

Intermediaries in the IoT ecosystems

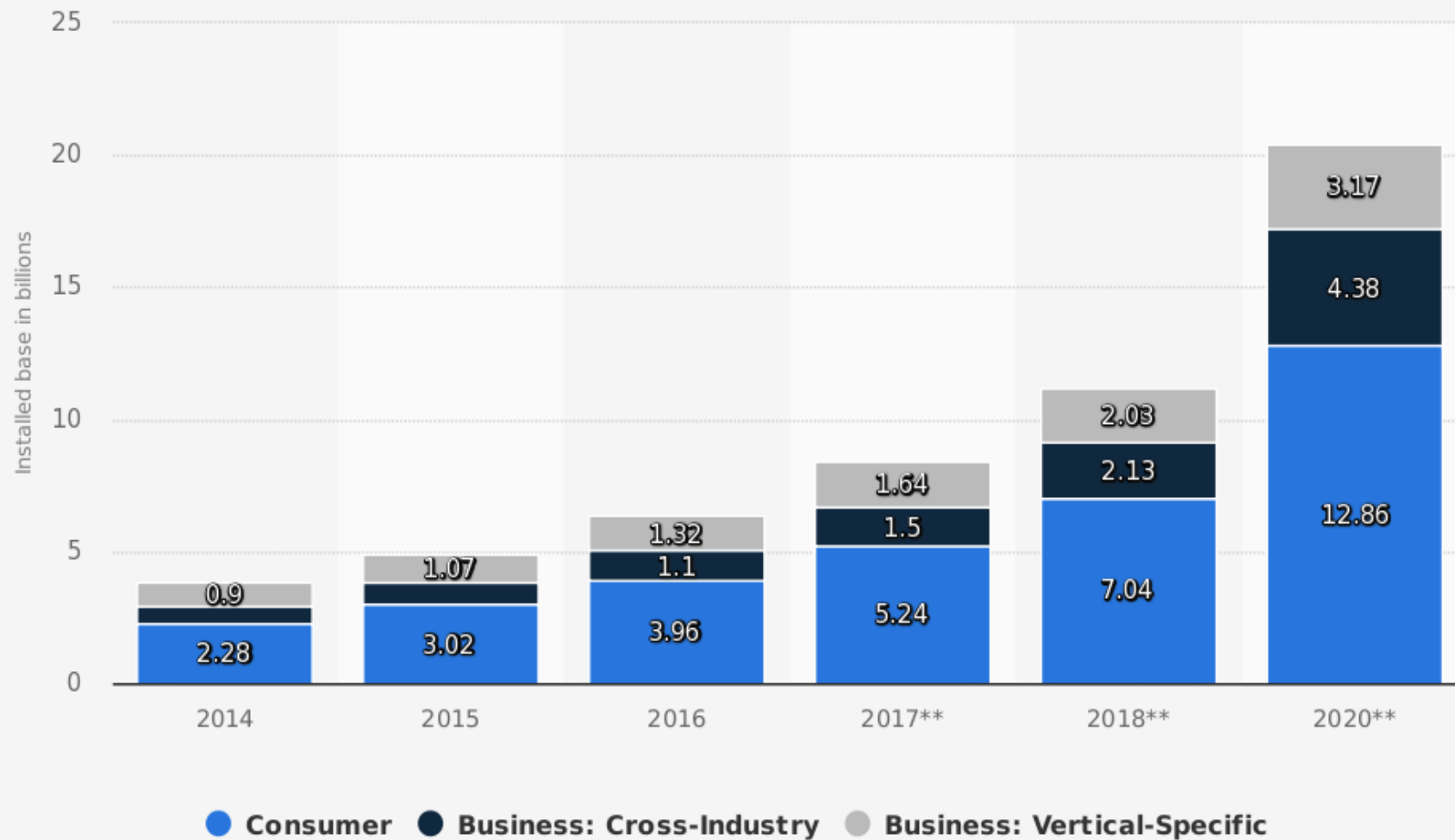
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The IoT business

