IoT Academy

Digital Transformation: Enhancing IoT-driven Solutions for Smart Islands

IoT concept, trend and verticals related to smart islands

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.

Outline:

- Internet of Things Definition
- Internet of Things Trend
- Internet of Things Market
- Internet of Things Elements
- Internet of Things Verticals

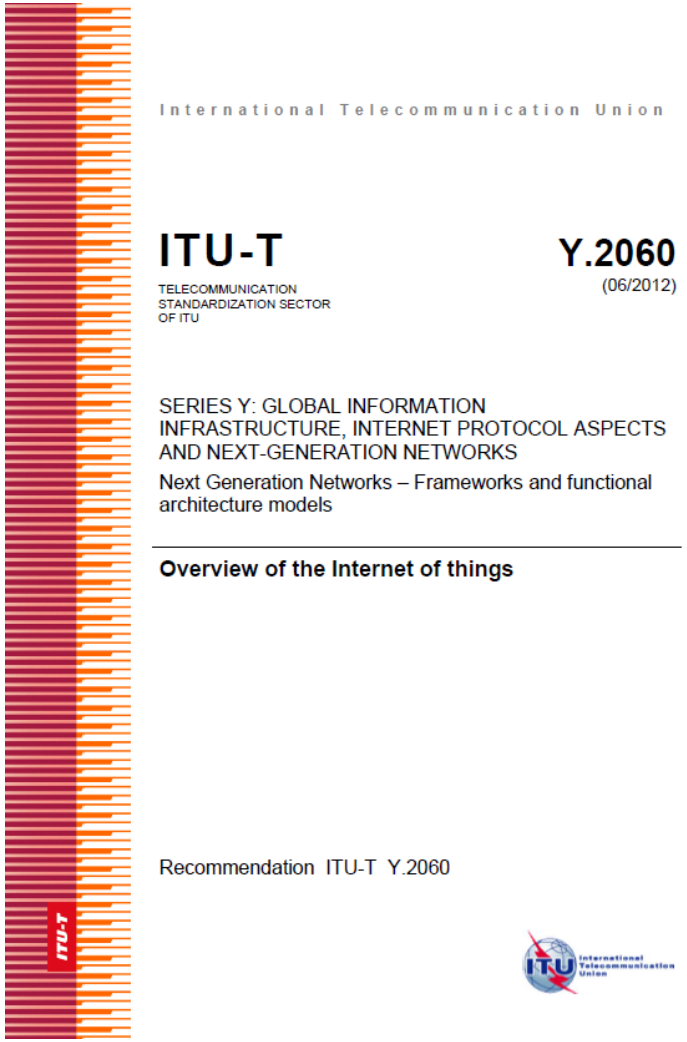
History of the Internet of Things

- Early ideas about connecting devices to the Internet to control them: 1980's: a toaster, a coffee machine, a Coke machine at MIT, ...
- Early terminology: pervasive computing, ubiquitous computing, embedded internet, wireless sensor networks, …
- Kevin Ashton in 1999 invented the term, when preparing a presentation for Procter&Gamble. He wanted to push forward the RFID technology and needed a good, new term.
- The term was not popular until 2010 and boomed in 2014.

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)

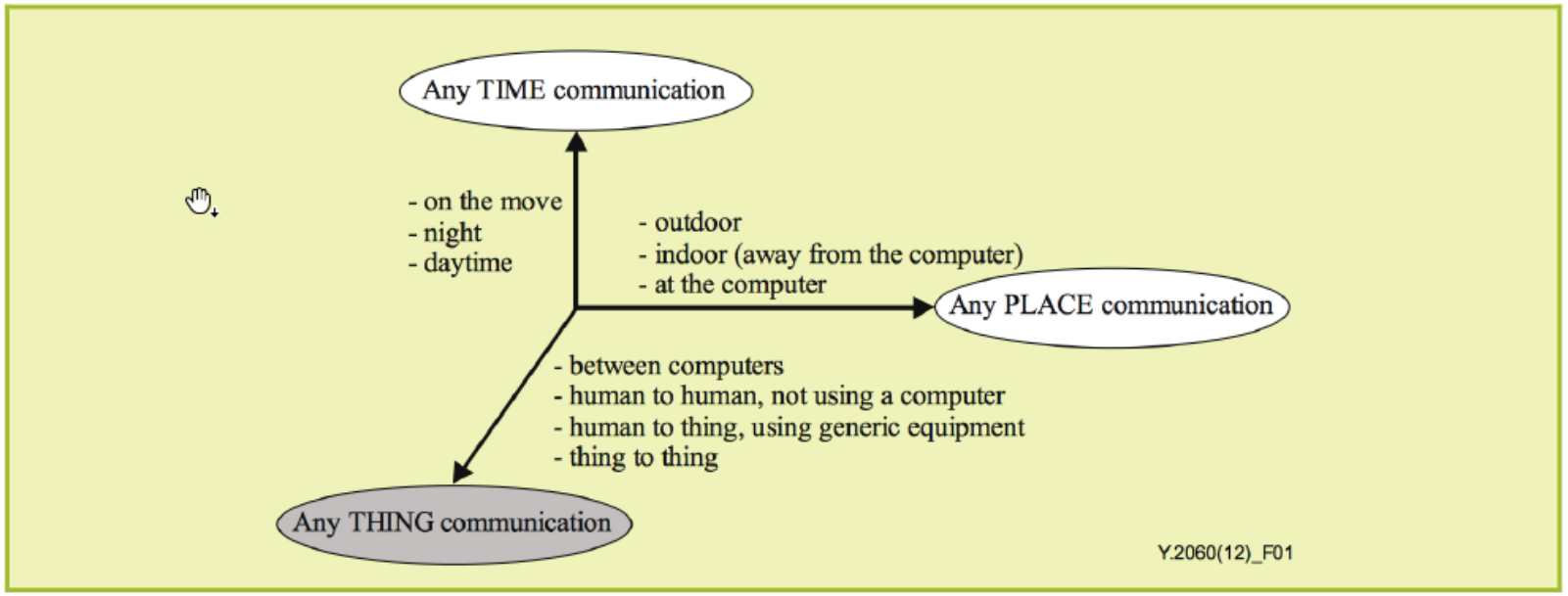
SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT-GENERATION NETWORKS

