SYNOPSYS®
Silicon to Software™

IoT – Opportunities and Challenges for the Latin American Region

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April 2019

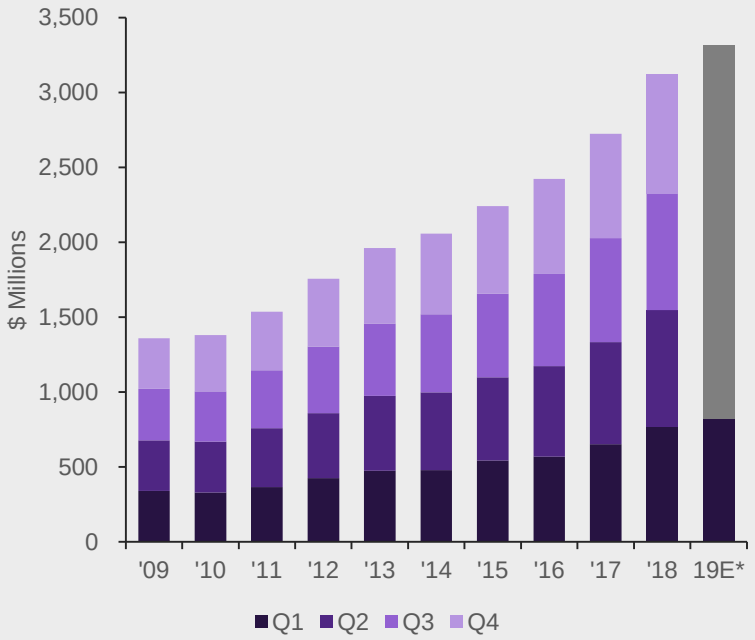
Synopsys Today: From Silicon to Software

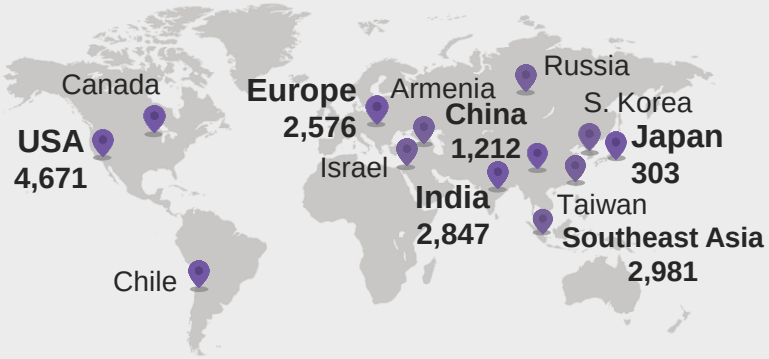
FY18 Revenue: ~$3.121B

Employees: >13,457

Patents: 3,129

Offices: 120



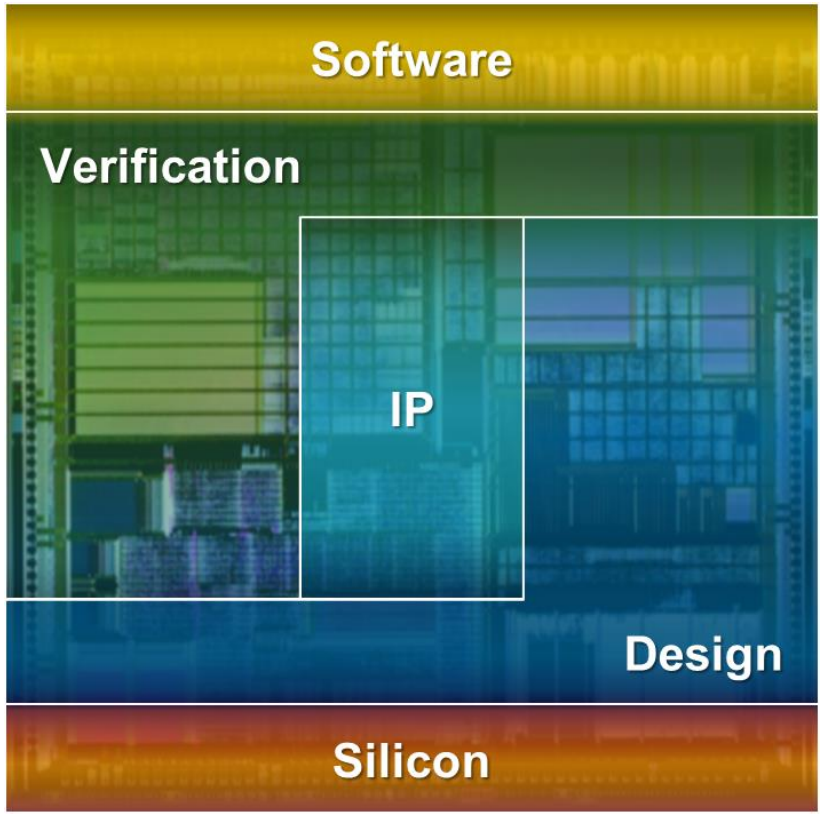


#1 electronic design automation tools & services

Broadest IP portfolio and **#1** interface, analog, embedded memories & physical IP

'Leader' in Gartner's Magic Quadrant for application security testing

Synopsys: Silicon to Software



Software
- Application security testing & quality
- Leader in Gartner's Magic Quadrant

Verification
- Fastest engines & unified platform
- HW/SW verification & early SW bring-up

IP
- Broadest portfolio of silicon-proven IP
- #1 interface, analog, embedded mem. & phys. IP

Design
- Digital & custom AMS platforms
- Best quality of results & highest productivity

Silicon
- TCAD, lithography tools & yield optimization
- Down to 5nm & below

Agenda

- Main Concepts
- Components and Communications
- Application Domains
- Challenges
- Market Predictions

IoT – Main Concepts

What is IoT?

IoT is anything that's connected to a network (including internet) or other machines and works autonomously without needing human intervention

The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.

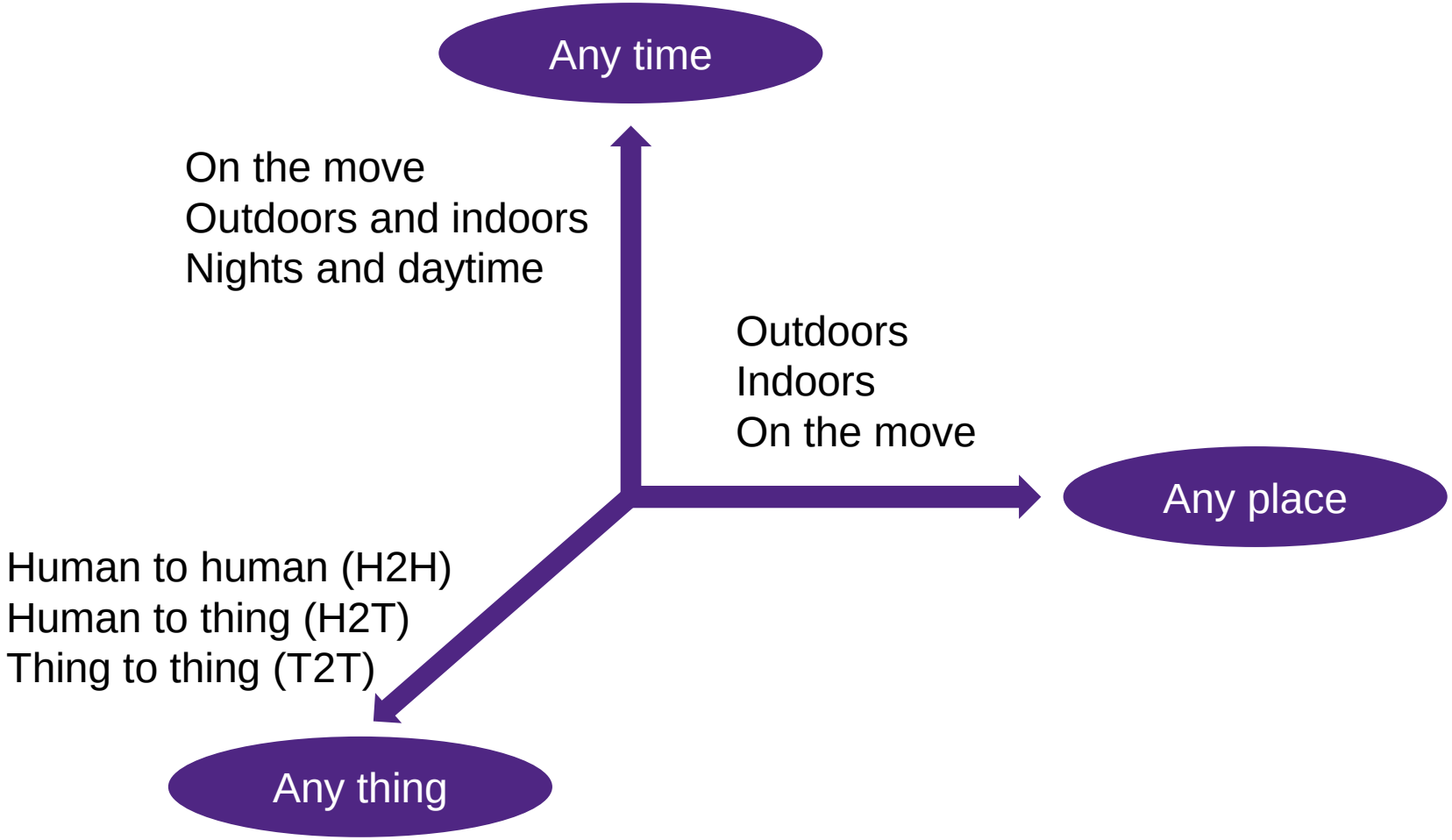
IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer-based systems, and resulting in improved efficiency, accuracy and economic benefit.

Things

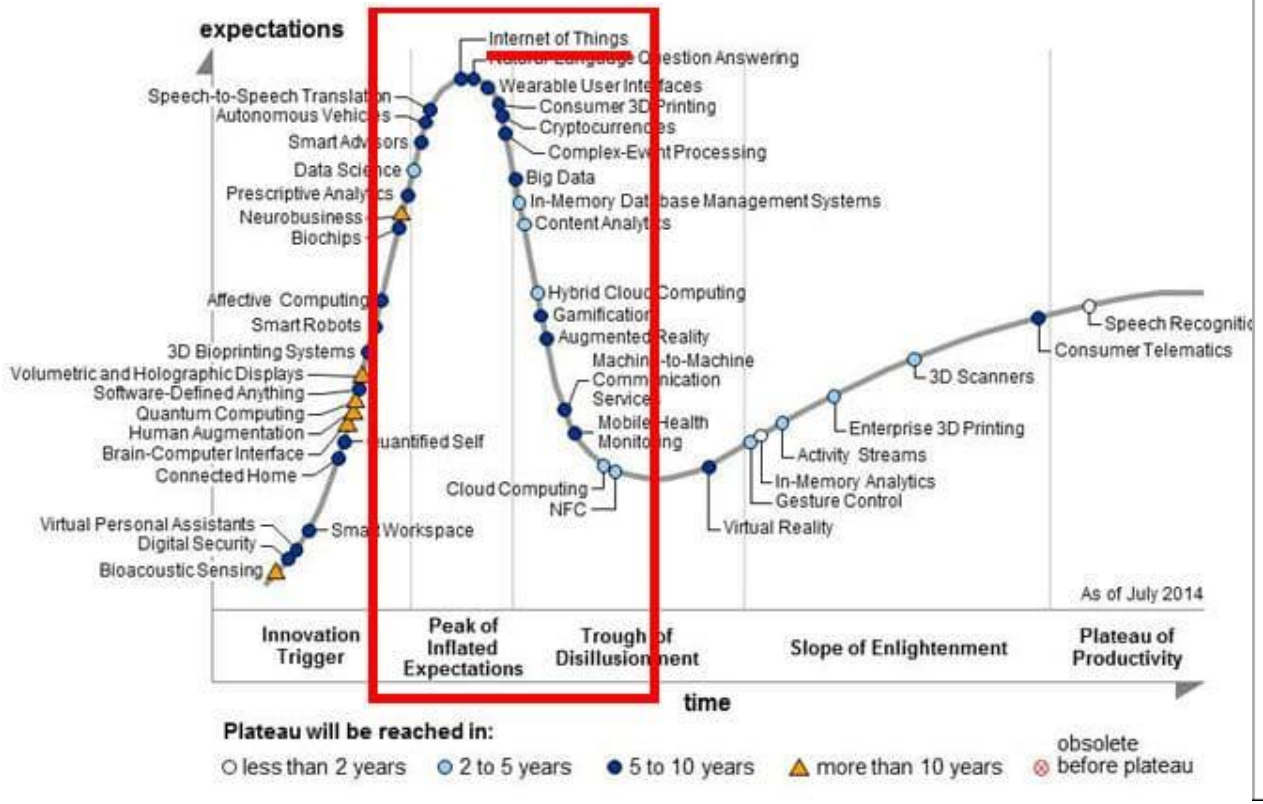
IoT – More Definitions

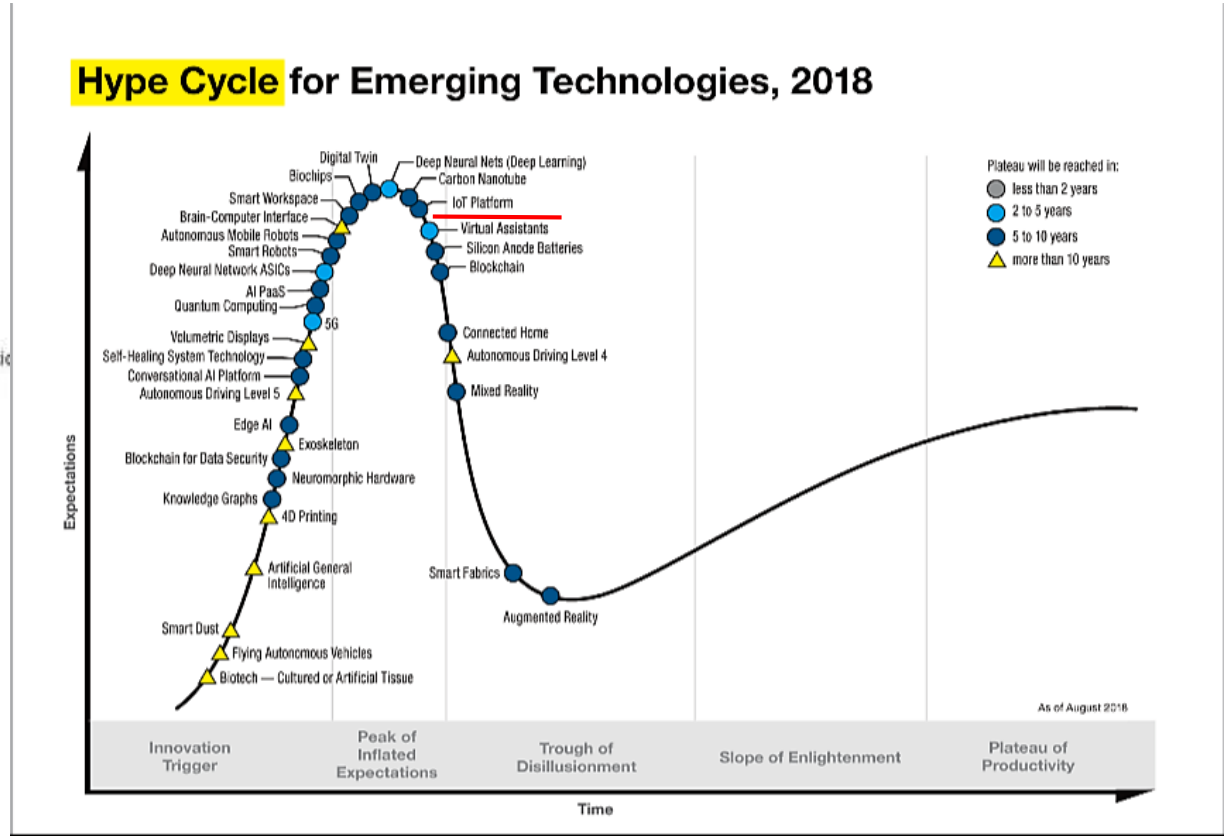
- Various Names – One Concept
  - M2M (Machine to Machine)
  - “Internet of Everything” (Cisco Systems)
  - “World Size Web” (Bruce Schneier)
  - “Skynet” (Terminator movie)
- Industrial IoT
  - Usage of IoT technology in the business and manufacture.
  - Three main areas:
    - Building automation: Heating, lighting, security, etc.
    - Smart maintenance: Applied to company assets and management systems.
    - Machine automation: Add IoT to precision mechanics and production techniques.
    - Other applications (agriculture, mining, cattle raising, etc.)

IoT Perspective



Hype Cycle de Gartner





2014

2018

Historical Facts

Year	Device	Reference
1973	Mario Cardullo receives the patent for first RFID tag	US Patent US 3713148 A
1982	Carnegie Mellon internet-connected soda machine	https://www.cs.cmu.edu/~coke/history_long.txt
1989	Internet-connected toaster at Interop 89	IEEE Consumer Electronics Magazine (Volume: 6; Issue: 1, Enero 2017)
1991	HP introduces HP LaserJet IIISi: first Ethernet-connected network printer	http://museum.net/display_ítem.php?hw=350
1993	Internet-connected coffee pot at University of Cambridge (first internet-connected camera)	https://www.cl.cam.ac.uk/coffee/qsf/coffee.html
1996	Genera Motor OnStar (2001 remote diagnostics)	https://en.wikipedia.org/wiki/OnStar
1998	Bluethoot SIG formed	https://www.bluethooth.com/about-us/our-history

Historical Facts

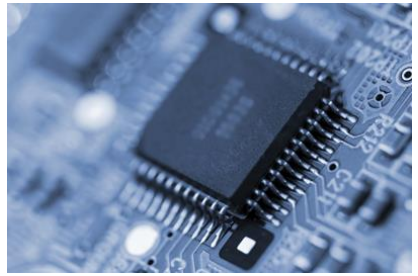
Year	Device	Reference
1999	LG Internet Digital DIOS refrigerator	https://www.telecompaper.com/news/lg-unveils-internetready-refrigerator--221266
2001	First bluethooth product launched: KDDI Bluethooth-enabled mobile phone	http://edition.cnn.com/2001/BUSINESS/asia/04/17/tokyo.kddibluethooth/index.html
2005	United Nation's International Telecommunications Union report predicting the rise of IoT for the first time	http://www.itu.int/osg/spu/publications/internetofthings/InternetofThings_summary.pdf
2008	IPSO Alliance formed to promote IP on objects, first IoT-focused alliance	https://www.ipso-alliance.org
2010	The concpt of smart lighting formed after success in developing solid-state LED light bulbs	https://www.bu.edu/smartlighting/files/2010/01/Bobk.pdf
2014	Apple creates iBeacon protocol for beacons	https://Support.Apple.com/en-us/HT202880

IoT – Why Now?

- Sensors and communication devices cost has decreased . They can be added to other devices (e.g. washing machines, traffic light, etc.) without impacting final cost.
- Wireless communications are available in almost all places, there is a lot to do in rural zones.
- There are communication options without operating costs.
- Power consumption has decreased allowing devices to work longer with the same battery

Key Players Enabling IoT

- Semiconductor Industry: Lower barriers to product creation
- Cloud Industry: Lower barriers to create new services
- Telecom Industry: Lower barriers to be connected.



IoT

IoT can be improved through

- Artificial intelligence
- Machine Learning
- Deep Learning
- Neural network

Artificial Intelligence

$38.6B

AI Revenue by 2025

Source: Tractica

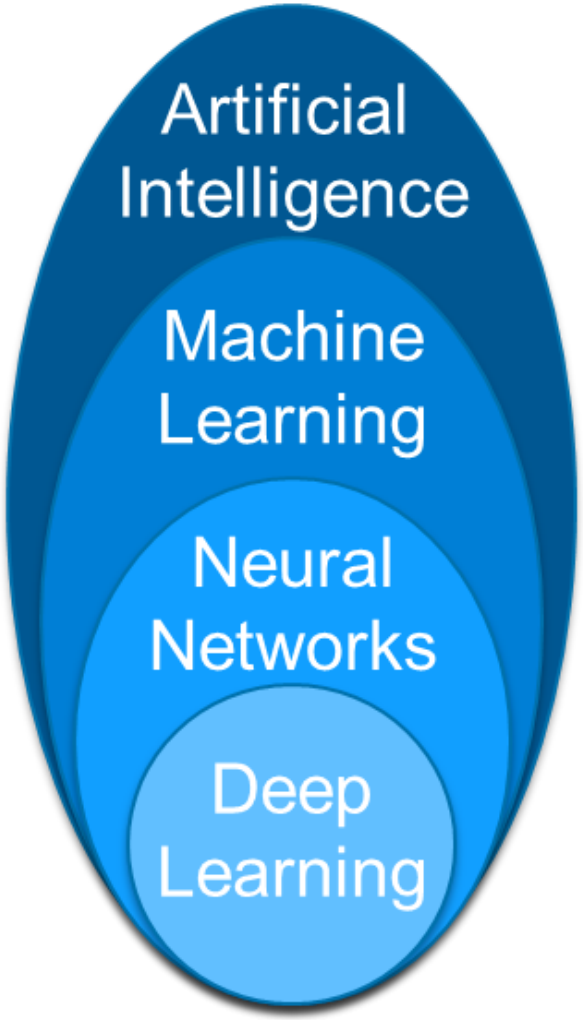
Everyday AI

- Speech Recognition
- Ride Sharing
- Autopilot on Aircrafts
- Spam Filter
- Mobile Check Deposits

Emerging AI

- News Generation
- Purchase Prediction
- Fraud Detection
- Touch & Image Recognition
- Autonomous vehicles

Defining ML & AI



- Artificial Intelligence
  - Human levels of intelligence exhibited by machines
  - Narrow AI: Technology outperforming humans in a narrowly defined task
- Machine learning
  - An application of artificial intelligence that uses algorithms to analyze large amounts of data and then infers some information about the real world from the data
- Neural Networks
  - A class of machine learning algorithms – modeled after the human brain with a neuron representing the computational unit and the network describes how these units are connected to each other
- Deep Learning
  - A subset of machine learning using artificial neural networks with input, output and ‘hidden’ intermediate. Deep neural networks are capable of learning using large data sets

Components and Communications

From the Edge to the Cloud

IoT Edge Devices
(Smart Devices)

“Things” with sensors & actuators that monitor, process, and control.

