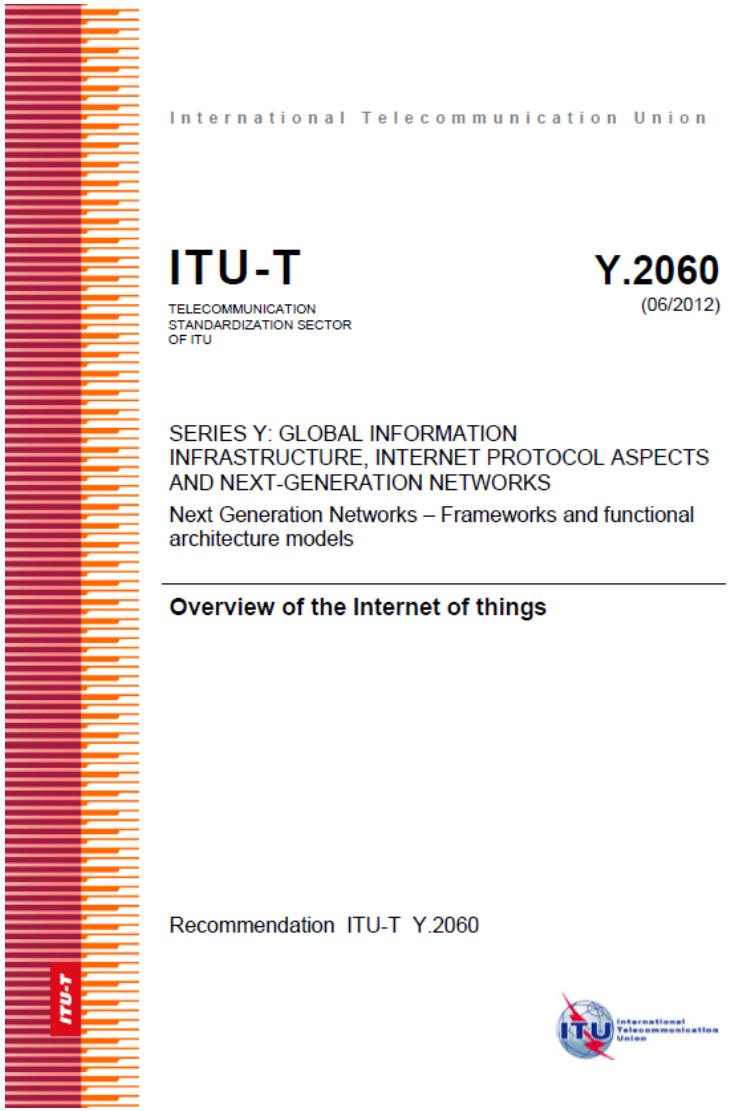
(Evolution of Science, Technology and Innovation Policies for Sustainable Development: The Experiences of China, Japan, the Republic of Korea and Singapore, ESCAP, United Nations 2018)

Internet of Things (IoT)

Internet of things (IoT): A global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving
interoperable information and communication technologies.

NOTE 1 – Through the exploitation of identification, data capture, processing and communication capabilities, the IoT makes full use of things to offer services to all kinds of applications, whilst ensuring that security and privacy requirements are fulfilled.

NOTE 2 – From a broader perspective, the IoT can be perceived as a vision with technological and societal implications.


International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Y.2060

(06/2012)

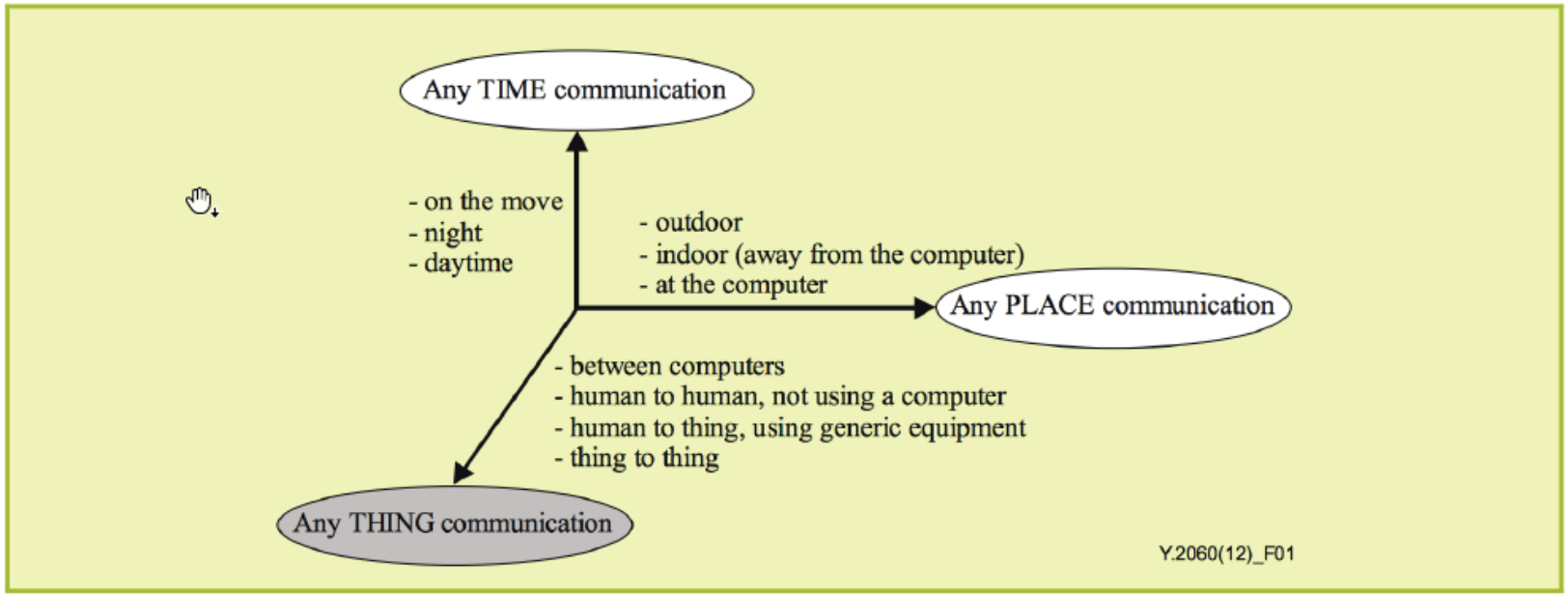
SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT-GENERATION NETWORKS