Next Generation Networks – Frameworks and functional architecture models

Overview of the Internet of things

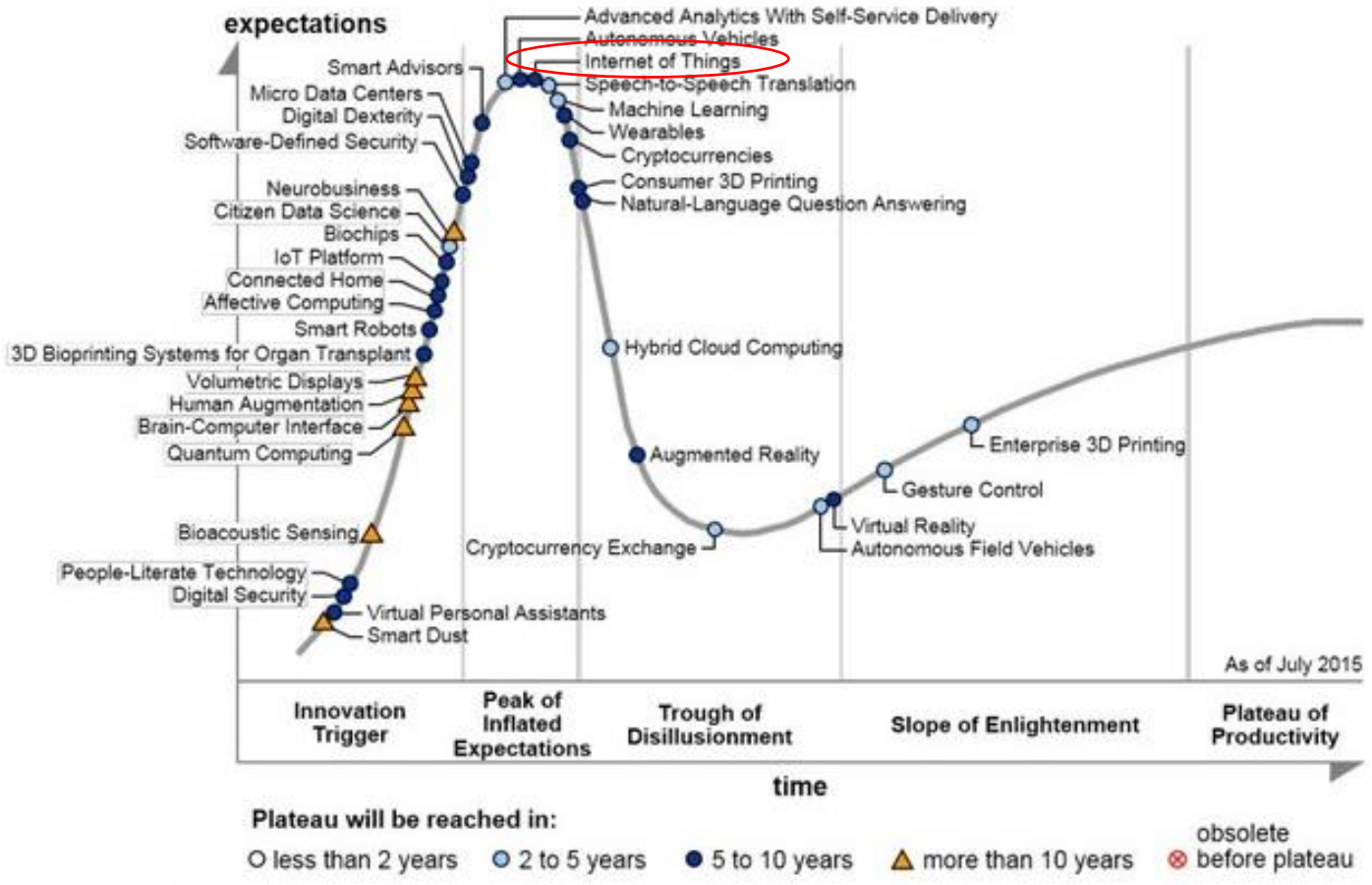
Recommendation ITU-T Y.2060

Any-Time/Place/Thing



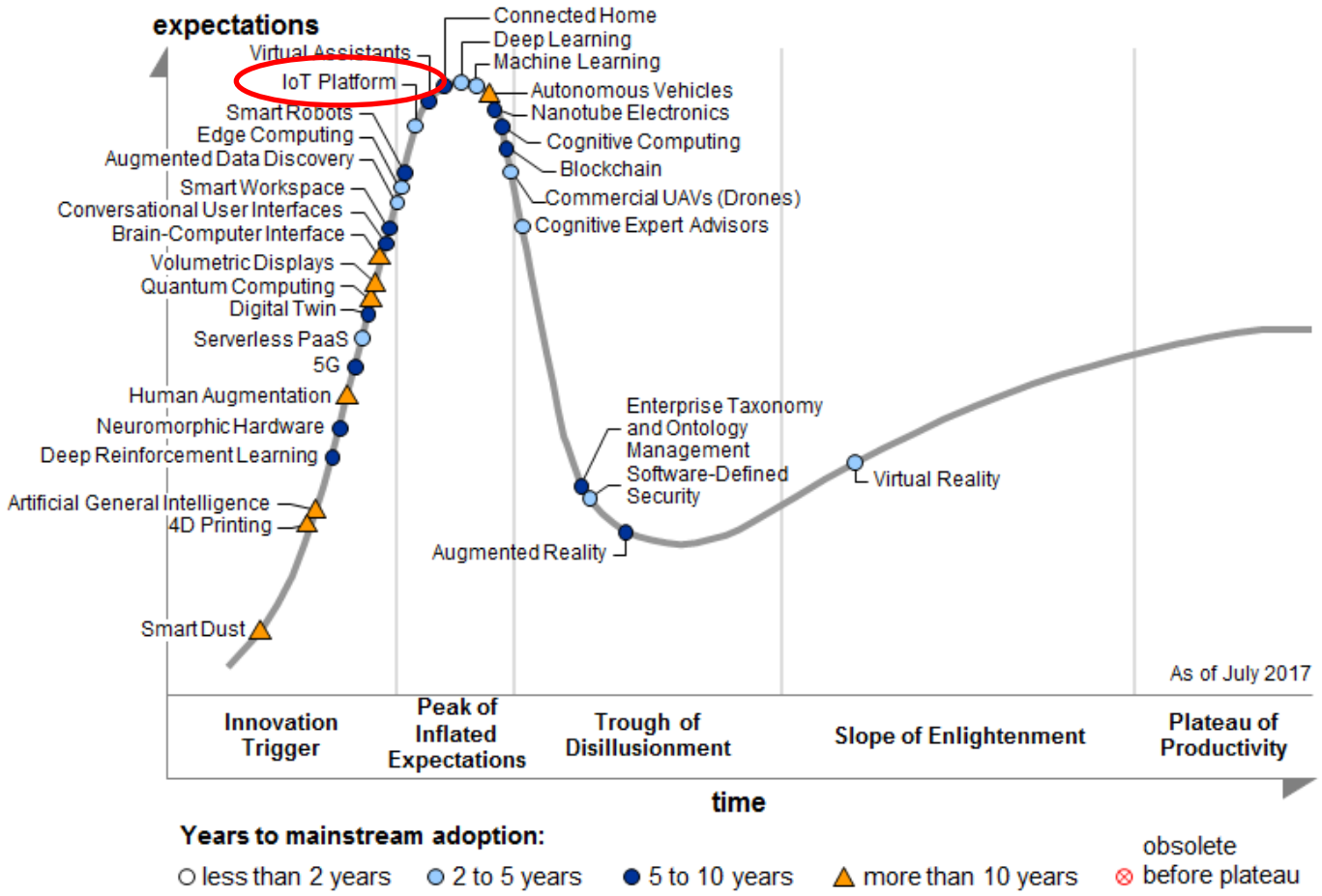
Source: Recommendation **ITU-T Y.2060**

Hype Cycle for Emerging Technologies, Gartner - 2015

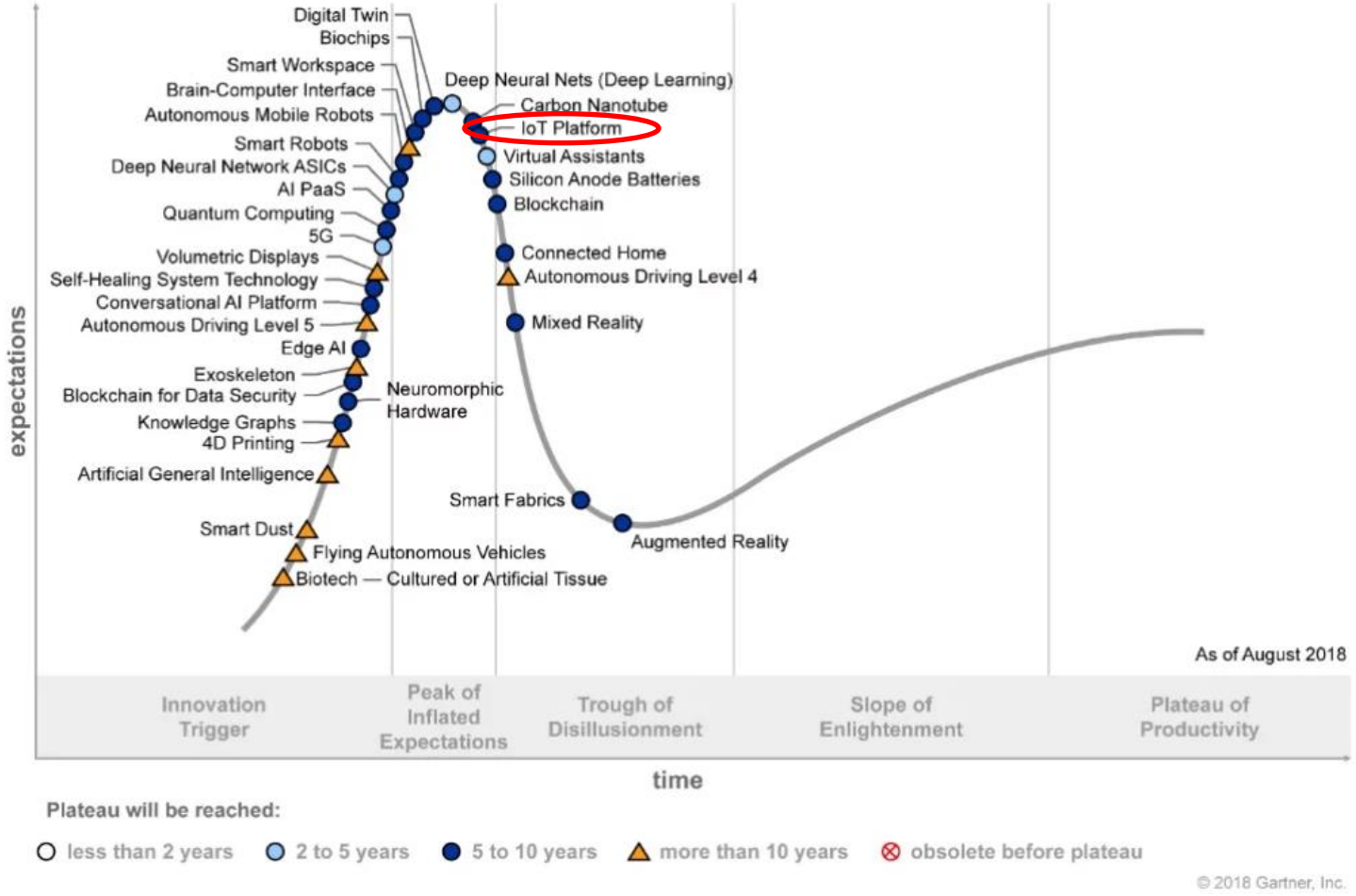


Hype Cycle for Emerging Technologies, Gartner - 2016

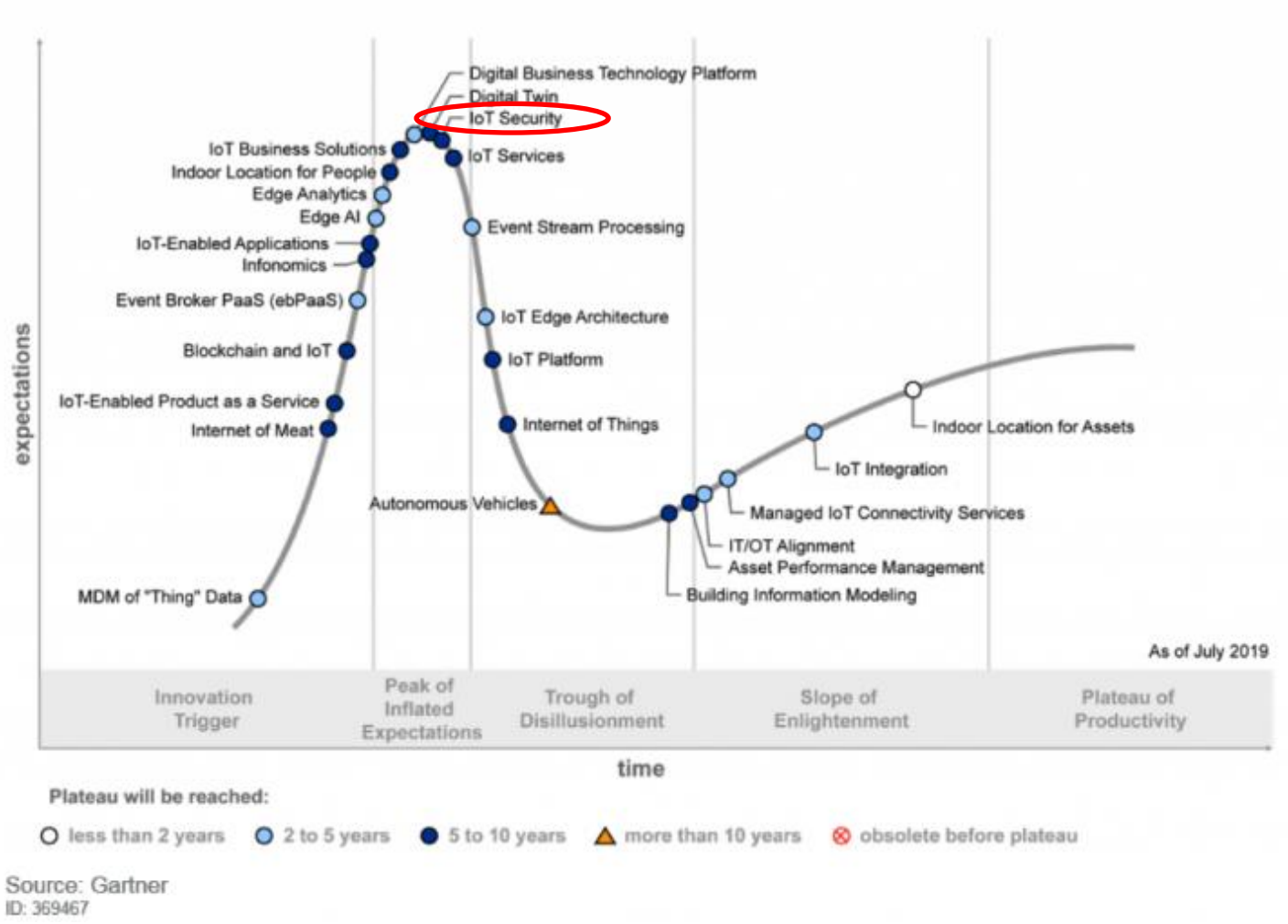
Hype Cycle for Emerging Technologies, Gartner - 2017