- There will be over 14 billion connected devices by the end of 2019, and over 25 billion by the end of 2021. (Source: Gartner)
- The global IoT market is expected to exceed \$1.5 trillion by 2025. (Source: IOT Analytics) [€23 billion value added in Germany in 2020, McKinsey]
- By 2020, there will be 4 internet connected devices for every human on the planet. (Source: Gartner)
- By 2020, the lack of data science specialists will prevent 75% of all businesses from maximizing their IoT goals. (Source: Gartner)
- The number of smart home devices purchased is expected to exceed 1.94 billion by 2023, with device sales exceeding \$78 billion by that time as well. (Source: Strategy Analytics)
- Smart cities are a major and emerging market for IoT. Over one-fifth of all publicly announced IoT projects involve IoT-driven smart cities of some kind, with most of these smart cities (45 percent) located in Europe. (Source: IoT Analytics)

The Internet of Things (IoT)* units installed base by category from 2014 to 2020 (in billions)



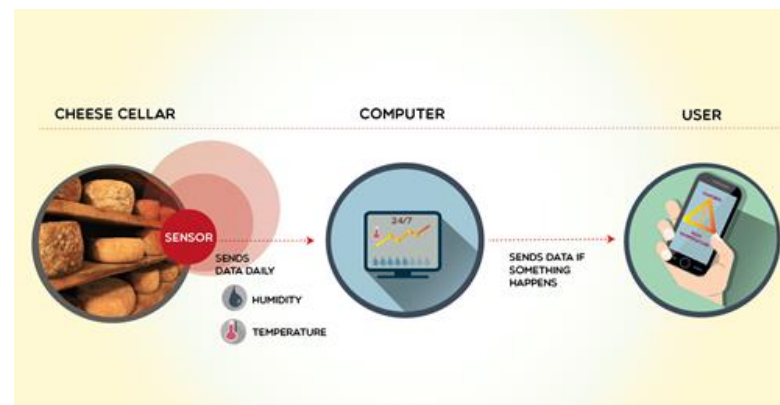
Source
Gartner
© Statista 2018

Additional Information:
Worldwide; Gartner; 2014 to 2016

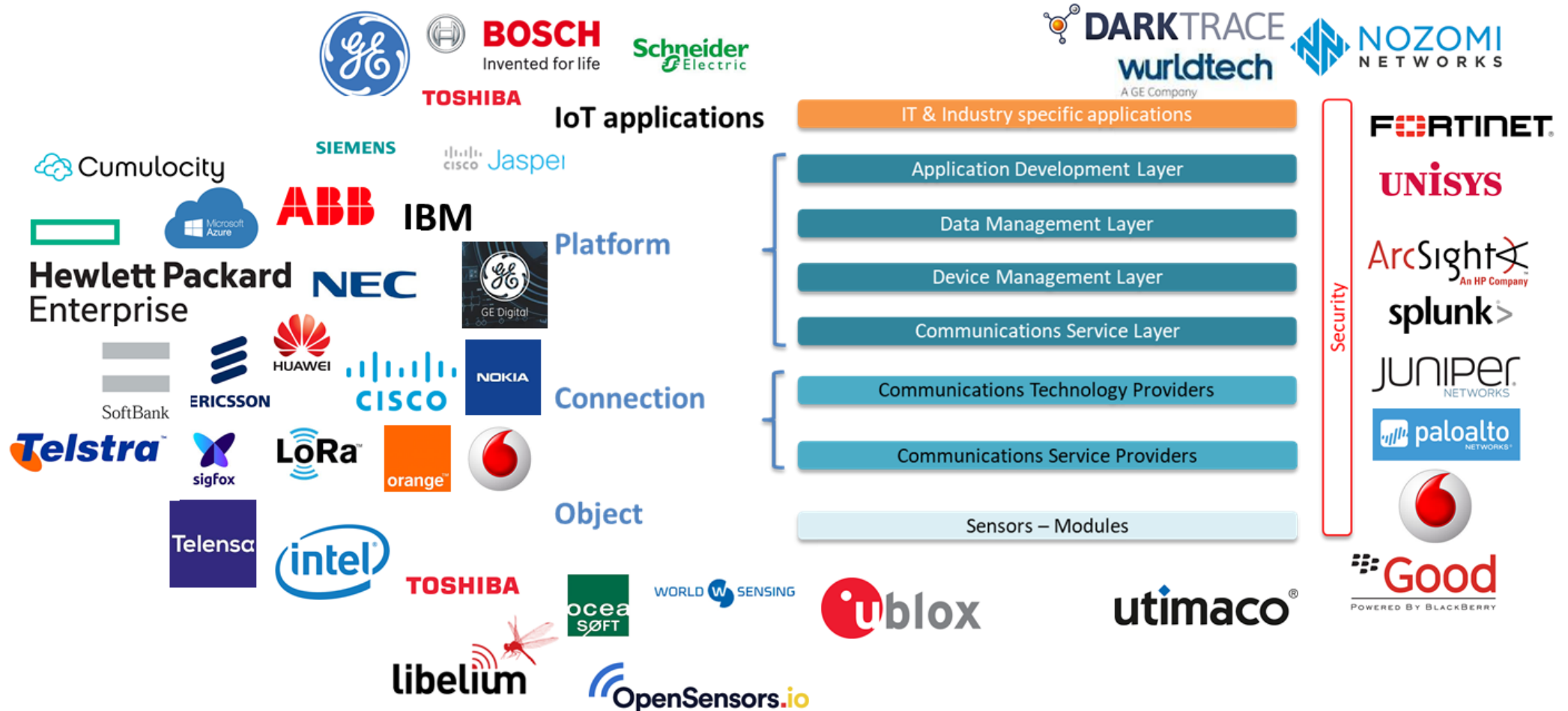
The IoT - Monitoring Machines and Assets