Next Generation Networks – Frameworks and functional architecture models

Overview of the Internet of things

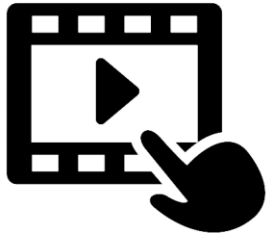
Recommendation ITU-T Y.2060

Any-Time/Place/Thing

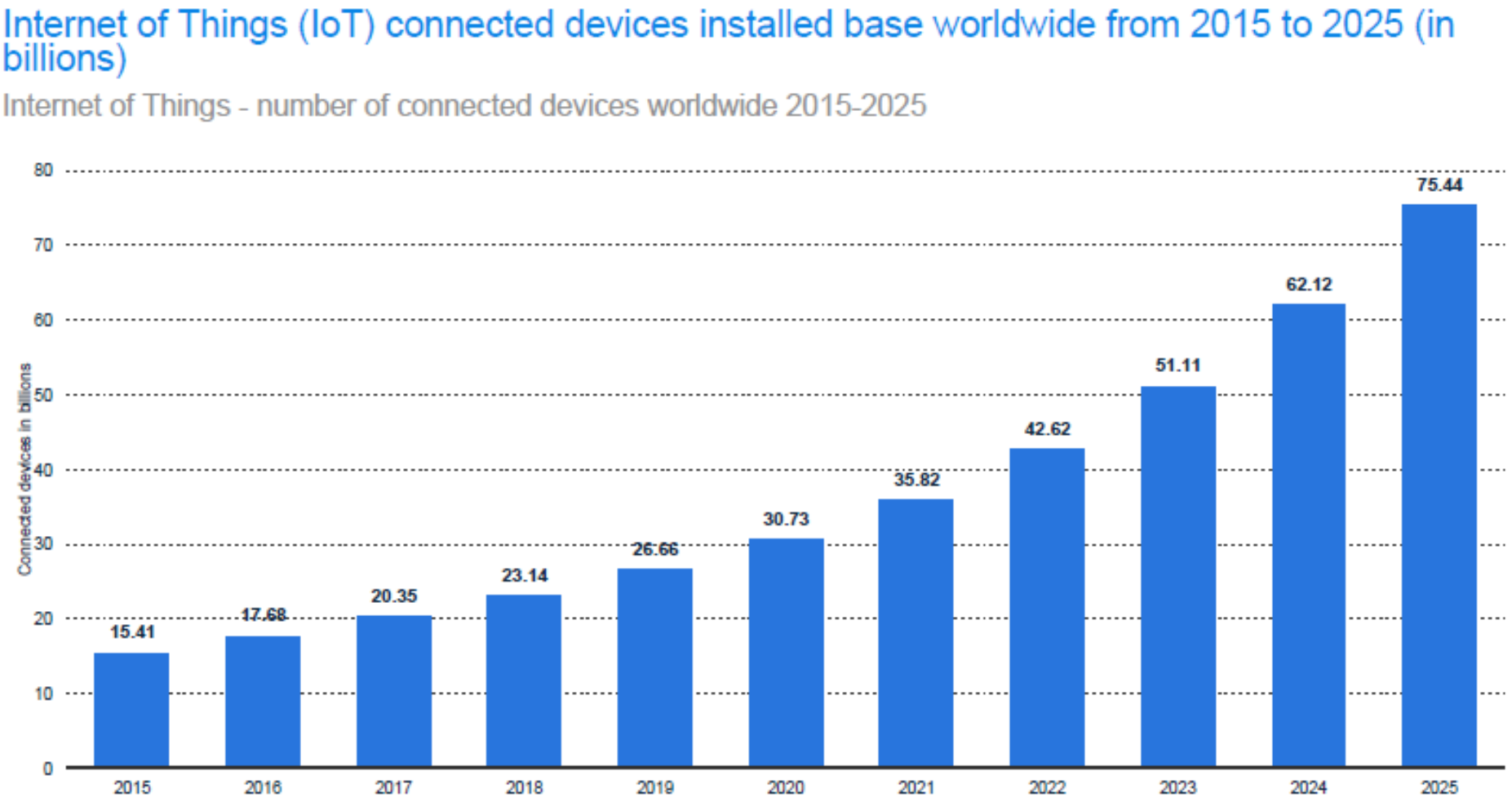


Source: Recommendation **ITU-T Y.2060**

To watch the video of this slide, refer to the video presentation.