Hype Cycle for Emerging Technologies, Gartner - 2018

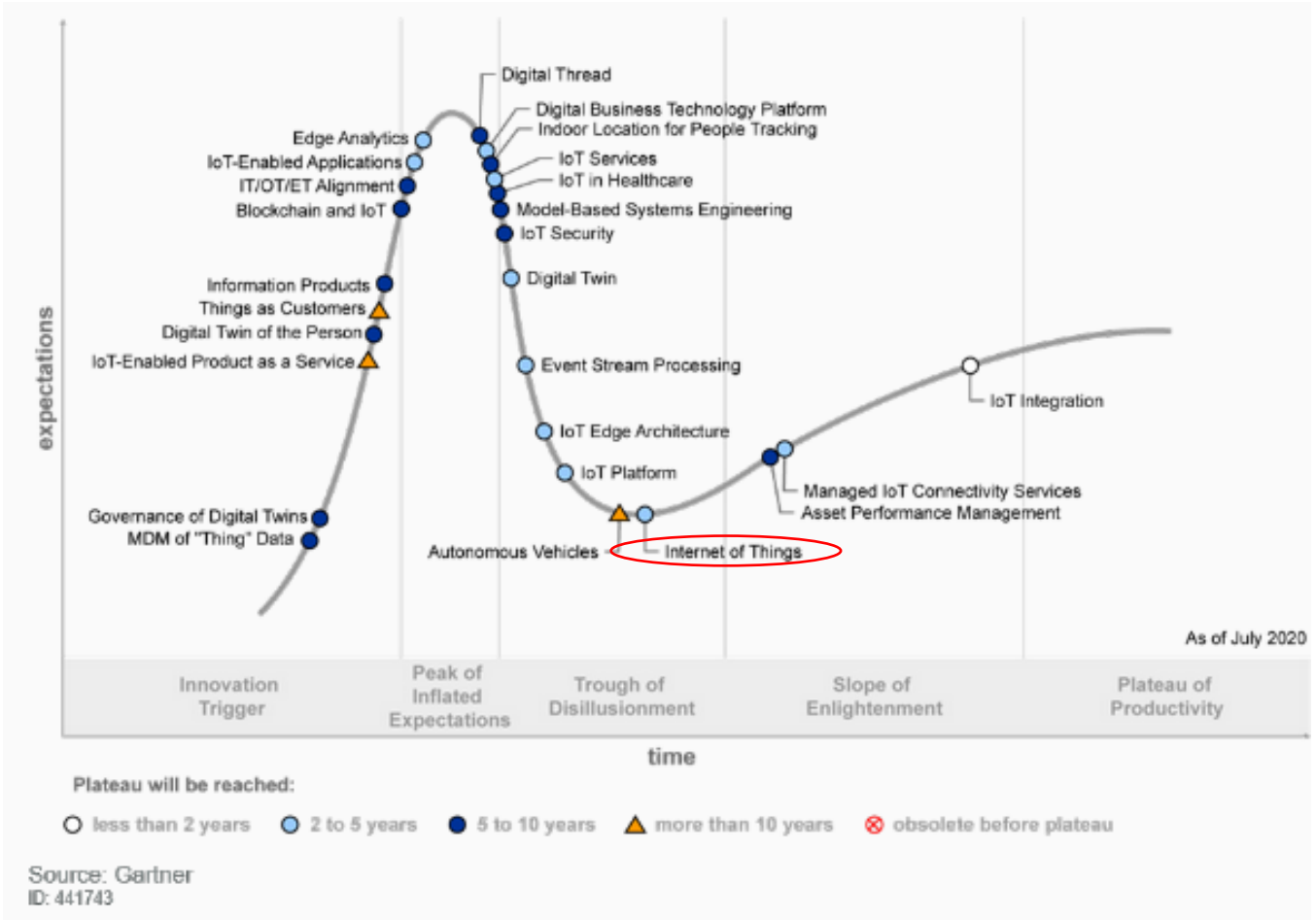


Hype Cycle for Emerging Technologies, Gartner - 2019



Source: Gartner
ID: 369467

Hype Cycle for the Internet of Things, 2020



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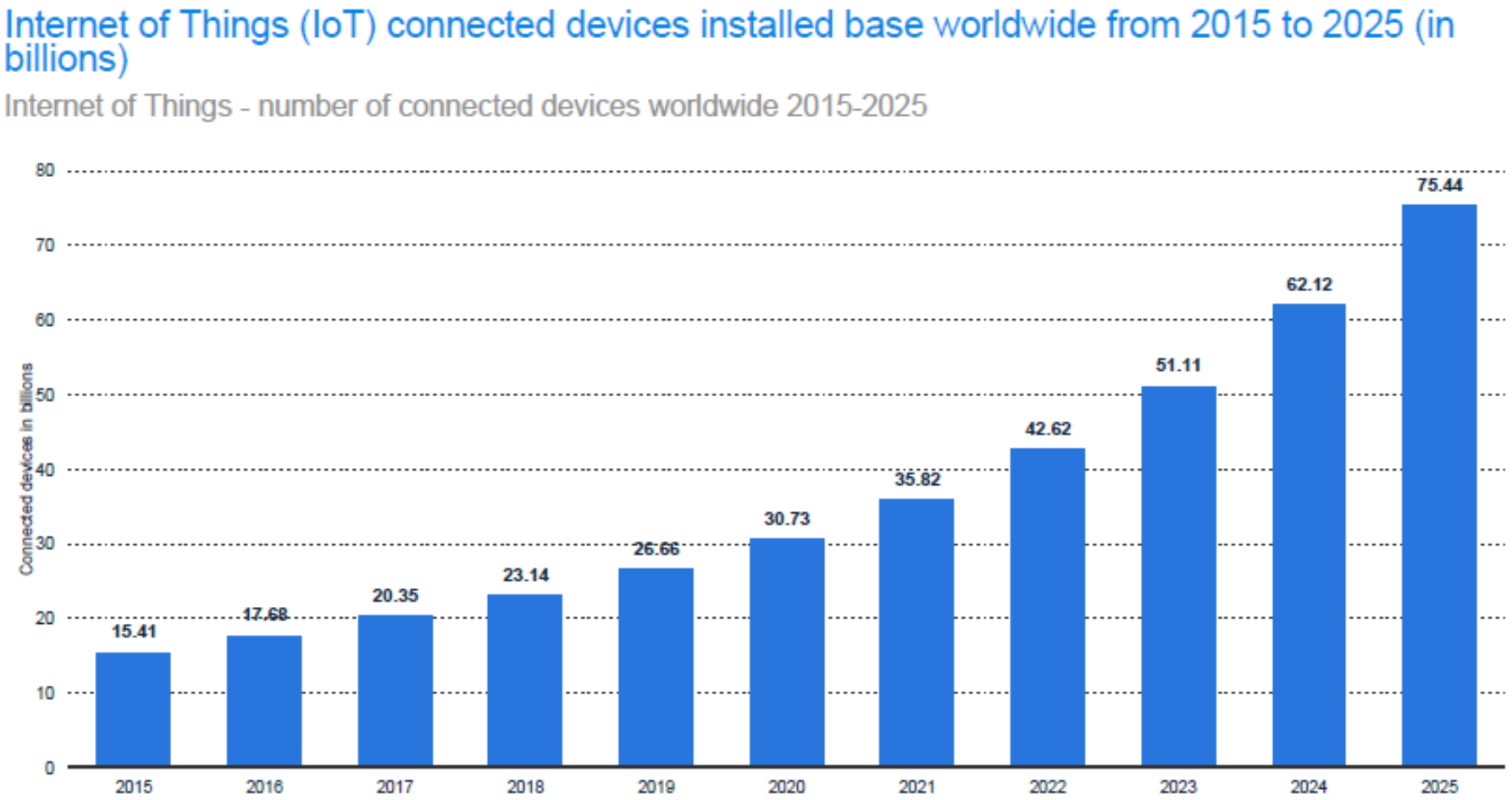
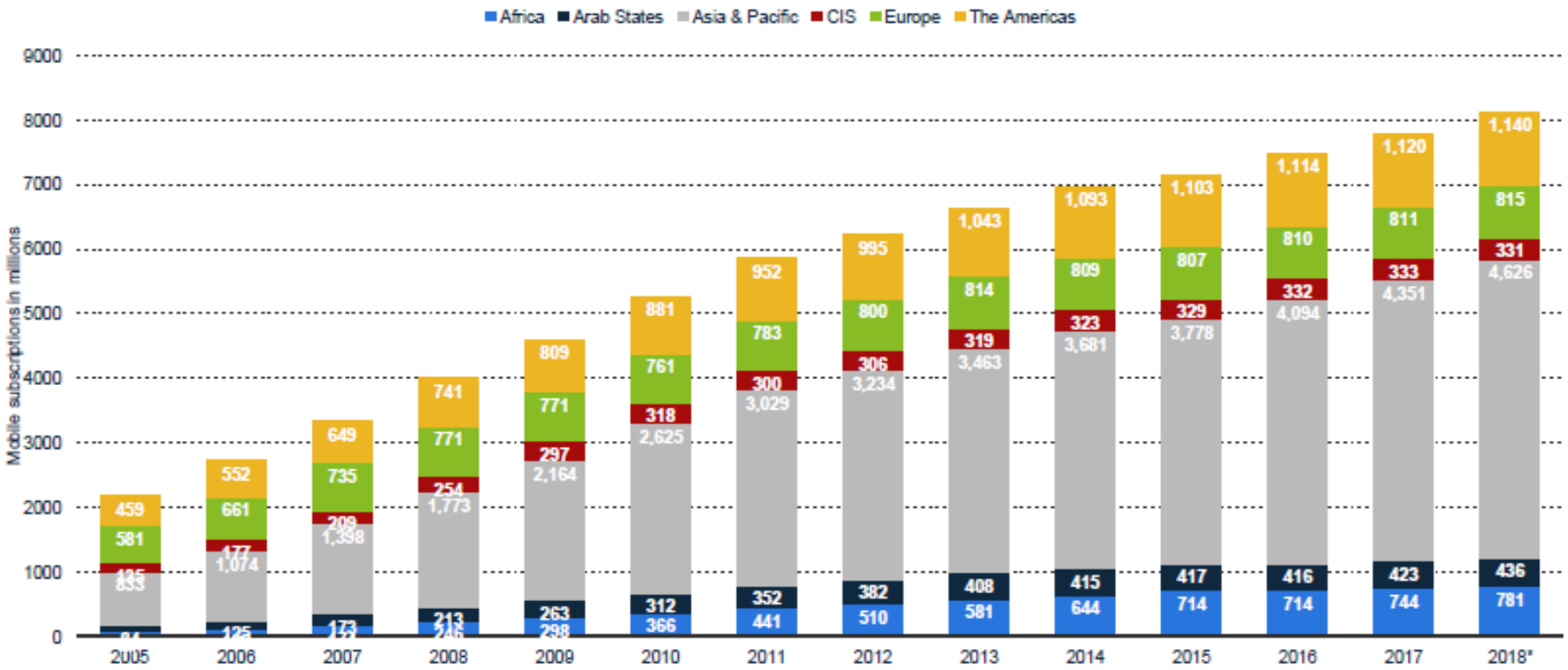
Internet of Things Trend



