

# Digital Transformation

## Class # 2: Technology Drivers # 1 – Internet of Things (IoT), Blockchain

EPITA | Fall 2025

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Valeriu Petruian

# Digital Transformation Class 2



- Admin
  - Recap
  - Thoughts for the day

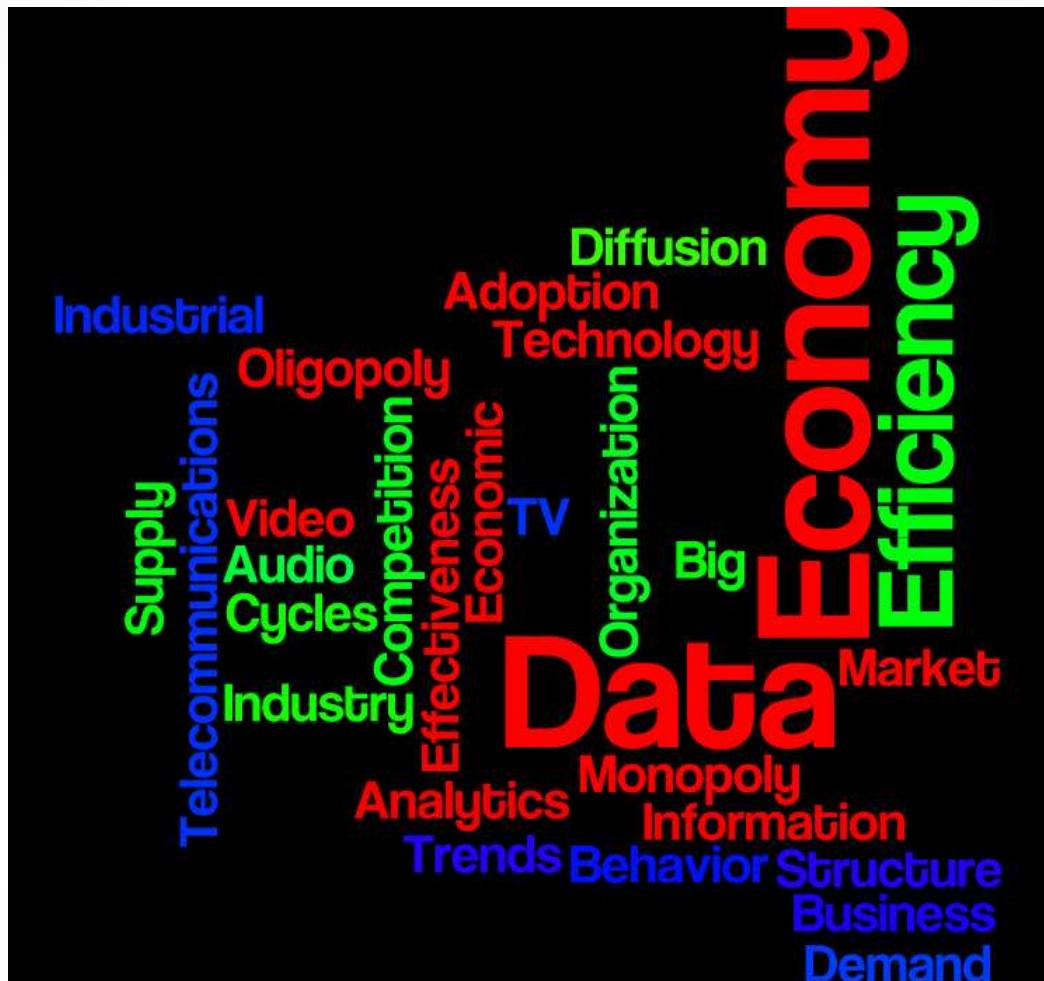
# Course Breakdown

## EPITA Fall 2025

Class	Date & Time   Topics
Class # 1	Welcome to the Digital Economy!
Class # 2	Technology Drivers # 1: Internet of Things (IoT), Blockchain
Class # 3	Technology Drivers # 2: Big Data & Artificial Intelligence (AI)
Class # 4	Other (non-technical) drivers of Digital Transformation
Class # 5	Digital Business Models: Platforms
Class # 6	Beyond Products: Designing Digital Businesses, and Markets   Course Wrap-Up
Class # 7	Final Presentations

### Today's Readings:

- **Michael E. Porter and James E. Heppelmann.** *How Smart, Connected Products Are Transforming Competition.* Harvard Business Review, November 2014 Issue
- **Marco Lansiti, Karim R. Lakhani.** *The truth about blockchain.* Harvard Business Review, January-February 2017



## Class # 2 Internet of Things (IoT), Blockchain

The Internet of Things (IoT):  
Fundamentals  
Blockchain

**Class assignment & discussion:**  
The distinctive natures of IoT and  
Blockchain

# Technology trends

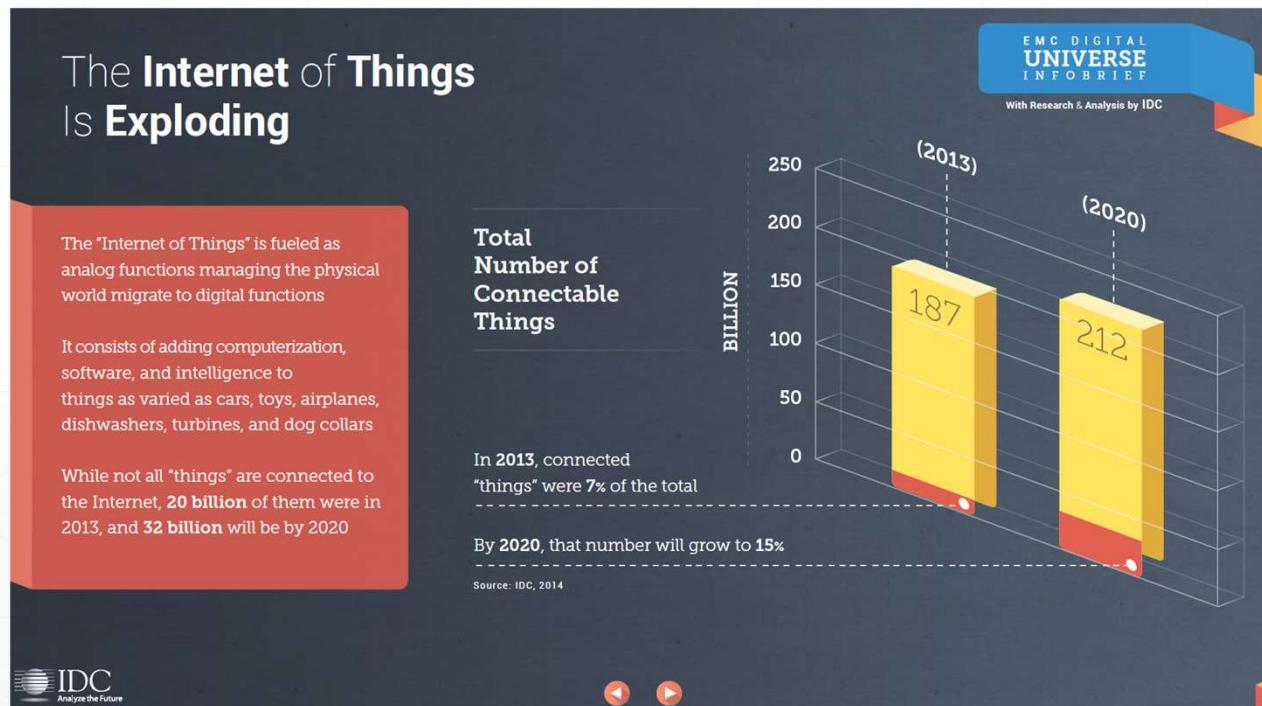
## Starting point

- Imagine the following situation:
  - A professor comes to class with a set of carefully selected references for his/her course
  - He/she wishes
    - That each student uses 1 reference at a time for the class assignments
    - That the students interexchange the references (between themselves)
    - That the students return the references at the end of each class
    - That for the next class, the process starts again, until the end of the course
    - At the end of the course, he/she wants trustworthy statistics and recommendations on who used what, when and why

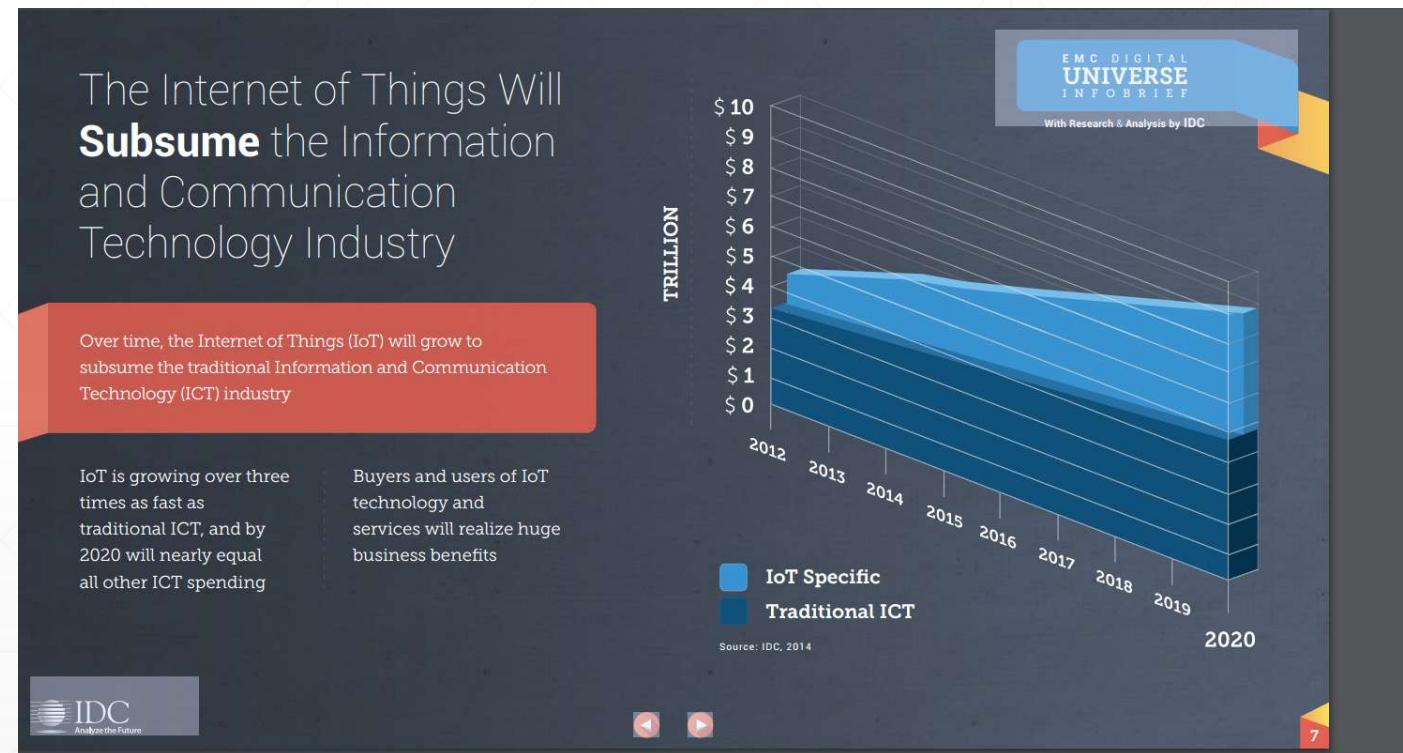
### What does the professor need?