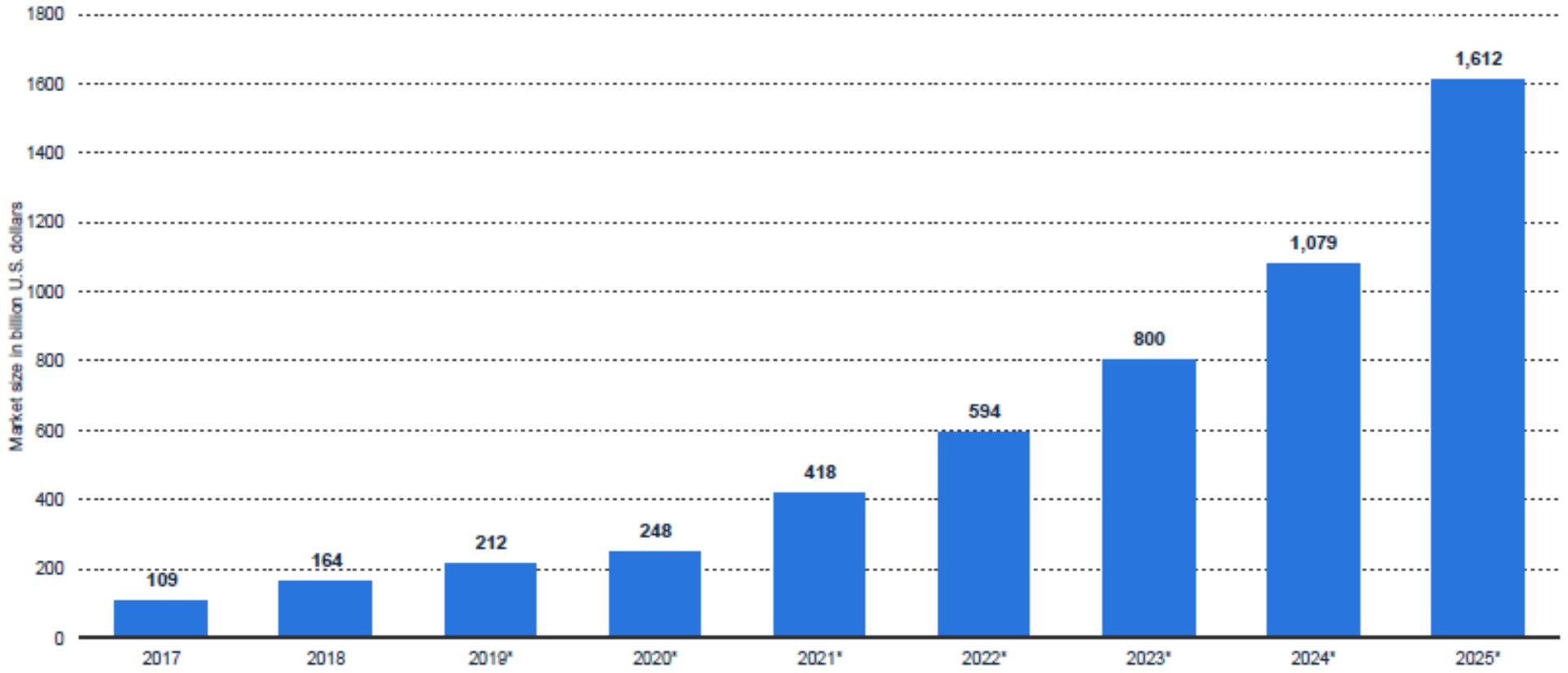
Internet of Things Trend



Internet of Things Market

Size of the Internet of Things (IoT) market worldwide from 2017 to 2025 (in billion U.S. dollars)

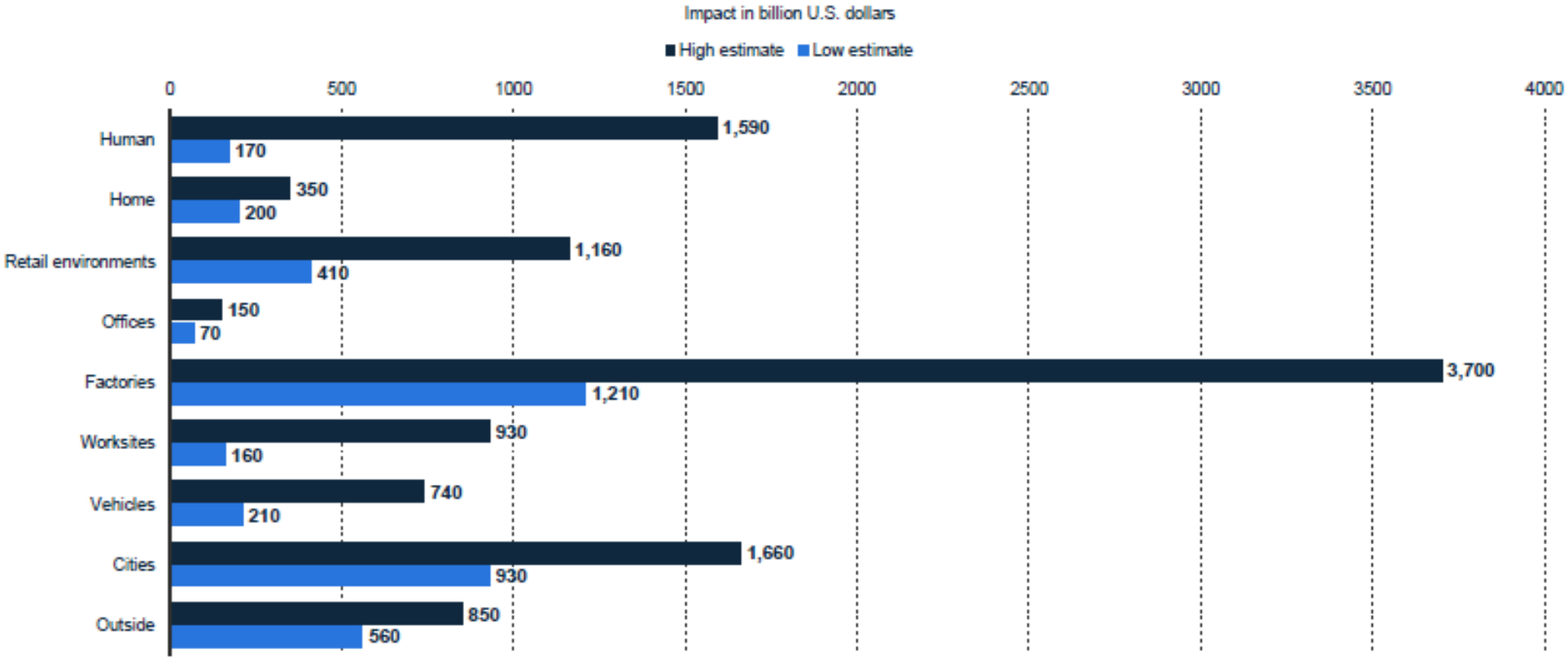
Global IoT market size 2017-2025



Internet of Things Market

Forecast economic impact of the Internet of Things (IoT) in 2025 (in billion U.S. dollars)