Internet of Things Trend

Number of mobile (cellular) subscriptions worldwide by region from 2005 to 2018 (in millions)

Number of mobile subscriptions worldwide by region 2005-2018



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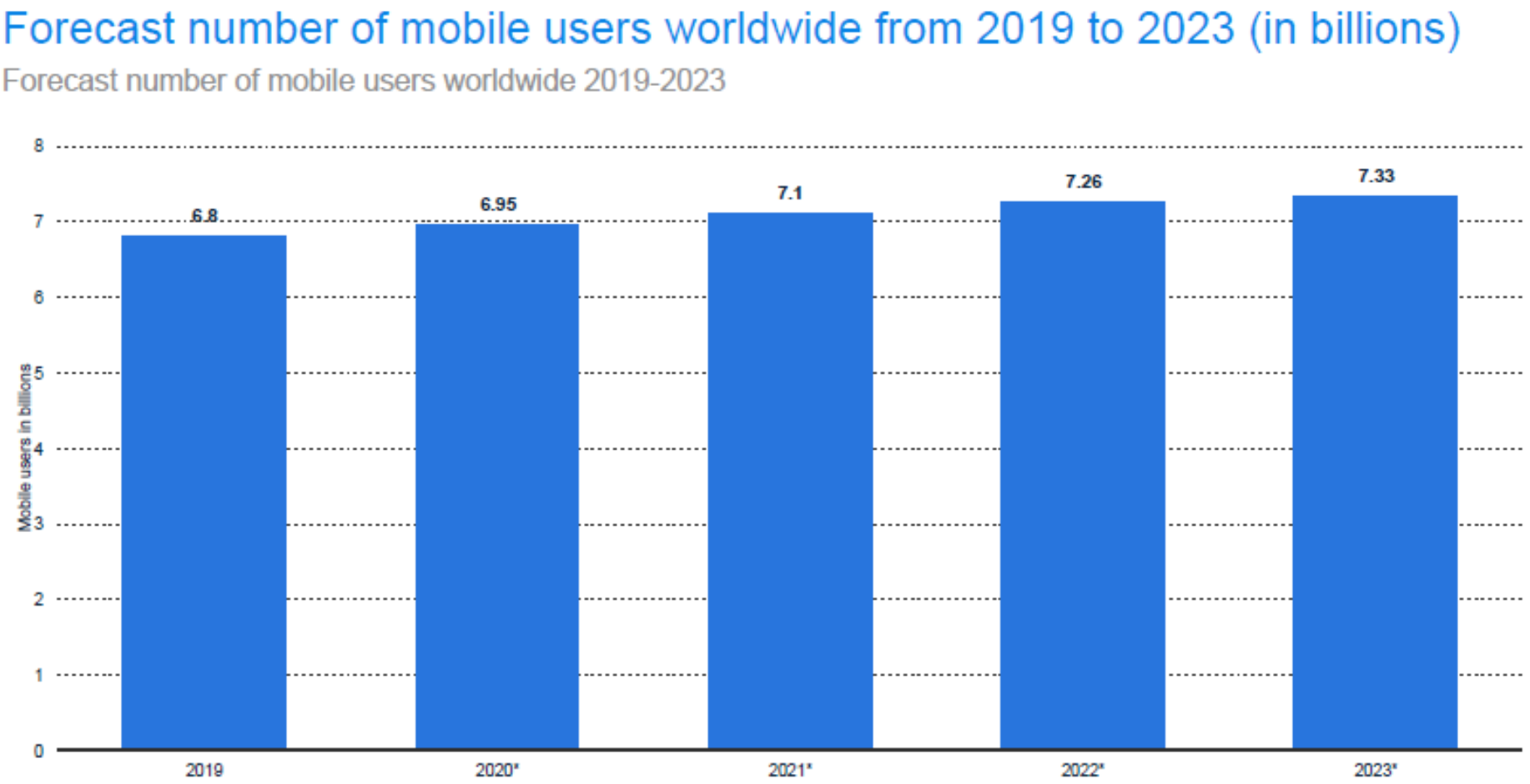
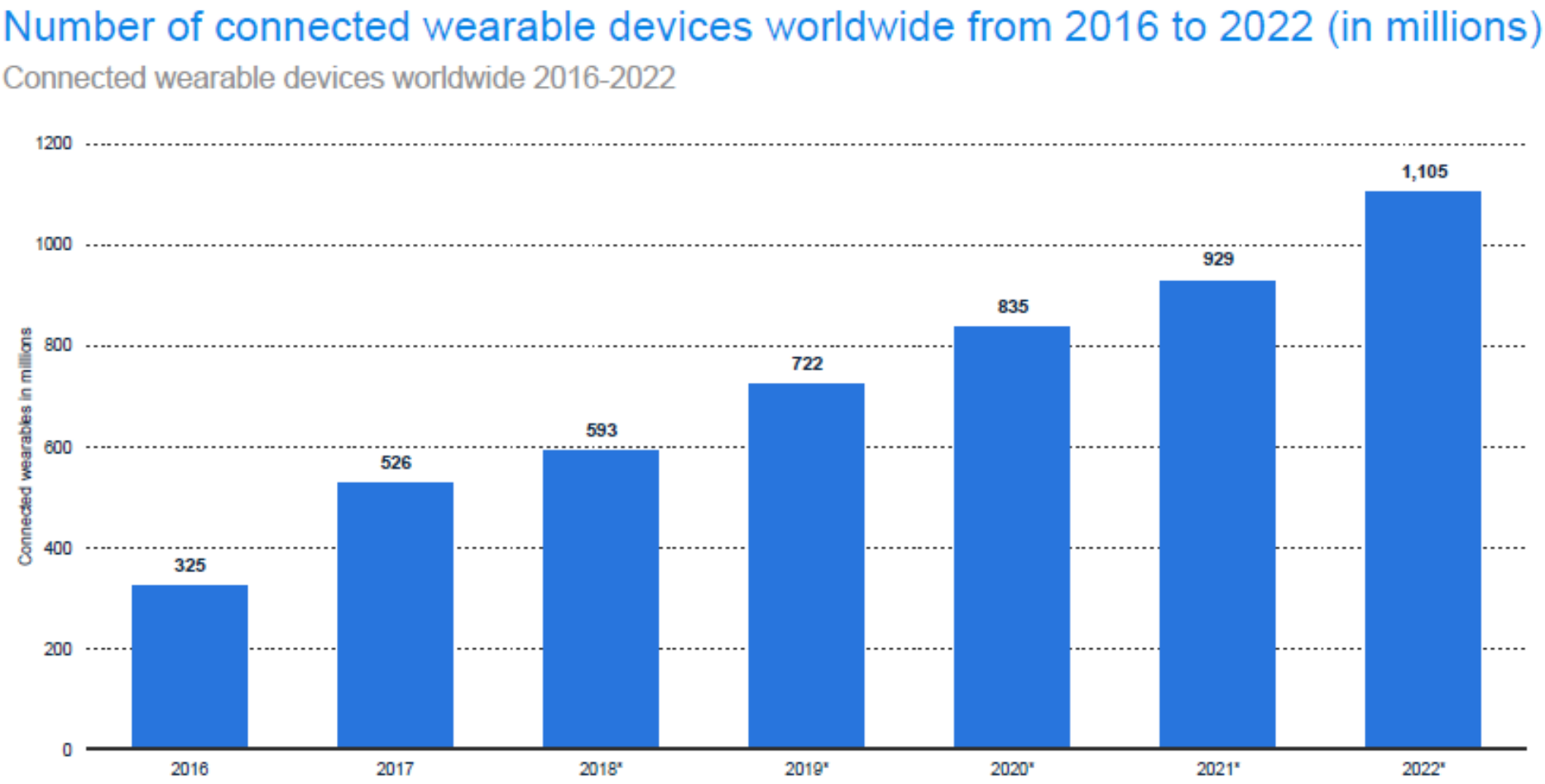