- Each reference to hold a tag
- Each student to hold a student ID
- A reading mechanism for tags and IDs
- A computer program:
  - To store references and student IDs
  - To link reference movements to class/context/time
- A set of rules

# Why IoT ? 10 years ago Predictions came true? | Growth Potential



# Why IoT ? 10 years ago Predictions came true? | Challenging traditional ICT



# Why IoT ? 10 years ago Predictions came true? | New Opportunities

**5 Ways IoT Will Create New Opportunities**

**EMC DIGITAL UNIVERSE INFOBRIEF**  
With Research & Analysis by IDC

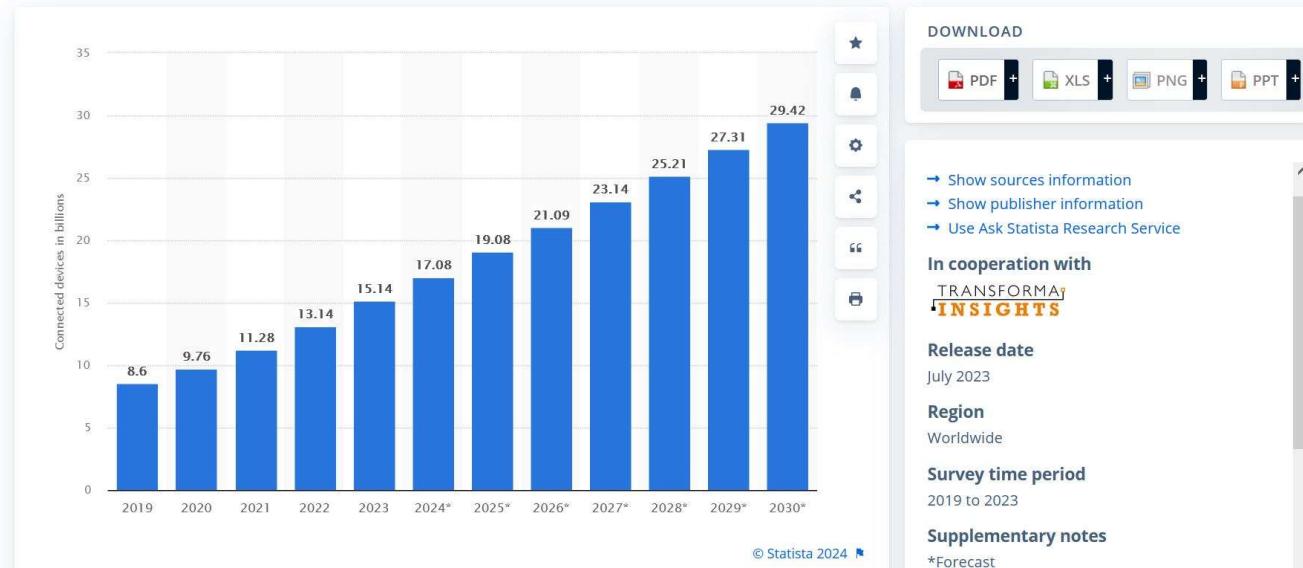
- New business models**  
The IoT will help companies create new value streams for customers, speed time to market, and respond more rapidly to customer needs.
- Real-time information on mission-critical systems**  
Enterprises can capture more data about processes and products more quickly and radically improve market agility.
- Diversification of revenue streams**  
The IoT can help companies monetize additional services on top of traditional lines of business.
- Global visibility**  
The IoT will make it easier for enterprises to see inside the business, including tracking from one end of the supply chain to the other, which will lower the cost of doing business in far-flung locales.
- Efficient, intelligent operations**  
Access to information from autonomous endpoints will allow organizations to make on-the-fly decisions on pricing, logistics, and sales and support deployment.

Source: EMC, IDC Digital Universe 2014 Report.  
<http://www.emc.com/collateral/analyst-reports/idc-digital-universe-2014.pdf>

# Predictions came true? Current figures

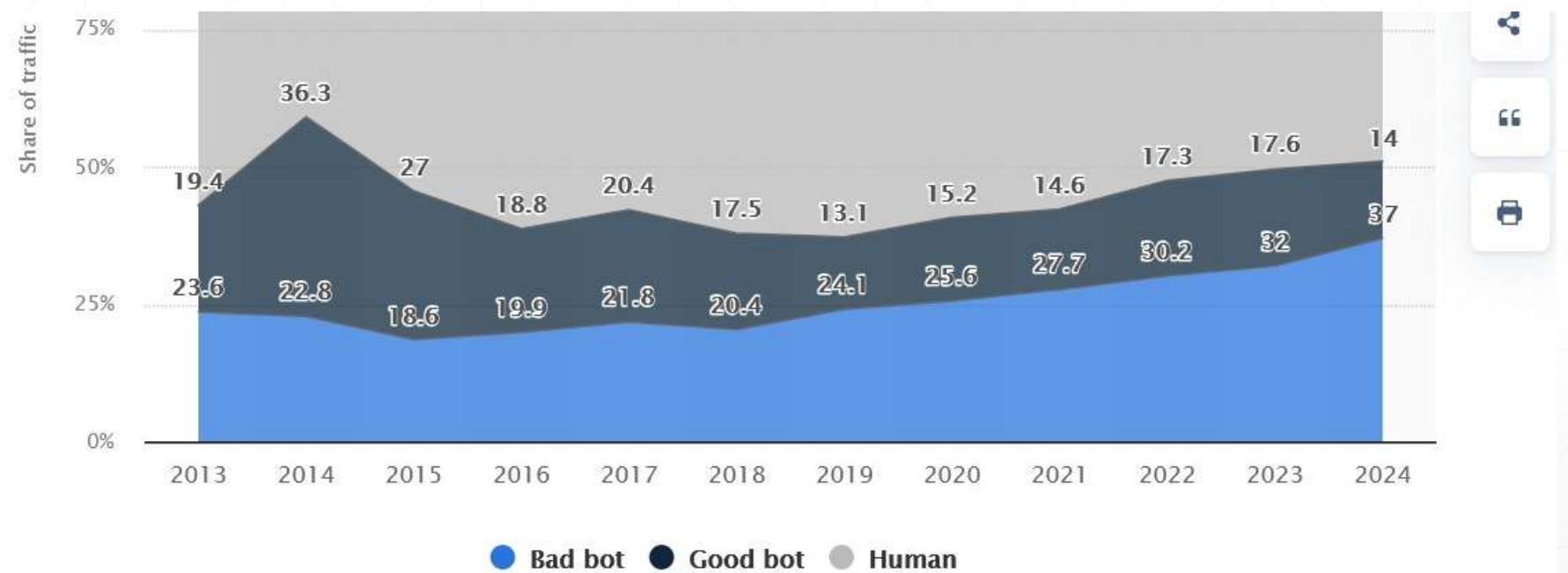
Number of Internet of Things (IoT) connected devices worldwide from 2019 to 2023, with forecasts from 2022 to 2030

(in billions)



Source: <https://www.statista.com/statistics/1183457/iot-connected-devices-worldwide/>

## Predictions came true? Current figures (2)



Source: [https://www.statista.com/statistics/1264226/human-and-bot-web-traffic-share/?srsltid=AfmBOoqbRPZvnIGr1ePK3Ba7detRbkv3sRJ4jjRoCEIJSCJgki\\_Vxre](https://www.statista.com/statistics/1264226/human-and-bot-web-traffic-share/?srsltid=AfmBOoqbRPZvnIGr1ePK3Ba7detRbkv3sRJ4jjRoCEIJSCJgki_Vxre)

## Predictions came true? Current figures (3)

- According to a recent report by Imperva (*Imperva Bad Bot 2024, 16 April 2024*) traffic from **bots** represents half of internet traffic (49.6%) with traffic from **humans** at 50.4%
- **Bad bots** account for 32% of all internet traffic
- Adoption of Generative AI represents the main cause in bot traffic increase
- Bad bot traffic by industry:
  - Gaming (57.2 %)
  - Retail (24.4%)
  - Travel (20.7%)
  - Financial services (15.7%)