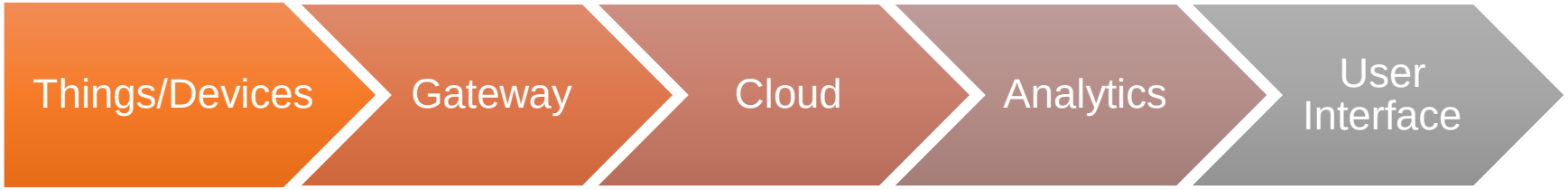
IoT economic impact forecast 2025, by sector

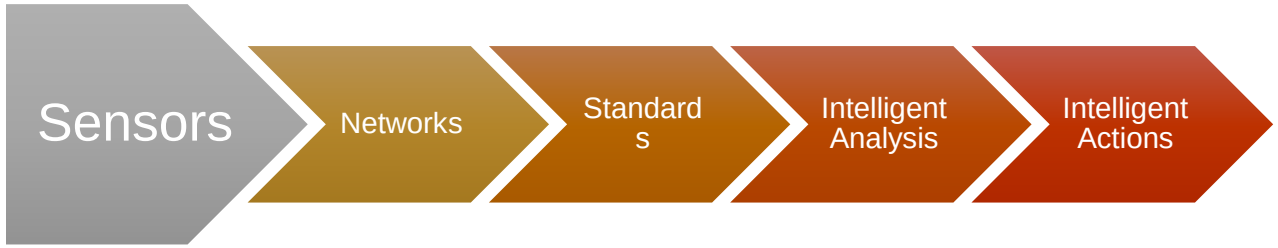


IoT Components

Conceptual overview

Implementation-driven overview





- Sensors can be classified / differentiated by their:
  - Purpose (what do they sense? Temperature? Location?)
  - Accuracy (How close is the data to reality?)
  - Reliability (How often do they work accurately?)
  - Range (How far can they sense, e.g. radiation?)
  - Resolution (Does a location sensor provides data in meters or in hundreds of meters?)
  - Level of Intelligence (Can the sensor self-calibrate? Can it recognize that something is wrong?)
- General trend: small, cheap and smart!

- Main challenges:
  - Many different network technologies, e.g. LTE, Wi-Fi, W-Max, Bluetooth, Ethernet, etc.
  - Power consumption
  - Enormous amount of devices
  - Changing traffic patterns
  - Security
  - Mobility

- Various standards and regulations:
  - Technology-related (networks, communications, data)
  - Health regulations
  - Private data handling regulations
- Mandatory vs. non-mandatory standards
  - Example: Company A decides to produce a new body-worn sensor. It can develop its own communication system and networking stack, but needs to adhere to health regulations, private data laws and frequency regulations for wireless communications.
- Main challenge: knowledge about standards and their adoption

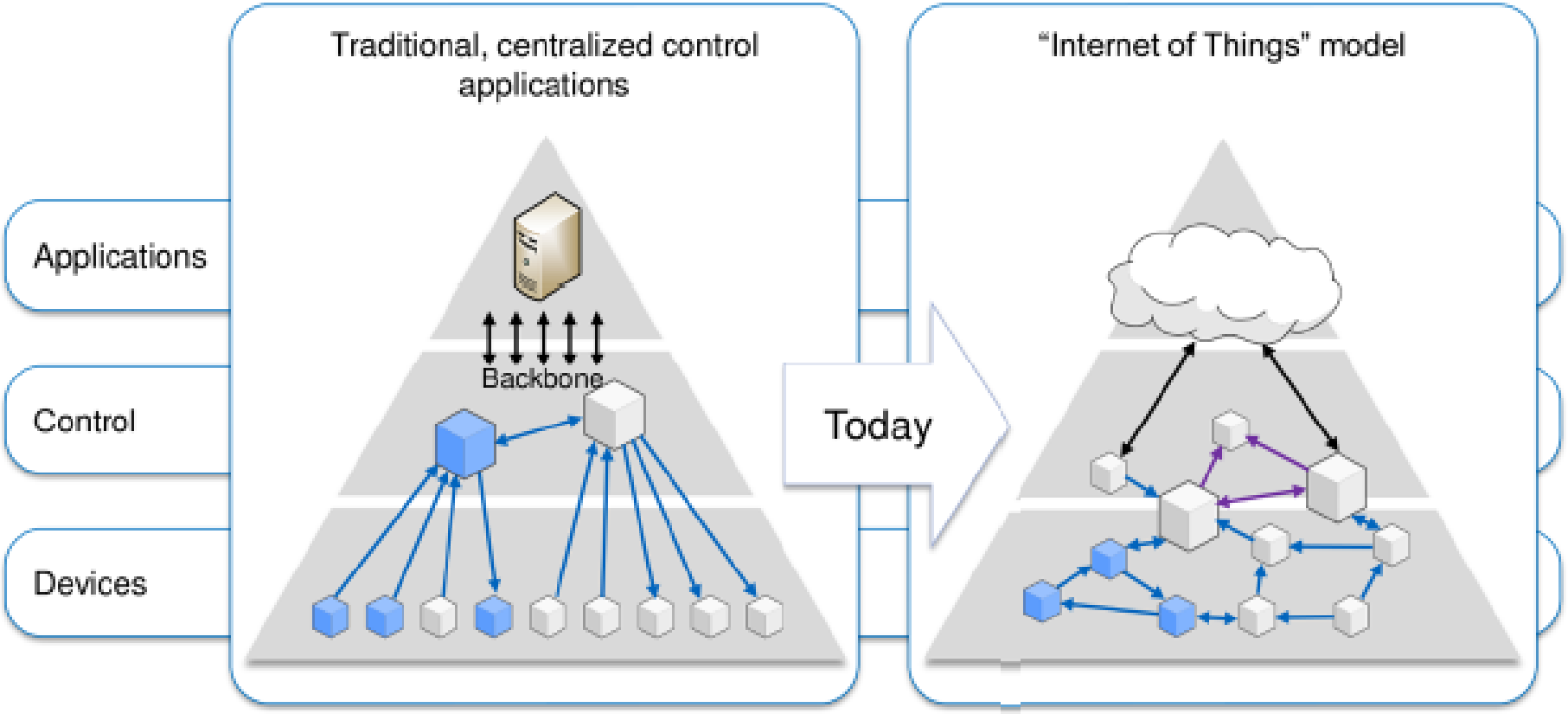
- Main techniques:
  - Computer vision: enables automatic “seeing”, e.g. for security, driving, etc.
  - Natural language processing, e.g. read signs and produce text or speech itself
  - Speech recognition to communicate with humans