Internet of Things Trend



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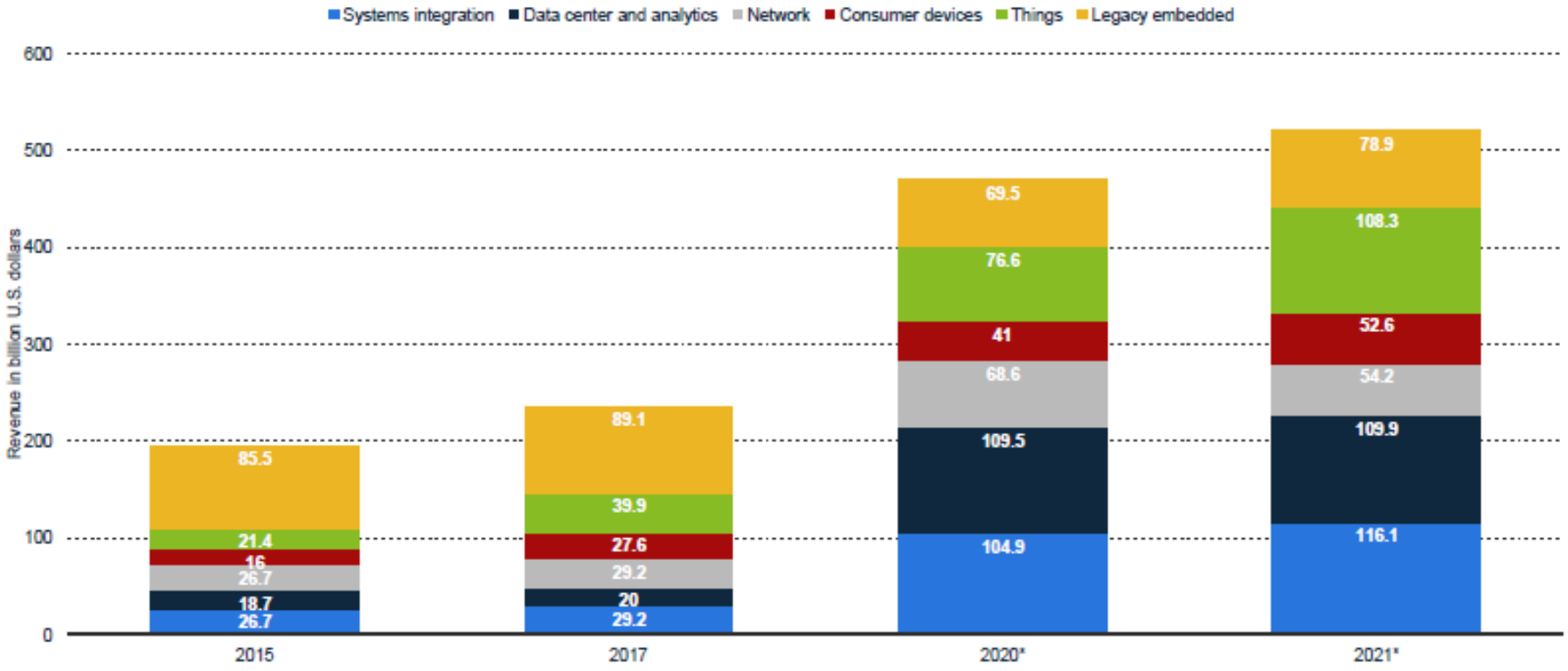
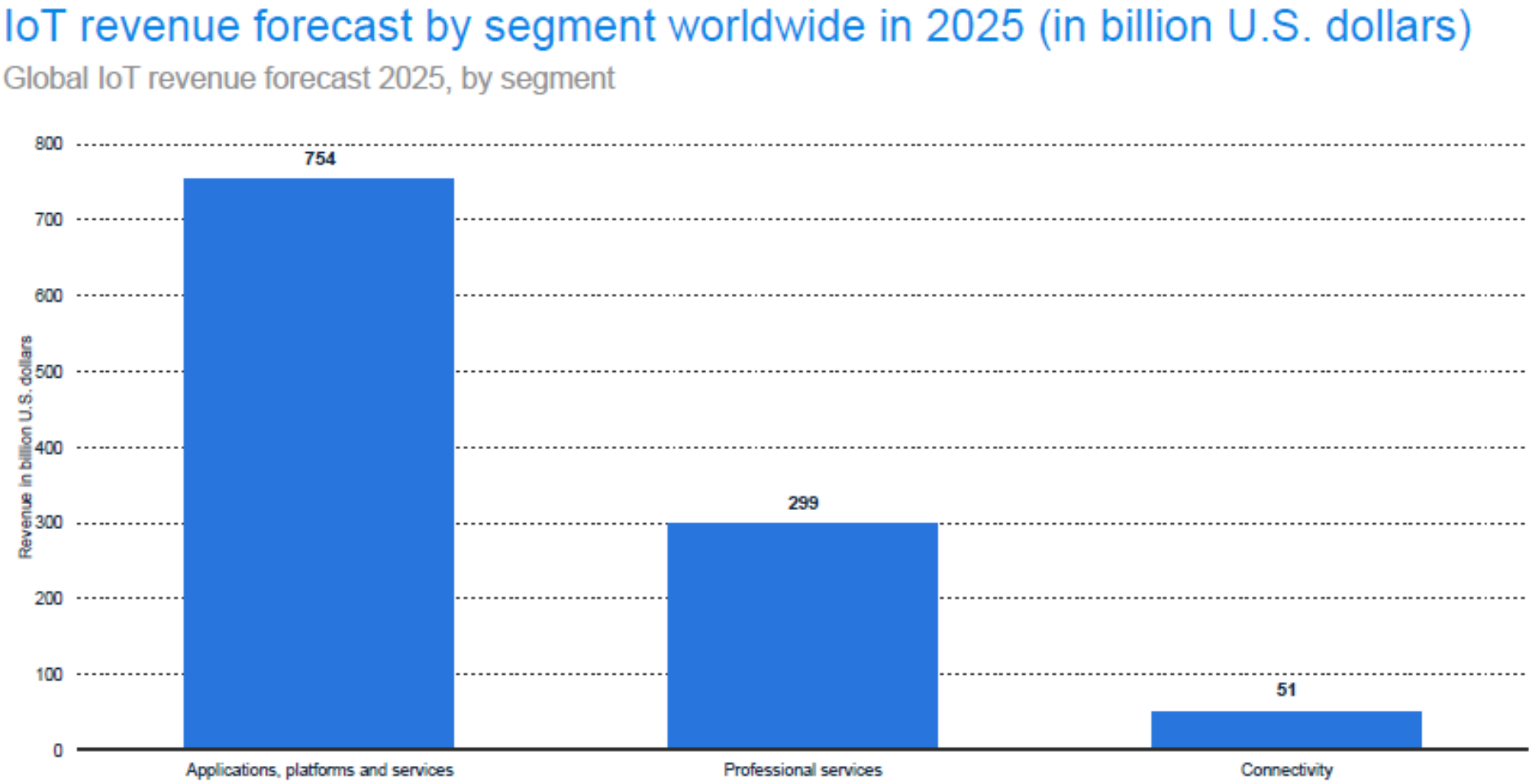
Internet of Things Market

Projected market revenue of the internet of things (IoT) and analytics worldwide from 2015 to 2021, by segment (in billion U.S. dollars)