Aggregation Layers
(Hubs/Gateways)

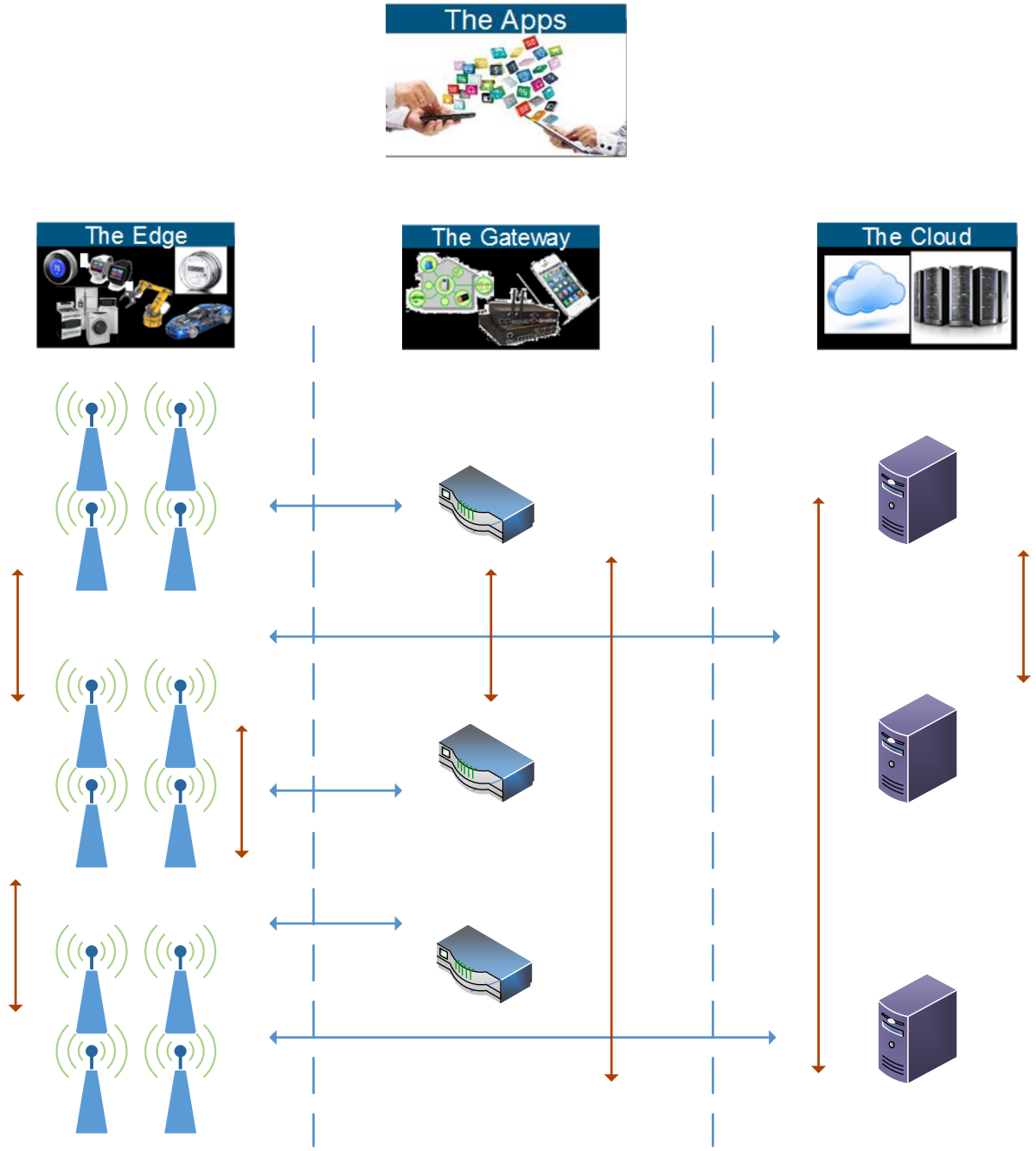
Connectivity & Interfaces to aggregate the edge data to send to the cloud.

Remote Processing
(Cloud Based)

Applications to analyze the data and offer cloud services.

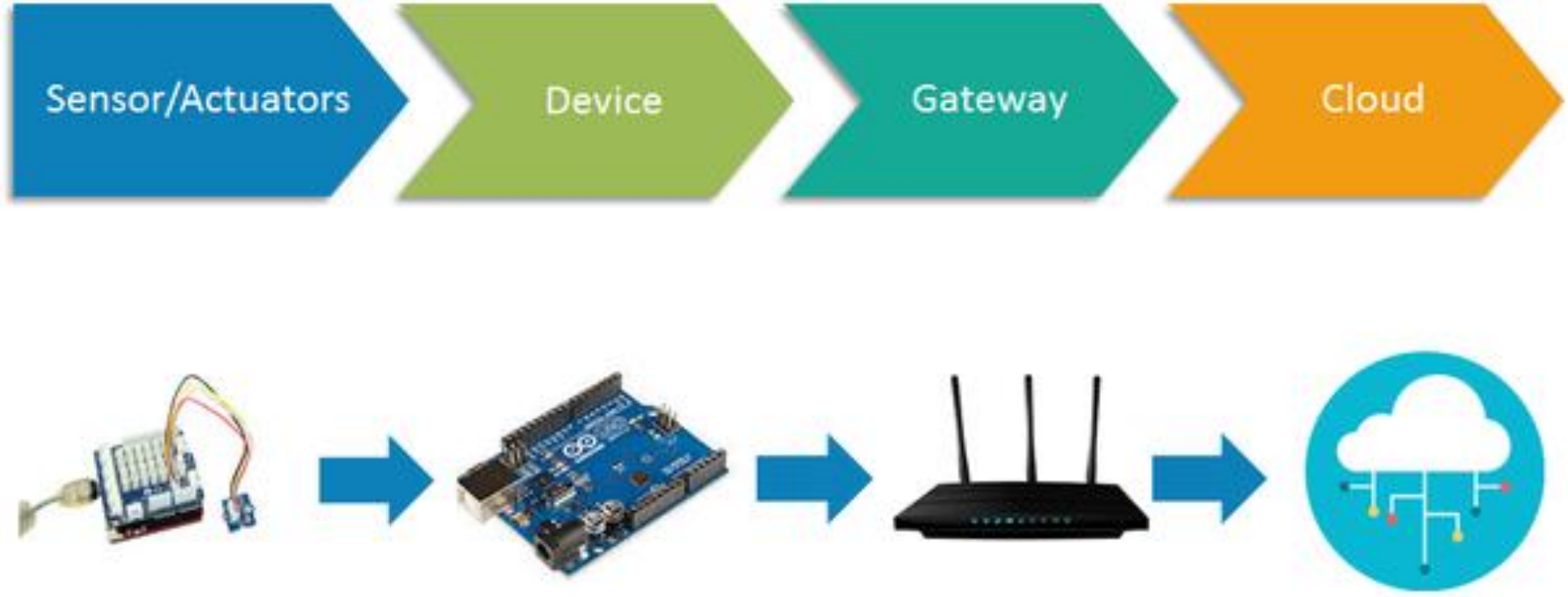
Iot Architecture

- 4 layers architecture
  - Apps.
  - Cloud.
  - Gateway.
  - Edge.

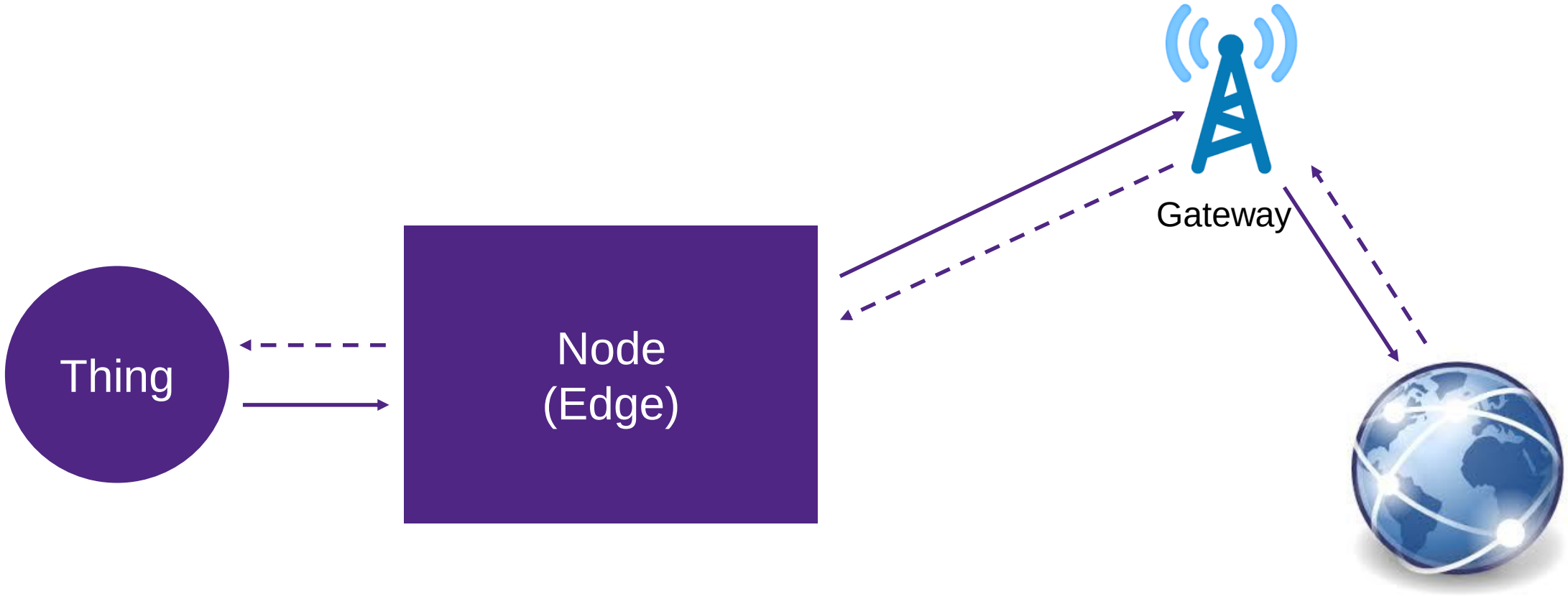


IoT Architecture

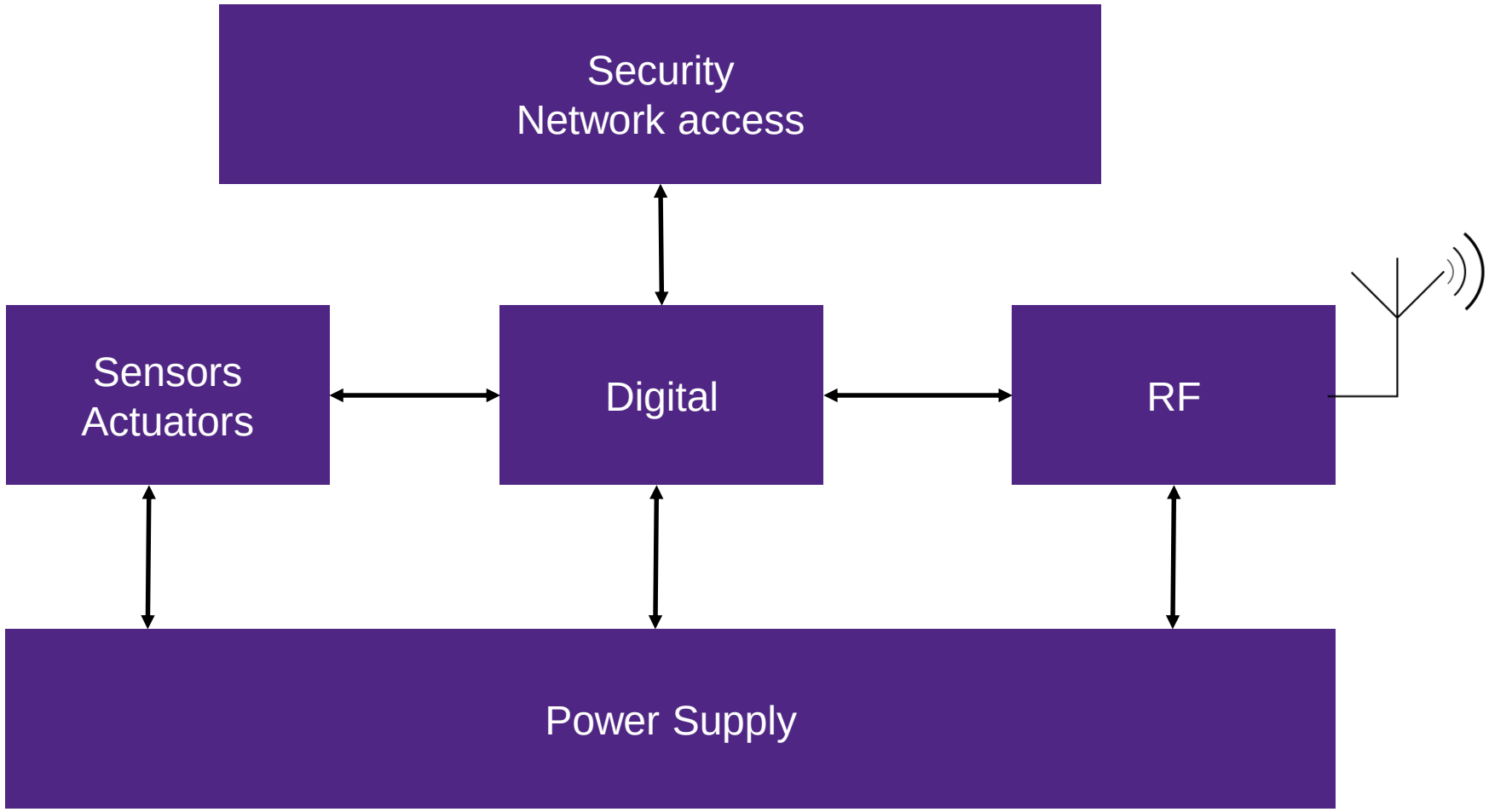
- Composed by
  - Sensors / Actuators
  - Devices
  - Gateway
  - Cloud



How to Connect a Thing to Internet?



What is the Node?



How to Connect a Thing to Internet?

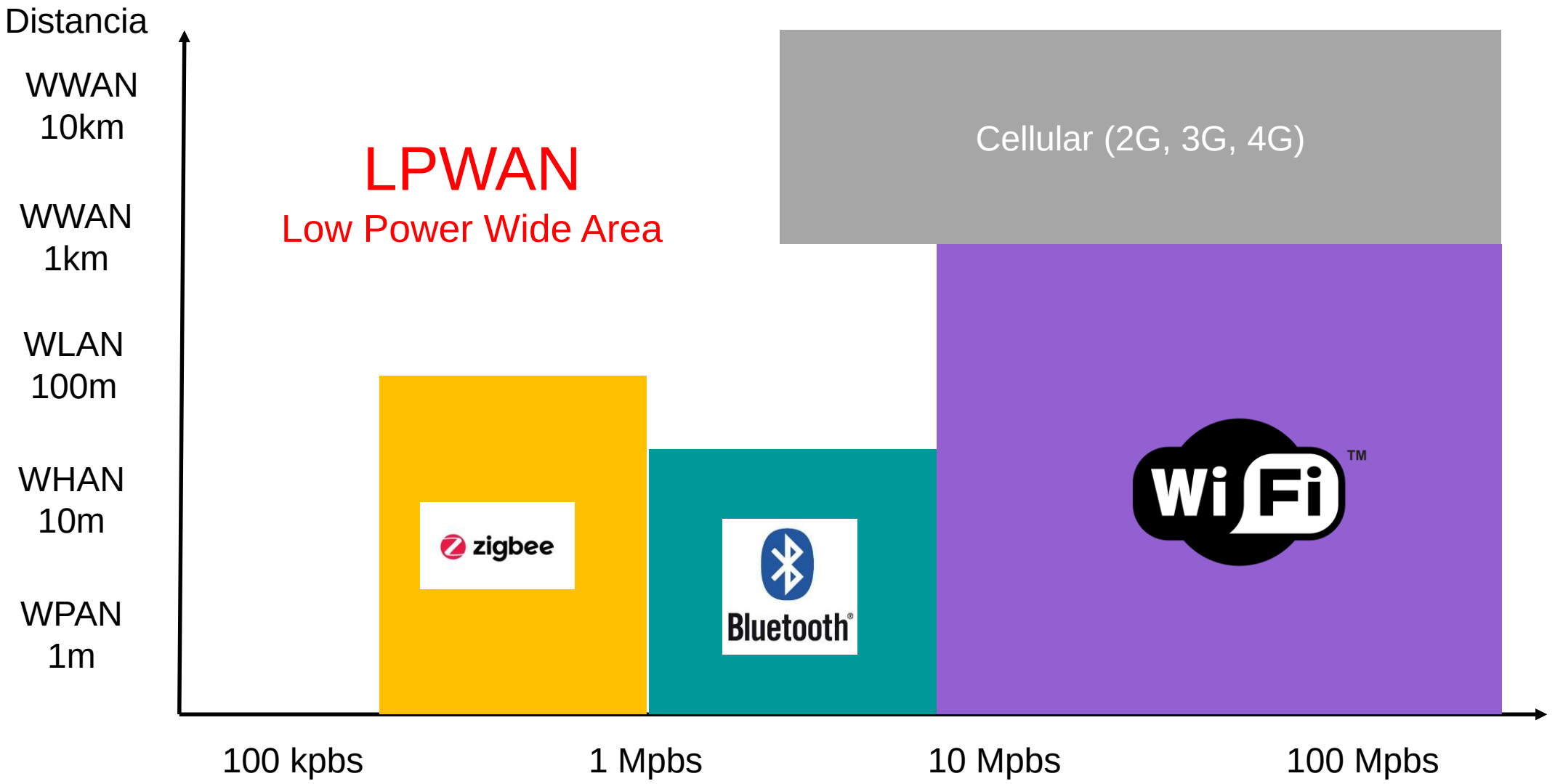
Node (Edge)

Radio link

Network link

End user

Connection Types and How to Chose



LPWAN (Low Power Wide Area)

- Licensed
  - 2G
  - 4G
- Free band
  - Sigfox
  - LoRa

How IoT Works? – Used Technologies

RFID	Sensor	Smart Tech	Nano Tech
• identify and track the data of things	• collect and process the data to detect the changes in the physical status of things	• enhance the power of the network by devolving processing capabilities to different part of the network	• make the smaller and smaller things have the ability to connect and interact

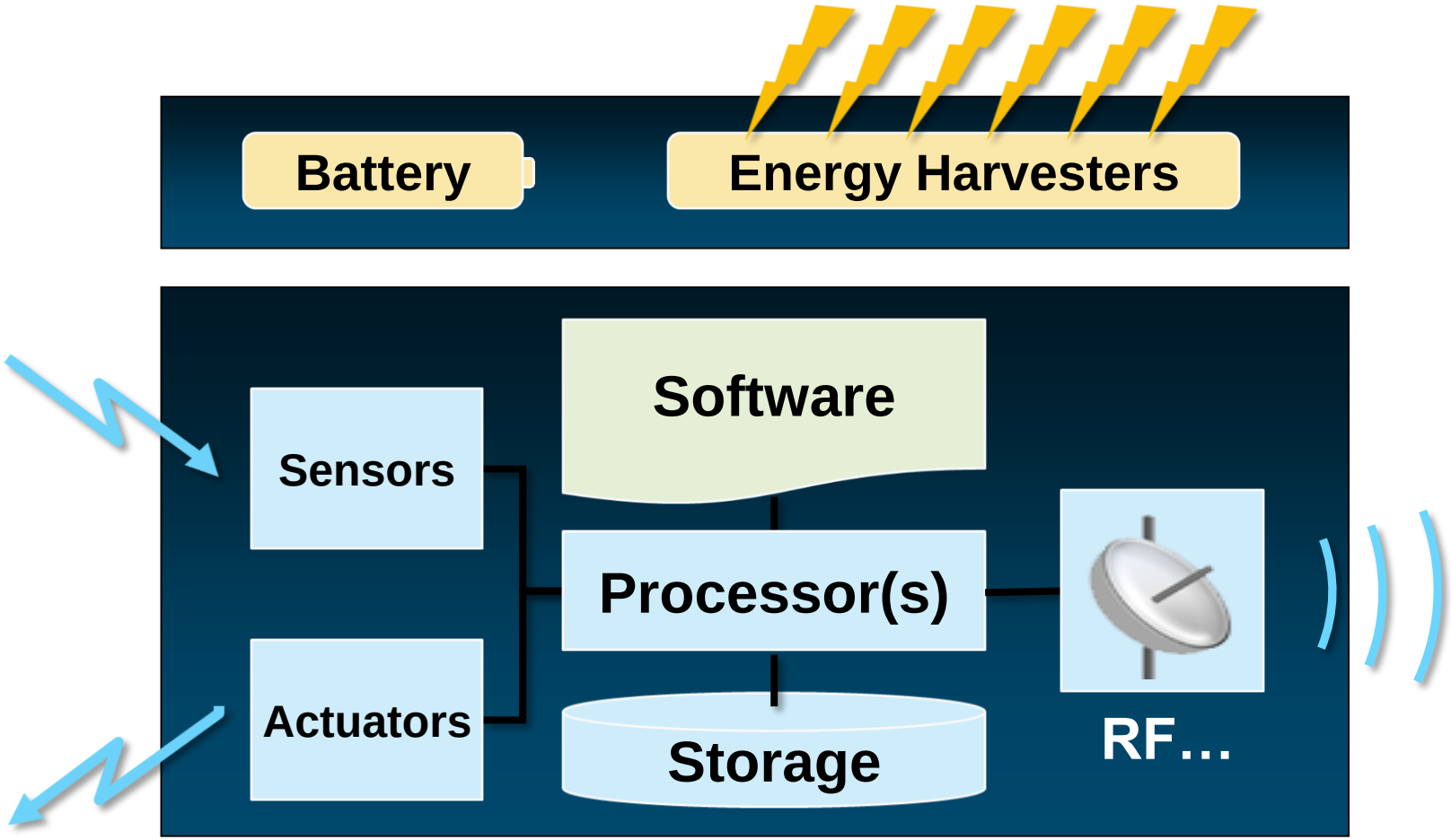
Data Processing

- Cloud
  - Only convenient when an action is not immediately requested.
  - Can produce bandwidth issues.
  - Cannot send all data to the cloud (no changes or very small changes).
- Gateway
  - Useful when having a sensor network.
- Edge
  - Becoming common.
  - Very efficient.
  - Needed for fast action.

Edge computing refers to the computation and analysis of data on distributed devices positioned at the edge of a network rather than on centralized systems.

Gartner anticipates that by 2025, 75% of data processing will move to the edge – up from 10 % in 2018

Edge Architecture



Key Design Requirements

Wireless Connectivity

What de-facto standards will emerge?

Security

Pervasive security needed but what exactly is required?

Sensor Processing

How much processing and where will the on-chip integration be?

Energy Efficiency

Add connectivity, security, & processing while extending battery life

IoT – Challenges

IoT: Incredible Opportunity with Hurdles…

Billions of Edge Devices

Battery life is expected to extend while adding connectivity.

Type of functionality, connectivity, and energy use dictate costs.

Wireless, Power Management, Memories, Sensors, Processors, etc…

In 2016, New Hacks To Worry About: Smart Homes & Connected Cars.