- Depend strongly on Intelligent Analysis

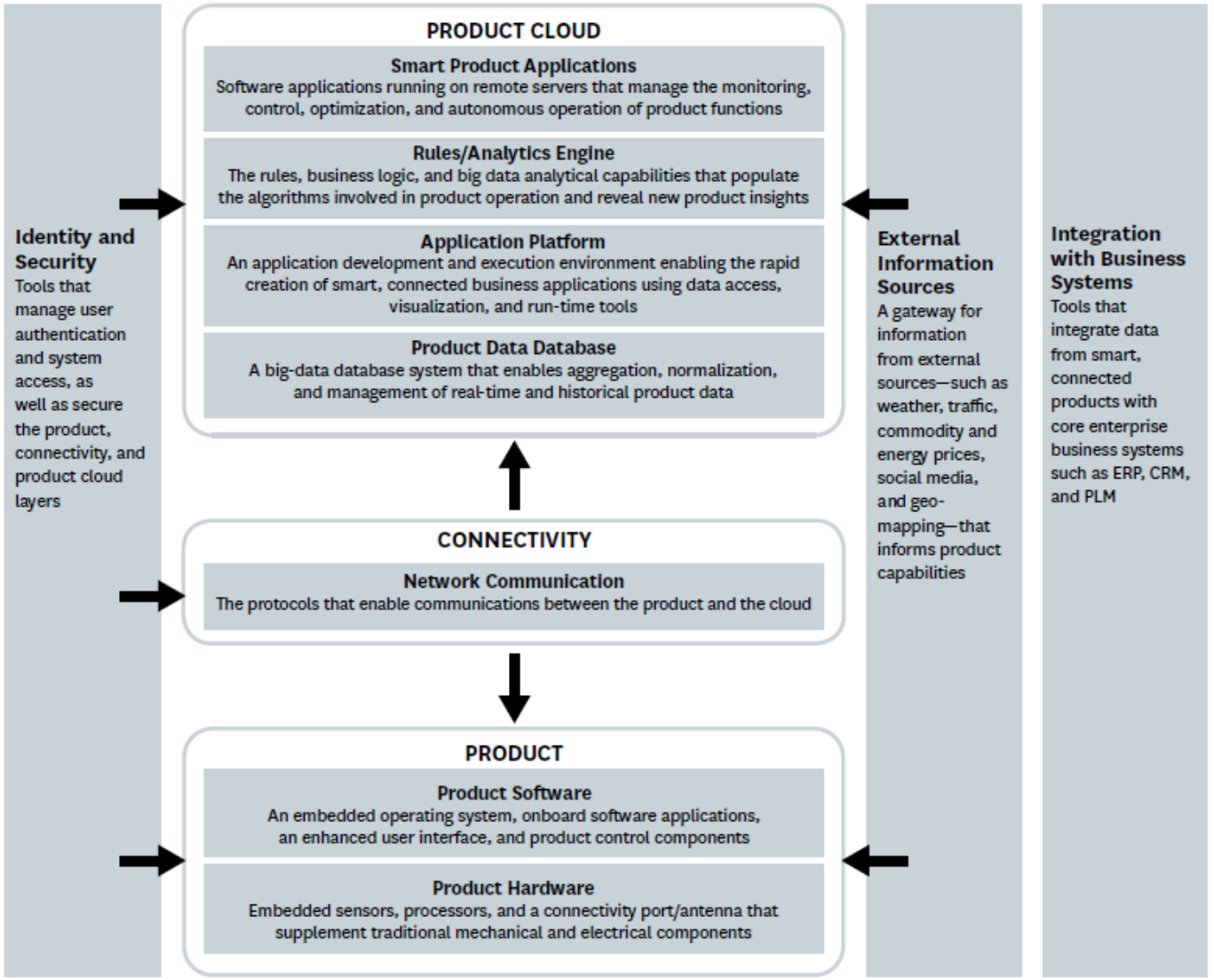
•Main open question: how much a machine is allowed to do? When a machine is allowed to take decisions?