IoT and analytics - global revenue 2015-2021, by segment



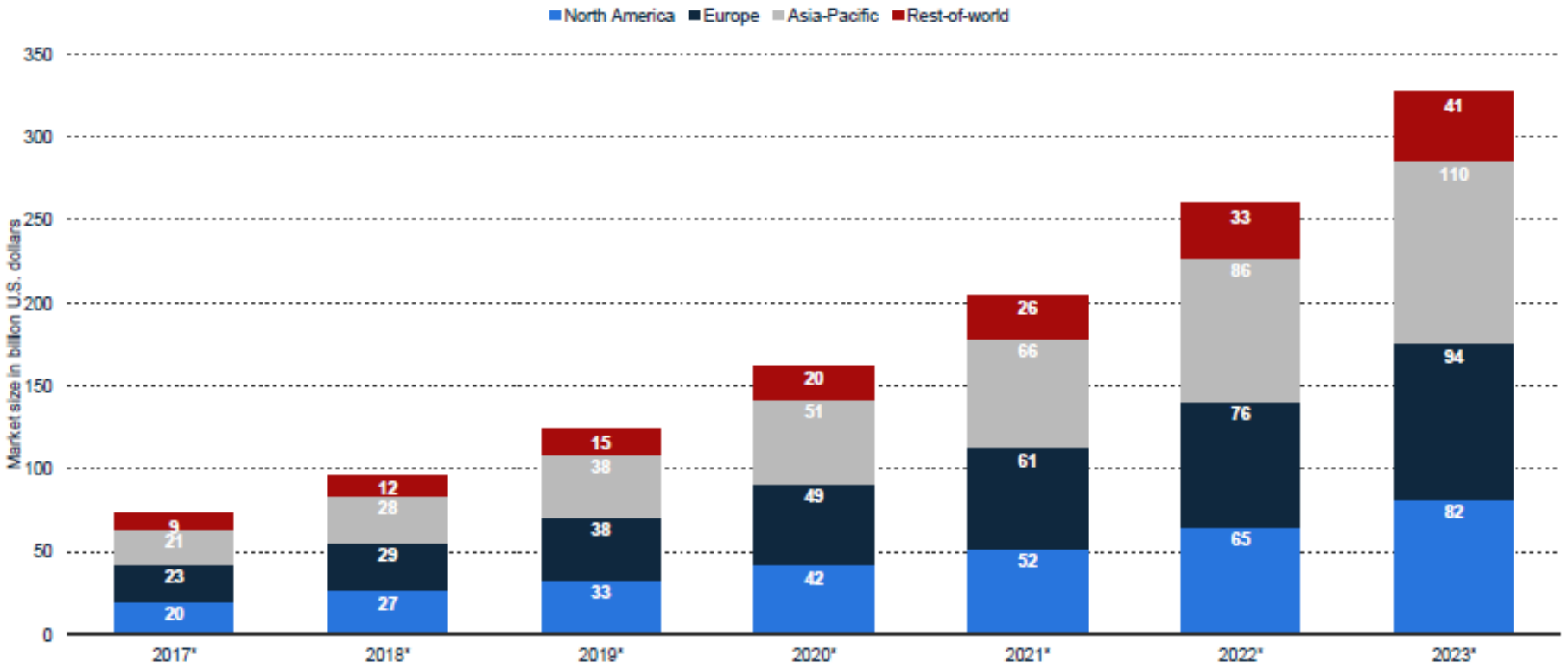
Internet of Things Market



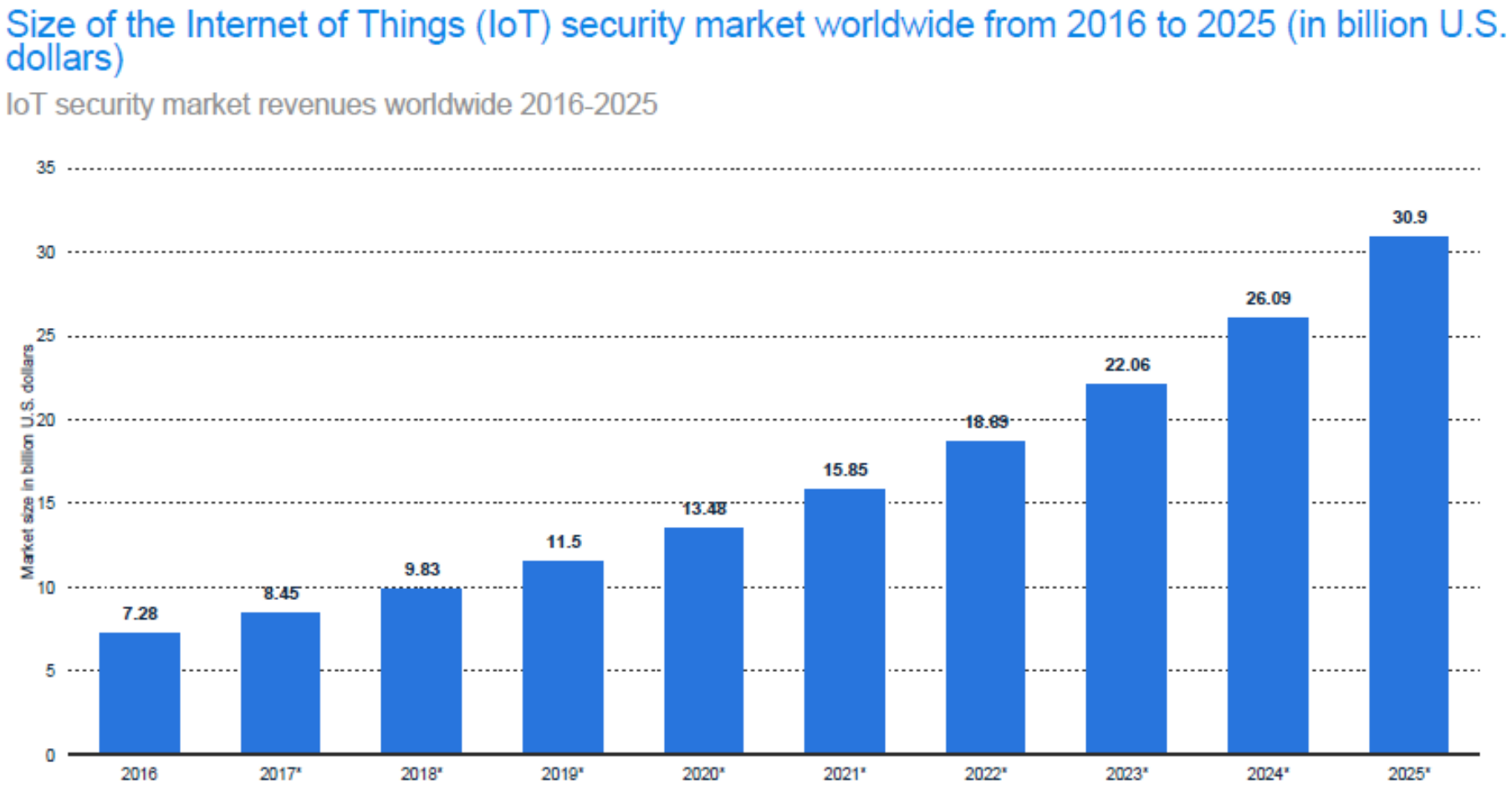
Internet of Things Market

Global smart systems, services and IoT platform market size from 2017 to 2023, by region (in billion U.S. dollars)

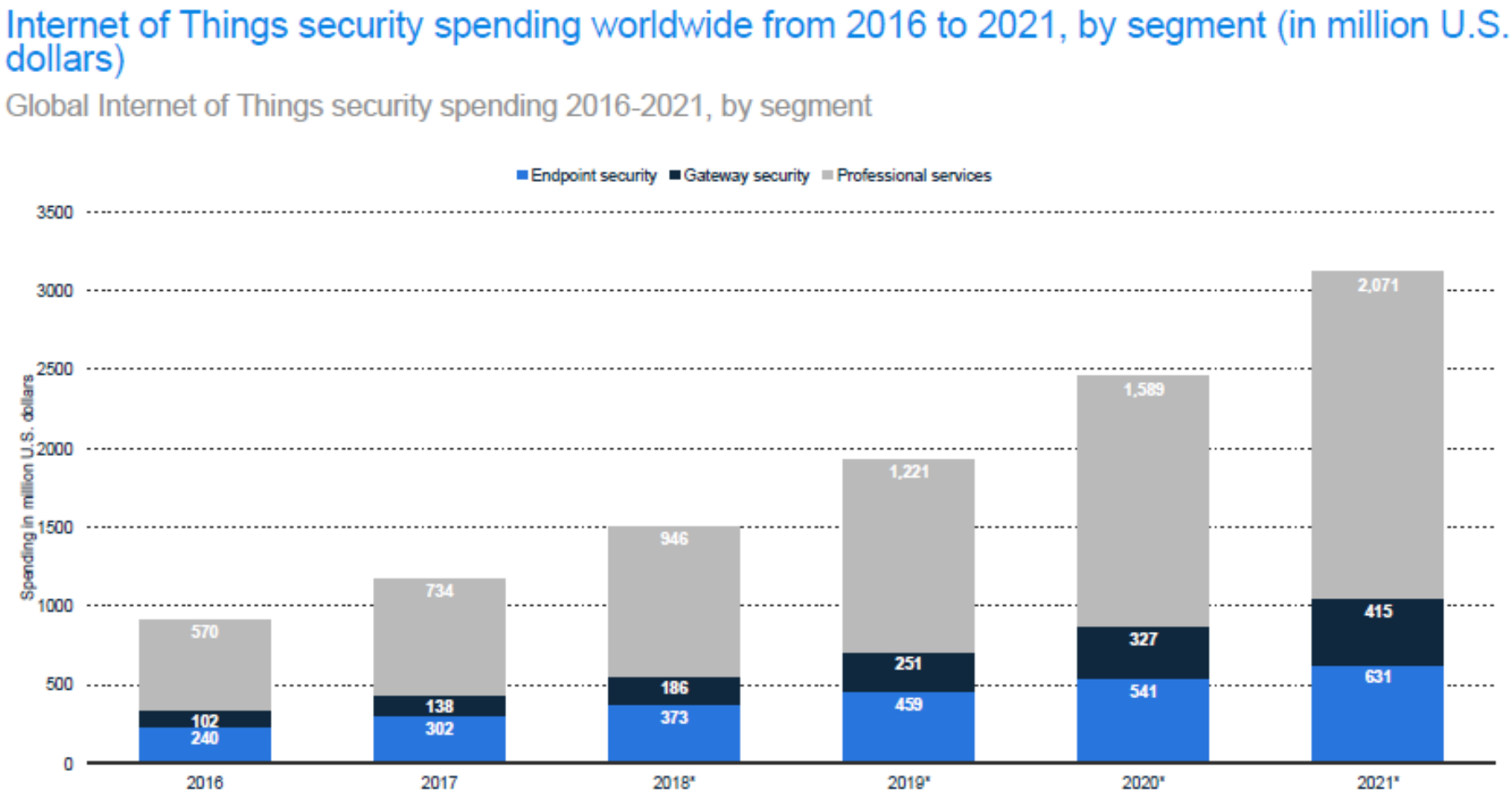
Smart systems, services and IoT platform market worldwide by region 2017-2023



Internet of Things Market



Internet of Things Market



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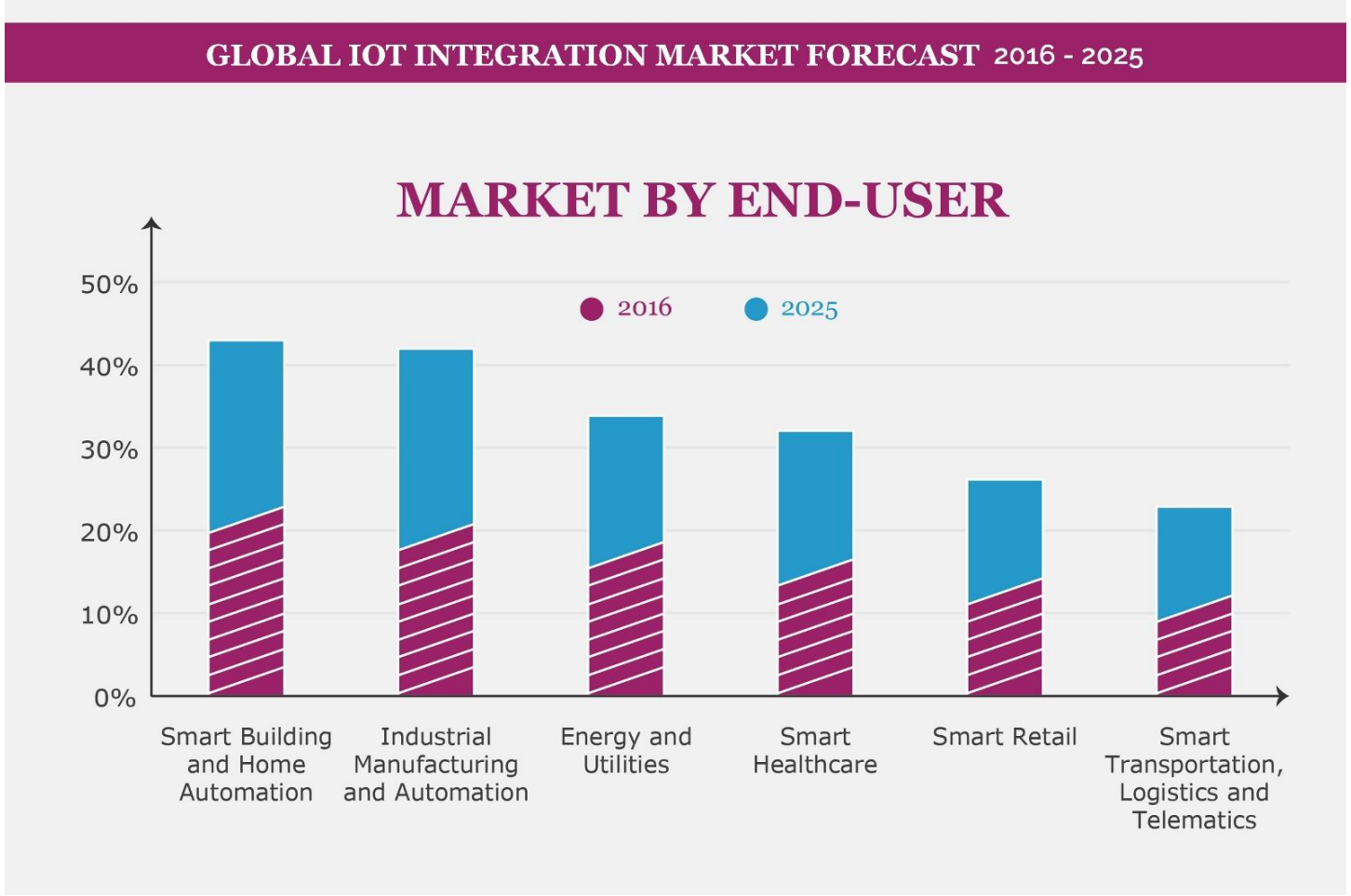
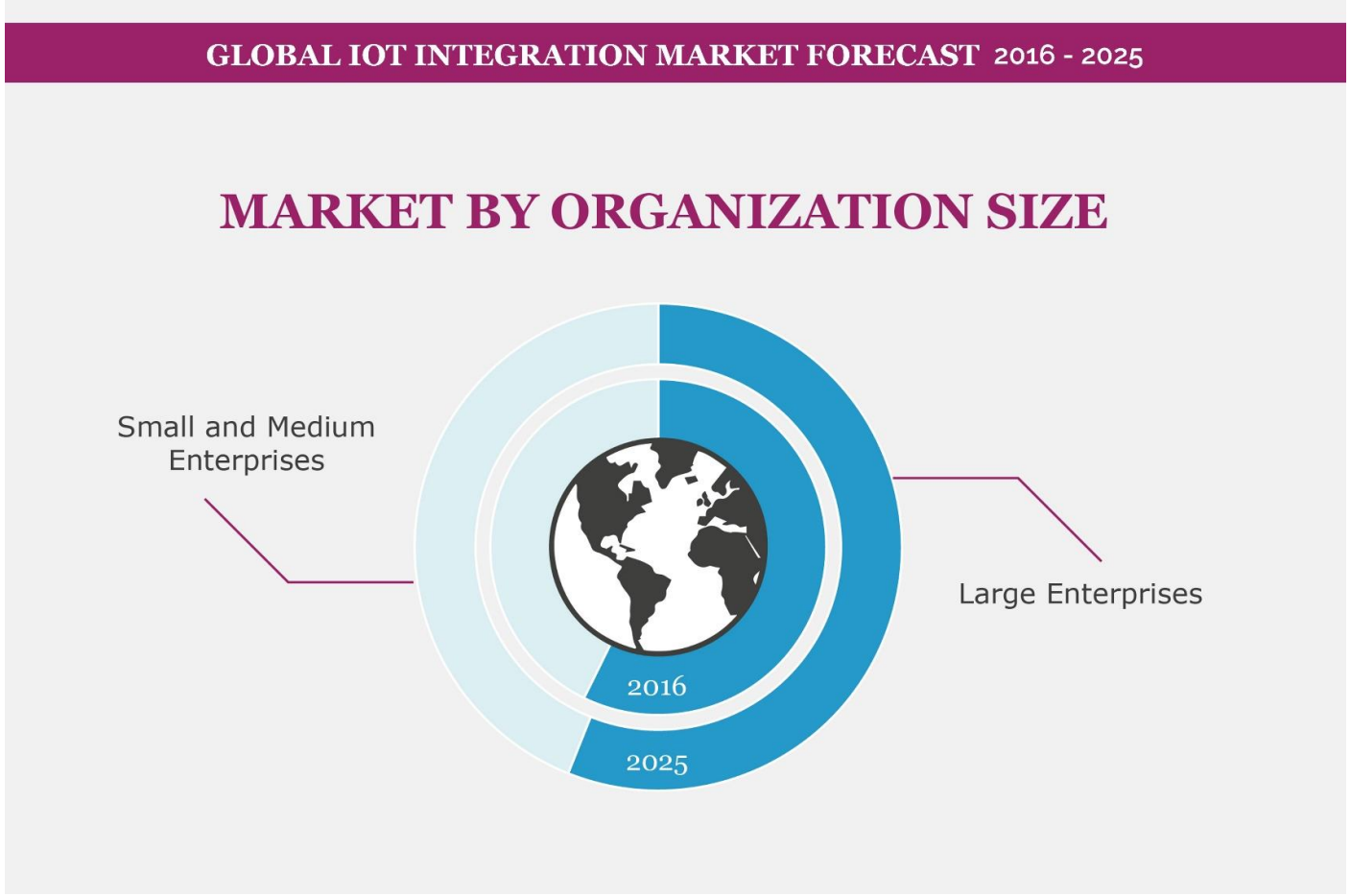