“The Internet of Things includes all devices and objects whose state can be altered via the Internet, with or without the active involvement of individuals.” (OECD, 2018)

The IoT is a dynamic global network infrastructure that will be integrated into and act as an extension of the future internet, in which various “things” have unique identities, physical attributes, virtual personalities, and intelligent interfaces. Put differently, “the Internet of Things will allow people and things to be connected any time, any place, with anything and anyone, ideally using any path/network and any service” (Guillemin and Friess, 2009).



The Technological Complexity of the IoT



Towards IoT marketplaces

Towards IoT Marketplaces

Technology

Challenges



Major challenges to the wide deployment and exploitation of the IoT potential

- Digital transformations are leading to radical changes in companies' roles and beneficiaries throughout the value chain and to the creation of new markets. **Monopolising** may be an obstacle to the development of these markets, and to the development of open digital platforms.
- Many companies are still cautious when it comes to the IoT and Industry 4.0 implementation as it may involve **radical structural changes and radical shift in value creation**. This could explain why established large players often find it difficult to adapt to new business models and engage in new types of alliances. In that respect, agile players like SMEs, especially entrepreneurs and start-ups, are considered to have the potential to seize new opportunities brought up by the IoT.
- **Lack of common standards and interoperable solutions** throughout the products and services life cycles.
- There is a **lack of consensus on EU policy coordination** in this area, which can create at least five major risks:
 - 1) Risks of fragmentation and a need to address a coordination failure between Member States, which are developing national policies
 - 2) A number of industries are already adopting the IoT by adding connectivity to products and processes. However, in many cases each industrial actor acts unilaterally, adopting separate architectures, standards and business models.
 - 3) Risk of lock-in in proprietary ecosystems, through restraint interoperability and access to data and applications.
 - 4) Risk of users being forced to compliance and data sharing instead of developing a human-centred IoT where users can trust that the IoT systems around them operate according to understood principles and guarantees for their integrity, privacy and security.
 - 5) Risk that the uncertainty about business models and standards could generate information asymmetries and market failures, preventing investment and risktaking.