# Predictions came true? Current situation

## Major applications of IoT

Provenant de diverses sources sur le Web

 Smart city	 Agriculture	 Wearables
 Healthcare	 Smart grid	 Smart homes
 Smart home	 Autonomous driving	 Hospitality
 IoT Analytics	 Connected cars	 Energy
 Transportation	 Manufacturing	 Predictive maintenance
 Supply chain management	 Fleet management	 Internet
 IoT in energy	 Smart supply chain	 Water
 Industrial IoT	 Smart retail	 Retail IoT

Source: May 2024 web query « major IoT applications »

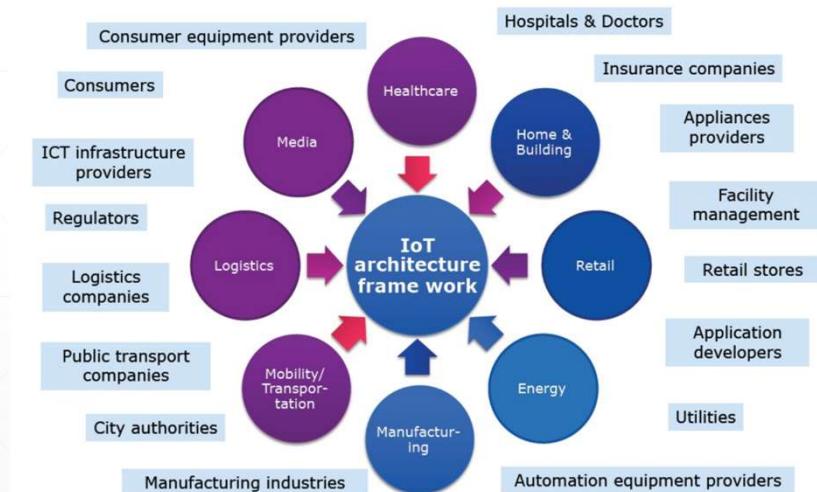
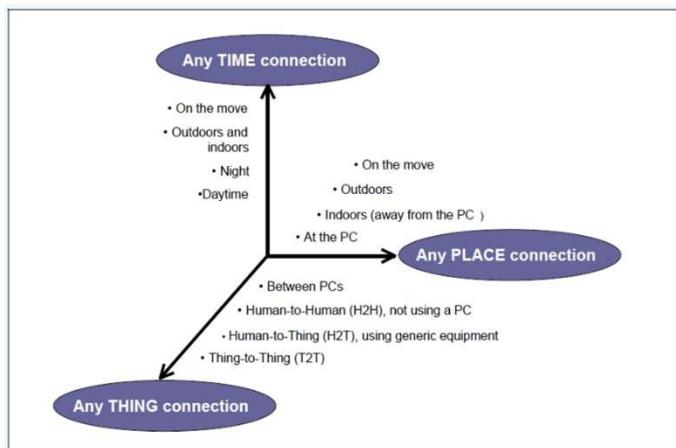
# IoT Fundamentals

## Definitions

- **Wikipedia** – “The Internet of things (IoT) is a system of interrelated computing devices, mechanical and digital machines are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.”
- **IEEE** – « A network of items – each embedded with sensors – which are connected to the Internet.”
- **ETSI** – “Machine-to-Machine (M2M) communications is the communication between two or more entities that do not necessarily need any direct human intervention. M2M services intend to automate decision and communication processes.”
- **ITU** – “A network that is available anywhere, anytime, by anything and anyone.”

# IoT Fundamentals

## Potential reach and usages at a glance



Source: IEEE Internet Initiative. “*Towards a definition of the Internet of Things (IoT).*” IEEE, May 27th 2015.

# IoT Fundamentals

## Few technical aspects: Operating Systems

OS	IPv6	TCP	6LoWPAN	RPL	CoAP
Contiki	Y	P	Y	Y	Y
Tiny OS	N	P	Y	Y	Y
Linux	Y	Y	Y	P	P
RIOT	Y	Y	Y	Y	N

	IPv6	EPC
Objects to identify	Network interfaces	Physical objects
Primary application	Routing address	Pointer to information
Address allocated by	Network manager	Item manufacturer
Unique identifier	Yes	Yes
Identifier length (bits)	128	64, 96, other
Can identifier change?	Yes	No
Area of difficulty	Mobility	No location information

Source: IEEE Internet Initiative. “*Towards a definition of the Internet of Things (IoT).*” IEEE, May 27th 2015.

# IoT Fundamentals

## Few technical aspects: Protocols

Protocol	Type of application
Bluetooth	Specific to IoT/General Purpose
Zigbee	Specific to IoT
Z-Wave	Specific to IoT
6LoWPAN	General Purpose
Thread	General Purpose
Wi-Fi	General Purpose
GSM/GPRS/EDGE (2G), UMTS/HSPA (3G), LTE (4G)	General Purpose
NFC	General Purpose
Sigfox	Specific to IoT
Neul	Specific to IoT
LoRaWAN	Specific to IoT

# IoT and 5G Example

	1 <sup>st</sup> G	2 <sup>nd</sup> G	3 <sup>rd</sup> G	4 <sup>th</sup> G	5 <sup>th</sup> G
Technology type	Analog	Digital	Digital	Digital	Digital
Norms (examples)	NMT, Radiocom 2000	GSM, TDMA, CDMA	UMTS	LTE	3GPP 5G NR
Bandwidth	1,9 kbps	14,4 kb/s to 384 kb/s	144 kb/s to 2 Mb/s	2 Mb/s to 1 Gb/s	1 Gb/s to 10 Gb/s
Main application	Voice calls	Data messages (SMS, MMS)	Mobile internet	Video streaming	Internet of Things

<b>Lock-In types</b>	<b>Associated switching costs</b>
Contracts	Cancellation costs
Durable equipment	Costs of replacing equipment
Specific skill set	Learning costs
Information and data-bases	Costs of conversion of data to new formats
Specialized suppliers	Costs of changing suppliers
Research costs	Costs associated with researching alternative products
Loyalty programs	Loss of acquired advantages

## **Cost of change (lock-in and switching costs)**

The cost of change is very often an important decision element and, consequently, a potential barrier to change.

Shapiro and Varian propose a classification of the costs associated with switching from one technology to another.

Source: SHAPIRO C., VARIAN H. *Economie de l'information*. Trad. Française, De Boeck Université. Paris, Bruxelles, 1999

# IoT Fundamentals

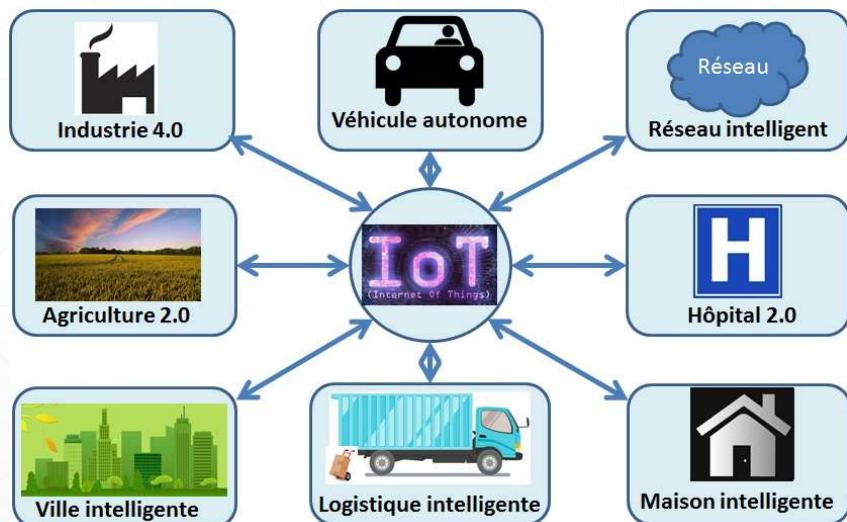
## Enabling Technologies (according to the ITU)

- For tagging things
  - **RFID**
- For “feeling” things
  - **sensor technologies**,
- For making things “think”
  - **smart technologies**
- For shrinking things
  - **nanotechnology**
- RFID has advantage over barcode technologies
- Sensor technologies are being used for « **sensing** » and « **actuating** ». The former in input devices (« eyes » that collect information) the latter in output units (« hands » that implement decisions »)
- Smart materials incorporate both sensors and actuators and they can be passive, active or autonomous

Source: IEEE Internet Initiative. “*Towards a definition of the Internet of Things (IoT).*” IEEE, May 27th 2015.

# IoT Fundamentals

## The Interoperability challenge



[https://fr.wikipedia.org/wiki/5G\\_pour\\_l%27Internet\\_des\\_objets](https://fr.wikipedia.org/wiki/5G_pour_l%27Internet_des_objets)

Examples of consortia working on the IoT Interoperability challenge:

- AllSeen Alliance
- Open Connectivity Foundation
- oneM2M
- Thread Group
- Wi-Fi Alliance, Bluetooth 5
- ...