- Main challenge: decisions in new/unpredicted situations

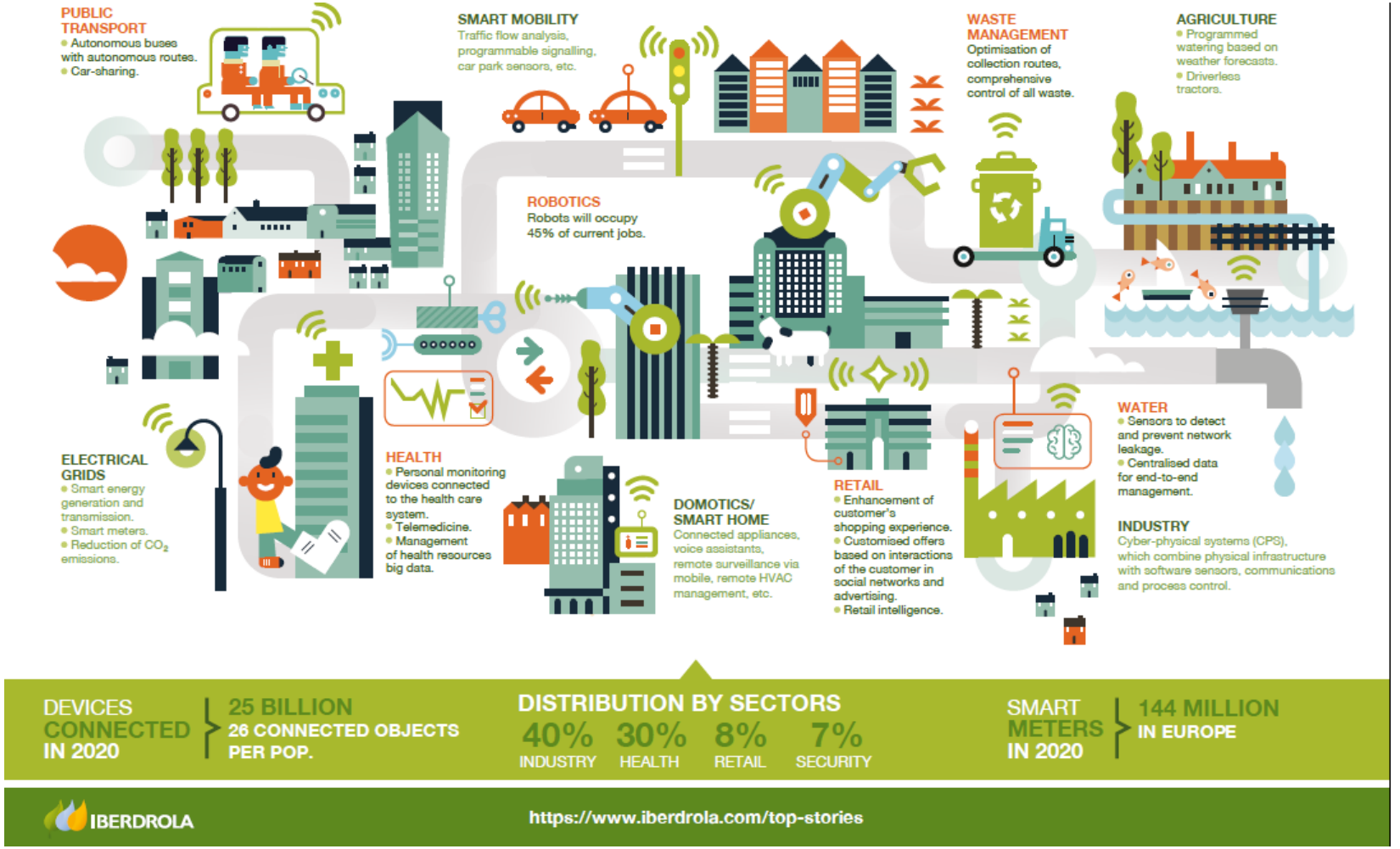
TRADITIONAL MODEL AND MODEL OF INTERNET OF THINGS



IOT ARCHITECTURE



IOT APPLICATIONS



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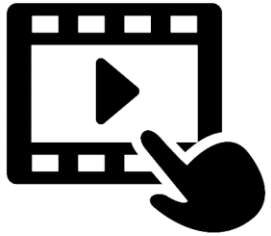
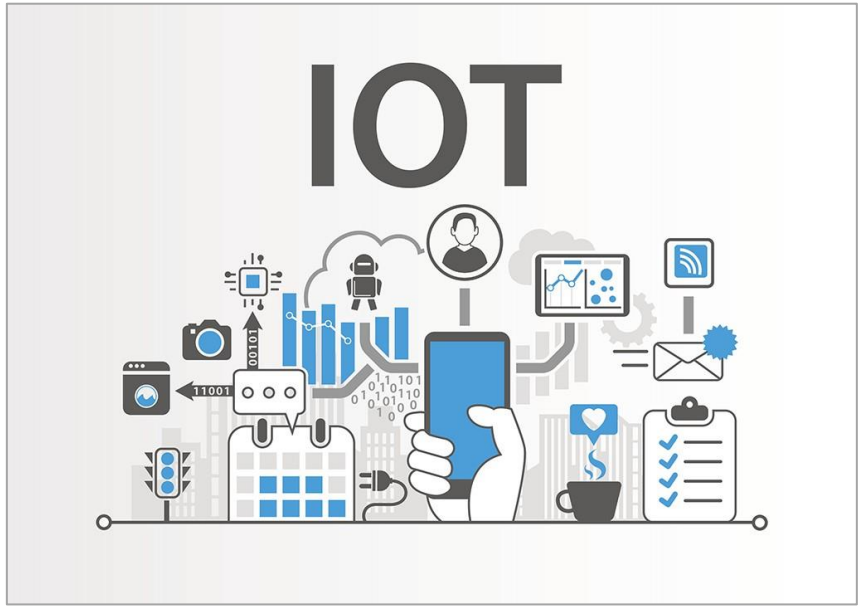


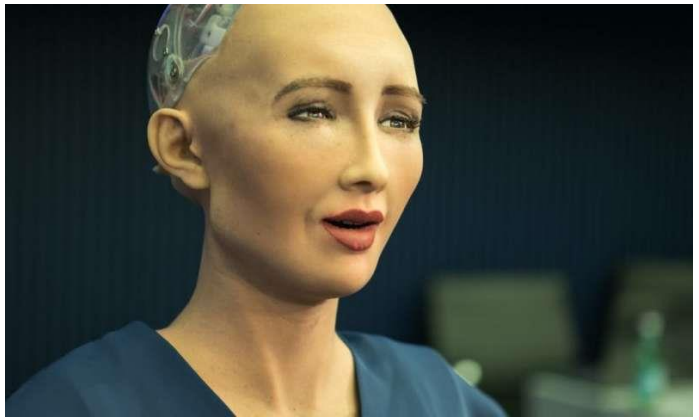
Critical steps to ensure success with the Internet of Things (IoT)



- Cut through complexity
- Make your data useful
- Architect for your analytics
- Secure opportunities

(Source: https://www.cio.com/article/3191167/four-critical-steps-to-ensure-success-with-the-internet-of-things-iot.html)

Artificial Intelligence



Artificial Intelligence

Artificial Intelligence (AI) is the science and engineering of making intelligent machines, especially intelligent computer programs. -John McCarthy, father of AI, Dartmouth, 1956.