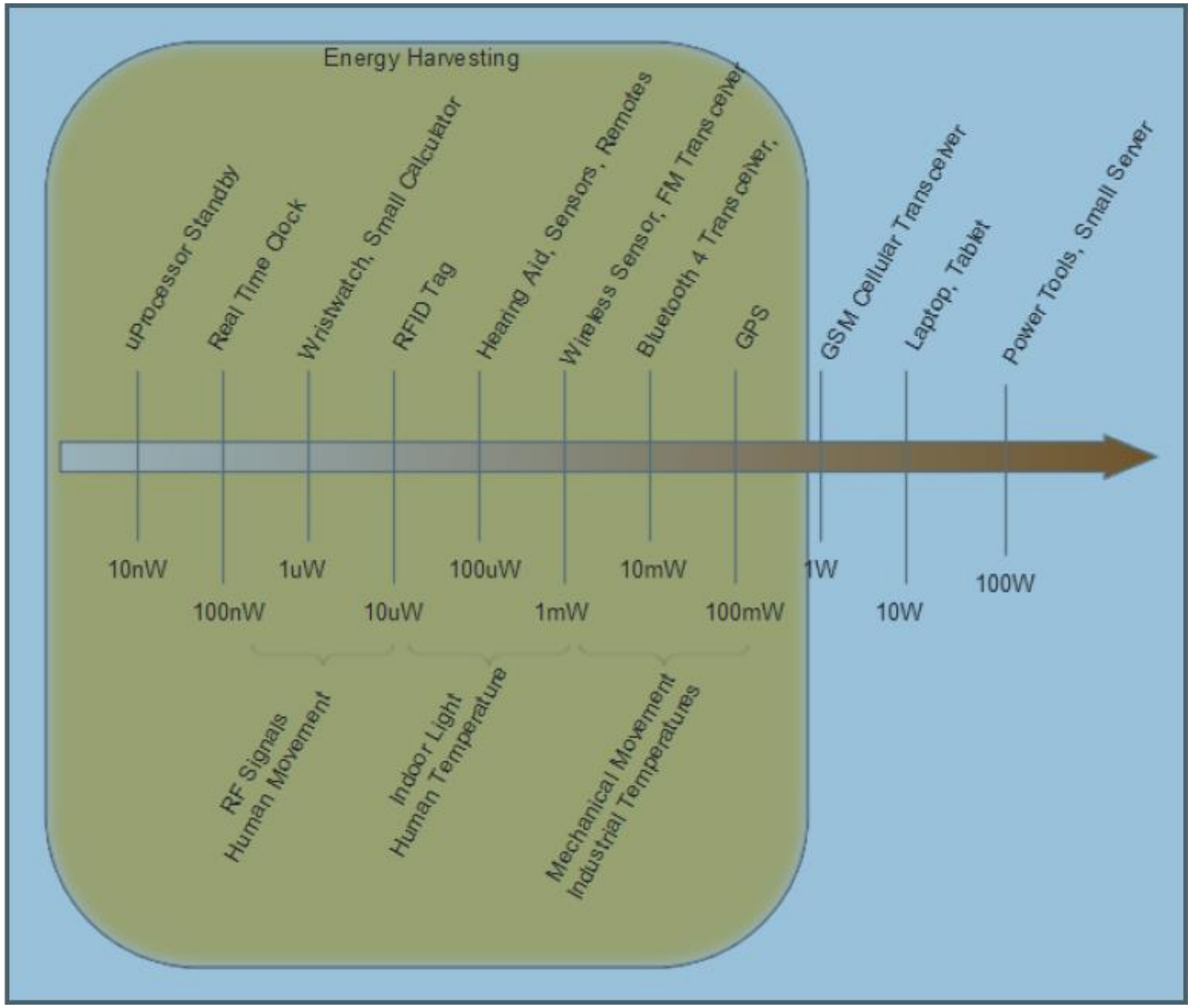
Low Power

System Cost

Integration

Security

Energy Comsumption

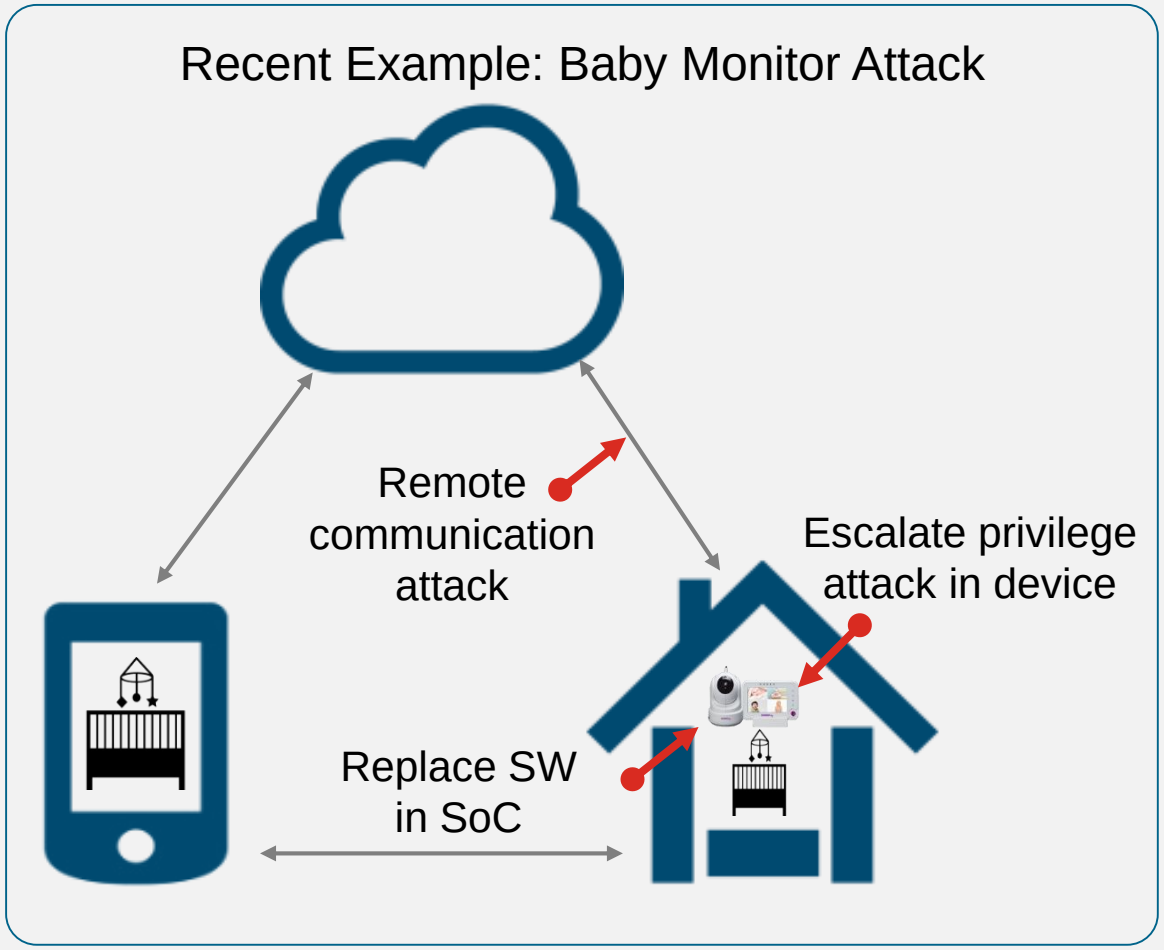


IoT Security Risks

- Disruption and denial-of-service attacks
- Understanding the complexity of vulnerabilities
- IoT vulnerability management
- Identifying, implementing security controls
- Fulfilling the need for security analytics capabilities
- Modular hardware and software components
- Rapid demand in bandwidth requirement

Connected Devices at Risk of Being Attacked

Attacks Are on the Rise & Evolve Continuously



- Everyone is affected, from consumers and enterprises, to service providers and manufacturers.
- Security is crucial and needs to be addressed at all levels, starting with the SoC
  - Latest hacks result in investigation.
  - Companies need to be prepared to justify the security of their products.
- Growth: 30% to 95% in 2020.

EMBEDDED SECURITY is ESSENTIAL.

Understanding Security

What is meant by “security”?

- **Confidentiality**: protecting access to information.
- **Integrity**: ensuring data has not been altered/tampered with .
- **Authenticity**: knowing the sender and receiver of transmitted information.

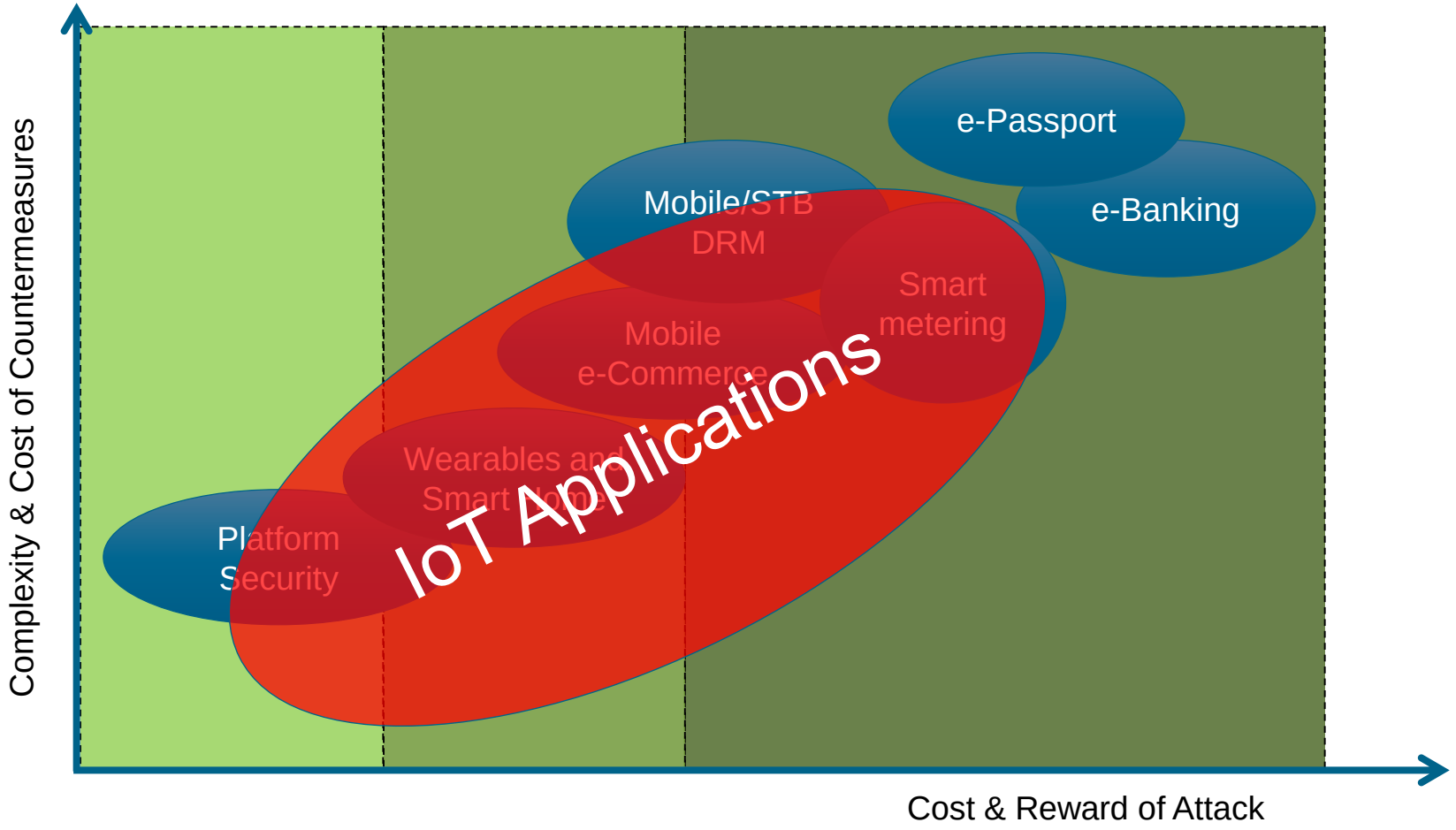
Common security technologies

- Cryptography and secure protocols.
- Platform security.
- Tamper detection/prevention.

Key question: what are you trying to protect?

The Cost of Security

Differs Across Market Segments



“Value” of Attack

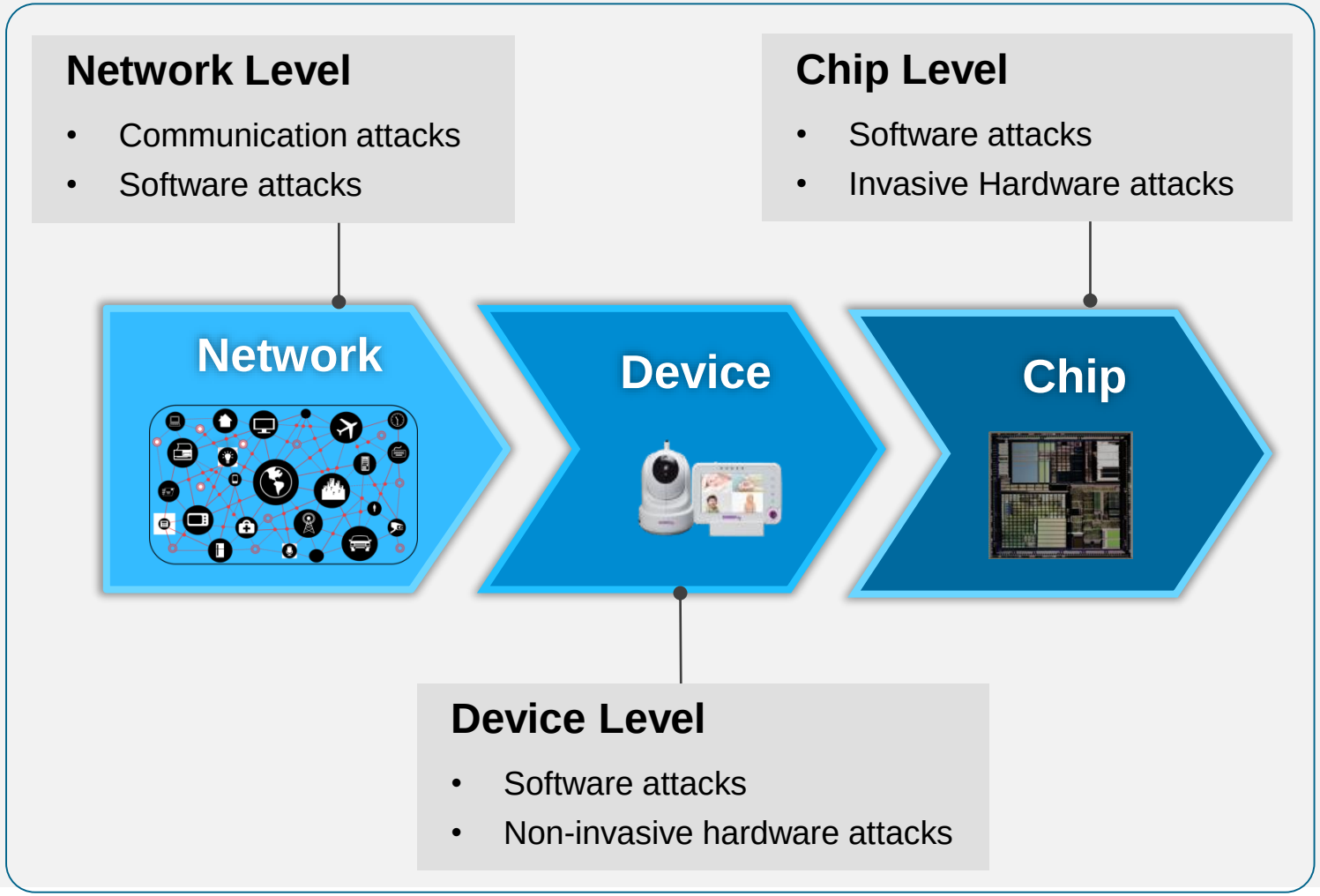
- ***Reward ($$$ or fun).***
- ***Technical challenge.***
- ***Terrorism.***

“Cost” vs. “Risk”

- ***Time spent.***
- ***Cost of equipment.***
- ***Expertise required.***
- ***System access.***
- ***Legal implications.***

Security Threats are a Top Concern for IoT Developers

Security Must Be Addressed at All Levels and Begins at the Processor



- **Communication**
  - Sniffing of sensitive data (passwords).
  - Direct remote attacks (backdoors).
  - Indirect remote attacks (remote nodes).
- **Software**
  - Malware (viruses, rootkits).
  - Exploit of buffer/stack overflows.
  - Privilege level tampering.
- **Hardware**
  - Non-invasive (debug ports, side channel).
  - Invasive (decapsulation, probing).

Chalenges in IoT Implementation

Source: Forbes Insights, 2017.

Five Essential Requirements

- Edge computing/analytics
  - Data needs to be analyzed in real time.
  - Rapid response to sudden change.
  - An edge processing can respond in a few milliseconds. A cloud system will take more than a 100 milliseconds.
- Data ingestion and stream processing
  - Device telemetry data being imported and converted into a format usable by cloud-based IoT services.
  - Gathering data for multiple devices.
  - Need to transform for cloud-based analytics platforms.
  - 60% of IT executives say collecting, storing, integrating, and analyzing real-time data from endpoint devices is a key barrier to a successful IoT implementation.
- Device management
  - Covers the hardware, software and processes that ensure devices are properly registered, managed, secured and upgraded.
  - Staff is notified if a device fails
  - Device management should reliable scale to billions of connected devices and trillion of messages

Source: Cognizant, 2019.

Five Essential Requirements

- Cold path and advanced analytics
  - Large amount of data is analyzed by advanced algorithms after the data is stored on the cloud platform.
  - Deep analysis of IoT data should result in cost savings.
  - It should allow to create new business opportunities.
  - Large scale processing can include loads greater than 100, 000 events per second (payload size of over 100 MB per second).
- Enterprise integration with business systems
  - Integration with business applications and enterprise systems enables the sharing of raw and processed data, as well as analysis driven insights
  - IoT insights need to be delivered to enterprise systems.
  - IoT devices should receive reference metadata to interpret device data.
  - Results: Improved efficiencies, reduced cost, heightened customer satisfaction and the ability to create and lead new markets.

Source: Cognizant, 2019.

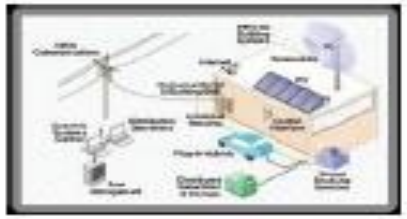
How to Find Success with the IoT

- Begin with the business case, not with the technology.
- Develop a comprehensive IoT strategy.
- Start small to go big.
- It is all about co-creation.
- View the IoT as a source of competitive advantage and competitive threat.
- Instill a sense of urgency in yourself, your team, and your company.

IoT Application Domains

IoT is everywhere and almost in all domains

Top Industries Key for IoT Applications



Smart Grid

Smart Health

Smart Home

Smart Cities

Smart Industries

Smart TV

Smart Watch

Smart Car

Smart Kegs

IoT – Smart …

Smart Thing	Smart City-Environment	Smart Home	Smart Driving	Smart Industry
• Understands the environment • Manages data and transforms to Info • Connects to the world • Protects your data • Is energy efficient	• Infrastructure to improve traffic and municipal services • Smart grid • Intelligent, adaptive smart lighting • Smart buildings • Reducing waste	• Control of heating, air-con, appliances, locks and alarms • Smart meters to connect homes to the smart grid • More energy efficiency, convenience, comfort and security	• Making driving safer for the driver and car occupants and for other road users • Improving power and fuel efficiency • Moving towards electric vehicles • Connected driving experience	• More efficient factories • More flexibility and customization • More sustainable production • Safer working environment • Better man-machine cooperation

Industrial IoT

- Preventive maintenance on new and pre-existing factory machinery.
- Throughput increase through a real-time demand.
- Energy savings.
- Safety systems such as thermal sensing, pressure sensing, and gas leaks.
- Factory floor expert systems.
- Advanced manufacturing.
- Factory automation.
- Smart control of engines.
- 3D Printer.
- Industrial robots.
- Industrial lighting.
- Sensors for industry.

Consumer

- Smart home gadgetry
  - Smart irrigation.
  - Smart garage doors.
  - Smart locks.
  - Smart light.
  - Smart thermostats.
  - Smart security.
- Wearables
  - Health and movement trackers.
  - Smart clothing/wearables.
- Pets
  - Pet location systems.
  - Smart dog doors.

Healthcare

- In-home patient care.
- Learning models of predictive and preventive healthcare.
- Dementia and elderly care and tracking.
- Hospital equipment and supply asset tracking.
- Pharmaceutical tracking and security.
- Remote field medicine.
- Drug research.
- Patient fall indicators.

Agricultural and Environment

- Smart irrigation and fertilization techniques to improve yield.
- Smart lighting in nesting or poultry farming to improve yield.
- Livestock health and asset tracking.
- Preventive maintenance on remote farming equipment via manufacturer.
- Drones-based land surveys.
- Farm-to-market supply chain efficiencies with asset tracking.
- Robotic farming.
- Volcanic and fault line monitoring for predictive disasters.

Energy

- Oil ring analysis of thousands of sensors and data points for efficiency gains.
- Remote solar panel monitoring and maintenance.
- Hazardous analysis of nuclear facilities.
- Smart electric meters in a city wide deployment to monitor energy usage and demand.
- Real-time Blade adjustment as a function of weather on remote wind turbines.

Smart City

- Pollution control and regulatory analysis through environmental sensing.
- Microclimate weather predictions using citywide sensor networks.
- Efficiency gains and improved costs through waste management service on demand.
- Improved traffic flow and fuel economy through smart traffic light control and patterning.
- Energy efficiency of city lighting on demand.
- Smart snow plowing based on real-time road demand, weather conditions and nearby plows.
- Smart irrigation of Parks and public spaces, depending on weather and current usage.
- Smart cameras to watch for crime and real-time automated AMBER alerts.
- Smart parking lots to automatically find best space parking on demand.
- Bridge, street, and infrastructure wear an usage monitors to improve longevity and service.

Let's see some examples

Smart Home

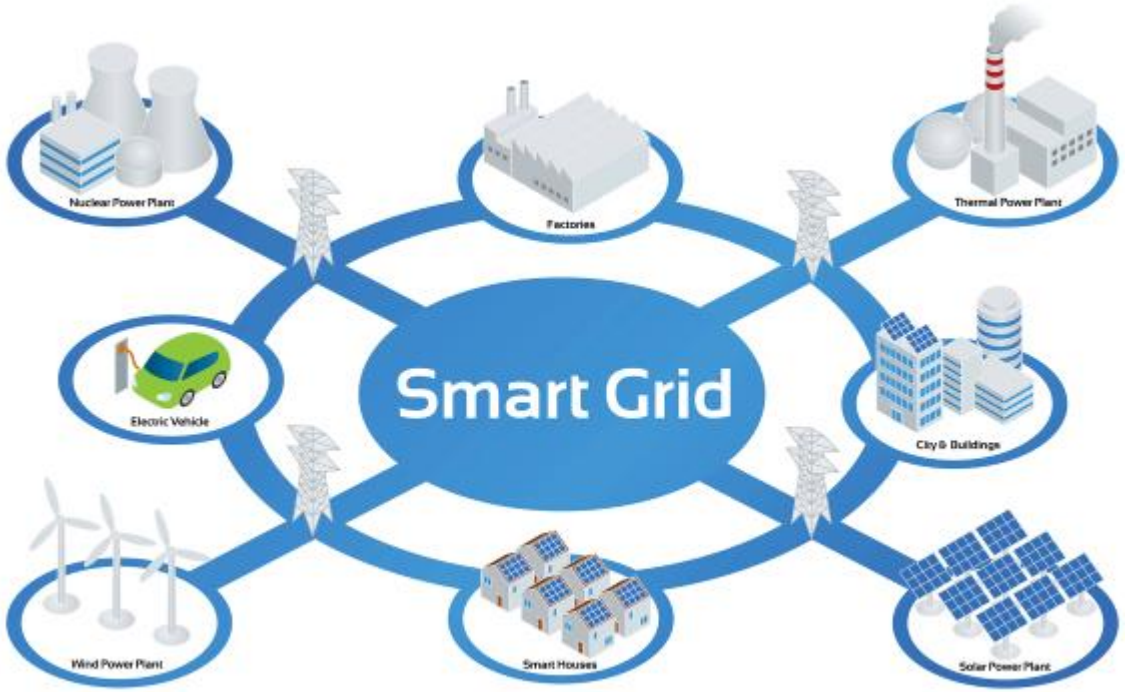
- Remote Monitoring/Control (Appliances)
- Safety
  - When do the doors open/close?
- Energy Management
  - Turn off the lights/AC?
- Maintenance
  - Are the sinks/pipes leaking?
- Entertainment Control
- ….