	Control	Openness
Compatibility	Controlled migration	Open migration
Performance	Performance choice	Discontinuity

Generic strategies when launching a new technology in network economics

Source: SHAPIRO C., VARIAN H. *Economie de l'information*. Trad. Française, De Boeck Université. Paris, Bruxelles, 1999

		Choice of the weak	
		Conflict	Standard
Choice of the strong	Conflict	« Standard war »	Weak tends to block strong
	Standard		Agreement on a standard

Strategies in standard-setting

Source: SHAPIRO C., VARIAN H. *Economie de l'information*. Trad. Française, De Boeck Université. Paris, Bruxelles, 1999

## Strategies & Standard-setting tactics

Shapiro and Varian quote 7 factors that are important in standard setting strategies:

1. Installed base
2. IP rights
3. Capacity to innovate
4. Pioneer's advantage
5. Production capacity
6. Product complementarity
7. Brand reputation

# IoT | Supply-side considerations

## Complexity is obvious ...



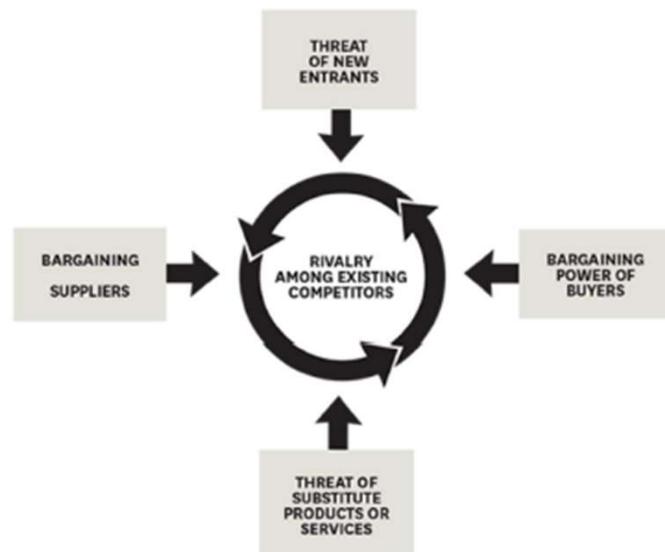
IoT  
**LANDSCAPE**

### Discussion:

- A large variety of frameworks, architectures, technologies, applications, ..
- OS, Protocols
- Tagging
- Sensors
- Industry-specific versus general purpose solutions
- Open vs proprietary standards, ...

## The Five Forces That Shape Industry Competition

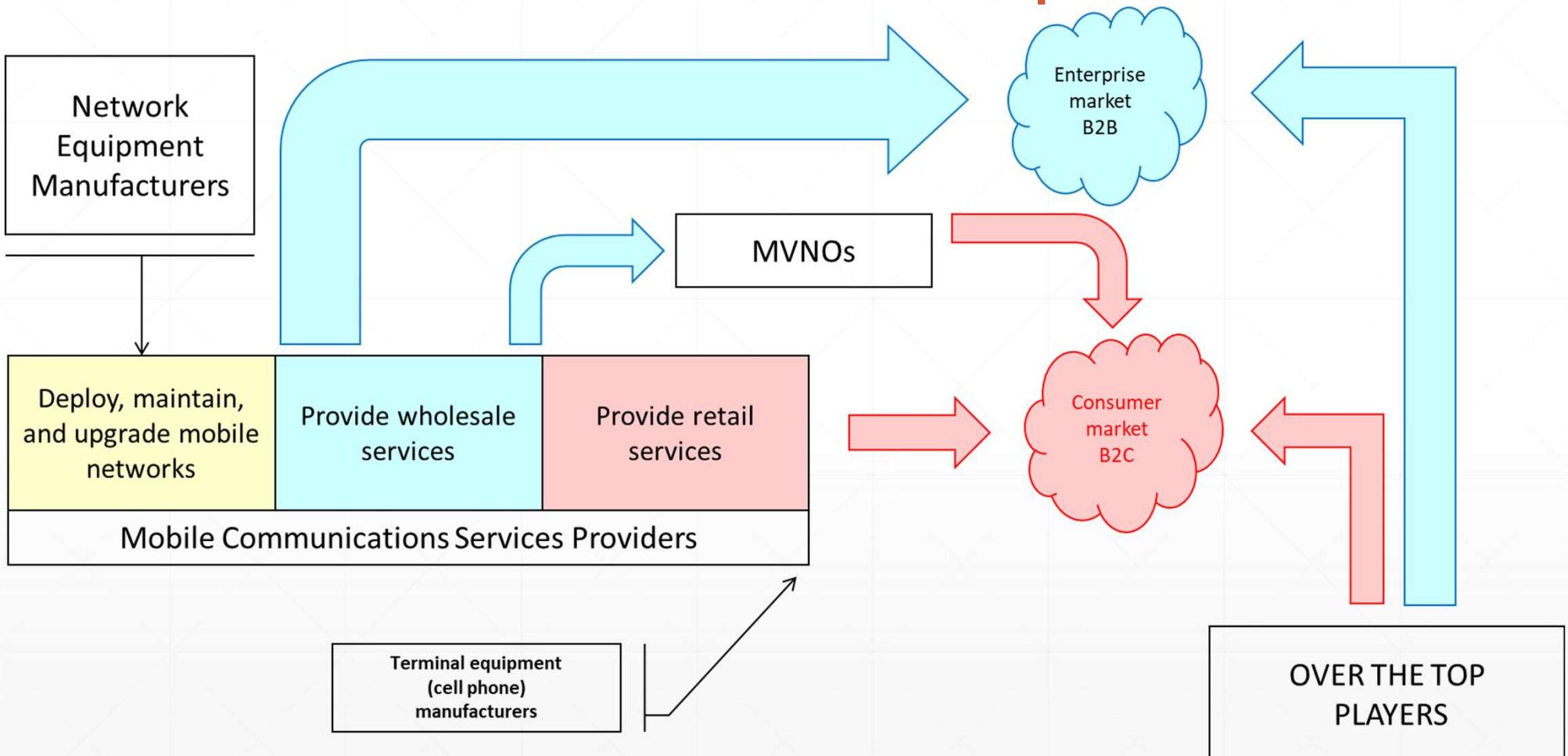
Smart, connected products will have a transformative effect on industry structure. The five forces that shape competition provide the framework necessary for understanding the significance of these changes.



## Reminder: The competitive framework

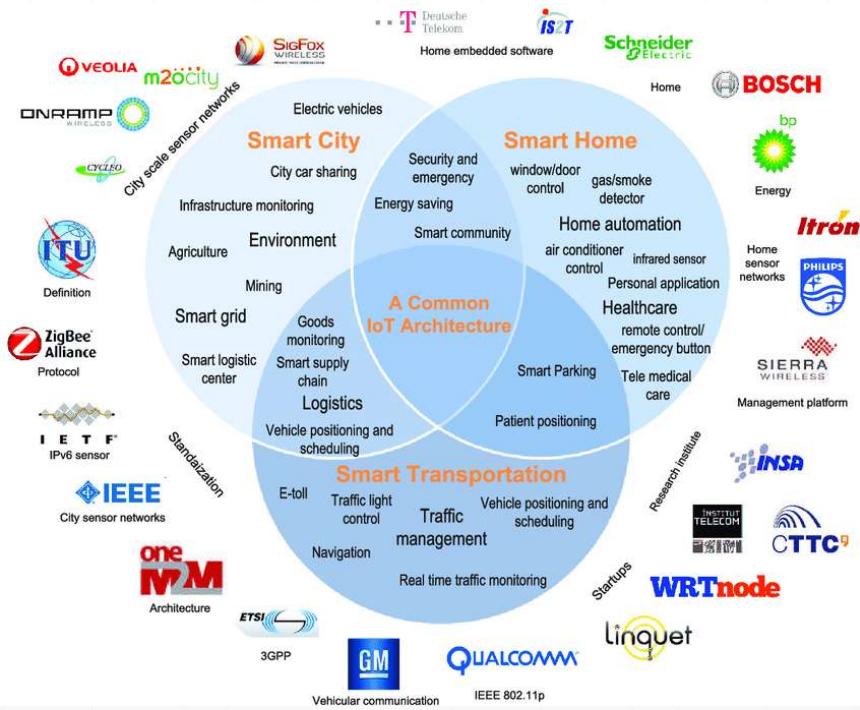
Source : Michael E. Porter, James E. Heppelmann. *How Smart, Connected Products Are Transforming Competition*. Harvard Business Review, November 2014