- AI refers to the ability of a computer or a computer-enabled robotic system to process information and produce outcomes in a manner similar to the thought process of humans in learning, decision making and solving problems. In a way, the goal of AI systems is to develop systems capable of tacking complex problems in ways similar to human logic and reasoning.
- A straightforward, consensus definition of AI is not yet there. It is best understood as a set of techniques aimed at approximating some aspect of human or animal cognition using machines.
- AI is a science and a set of computational technologies that are inspired by—but typically operate quite differently from—the ways people use their nervous systems and bodies to sense, learn, reason, and take action.

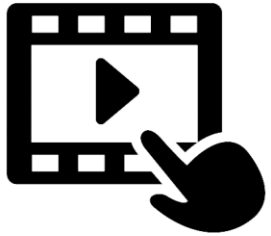
AI for Good

- AI for Good is a United Nations platform that fosters dialog on the beneficial users of AI to solve challenging economic and social problems

- ITU holds a global symposium where they bring together different stakeholders

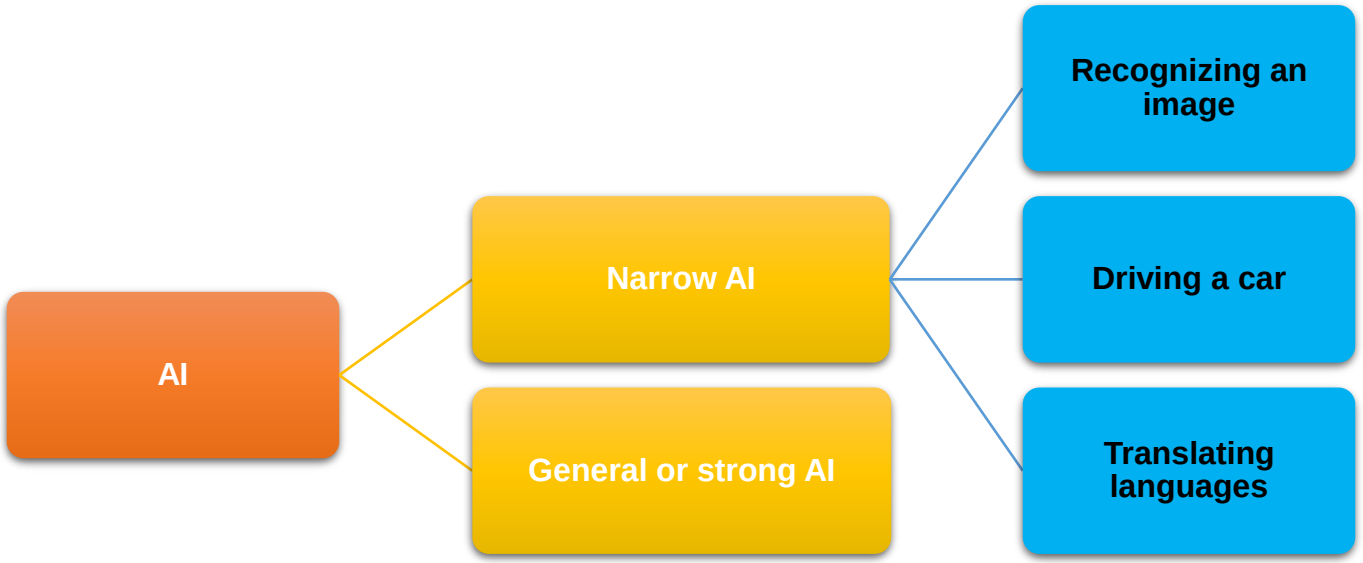
- At Stanford University, researchers are using AI to analyze satellite images to identify which areas have the highest poverty level

To watch the video of this slide, refer to the video presentation.



Artificial Intelligence (AI)

Computer algorithms that can perform tasks that usually require human intelligence.



(Source: Frontier technologies for sustainable development in Asia and the Pacific, ESCAP, United Nations, 2018)

Critical Steps for a Successful AI Transformation

- Build an informed business vision looking outside-in
- Devising a solid business strategy
- Focus on organizational culture and people
- Organizational readiness
- Avoid short-termism
- Assume risks and accept failures

(Source: AI and Digital Transformation: A Comprehensive Guide, Mohak Shah, 2019)

Gartner's Predictions from AI to health to a digital society

(Source: https://bitprime.co/gartner-top-10-strategic-predictions-for-2020-and-beyond/)

1- Through 2023, 30 percent of IT organizations will extend policies with "bring your own enhancement" to address augmented humans in the workplace. Changing the human condition, changing our relationship to technology, and resetting our expectations for change

2- By 2023, the number of people with disabilities employed will triple due to AI and emerging technologies, reducing barriers to access. Disabilities will lead to "super abilities" where disabled people can do more than normal people, by using things such as augmented reality (AR). organizations that actively employ people with disabilities see a 72 percent increase in productivity, 89 percent higher retention rates, and a 29 percent increase in profitability.

3- By 2024, the World Health Organization will identify online shopping as an addictive disorder, as millions abuse digital commerce and encounter financial stress. we need to shift our user experience approaches to try to not make them addictive.

4- By 2024, AI identification of emotions will influence more than half of the online advertisements you see. "Hyper-personalization" is going real-time based on emotions, for instance, personal assistants can tell how you are feeling.

5- By 2023, individual activities will be tracked digitally by an "Internet of Behavior" to influence benefit and service eligibility for 40 percent of people worldwide. In our organizations we need to update our ethical data management policies, be transparent about how we use data, and position our brands as a company that protects user's data.