Smart Home – The Potential

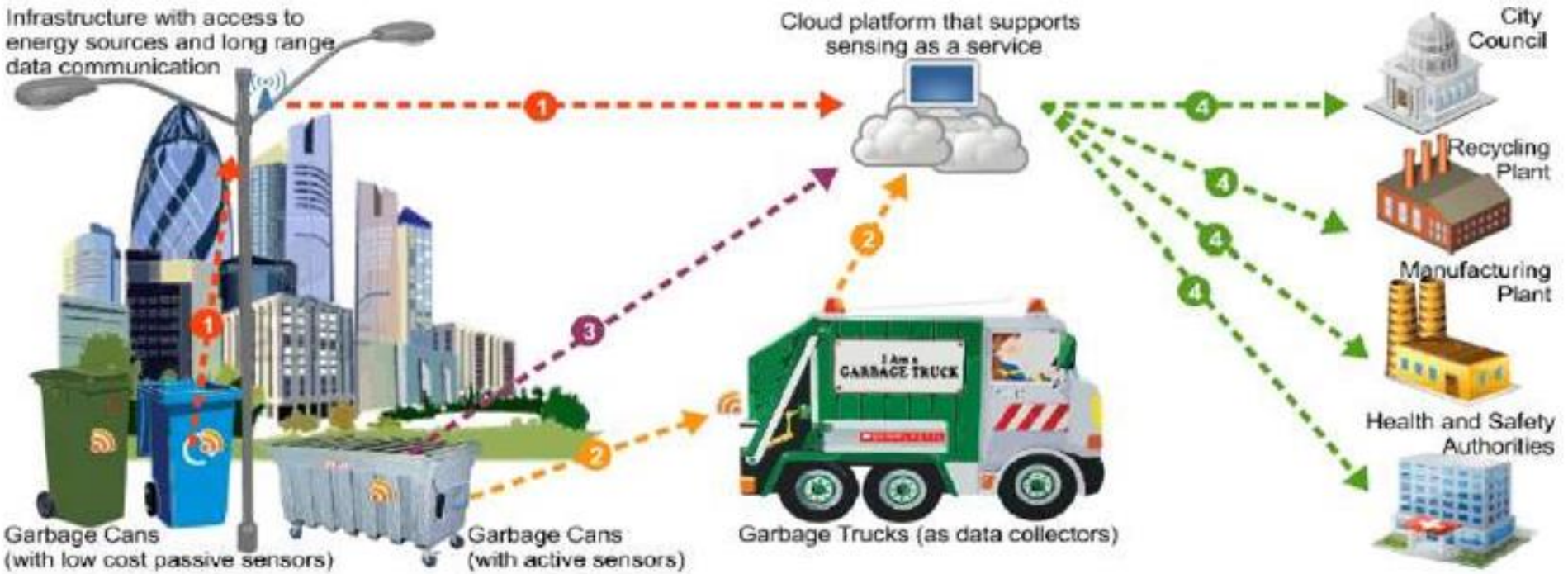
- Air conditioning - 30% energy saving
  - From analog to digital
  - From AC to BLDC control
- Refrigerator – 40% energy saving
  - From on-off control to PWM
- Light and dimming – 25% energy saving
  - From on-off ligth to PWM dimming
- Washing machine – 40% energy saving
  - From class D to class A++
- Electronic lighting – 80% energy saving
  - From bulb lamps to tube lamps and LED
- Digital consumer power supply – 77% energy saving
  - Increasing efficiency above 98% in run mode
  - Decreasing stand-by power to < 1mW

Smart Grid

- Utility companies use IoT to improve
  - asset performance
  - reduce costs
  - infrastructure management,
  - lower supply chain risks and
  - empower employees and consumers
  - More efficient and proactive maintenance

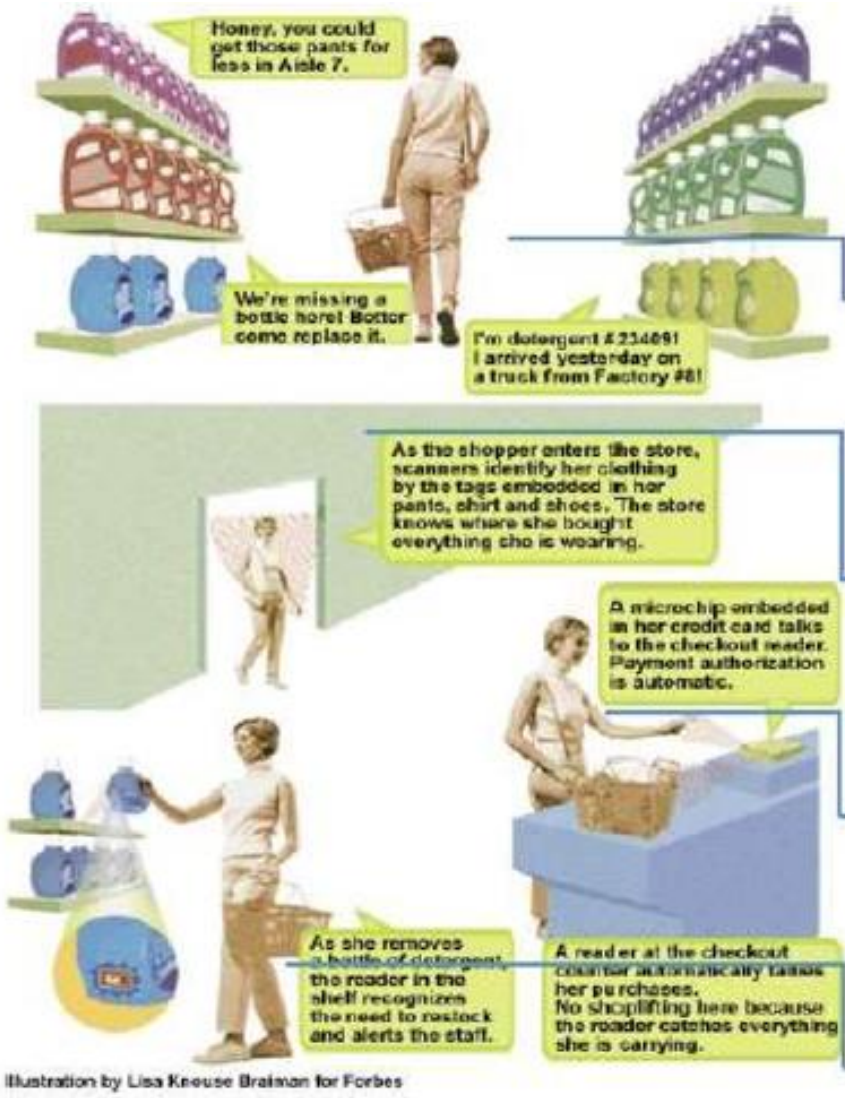


Waste Management in Smart Cities



[Source: "Sensing as a Service Model for Smart Cities Supported by Internet of Things", Charith Perera et. al., Transactions on Emerging Telecommunications Technology, 2014]

Smart Shopping



(2) When shopping in the market, the goods will introduce themselves.

(1) When entering the doors, scanners will identify the tags on her clothing.

(4) When paying for the goods, the microchip of the credit card will communicate with checkout reader.

(3) When moving the goods, the reader will tell the staff to put a new one.

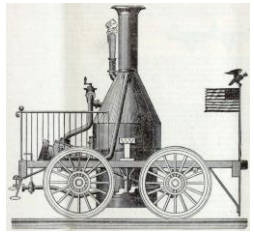
Smart Health

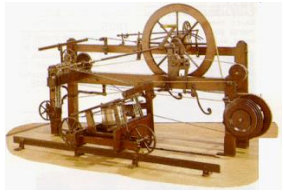
How many steps have you walked today?

Smart Health – How Well Do I Sleep?

Industry 4.0

The Industrial Revolutions





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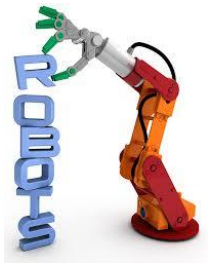
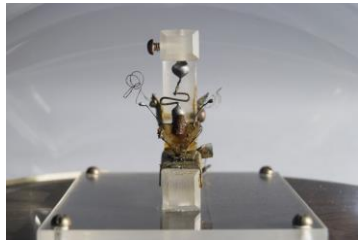
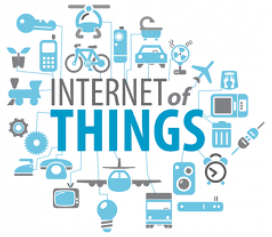
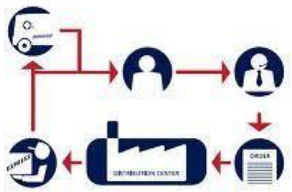




3.0



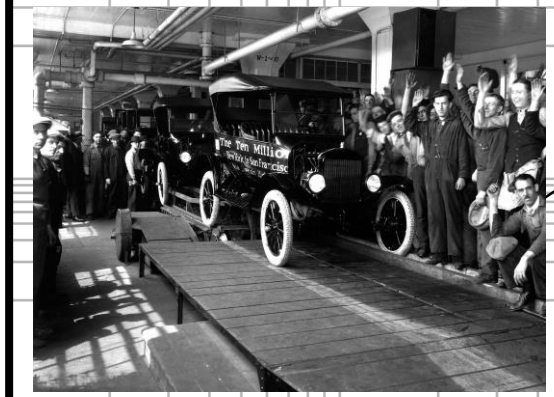


4.0

Industry 1.0 Through 3.0 Explained

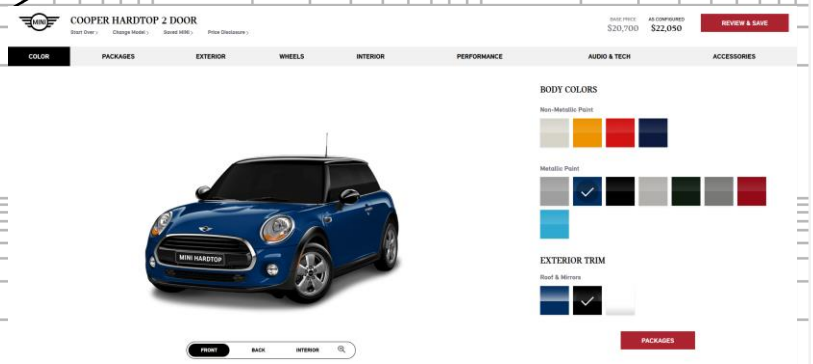
From (1.0) Benz Patent-Motorwagen (25 Configurations, 25 Cars Manufactured)
To (3.0) Mini (10 Million Configurations, 3 Million Cars Manufactured)

# of Cars Manufactured



Industry 2.0
1 Configuration
16M Manufactured

Industry 3.0
10M Configurations
3M Manufactured

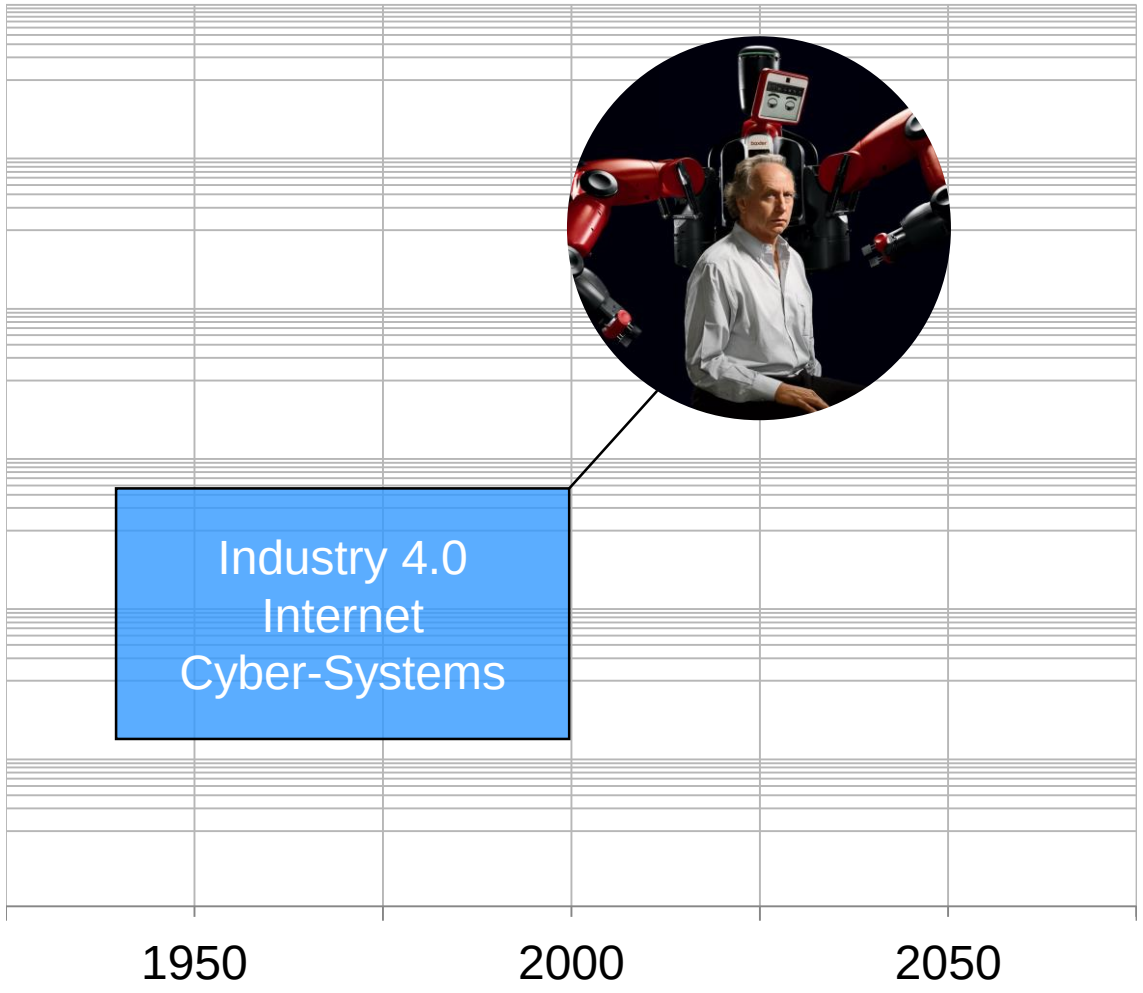


Industry 1.0
25 Configurations
25 Manufactured

# of Different Configurations

Industrial Revolutions

*(4.0) Everywhere, Everything (*Smart* Everything), Autonomous Systems*
Man-Machine Interoperability



"**The essence of the industry 4.0 vision**, the internet of things, **is the ubiquitous connection of people, things and ma-chines**. This connection is intended to produce a variety of new goods and services. Products, means of transport, or tools are expected to negotiate within a virtual marketplace regarding which production elements could best accomplish the next production step. This would create a seamless link between the virtual world and the physical objects within the real world."

Source: D. Wegener, Siemens, Industry 4.0 Project Coordinator, 2015

Industry 4.0 Explained

Durum Wheat Semola + Water + 3D-Printer at Home + 3D-Design from the Internet
Indeed, a Great Deal of Opportunity!

Source: https://www.youtube.com/watch?v=oz6D1FXwuvA, Barilla, EXPO 2015

Similar Concepts

- Industrial Internet
- Smart Factory
- Factories of the Future
- Industry 4.0
- Advanced Manufacturing

Smart Industry – Main Trends

- Next level of automation with distributed control.
- Safer work environment and new models of human-machine interaction.
- Greater energy efficiency for industrial machinery.
- Capture and exploitation of manufacturing data.
- Artificial intelligence and machine learning

Mining 4.0

Autonomous Haulage System (Driverless Trucks)

~ 70 Trucks, > 4 Million Kilometers Driven, > 400 Million Tons Iron Ore Hauled

Pilbara, Western Australia; Source: G. Lilleyman, Rio Tinto, 2015

Mining 4.0

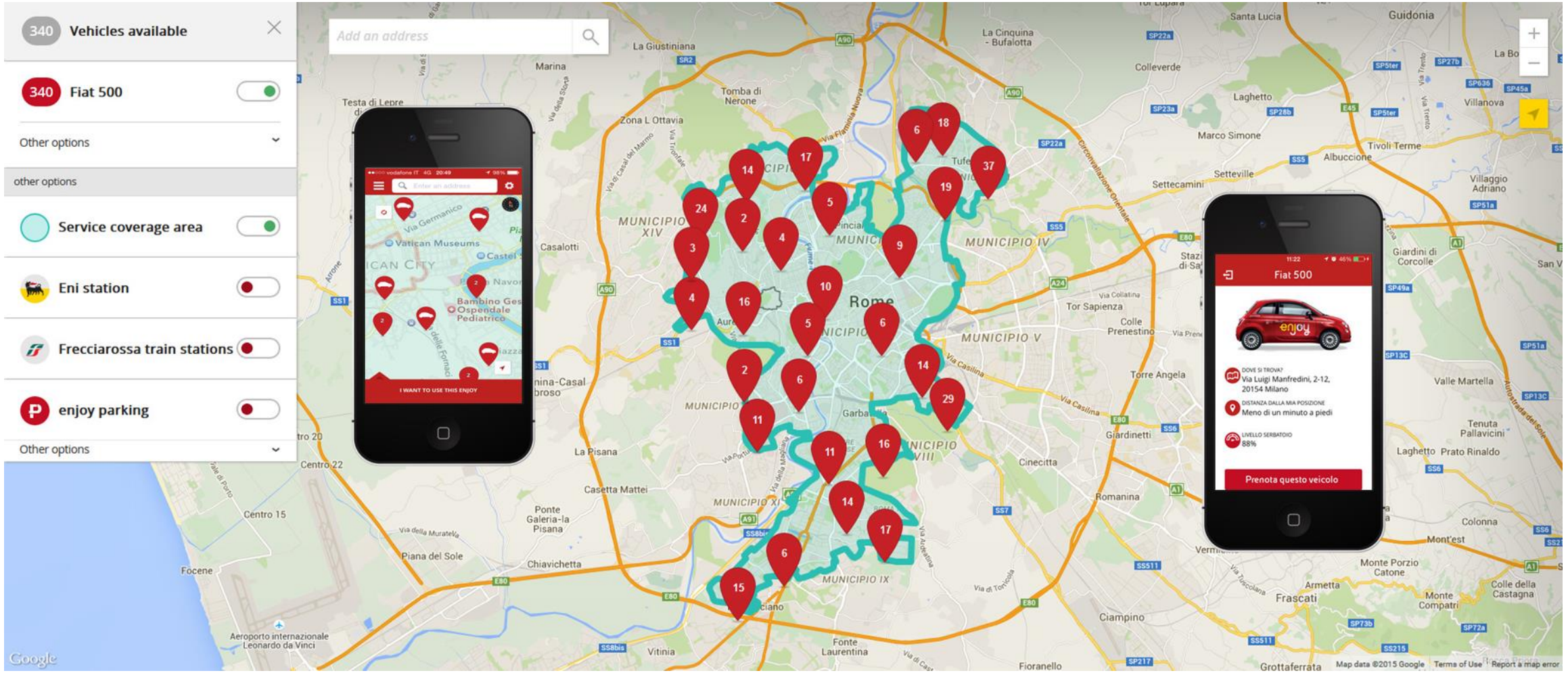
AutoHaul® (Driverless Trains)

2,000 Km, 190 Locomotives, > 350 Million Tons Iron Ore Hauled per Year

Pilbara, Western Australia; Source: G. Lilleyman, Rio Tinto, 2015

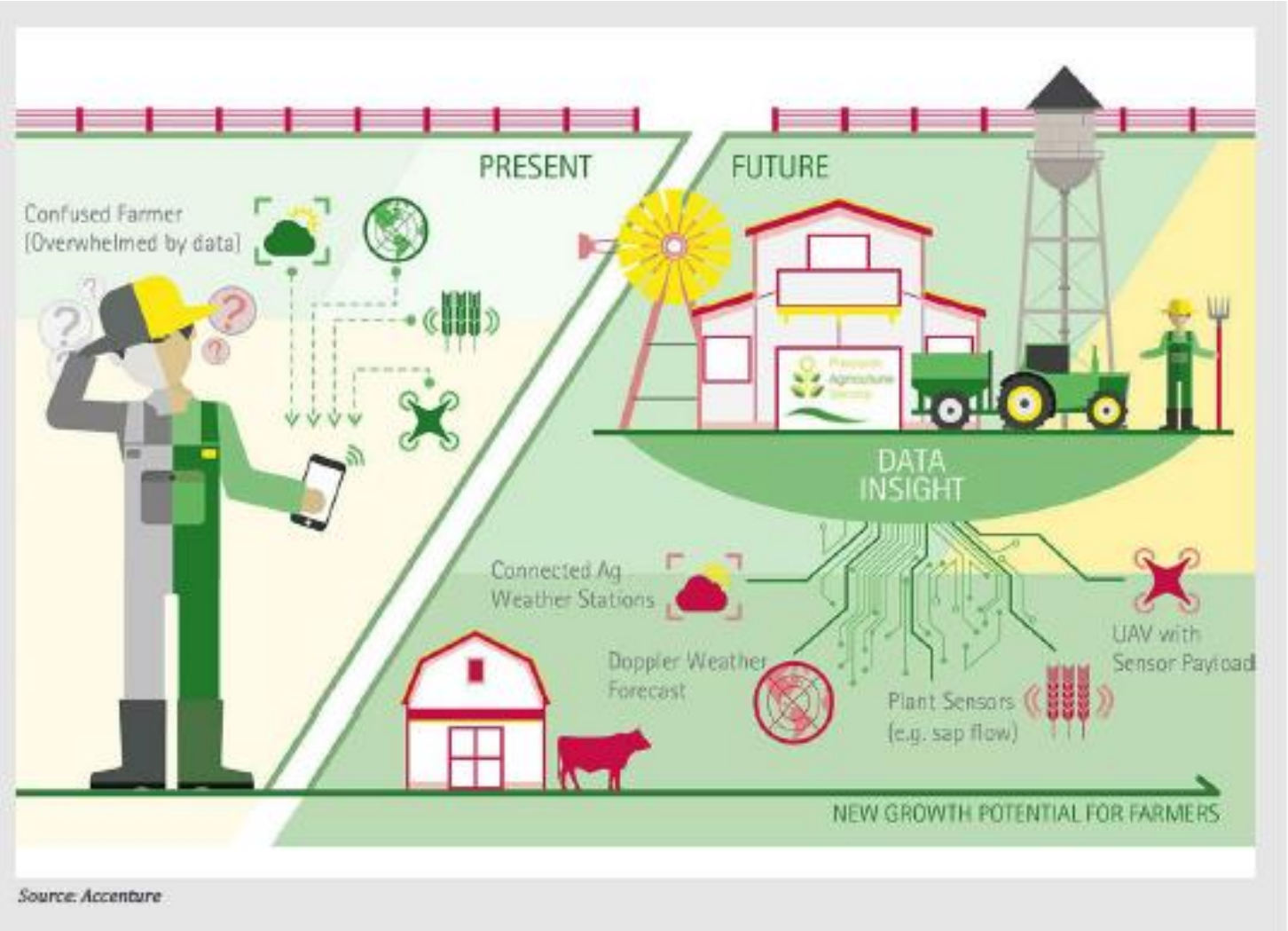
Transportation 4.0

Car Sharing in Rome, Italy (1 Car per 100 Customers)
Enjoy Is in the Cloud, Your Smartphone App Is on the Edge, and the Car Is the “Thing”