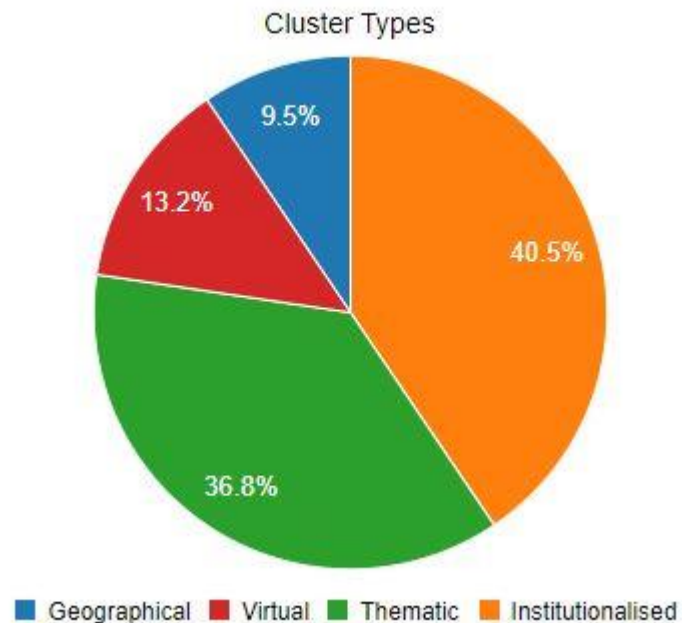
EU policy towards IoT

- Digitisation Communication and Standardisation Communication highlight the need to act along the following pillars (EU digital single market):
- 1. A single market for the IoT: IoT devices and services should be able to connect seamlessly and on a plug-and-play basis anywhere in the European Union (EU), and scale up across borders.
- 2. A thriving IoT ecosystem: open platforms used across vertical silos will help developer communities to innovate. As a kick-start, IoT deployments in selected lead markets will be supported.
- 3. A human-centred IoT: the IoT in Europe is to respect European values, empowering people along with machines and businesses, thanks to high standards for the protection of personal data and security, visible notably through a 'Trusted IoT' label.

Mapping IoT in Europe

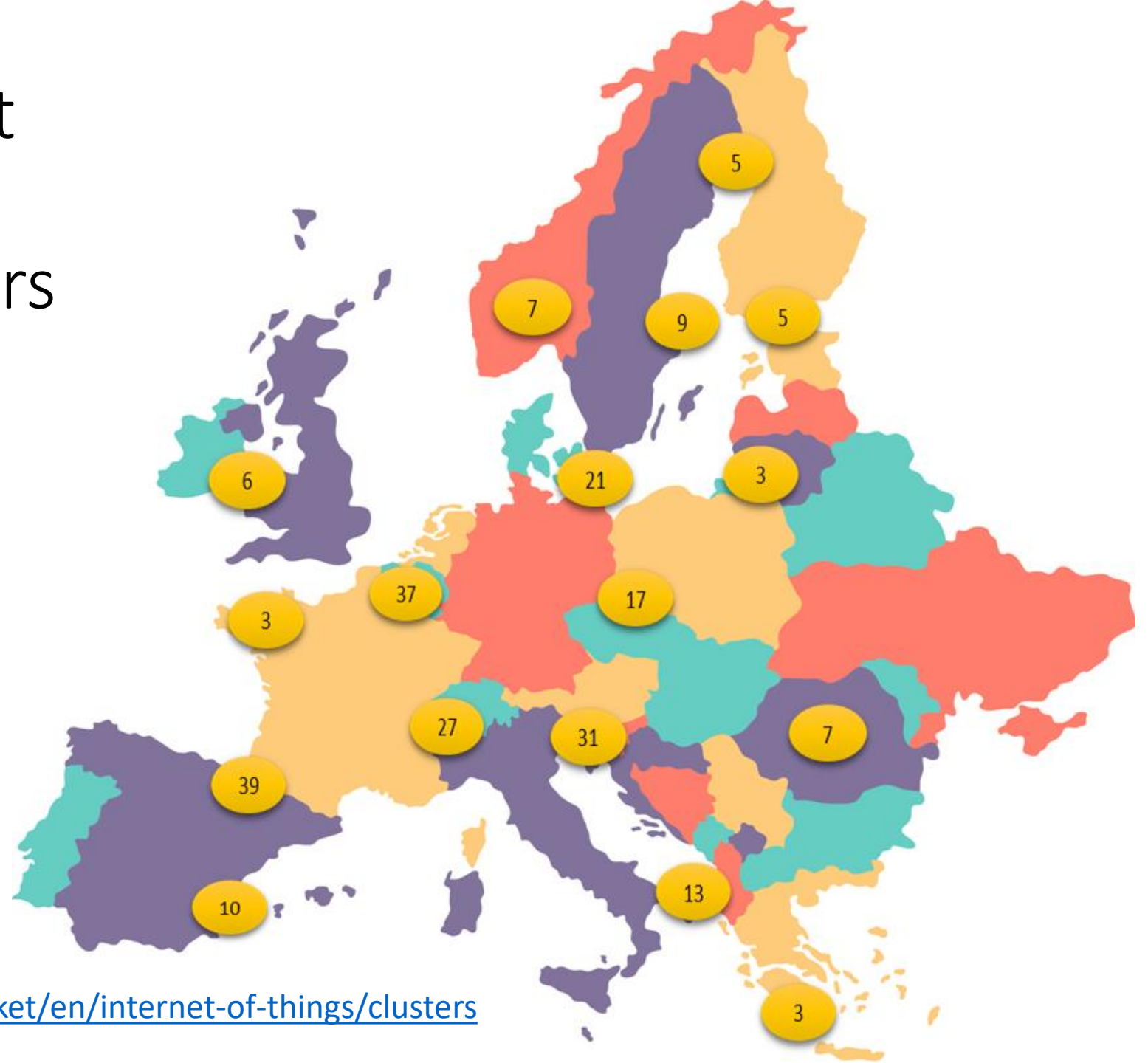
Mapping Internet of Things innovation clusters in Europe