Internet of Things Market



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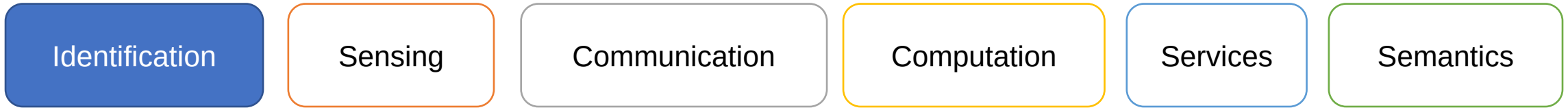
IoT Elements

Identification and Addressing



- Crucial to find and name services in the IoT
- Differentiate between object ID and its address
- Identifiers are not unique (e.g. temperature or humidity sensor)
- Addresses are unique, standards used include IPv4/IPv6

Sensing

- Hardware and Software needed to sense phenomena
- Popular integrated platforms: WeMo, Nest, SmartThings, etc.
- Popular development platforms: Arduino, RapsberryPi, BeagleBoard, Android, iOS, etc.

Communication

- Bring the data from the sensing/actuating hardware to the data cloud/user RFID, NFC, UWB, ZigBee, Bluetooth, WiFi, Z-Wave, WiFiDirect, LTE-A, IEEE802.15.4 and many more

Computation

- Hardware: like sensing
- Software: operating systems
  Android, Arduino, Contiki, TinyOS, RiotOS, LiteOS, ...
- Software: clouds
  Nimbits, Hadoop, …

Services

- Identity related services (who belongs to the system)
- Information aggregation services (process and summarize raw data – e.g. smart grids)
- Collaborative-aware services (on top of information aggregation, make decisions)
- Ubiquitous services (on top of collaborative-aware, provide services everywhere, any time to anyone)

Semantics

- Describe data, services and items in a generalized way
- Example: all temperature data is tagged with “temp” and given in Celsius.
  - Counter-example: some call is “temp”, some call it “tmp” and others call it “heat”. Some give it in Celsius, others in Fahrenheit.

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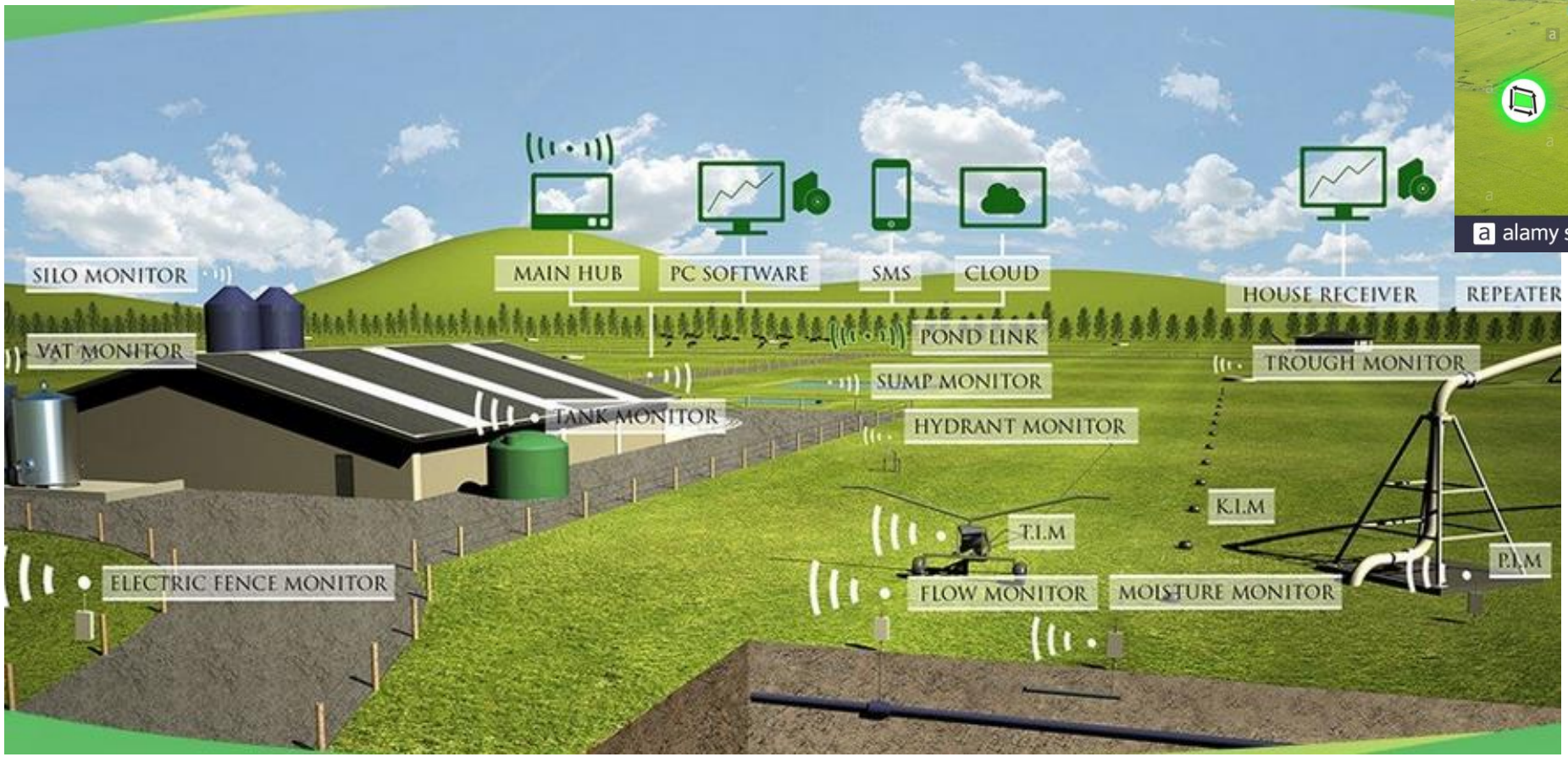
Internet of Things Market – Smart Agriculture



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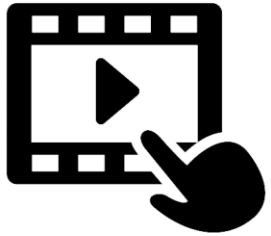