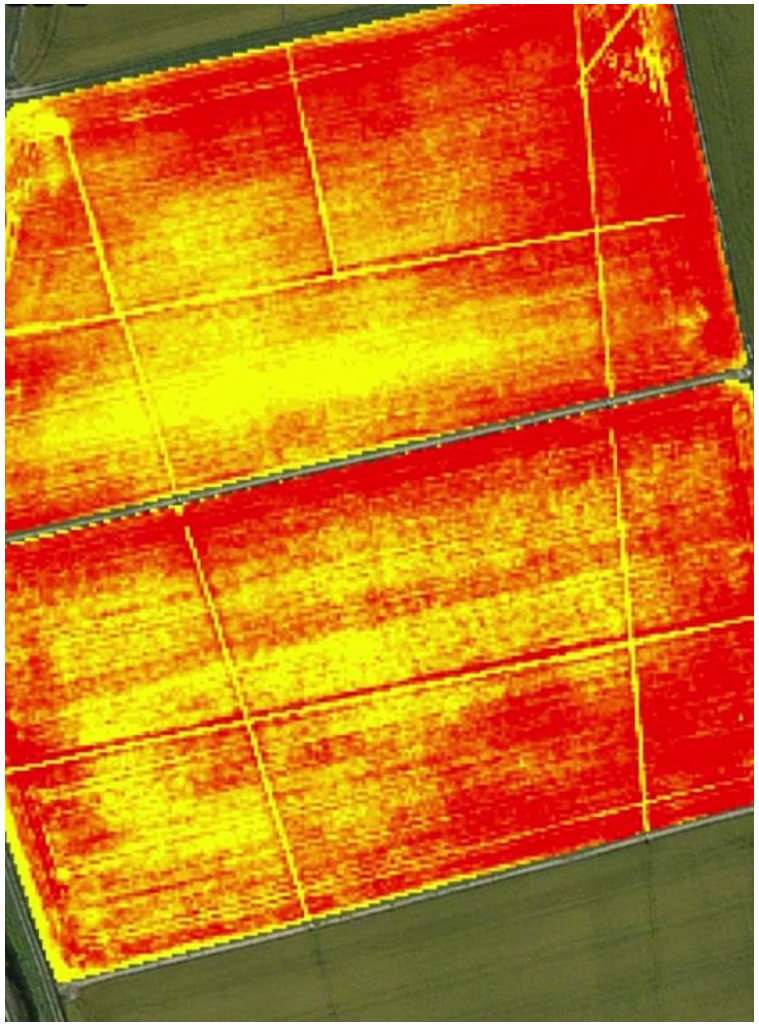
Source: Enjoy, 2015

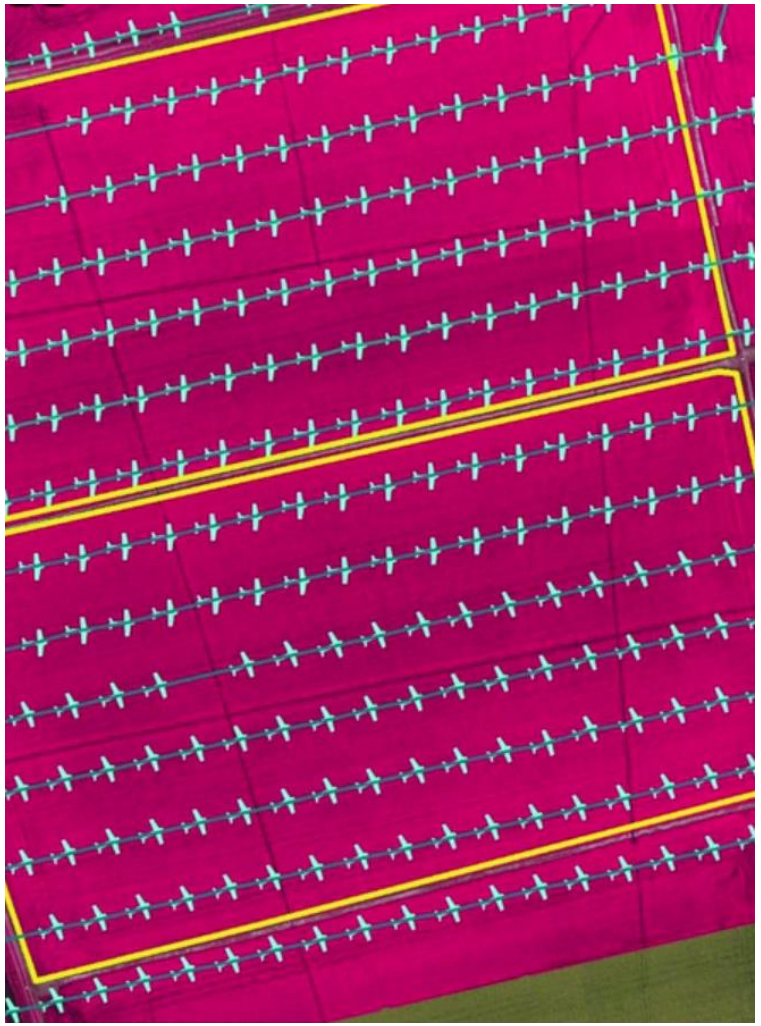
Agriculture 4.0

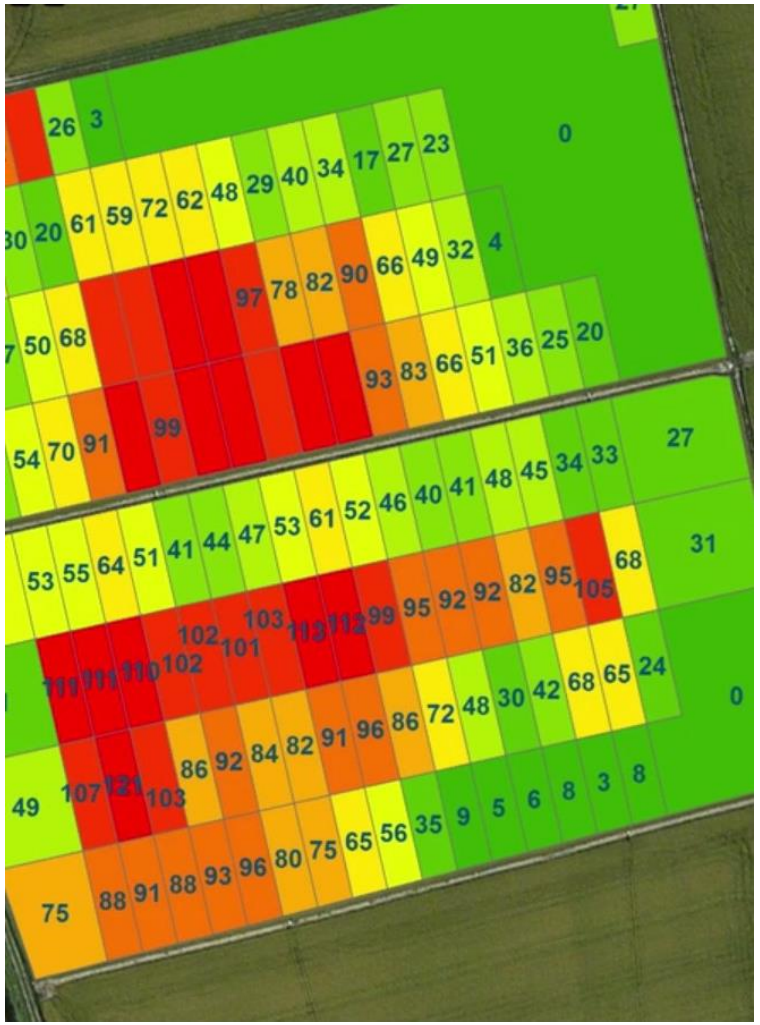


Agriculture 4.0

30% Fertilizer Reduction, Higher Yield, Better Quality
IR Camera + MCU + RF +… Airborne + Variable Rate Fertilization



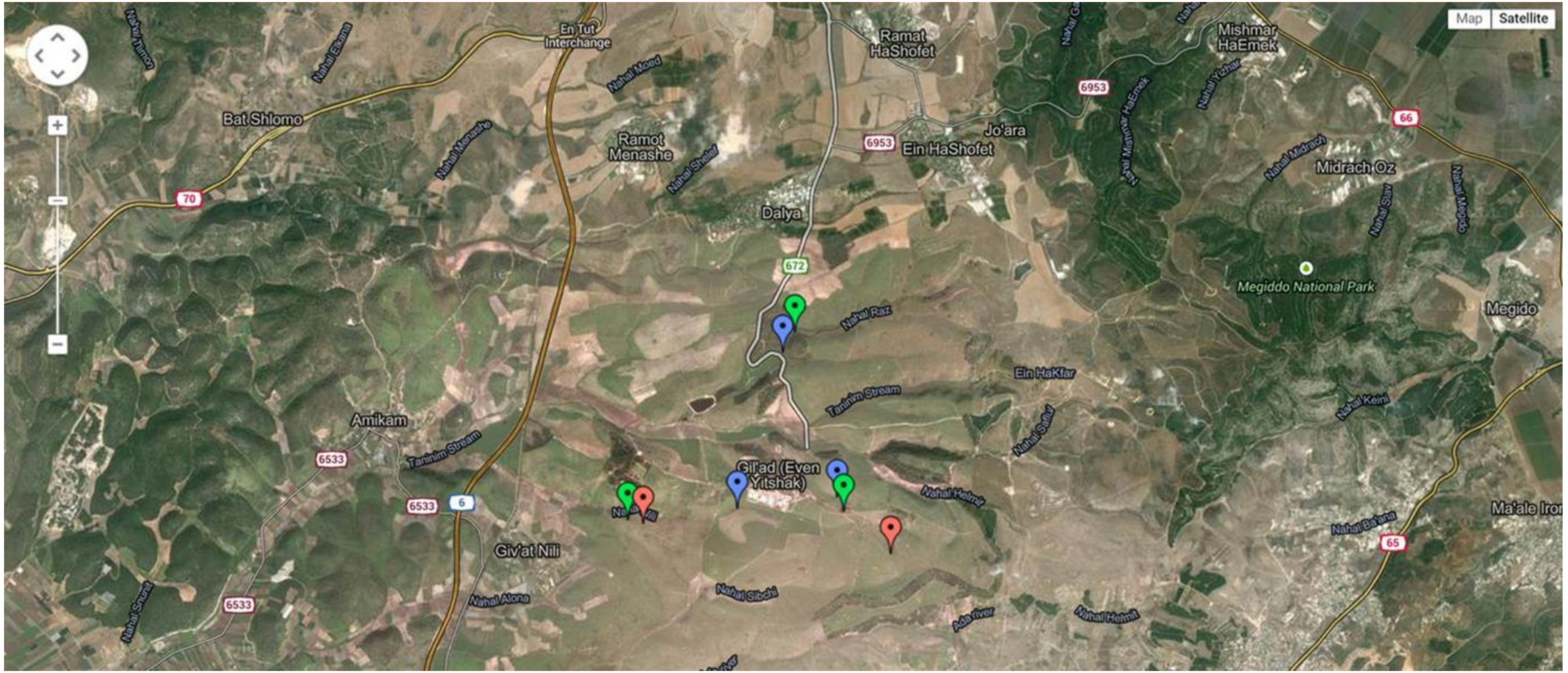




Source: Salt & Lemon Srl + A.C.R. Progetti Srl + Studio Associato Barbieri & Rognoni, 2016

Breeding 4.0

Monitoring Cows near Gal'ed (Even Yitzhak), Israel
MCU + Sensors + GPS + RF + Solar Panels +… Google Maps



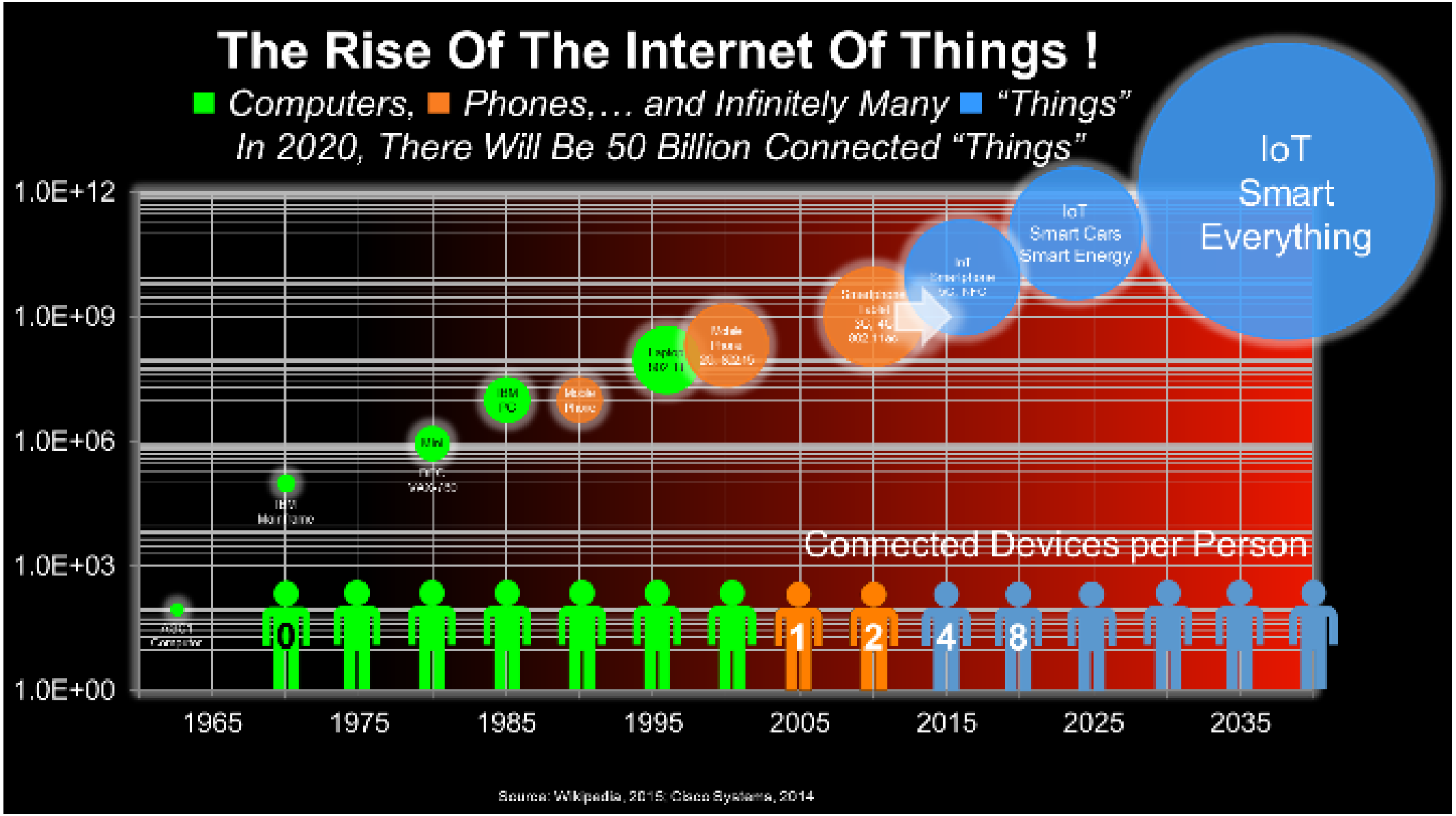
Courtesy of A. Gat, Moonitor Cows, Israel, 2015

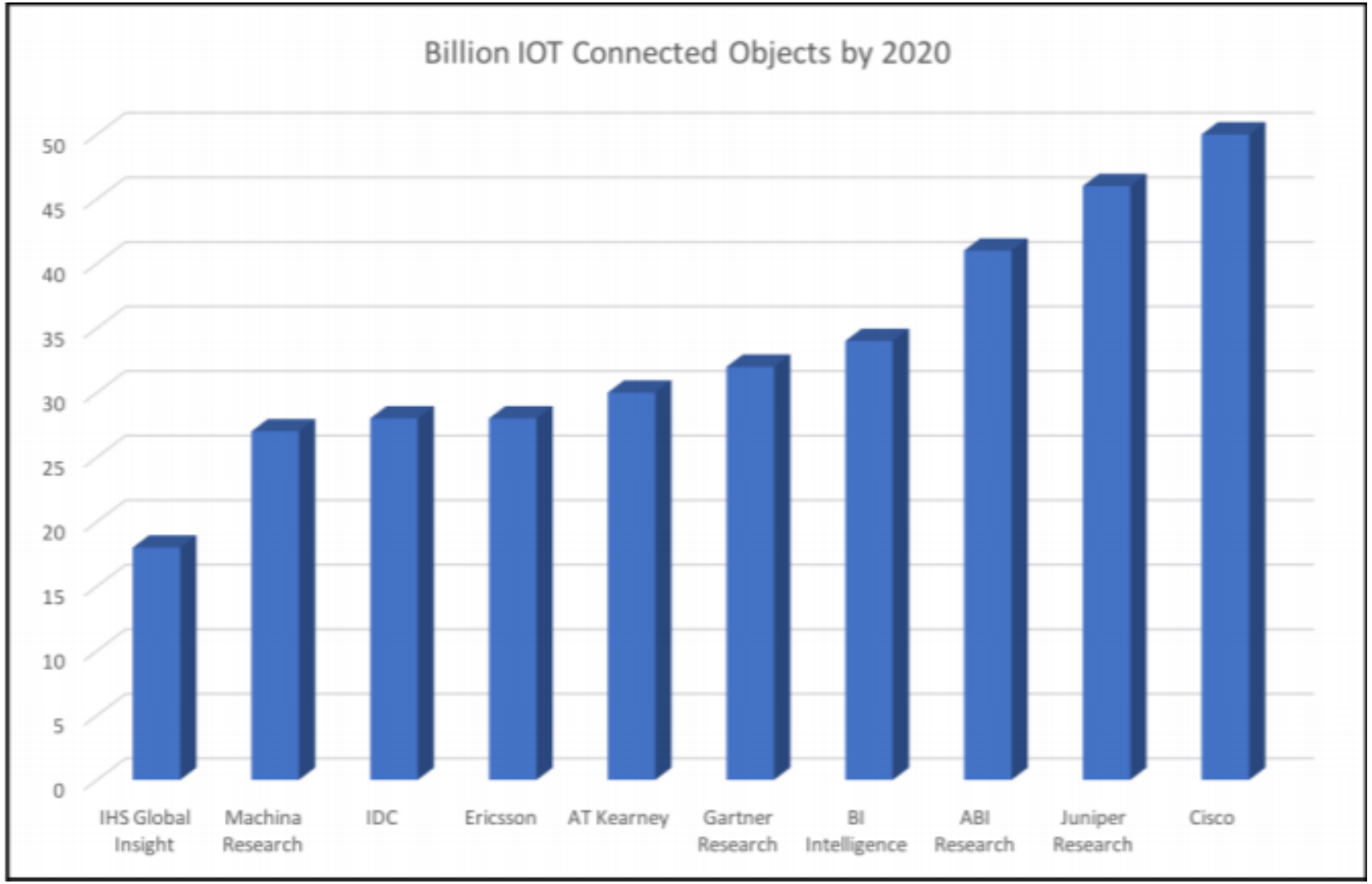
2019 Trends

- Industrial and commercial applications Will drive the industry, not consumers.
- The Edge will be far more important that people realize.
- Machine “pishing” Will become a more urgent concern.
- Real-time data Will grow in importance.
- Smart equipment Will begin to get momentum.
- Rules and business practices for data sharing Will start to gel.
- Traditional businesses Will develop new business models out of IoT.
- IoT projects Will have to hit their numbers.
- IT (information technology) will meet OT Operation technology).