389 clusters with 12,023 companies



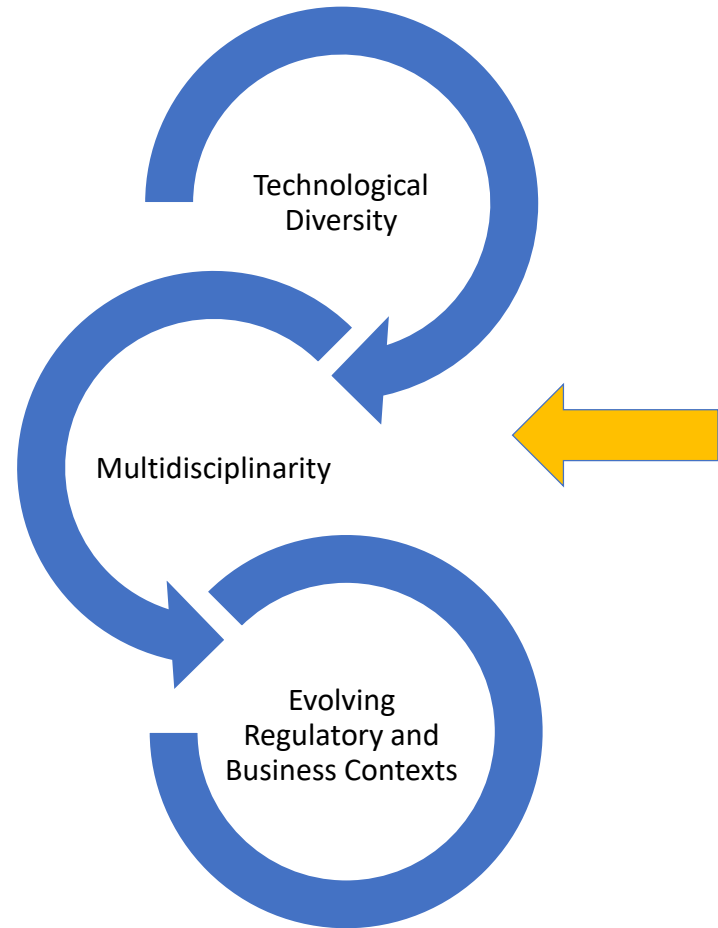
- Institutionalised clusters: associations of actors who work towards a common goal within an agreed formal or informal governance structure.
- Geographic clusters: clusters in the traditional Marshallian and Porterian conception, where sets of companies that act in a certain geographical area and possibly with a clear reference to IoT, or IoT start-ups in a certain city. They may have a structure and governance, or not.
- Virtual clusters: where different actors, which can be part of different thematic areas, collaborate in an action and towards a common goal without being co-located.
- Thematic clusters: clusters that independently from their location, deliver products, technologies or services related to ICT or the Internet of Things. The aggregation factor may be a specific technology, technological platforms, application and/or (open source) software projects.

Mapping Internet of Things innovation clusters in Europe



Innovation intermediaries in the IoT

Organizational Changes for Managing IoT Scenarios



New Skills
New Managerial Roles
(The Chief IoT Officer)
New Organisational Structures

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