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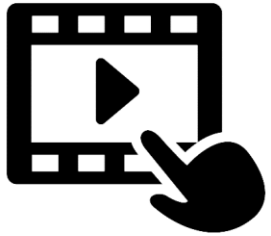
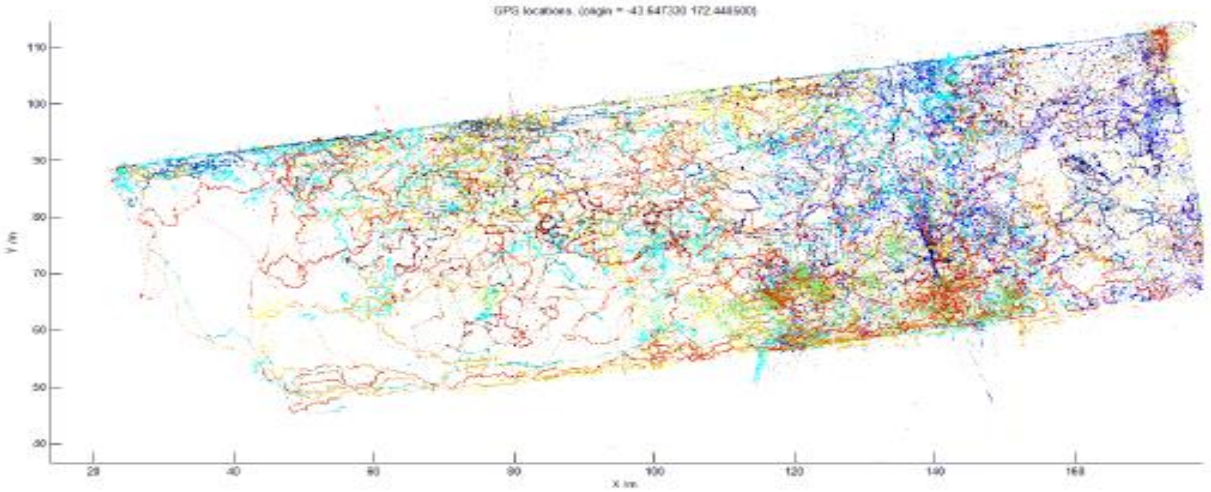


Internet of Things Market –Internet of Animals

Internet of Things Market –Internet of Animals



Internet of Things Market –Smart Livestock

- Animal care, monitoring of body temperature, monitoring of activity and their health are some of the applications of the Internet of Things in Livestock farming.

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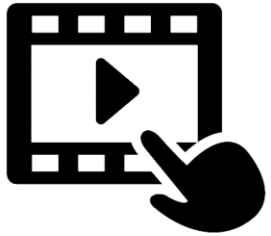
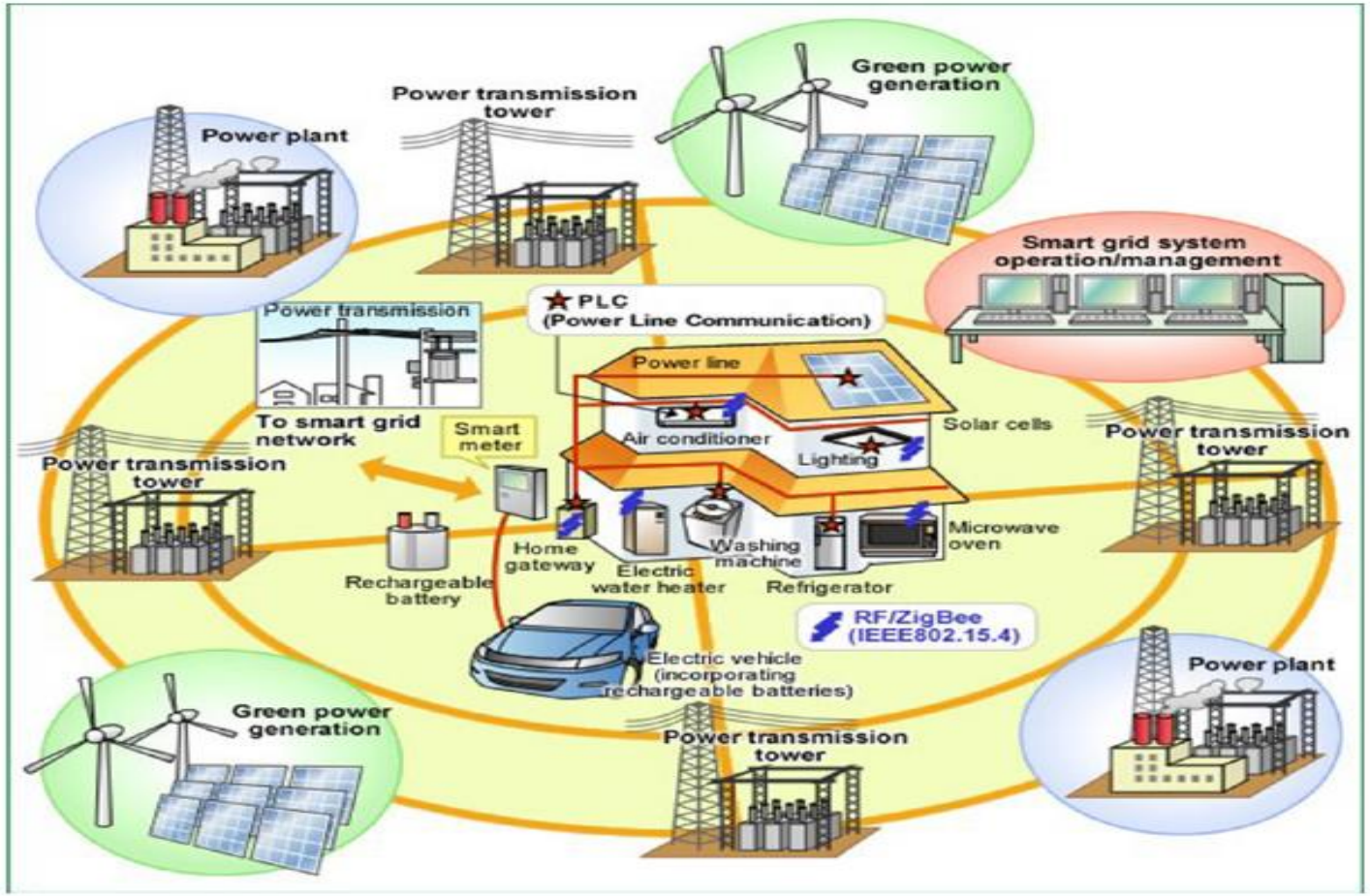
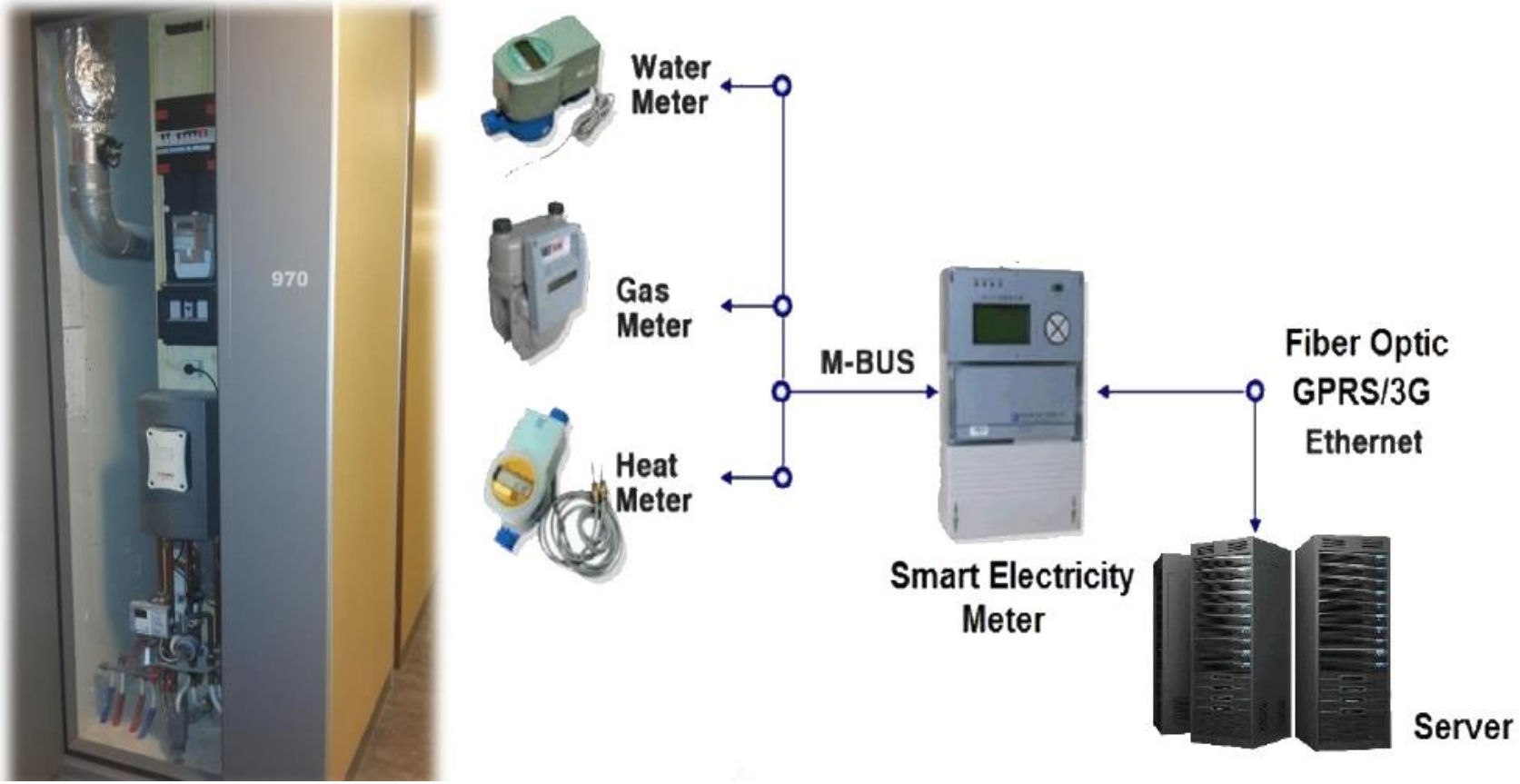


Internet of Things Market –Smart Grid



Internet of Things Market –Smart Metering



Internet of Things Market –Water Resource Management

- Up to 25% water savings on farms with the introduction of Internet of Things into the agricultural industry

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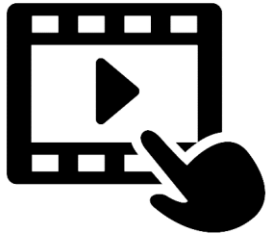

Internet of Things Market –Smart Shipping

Internet of Things Market –Smart Mine

Internet of Things Market –Smart Mine

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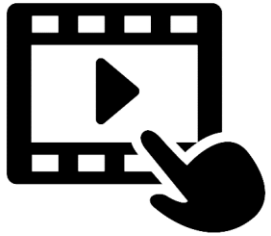


thank you
danke
謝謝
gracias
merci
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go raibh maith agat
obrigado
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bedankt
спасибо
ngiyabonga
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