Fuente: “9 top IoT trends for 2019”, Chris Nelson, 20 marzo 2019

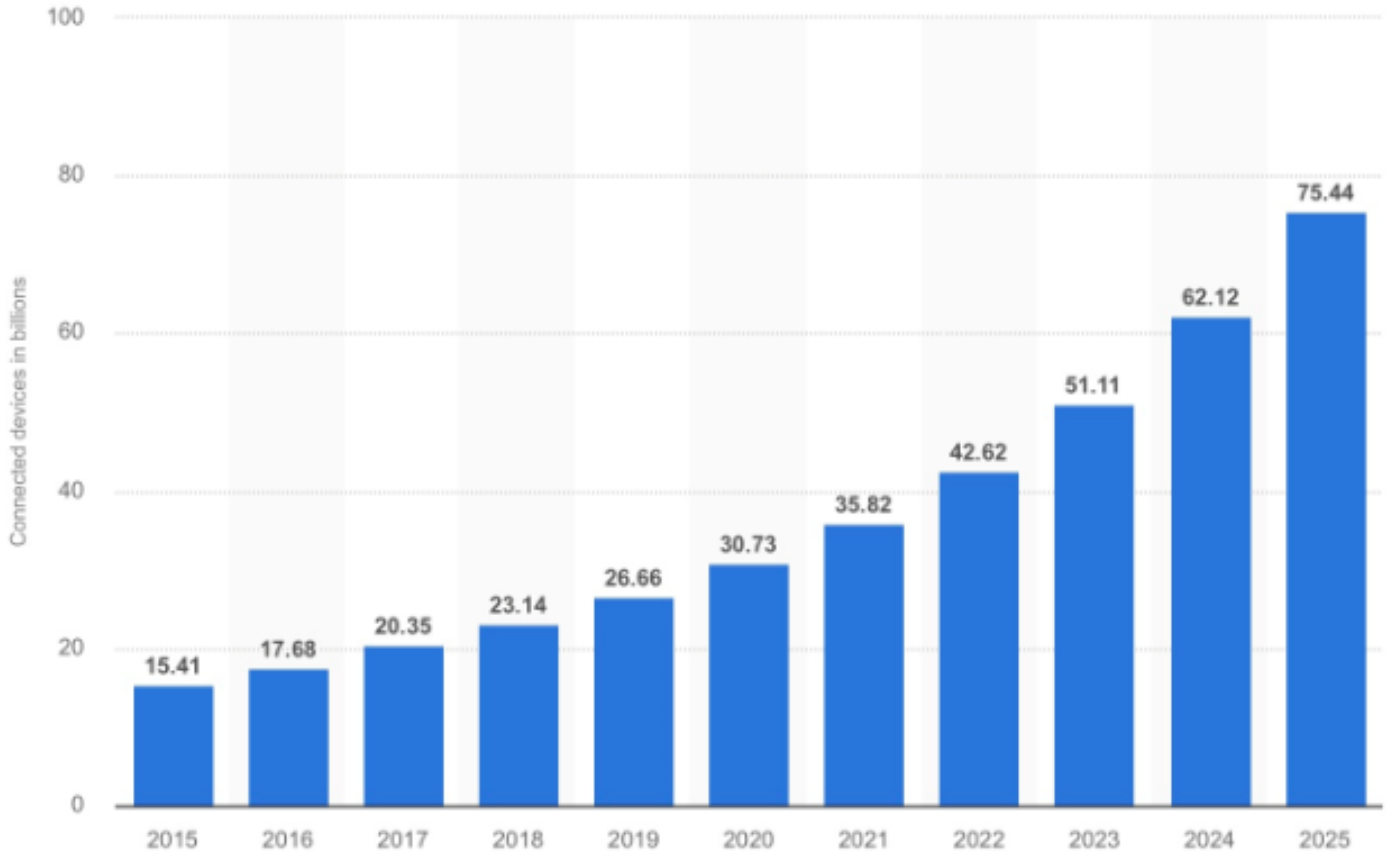
Market Predictions

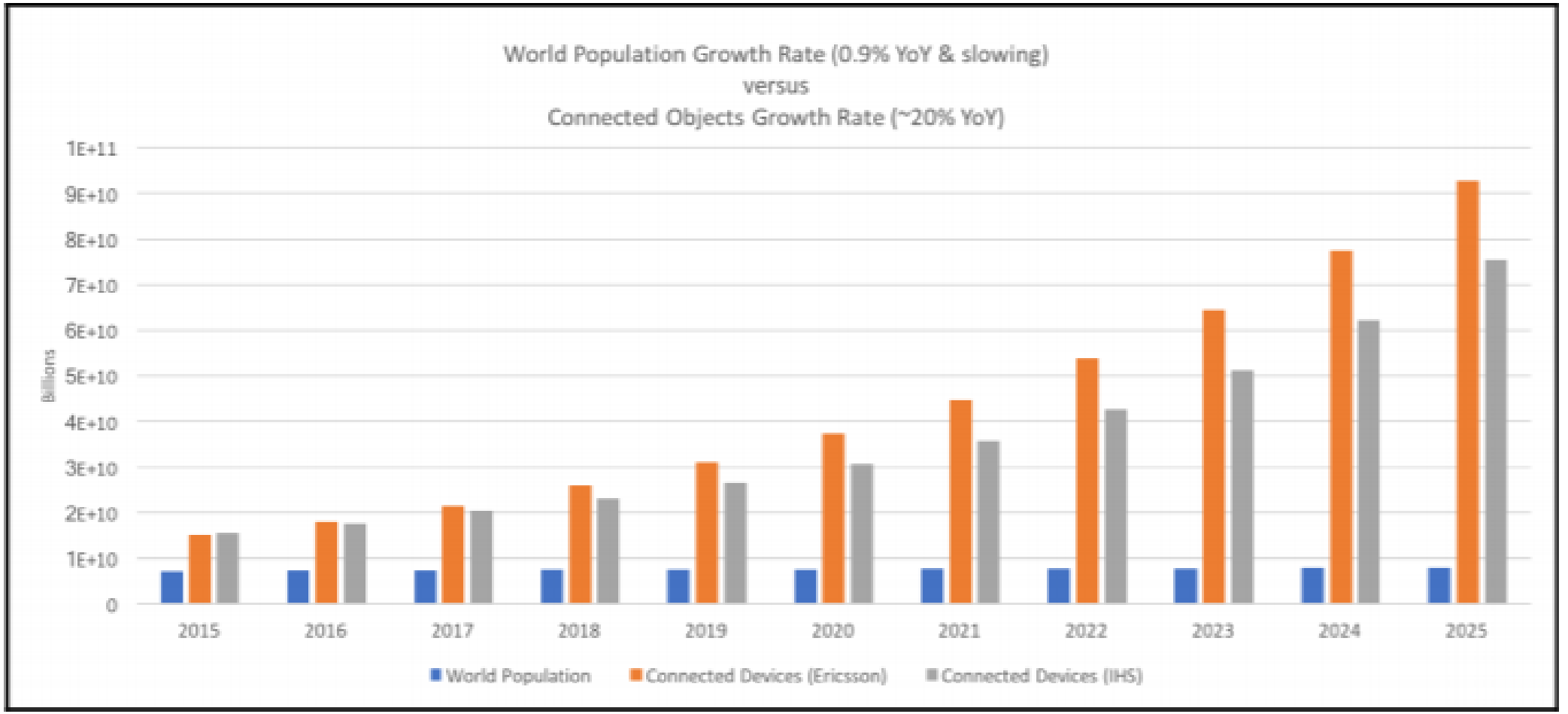




Source: Internet of Things for Architects, Perry Lea, Packt, 2018

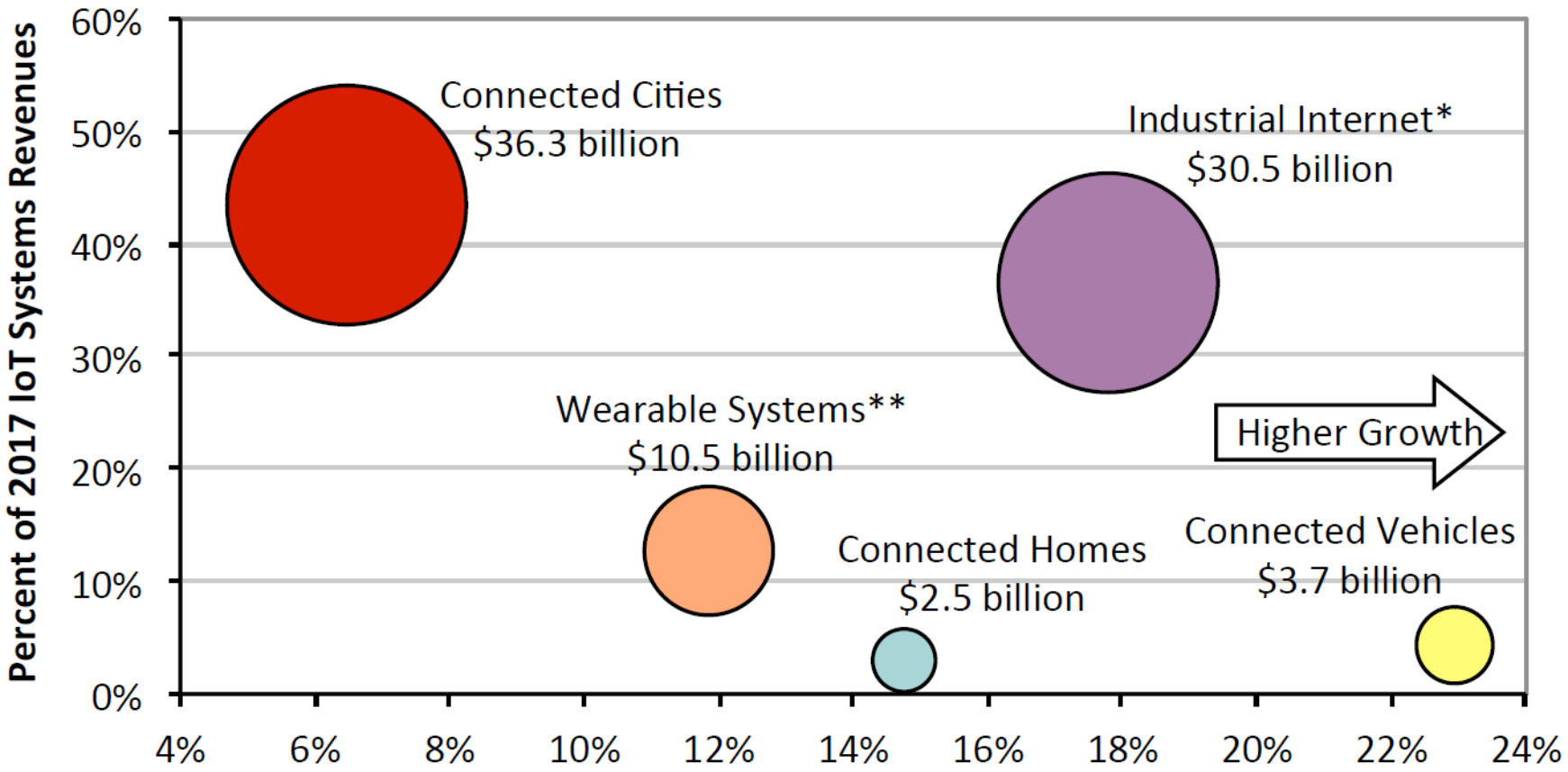
IoT Connected Devices Installed Base Worldwide From 2015 To 2025 (in billions)





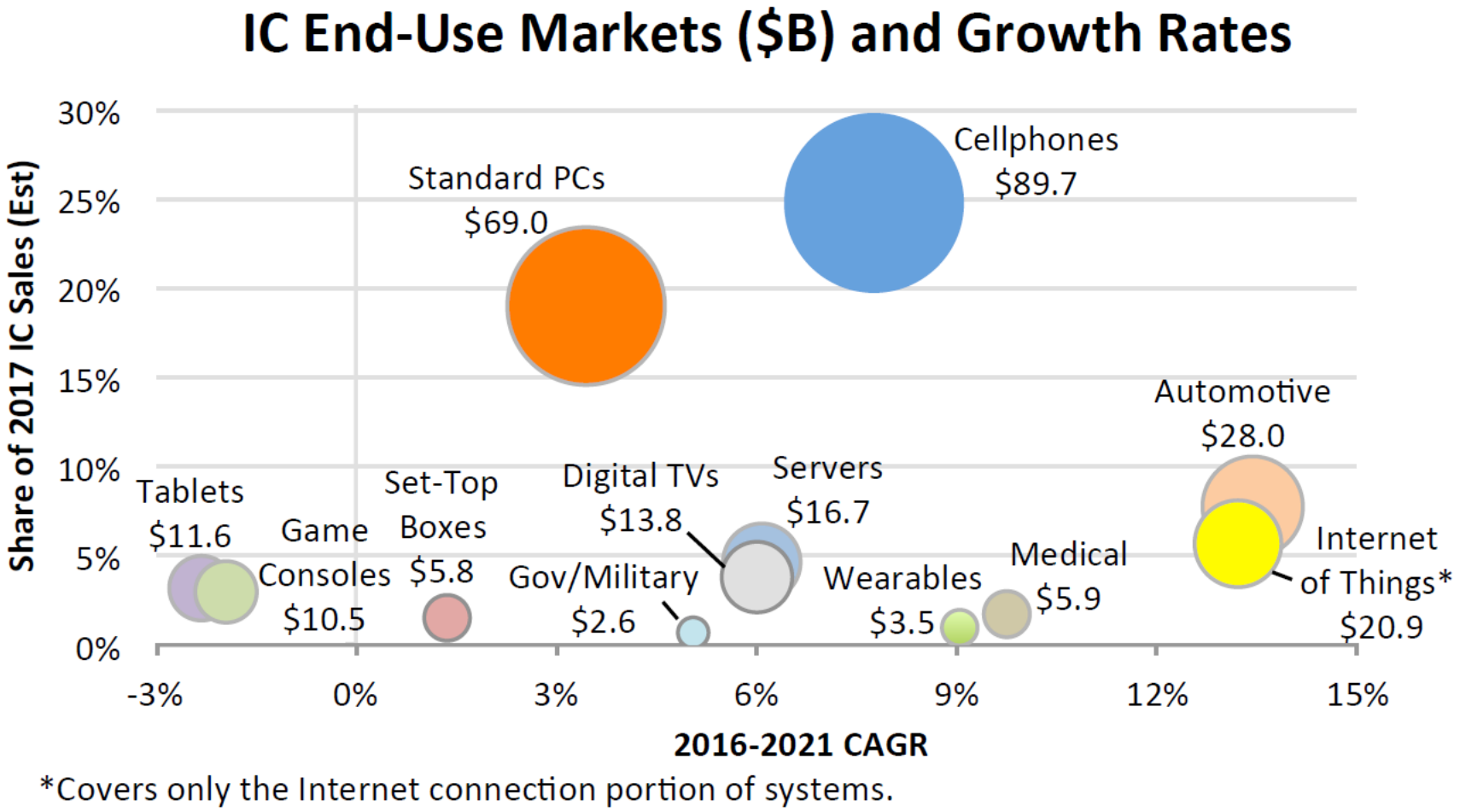
Source: Internet of Things for Architects, Perry Lea, Packt, 2018

Internet of Things Systems Sales & Growth Rates (2016-2021F CAGR)



Source: IC Insights, IC Market Drivers 2018 Update, June 2018

IC End-Use Systems Markets ($B) and Growth Rates



Source: IC Insights, IC Market Drivers Report 2018, December 2017

Interesting Data

- Enterprises that have adopted IoT
  - Decreased supply chain by more than 20%.
  - Increased productivity by 10% to 20%.
  - Reduced time to market by 20% to 50%.
- According to Cisco survey
  - 26% of companies consider their IoT initiative a success.
- According to Cognizant Center for the Future of Work
  - 60% of IoT executives said that IoT adds complexity to their IT infrastructure

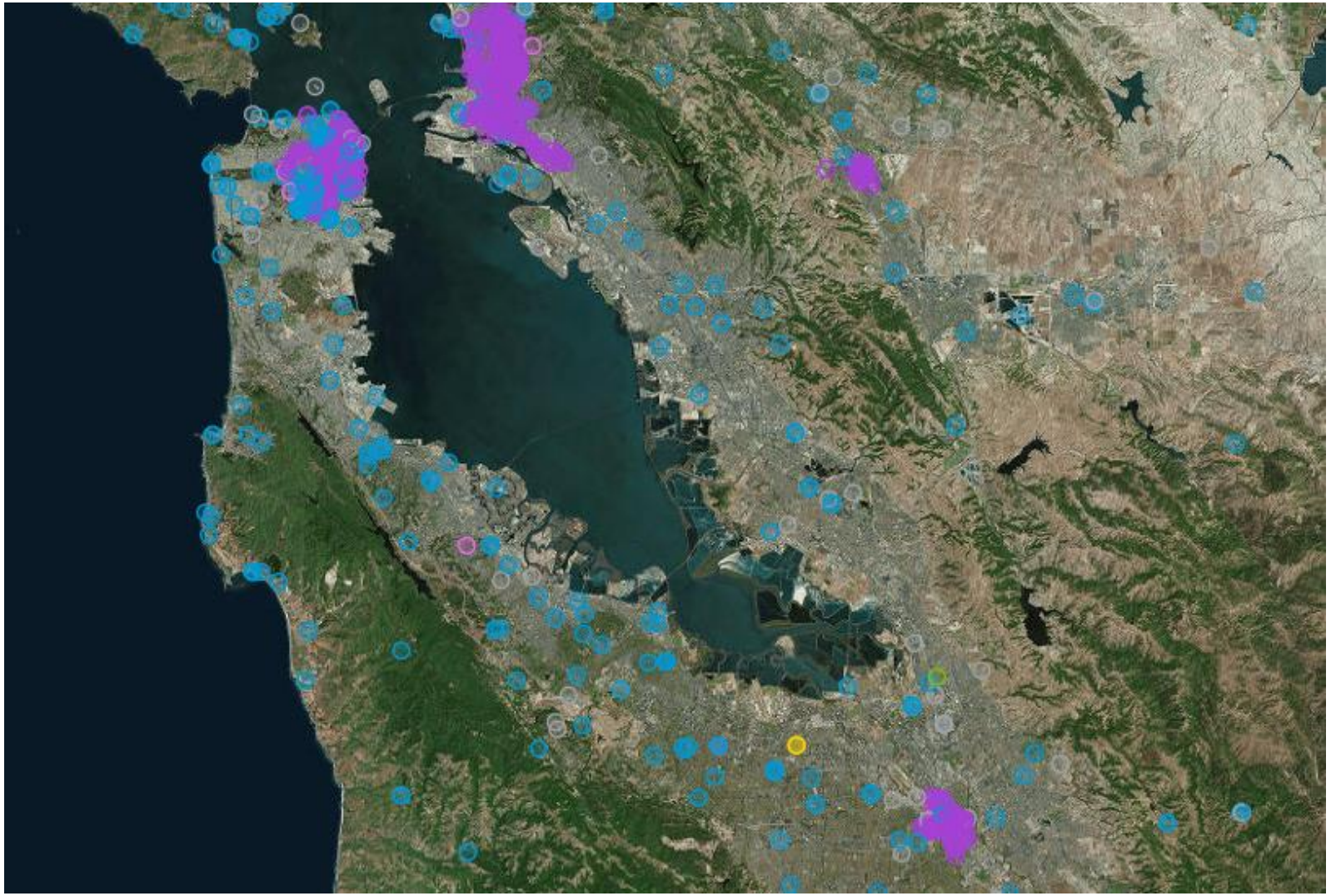
Interesting Facts

- 96% of companies work with infrastructure, hosting and data processing facilitated by a major provider of cloud computing.
- During 2019 45% of the information generated by the IoT solutions will be processed, stored, analyzed, and reacted at the "edge" of the network.
- The "gadgets" will produce about 2.5 trillion bytes daily.
- To reduce the traffic of data in the network, companies must analyze the important IoT data in the "edge". Only the state should be sent to the cloud.

The Rise Of The Internet Of Things !

Silicon Valley, CA, USA, Connected Things Map

Energy, Environment, Home, Transportation,…



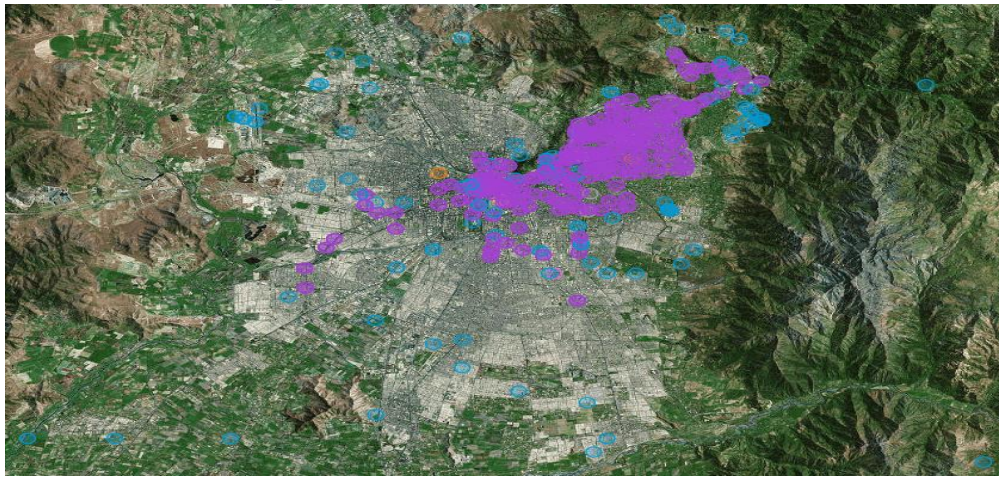
Source: Thingful Ltd., 2017

The Rise Of The Internet Of Things !

What about us?

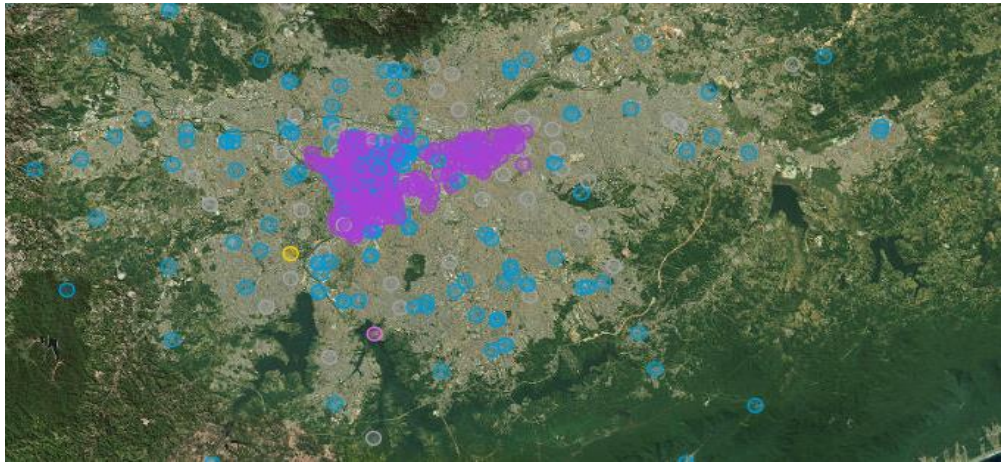
- *Energy,*
- *Environment,*
- *Home,*
- *Transportation,…*