# IoT and Telecommunications – Example



# IoT Applications and Players

## An illustration

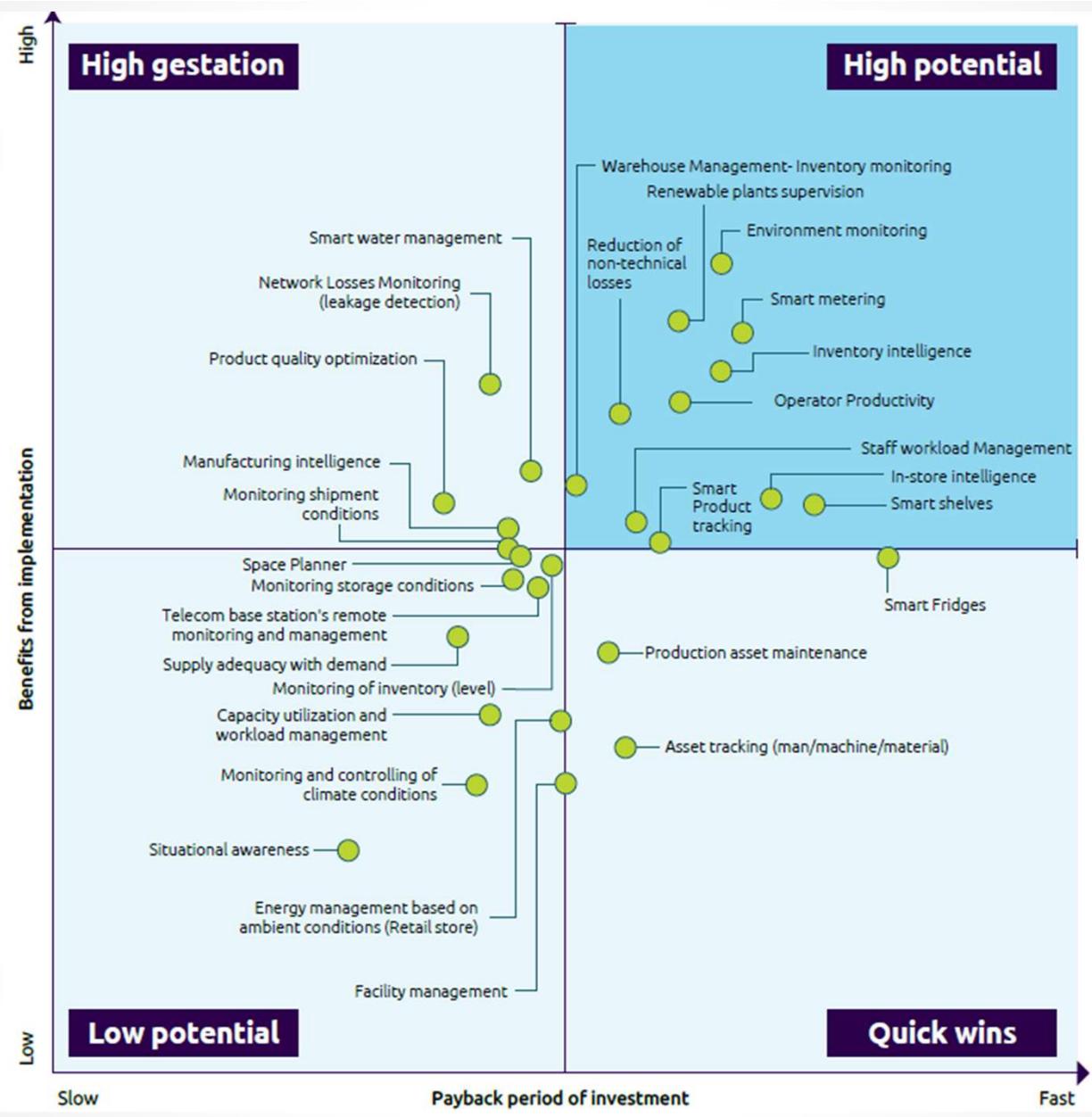


[https://www.researchgate.net/figure/Industrial-IoT-ecosystem-including-major-applications-and-players-3\\_fig8\\_277562344/download](https://www.researchgate.net/figure/Industrial-IoT-ecosystem-including-major-applications-and-players-3_fig8_277562344/download)

# IoT Case Studies Discussion



MAJOR THEMES:	INDUSTRY 4.0	SMART CITIES	SMART HOMES	SMART MOBILITY
B2B	B2C	H2M/M2H		M2M
Industrial IoT applications <ul style="list-style-type: none"><li>▪ Manufacturing</li><li>▪ Machinery</li><li>▪ Self-healing networks</li></ul>	Consumer IoT applications: <ul style="list-style-type: none"><li>▪ Retail shopping</li><li>▪ Health</li><li>▪ ..</li></ul>	Human to machine: <ul style="list-style-type: none"><li>▪ Quantified self</li></ul> Machine to Human <ul style="list-style-type: none"><li>▪ Remote health services</li></ul>	<ul style="list-style-type: none"><li>▪ Warehouse management</li><li>▪ Inventory management</li></ul>	



## IoT Use Cases Overview

**Source:** Capgemini Digital Transformation Institute. *Unlocking the business value of IoT in operations.* Capgemini, 2018



# Selected IoT Applications

## Smart Metering

### Smart metering

- “Smart meters record electricity consumption in intervals of one hour or less and communicate this data to the utility company.”

### Examples:

- France – Linky by Enedis
- Germany - Sonderweg

### Discussion points:

- Roll-out – adoption rate
- Data Collection and Privacy – regulation aspects
- Data usage – value creation aspects
- ... common to several European countries



## Selected IoT Applications

### Smart Home

#### Monitor home appliances

- “Adapt, in real-time, several home appliances (blinds, lights, cooling, lighting) depending on several parameters (humidity, homme occupancy, natural light, …)”

#### Examples:

- Multiple projects

#### Discussion points:

- Ownership of data
- Ownership of IoT system



# Selected IoT Applications

## Smart Mobility - 1

### Smart mobility

- “Smart mobility are P2P applications allowing carpooling and on-demand car sharing services. These are services similar to Uber and Lyft, the major distinction being that the relationship are 1-2-1 and there is no need for intermediation platform.”

### Examples:

- Norway – Sharepool
- Europe – Sunset project

### Discussion points:

- IoT as enabler for P2P interaction
- No need for platform in the middle
- Still early stage



## Selected IoT Applications Smart Mobility - 2

Connected cars

- Cars = computers on wheels

Examples:

- BMW iDrive
- Android Automotive OS

Discussion points:

- Dominant OS for cars?
- How many types of software applications are there already available for connected cars?
- Will car manufacturers create their own or will they rely on existing software?

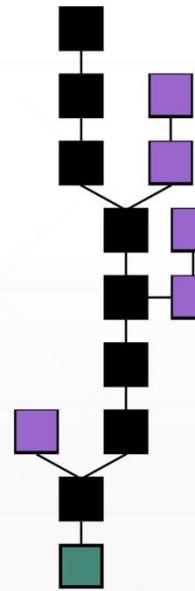
# Blockchain

## What is it?

« A **blockchain**, originally **block chain**, is a growing list of records, called *blocks*, that are linked using cryptography. Each block contains a cryptographic hash of the previous block, a timestamp, and transaction data (generally represented as a Merkle tree). By design, a blockchain is resistant to modification of its data.”

Source: Wikipedia

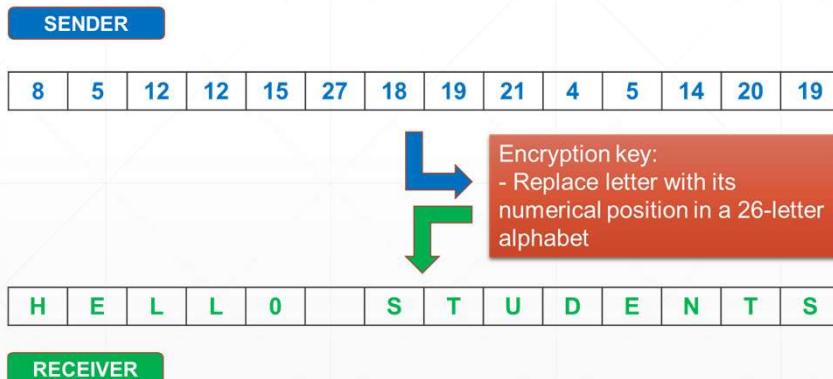
## What does it look like?



Source: Theymos from Bitcoin wikiVector : Razorbliss — Bitcoin Wiki: <https://en.bitcoin.it/wiki/File:Blockchain.png>, CC BY 3.0, <https://commons.wikimedia.org/w/index.php?curid=16043262>

# Blockchain Ingredients

## CRYPTOGRAPHY



## DISTRIBUTED LEDGER

A **distributed ledger** (also called a **shared ledger** or **distributed ledger technology** or **DLT**) is a consensus of replicated, shared, and synchronized digital data geographically spread across multiple sites, countries, or institutions. Unlike with a centralized database, **there is no central administrator**.

Source: Wikipedia

# Blockchain Ingredients (continued)

## P2P RELATIONSHIP

**Peer-to-peer (P2P)** computing or networking is a distributed application architecture that partitions tasks or workloads between peers. Peers are equally privileged, equipotent participants in the application. They are said to form a peer-to-peer network of nodes. **Example:** Napster (1999)

Source: Wikipedia

## TRUSTED THIRD PARTY

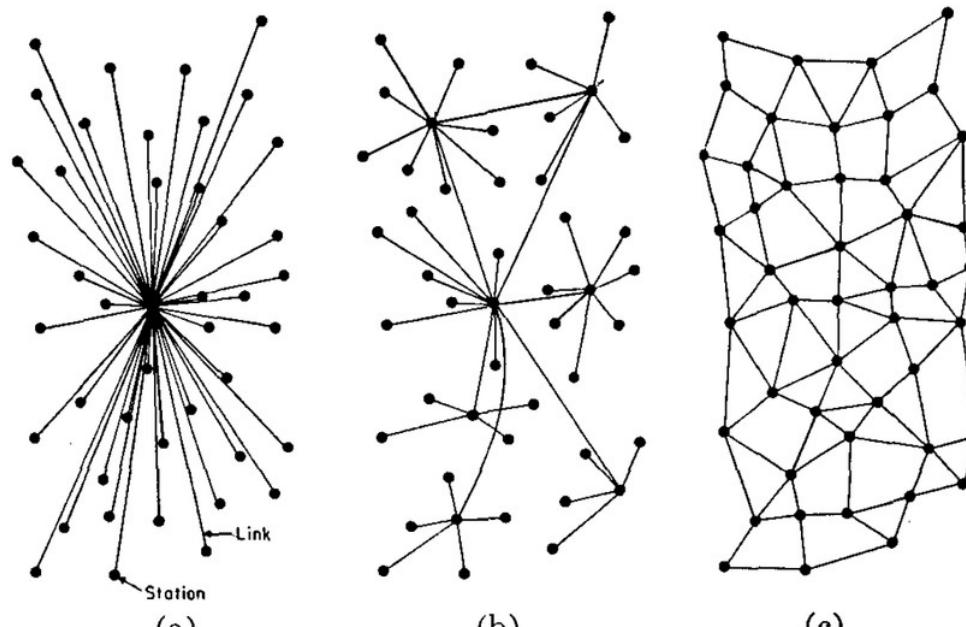
**Definition(s):** An entity other than the owner and verifier that is trusted by the owner, the verifier or both to provide certain services.

Source: [https://csrc.nist.gov/glossary/term/trusted\\_third\\_party](https://csrc.nist.gov/glossary/term/trusted_third_party)

**With blockchain, the « trusted third party » becomes the system itself:** each distributed element of the chain of blocks contains the necessary information that guarantees the integrity of the exchanged data (through a cryptographic algorithm).