6- By 2023, 40 percent of professional workers will orchestrate their business application experiences and capabilities like they do their music streaming experience. CIOs need to reject monolithic solutions, take an outside/in view of their customers and employees, and accelerate product-style delivery

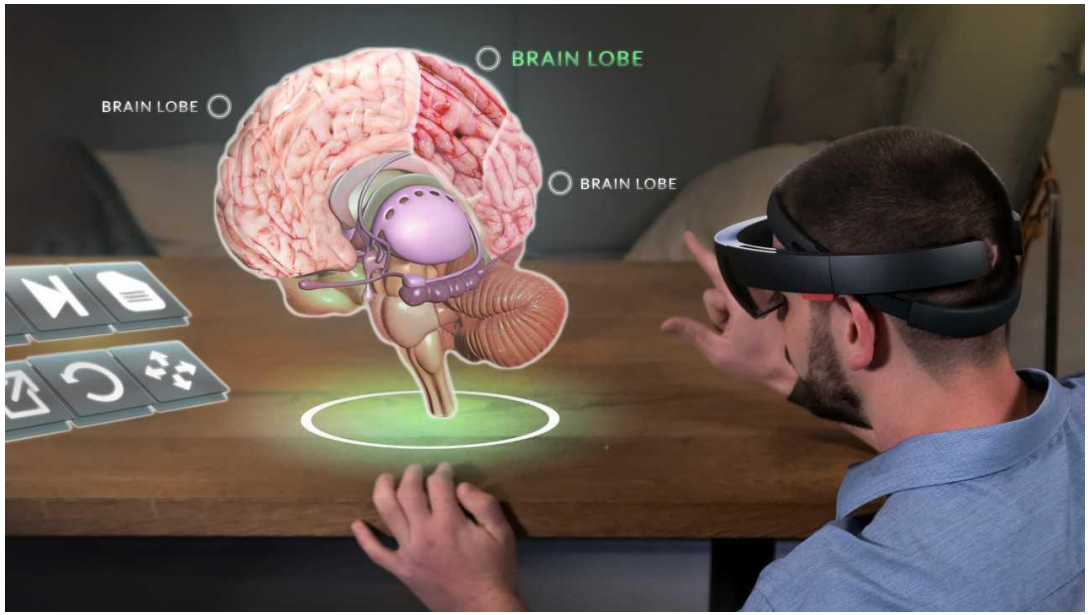
7- By 2025, 50 percent of people with a smartphone but without a bank account will use a mobile-accessible cryptocurrency account. we should be thinking that all customer apps should accept cryptocurrency payments, because this is become much more used in Asia/Pacific and in sub-Saharan Africa.

8- By 2023, up to 30 percent of world news and video content will be authenticated as real by blockchain, countering deep fake technology. blockchain will be used first to authenticate news stories and later deep fake videos, because its immutable ledger can prove the provenance.

9- By 2023, a self-regulating association for oversight of AI and machine learning designers will be established in at least four of the G7 countries**.** AI developers are creating systems that most people don't understand the decision process, and many of these systems are becoming life-critical. CIOs need to monitor developing standards and certifications in the area, develop internal practitioner standards, and develop AI governance to monitor what is going on with AI, the decisions it makes, and who did the work.

10- Through 2021, digital transformation initiatives will take large traditional enterprises on average twice as long and cost twice as much as anticipated. Business leaders' expectations for revenue growth are unlikely to be realized from digital optimization strategies, due to the cost of technology modernization and the unanticipated costs of simplifying operational interdependencies. Such operational complexity also impedes the pace of change along with the degree of innovation and adaptability required to operate as a digital business.

Augmented Reality
Virtual Reality



What is Augmented Reality?

Augmented reality is the result of using technology to superimpose information (such as sounds, images, text, video, 3D Objects,…) on the world we see from mobile, tablets or other equipments.

(Source: OPATEL Training Workshop, COE for e-Learning in Medical Education, Erasmus, 2018)

What is Virtual Reality?

Virtual reality is an interactive computer-generated experience taking place within a simulated environment.

A person using virtual reality equipment is able to "look around" the artificial world, move around in it, and interact with virtual features or items. The effect is commonly created by VR headsets consisting of a head-mounted display with a small screen in front of the eyes, but can also be created through specially designed rooms with multiple large screens.

(Source: OPATEL Training Workshop, COE for e-Learning in Medical Education, Erasmus, 2018)

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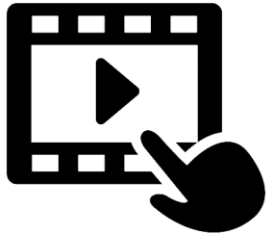
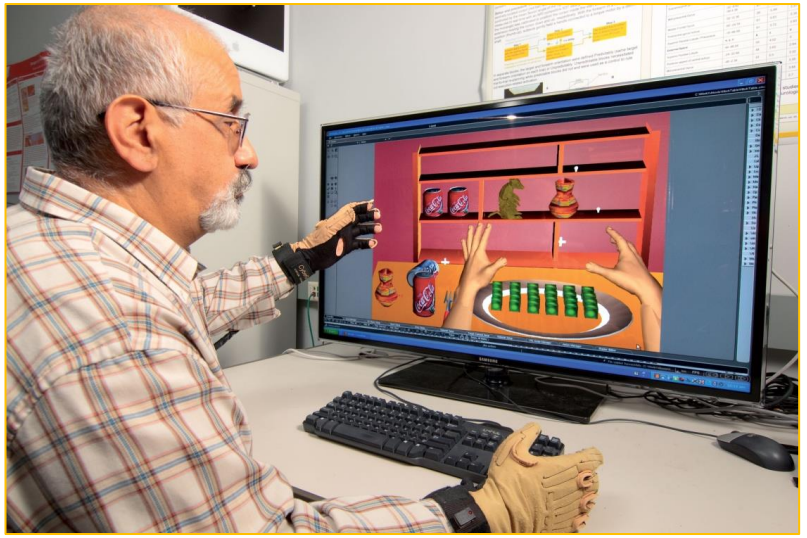


Usage of AR & VR in Health Care

(Source: OPATEL Training Workshop, COE for e-Learning in Medical Education, Erasmus, 2018)

Occupational Therapy



Ways AR/VR is Digitally Transforming Retail Customer Experience in 2019

- Interact and Inform
- Infuse Personalization
- Immersive Experiences

(Source:https://www.martechadvisor.com/articles/interactive-marketing/ar-digital-transformation-retail-customer-experience/)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рахмат
danke
謝謝
teşekkür ederim
Баярлалаа
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спасибо
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