Lima



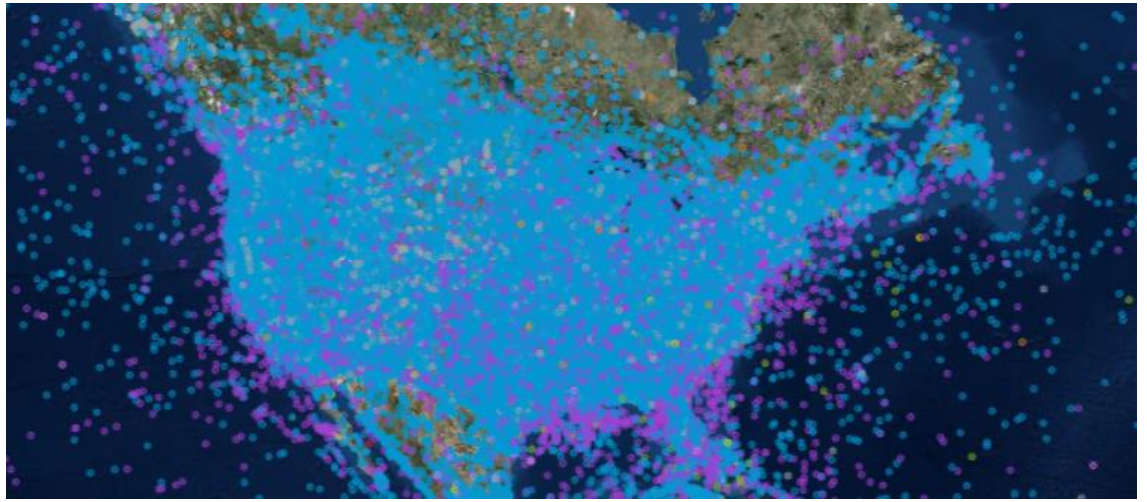
Santiago

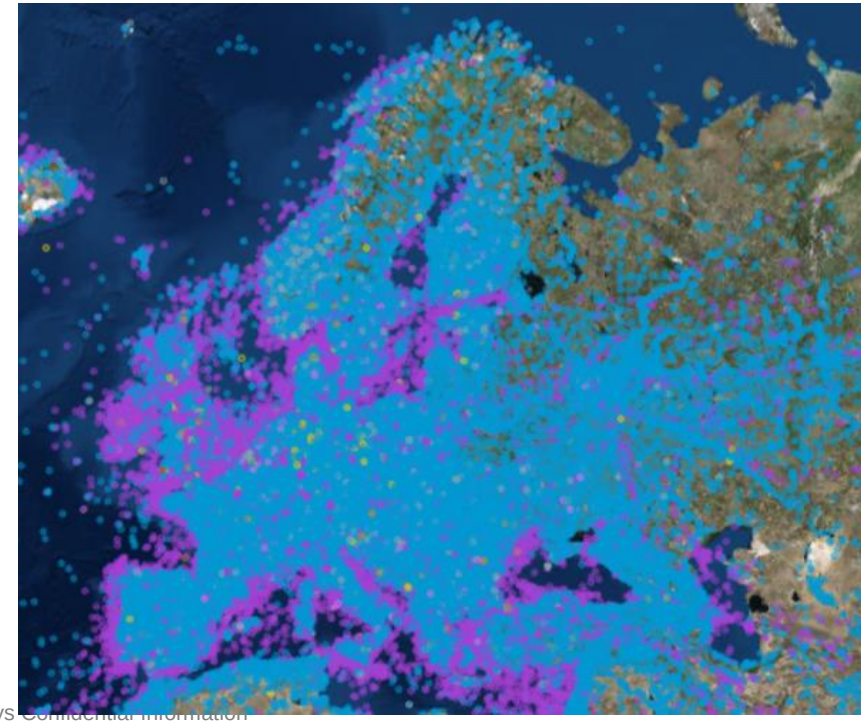
Buenos Aires



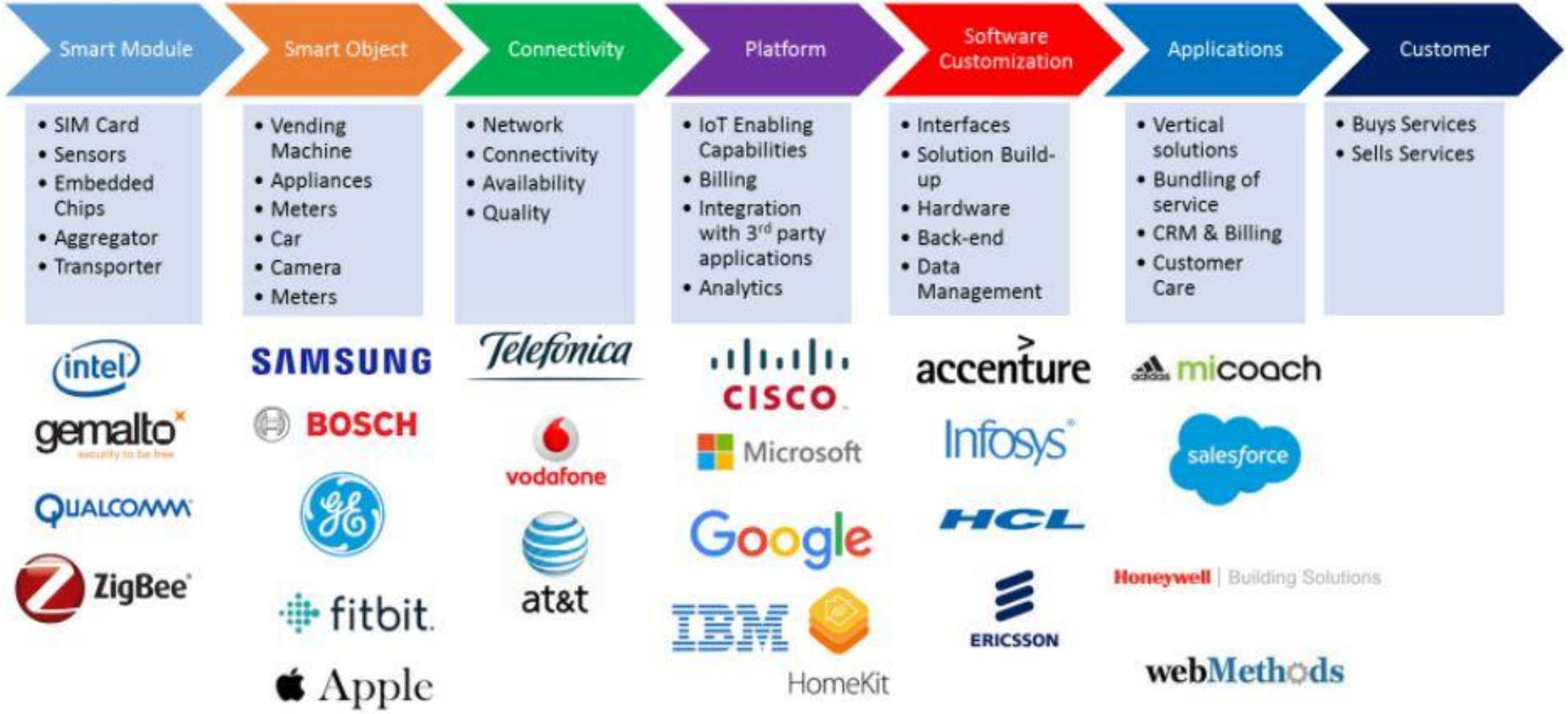
Sao Paulo

Source: Thingful Ltd., 2017





Internet of Things Value Chain

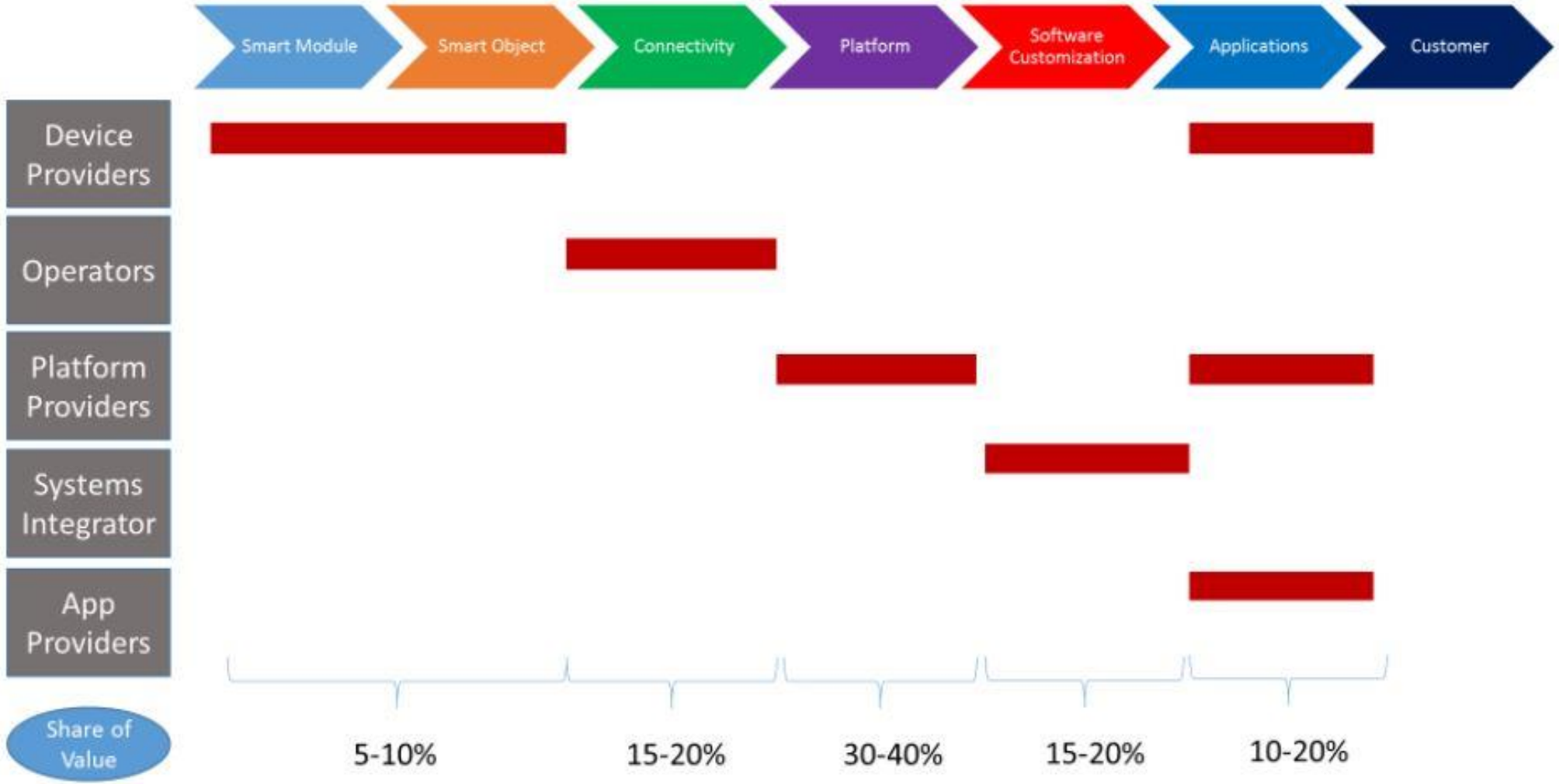


Note, the above is not an exhaustive list of companies and any company may have play in more than one component of value chain

Copyright: Telecomcircle.com

Source: Internet of Things – Business Models, Mohit Agrawa, March 2017

Who leads IoT?



Source: Internet of Things – Business Models, Mohit Agrawa, March 2017

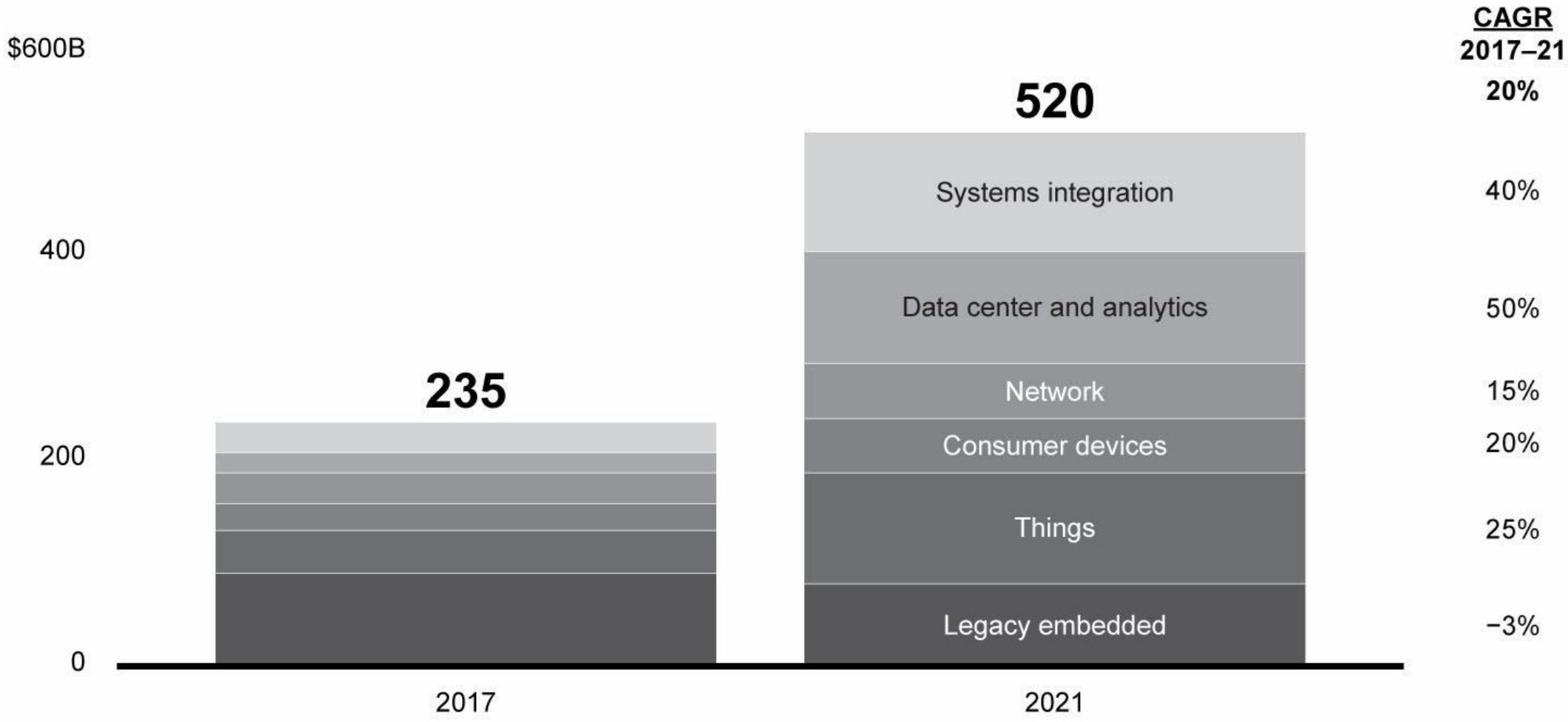
85% of firms will implement or plan to implement IoT solutions

B2B applications of the technology are set to take off in 2019 (Iiot)

Industrial manufacturing, healthcare, retail, and utilities

Source: Forrester – Predictions 2019

IoT and analytics revenue

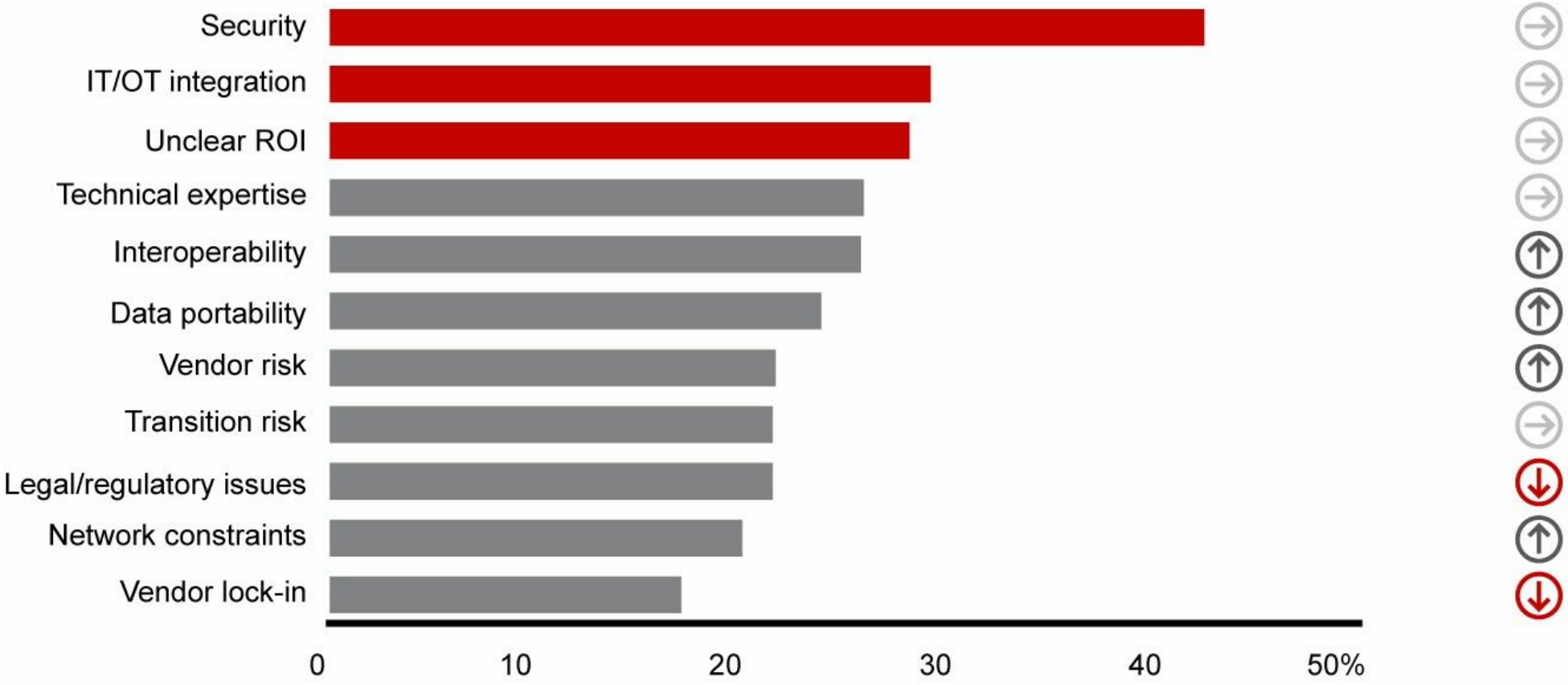


Sources: Gartner; IDC; Harbor; Cisco; Ericsson; Machina Research; Ovum; Bain analysis; market participant interviews

What are the most significant barriers limiting your adoption of IoT/analytics solutions?

Change since 2016

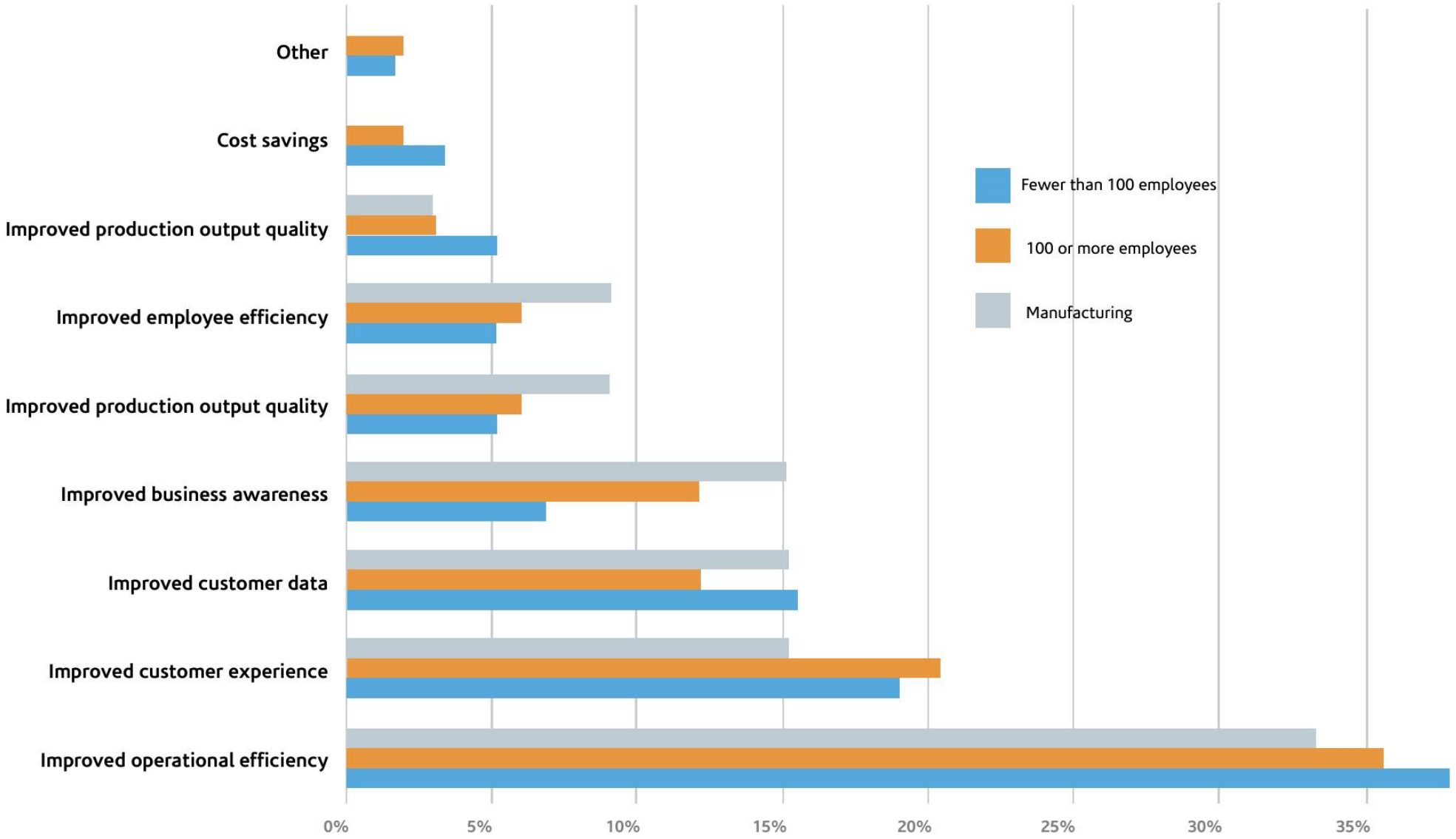
Percentage of respondents (top three barriers)



Sources: Bain IoT customer survey, 2016 (n=533); Bain IoT customer survey, 2018 (n=627); market participant interviews

Primary benefits

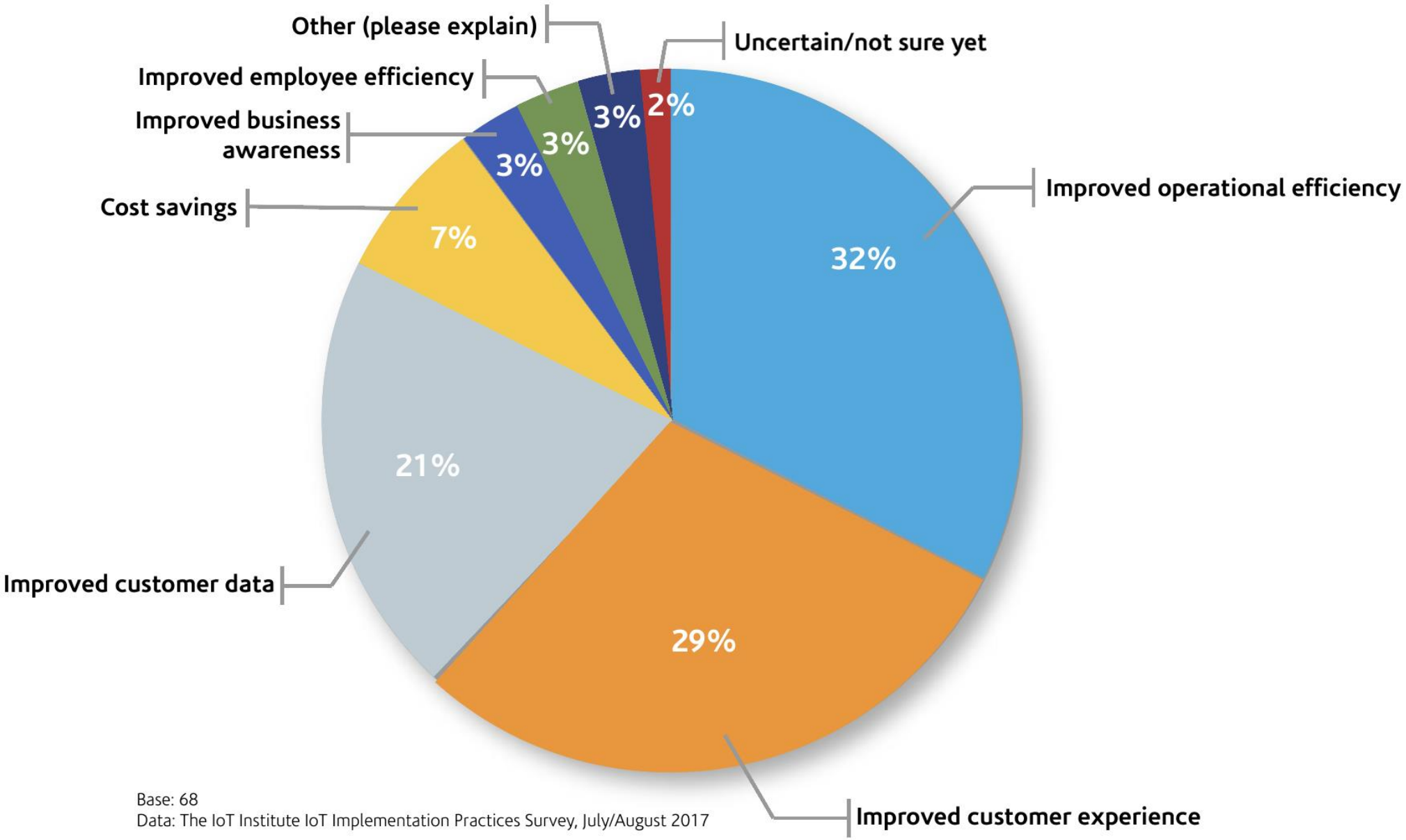
What would you consider the primary benefit of this production-scale IoT project?



Base: 58 (fewer than 100 employees), 98 (100 or more employees) and 33 (manufacturing)
Data: The IoT Institute IoT Implementation Practices Survey, July/August 2017

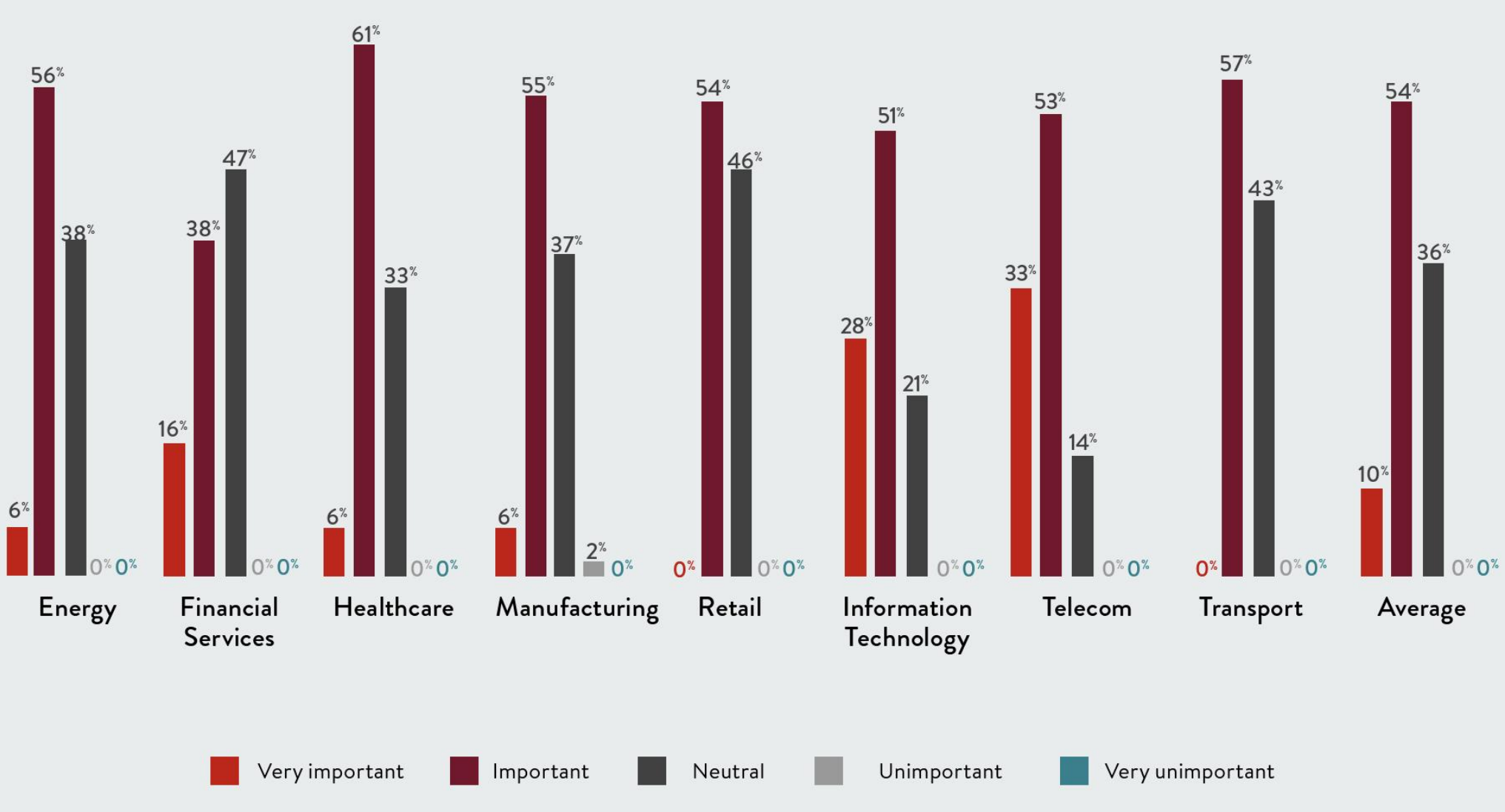
Expected benefits (projects being researched)

What do you anticipate would be the primary benefit of this IoT project your company is actively researching?