Source: Wikipedia (French)

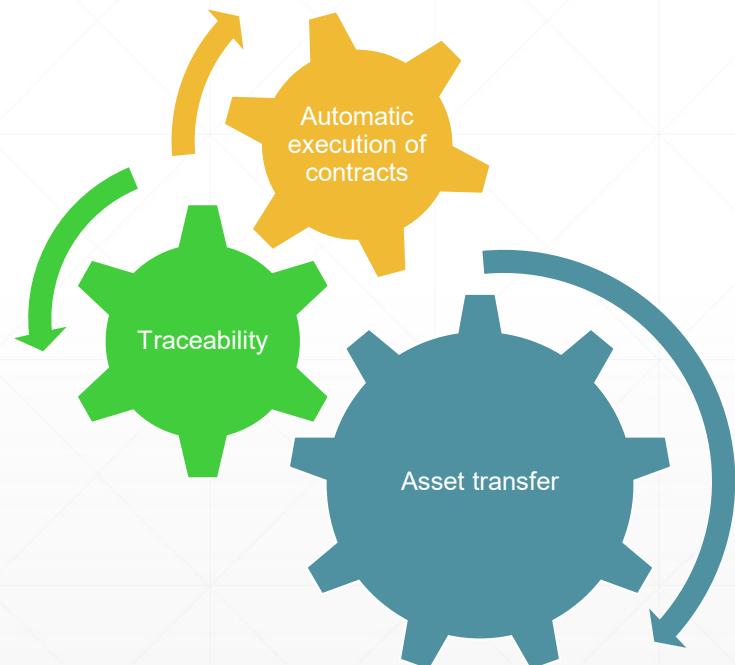
# Blockchain Architecture principles



(a) Centralized. (b) Decentralized. (c) Distributed networks.

Source: [https://www.researchgate.net/figure/Distinction-between-centralized-decentralized-and-distributed-systems-according-to-Baran\\_fig2\\_334170377/download](https://www.researchgate.net/figure/Distinction-between-centralized-decentralized-and-distributed-systems-according-to-Baran_fig2_334170377/download)

# Blockchain Application domains



## Main technologies using blockchain

-  Crypto market
-  Stablecoin
-  NFT

## (Potential) blockchain applications

-  CBDC (Central Bank Digital Currencies)
-  Cryptocurrency/stablecoin payments
-  Decentralized Finance (DeFi)
-  Global supply chain management
-  Identity and access management
-  Internet of Things (IoT)
-  Metaverse

# Blockchain applications

Source: Statista

<https://www.statista.com/topics/5122/blockchain/?srstid=AfmBOorO2pPr1KB15sLiCnVZOQZaU9PhVCBAvhLMgWHf0iEA4EmE4eqz#statisticChapter>

# Blockchain Main Applications - Overview

## Main Application Types

- Cryptocurrencies (ex: Bitcoin, Libra, Ethereum, ...)
- Smart contracts
- Distributed ledgers
- Anti-counterfeiting => NFT
- Energy trading
- ...

## More concretely

- Liquid stock exchange (security tokens)
- Immediate refund if plane is delayed (insurance)
- Product traceability (food markets)
- “tokenized” art work
- Digitalized and distributed gaming assets



# Selected Blockchain Applications

## Energy Trading (P2P)

### Energy trading

- Energy trading, enabled by blockchain, is the possibility to trade energy (coming, in most cases, from renewable sources) between individual producers, without having to go through the central distribution network

### Examples:

- France – ekWateur
- USA – Brooklyn MicroGrid project

### Discussion points:

- Blockchain as enabler for P2P interaction
- Role in renewable energy production



## Selected Blockchain Applications Product Traceability (food markets)

### Fresh product traceability

- Providing a unique source of information regarding food origin, main ingredients, transformation chain, including transport, intermediaries and distribution points

### Examples:

- France – connecting-food
- USA – IBM Food Trust

### Discussion points:

- Blockchain as a source of trust
- Transparency of supply chains



# Selected Blockchain Applications

## Non Fungible Tokens

### Non Fungible Tokens

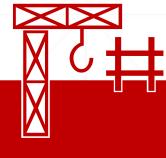
- Piece of code associated with a digital asset. It is usually associated to a license to use, copy or display the underlying asset. Unlike cryptocurrencies, NFTs are not mutually interchangeable, hence not fungible.

### Examples:

- Art – digital artwork
- Games – allowing gamers to trade game artefacts

### Discussion points:

- Anti-counterfeit measure
- Energy consumption (similar to cryptocurrencies)



# Class Assignment

Consider the IoT and Blockchain as two distinctive technologies and choose either of the 2.

For the chosen technology, please try to identify an item (pattern, attribute, feature, existing application or use case) that you believe will become shortly a “**dominant design**”, i.e. a key technological feature that become a de facto standard. (see: [https://en.wikipedia.org/wiki/Dominant\\_design](https://en.wikipedia.org/wiki/Dominant_design))

Please answer the following questions:

1. What makes you believe that the item you have identified has the potential to become a dominant design?
2. If such a thing happens, how would you forecast the S-Curve of the selected technology?

## The strategic nature of IoT

“Smart, connected products raise a new set of strategic choices related to how value is created and captured, how the prodigious amount of new (and sensitive) data they generate is utilized and managed, how relationships with traditional business partners such as channels are redefined, and what role companies should play as industry boundaries are expanded.”

Source : **Michael E. Porter, James E. Heppelmann.** *How Smart, Connected Products Are Transforming Competition.* Harvard Business Review, November 2014

## The strategic nature of Blockchain

« TCP/IP unlocked new economic value by dramatically lowering the cost of connections. Similarly, blockchain could dramatically reduce the cost of transactions. It has the potential to become the system of record for all transactions. If that happens, the economy will once again undergo a radical shift, as new, blockchain-based sources of influence and control emerge.”

Source: **Marco Lansiti, Karim R. Lakhani.** *The truth about Blockchain.* Harvard Business Review, January–February 2017

# IoT and Blockchain

## Factors influencing technology adoption

### Internal (intrinsic) factors

- Standards (open vs proprietary, for example)
- Interoperability
- « Ease of use »
- Availability of adjacent technologies
- Specific technological constraints:
  - in IoT's case: authentication, ID management, ...
  - In Blockchain's case: energy consumption, difficulty to embed existing contracts, ...

### External factors

- Sector and industry
- Organizational factors (for example: digital maturity, technology « savviness », ...)
- Availability of knowledgeable HR resources

# Blockchain adoption challenges

- **Scalability**

- A blockchain network enables a relatively lower number of transactions per second compared to traditional transactions networks

- **Interoperability**

- Most of the blockchain networks are designed to work in silo mode

- **Energy consumption**

- Transaction validation requires a lot of processing power

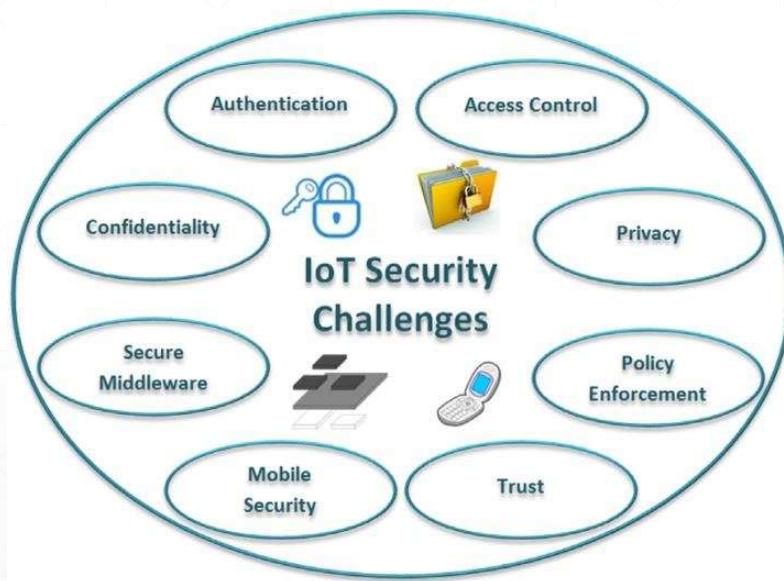
- **Talent**

- Trained blockchain specialists and interdisciplinarity

**Source:** <https://www.blockchain-council.org/blockchain/5-key-challenges-for-blockchain-adoption-in-2020/>

# IoT

## The Security Challenge



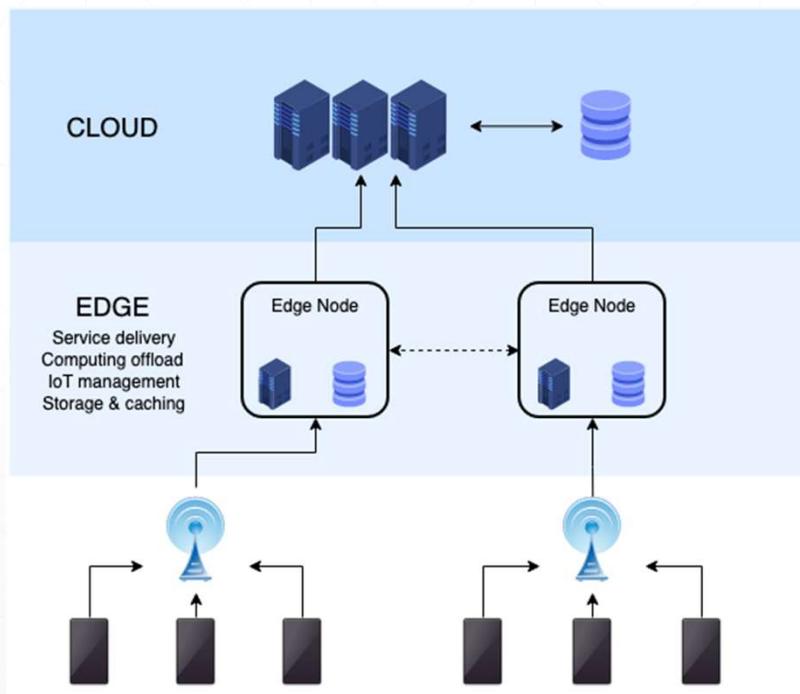
Main causes:

- Number of devices
- Number of transactions
- Complexity of networks
- « Anonymity » of devices
  - Access and authentication
  - Identity management

**Source:** Internet of Things: A Survey - Scientific Figure on ResearchGate. Available from: [https://www.researchgate.net/figure/Security-Challenges-of-IoT-23\\_fig3\\_315460916](https://www.researchgate.net/figure/Security-Challenges-of-IoT-23_fig3_315460916) [accessed 8 Mar, 2020]

# IoT Fundamentals

## Architecture Challenges

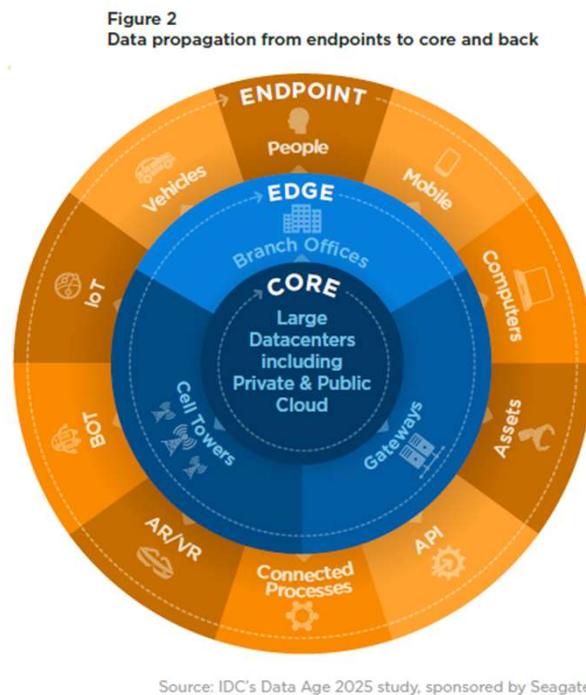


[https://en.wikipedia.org/wiki/Edge\\_computing#/media/File:Edge\\_computing\\_infrastructure.png](https://en.wikipedia.org/wiki/Edge_computing#/media/File:Edge_computing_infrastructure.png)

According to the IEEE, the long-term technology challenge is that:

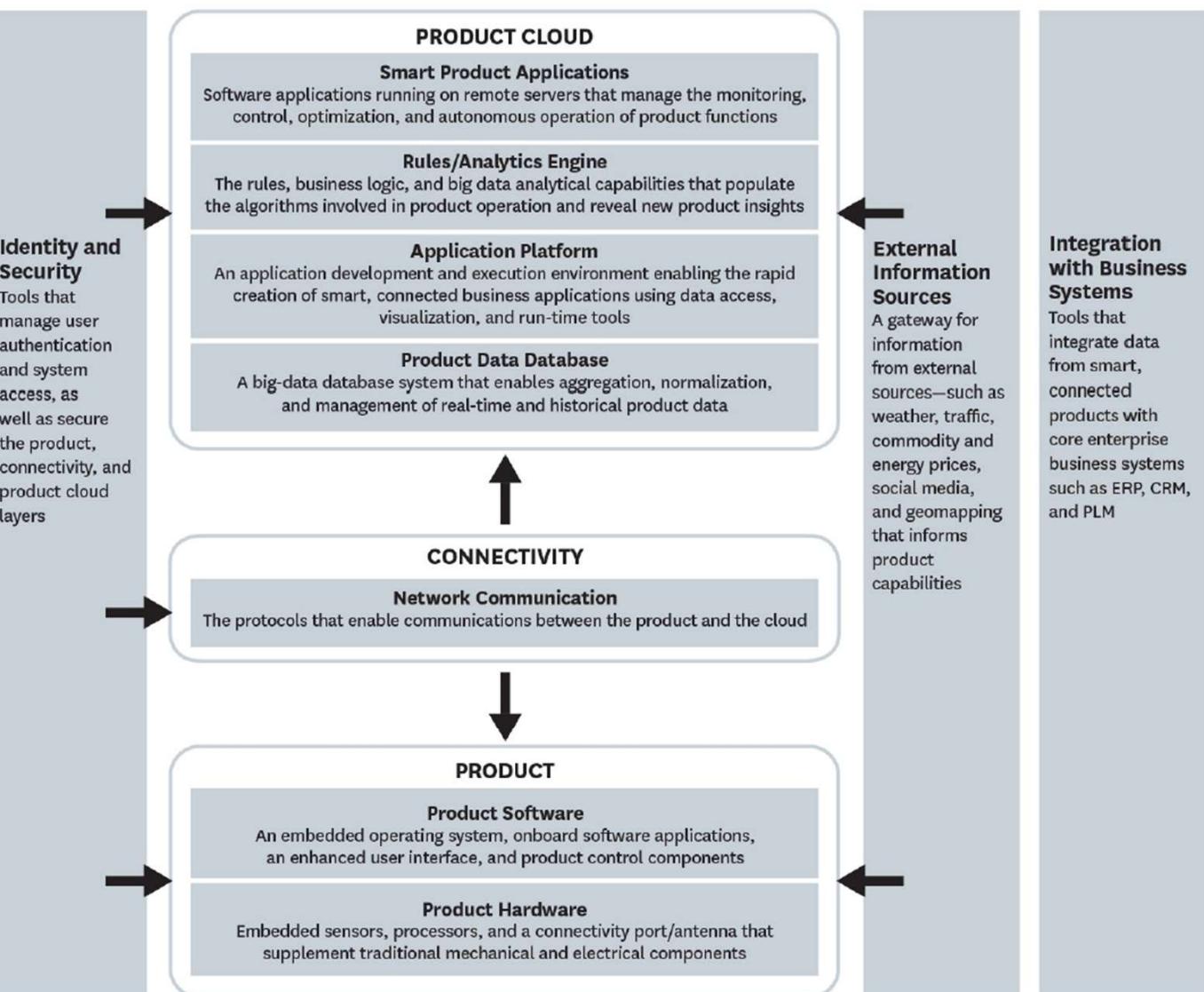
- “Embedded intelligence in the things themselves can further enhance the power of the network by devolving information processing capabilities to the edges of the network.”

# IoT Long Term Technology Challenge Shifting Intelligence



1. **Edge** – Enterprise servers and appliances which are not in the datacenters
2. **Core** – Designated computing datacenters on premises and in the cloud. It covers all forms of cloud (private, public, hybrid)
3. **Endpoints** – terminal devices (PCs, smartphones, sensors and wearables)

Source: IDC, Seagate Whitepaper. *Data Age 2025 – The Digitization of the world: From Edge to Core.* 2018



## Illustration: The IoT-Driven Technology Stack

Source : Michael E. Porter, James E. Heppelmann. *How Smart, Connected Products Are Transforming Competition*. Harvard Business Review, November 2014

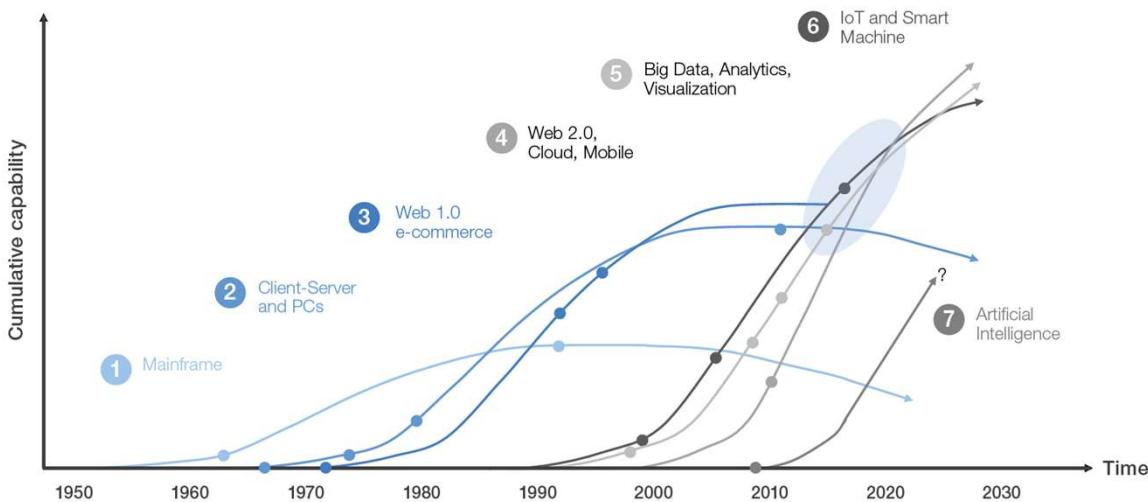
# IoT and Blockchain The Regulatory Perspective (Europe)

## EXISTING REGULATIONS

- General Data Protection Regulation (GDPR)
  - May 25<sup>th</sup> 2018
- Directive of Security of Network and Information System (NIS Directive)
  - May 9<sup>th</sup> 2018
- Payment Services Directive 2 (PSD2)
  - January 13<sup>th</sup> 2018

## PROPOSED REGULATIONS

- E-Privacy Regulation
  - Draft
- Free Flow of Data Regulation
  - Draft



## Combinatorial effects of technologies

Source: *Digital Transformation of Industries: Demystifying Digital and Securing \$100 Trillion for Society and Industry by 2025*. World Economic Forum, Accenture. January 2016

# Combining IoT and Blockchain The « Device Democracy » approach

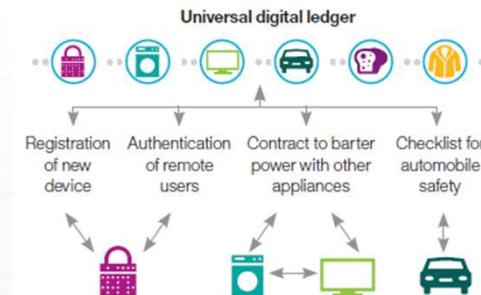
The challenge

**Figure 4.** To be safe, scalable and efficient, Internet of Tthings networks must be re-architected to gradually shift from managing billions of devices to hundreds of billions of devices



What if ... ?

**Figure 5**  
The blockchain functions as a universal digital ledger facilitating various types of IoT transactions between devices



**Source:** IBM, 2015. Device democracy *Saving the future of the Internet of Things*

# Blockchain Summary

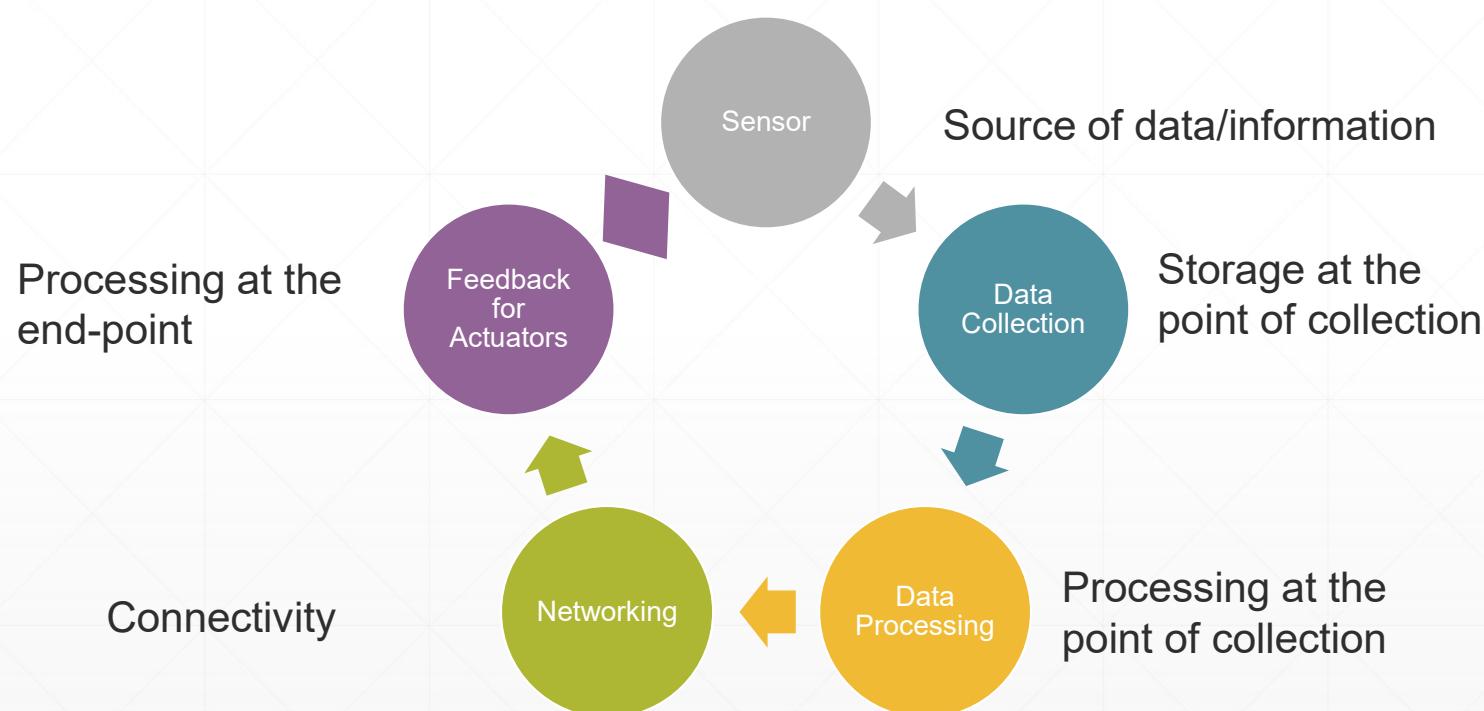
- P2P services (as opposed to mediated services through a 3rd party intermediary)
- Infrastructural-type of technology
  - Example: Blockchain is to digital services what TCP/IP is for communication networks
- Adoption (outside cryptocurrencies) is relatively slow, because of:
  - Inherent complexity
  - Transparency (trust)
  - Difficulty to embed existing legal provisions at technology layer

# The class/reference example IoT-Blockchain (so far)

- IoT is the technology enabling objects to be connected to a network, either existing, or new
  - In our case, the reader of reference and student IDs and the portable ID for each “item” allowing unique identification of all assets and temporary associations between them
- Blockchain is the technology allowing trust to be embedded in the system
  - In our case, the rules that make sure that all references are returned at the end, and; the possibility that students exchange references between them without going through a central point (professor)
- ...

# IoT and Blockchain Value Chain

## A simple model (for class discussion)

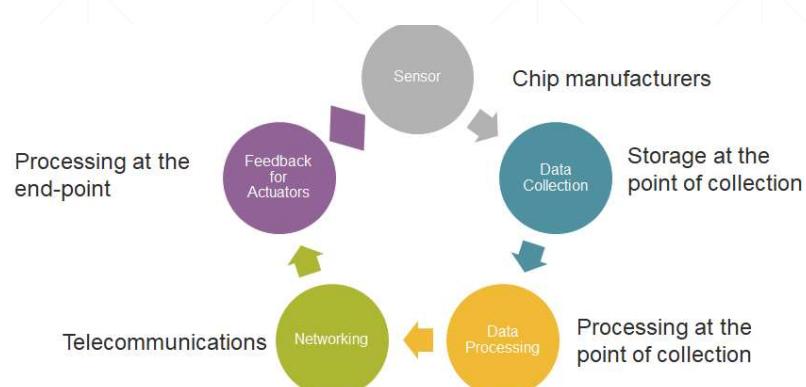




# IoT and Blockchain Value Chain

## Further discussion (1)

### SIMPLE MODEL STARTING POINT



### VERTICALS

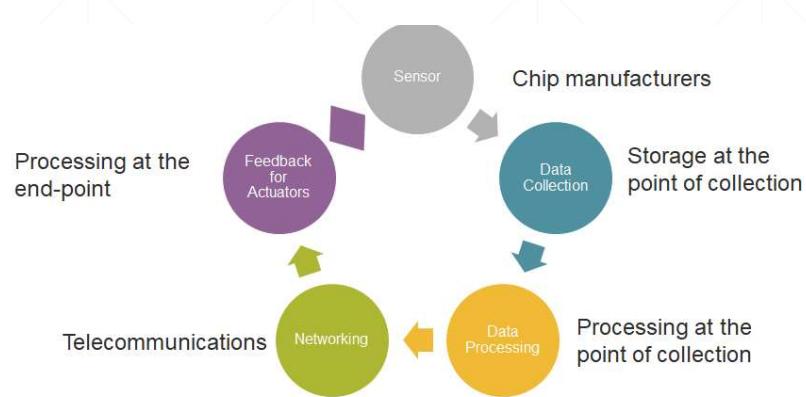
- Health-care
- Smart Cities
- Home (Consumer)
- Automotive
- Public transportation (Mobility Services)



# IoT and Blockchain Value Chain

## Further discussion (2)

### SIMPLE MODEL STARTING POINT



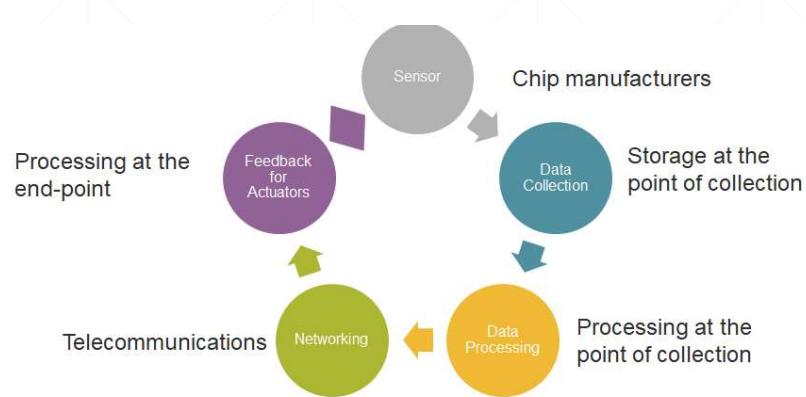
### TYPES OF PLAYERS

- Telecom Operators
- Systems Integrators
- Large Internet Players
- Semiconductor Manufacturers
- Governmental Authorities



# IoT and Blockchain Value Chain Further Discussion (3)

## SIMPLE MODEL STARTING POINT



## VALUE CREATION (THROUGH DATA)

- Data Collection
- Data Cleansing and Preparation
- Integration of Several Data Sources
- Data Analytics
- (Data Visualization)
- Insights & Recommendations

# IoT and Blockchain - Wrap-Up

## Adoption considerations (we'll come back to it)

- Combination of several technologies
- Adoption discussion:
  - Standards (ex: MS-DOS)
  - Installed base (ex: QWERTY keyboard)
  - Convergence between different types of knowledge
    - (ex: computer: binary arithmetic, symbolic logic, programming)
  - Co-existence of what initially was considered to be rival technologies (ex: DC and AC)

# Digital Transformation

## Class 2 – Summary (IoT and Blockchain)



- IoT is **one** of the enabling technologies of the Digital Economy
- It is a data generation technology set, which combines other various individual technologies, such as RFID, sensors, smart technologies, nano-technologies, etc ... Its adoption is expected to instill significant change in existing industrial supply chains, as illustrated by its current use cases
- Examples of current IoT use cases include, at a macro-level: Smart Home, Smart City, Smart Transportation
- Blockchain is about trust (and control), it's a distributed ledger technology mostly utilized in P2P transactions (energy trading, traceability, NFT, ...)
- Their combination might provide a promising infrastructure solution for our increasingly interconnected world

# Thank You!

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Valeriu Petruelian