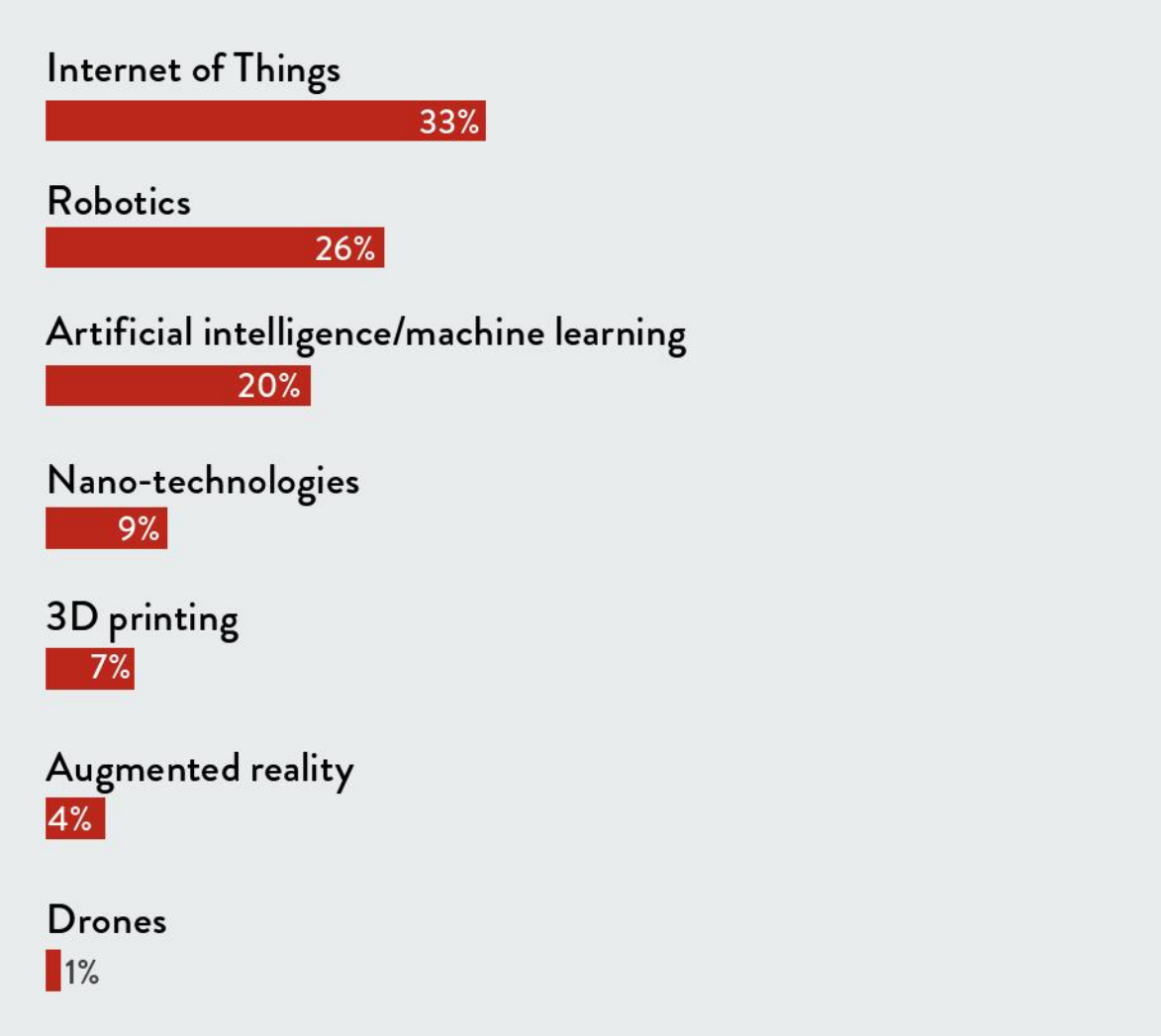
Base: 68
Data: The IoT Institute IoT Implementation Practices Survey, July/August 2017

How Important is the IoT to your Company's Business?



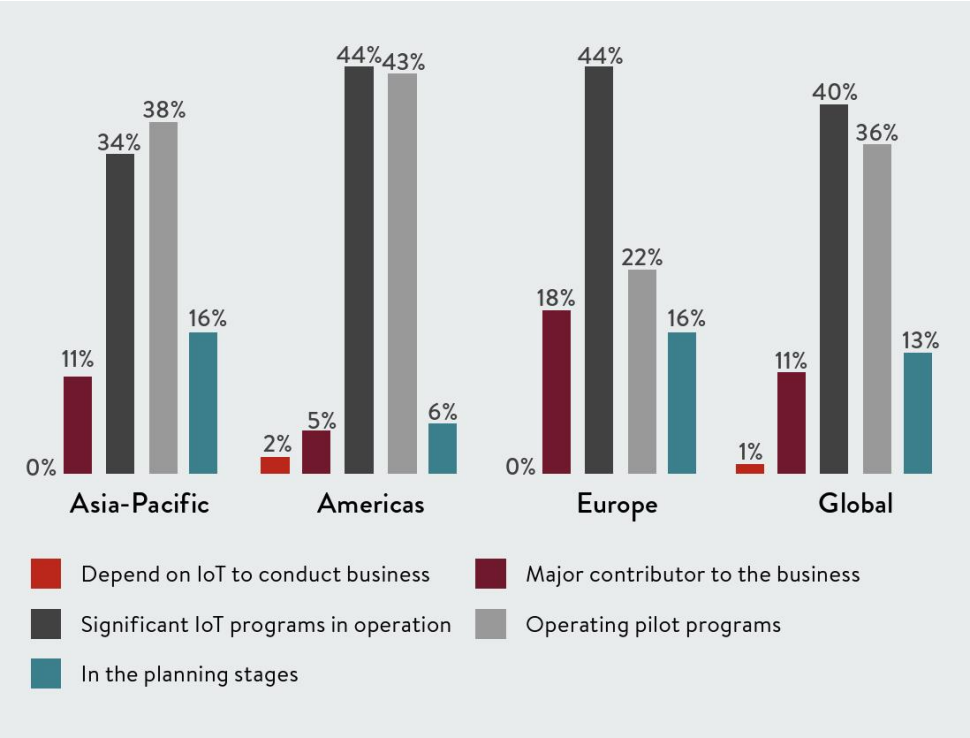
Source: The Internet of Things: From Theory to Reality, Forbes Insights

Technology Iniatives that Are Important to my Company

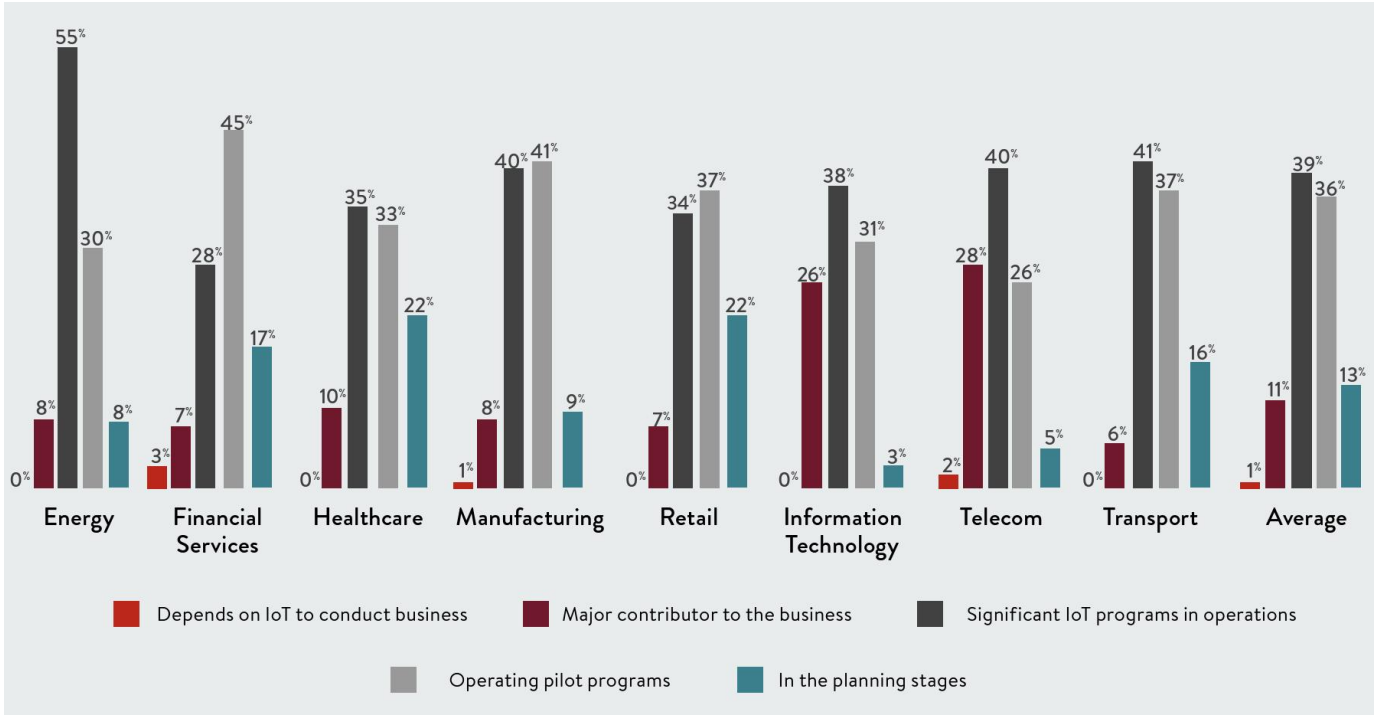


Source: The Internet of Things: From Theory to Reality, Forbes Insights

Which Best Describes the State of Development of the IoT in your Company



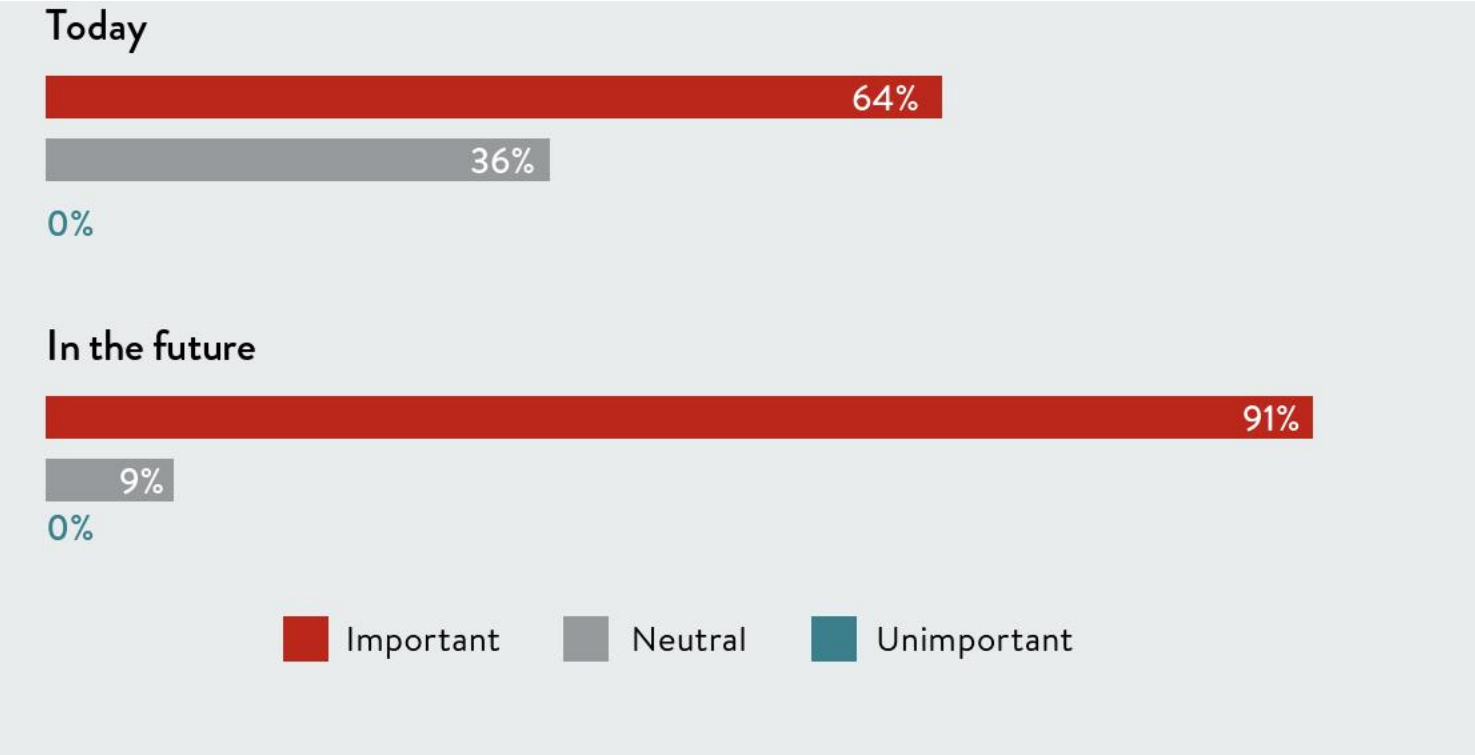
By region



By industry

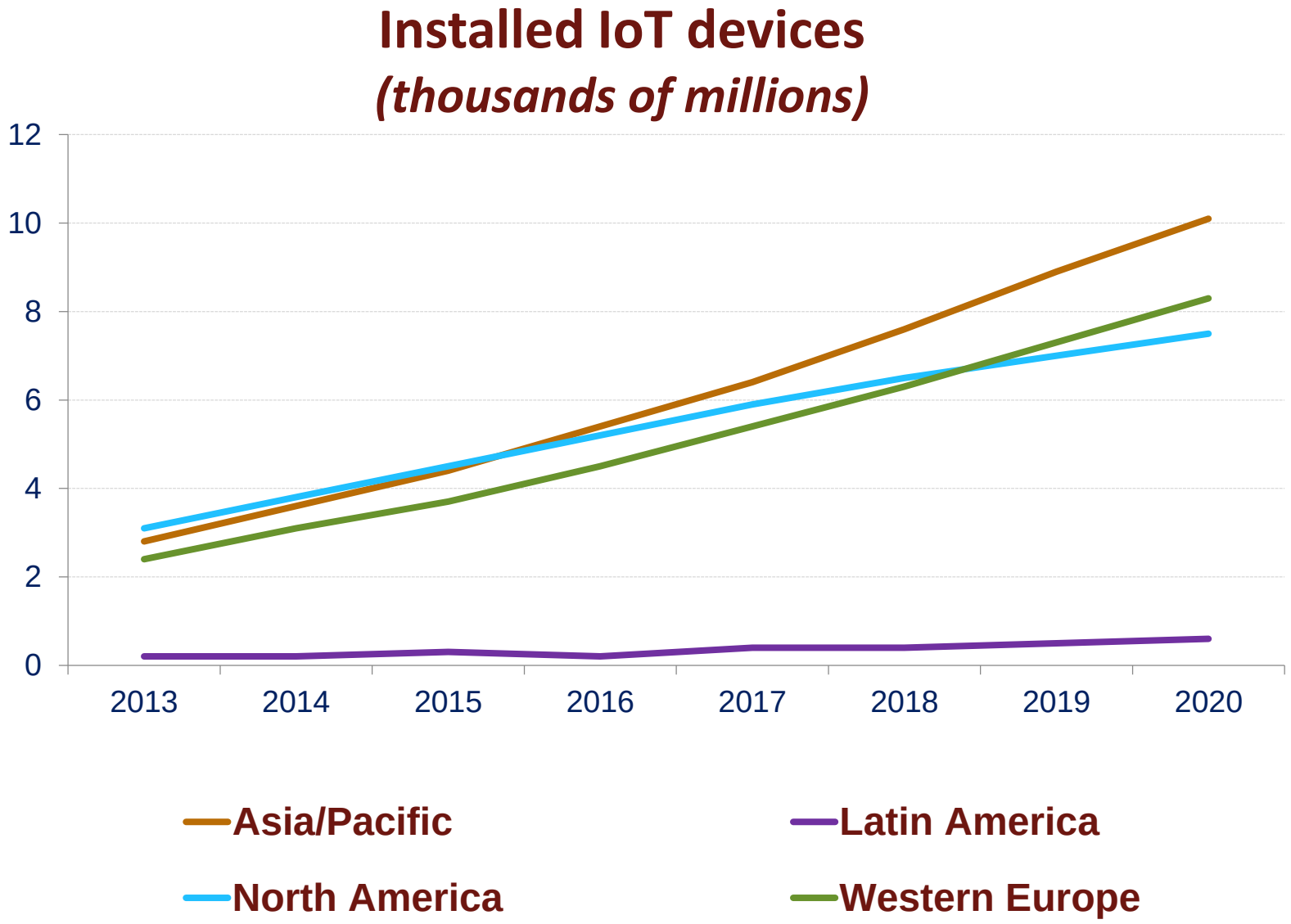
Source: The Internet of Things: From Theory to Reality, Forbes Insights

How Important is the IoT to your Business Today, and How Important Will it be in the Future



Source: The Internet of Things: From Theory to Reality, Forbes Insights

IoT Advancements



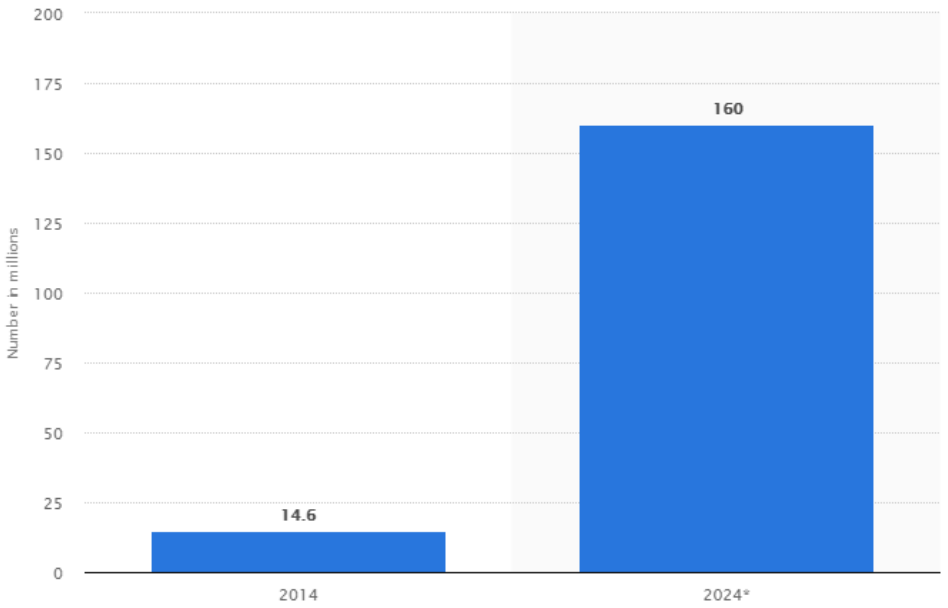
Economical impact in 2025: **4 -11 billions dollars**

McKinsey, 2014

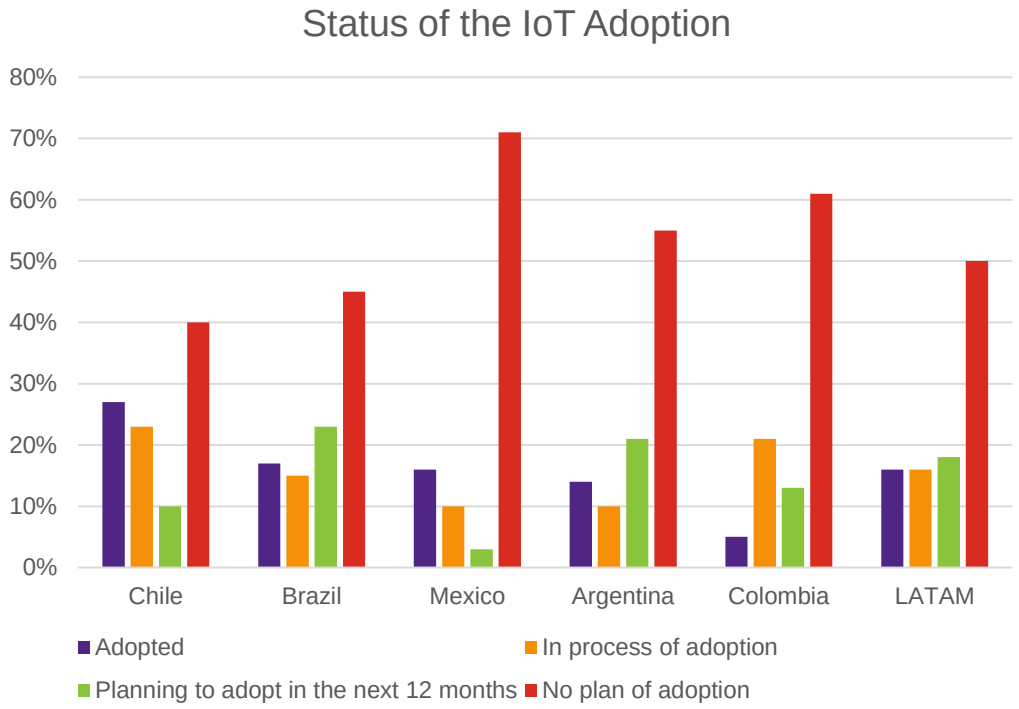
Iot in Latin America

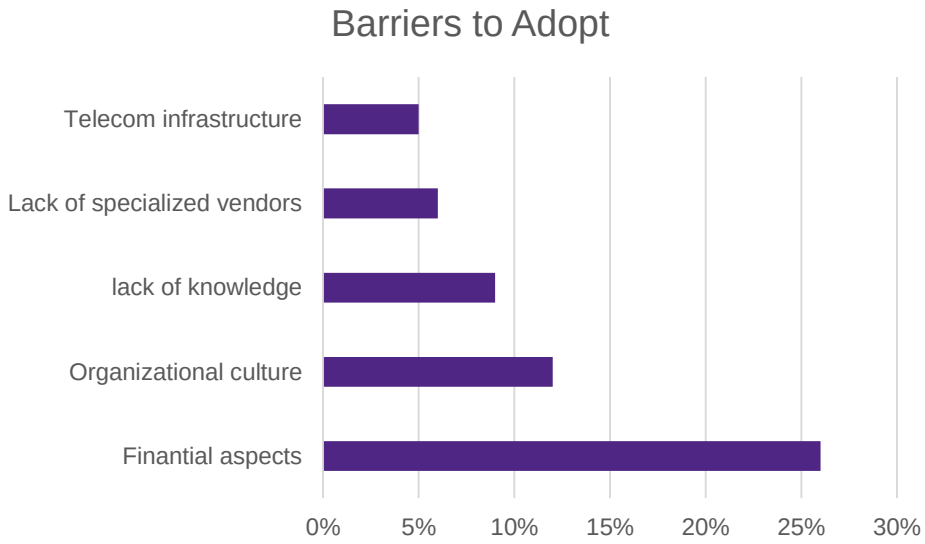
- Latin Americans have only two conected devices on average, compared to 11.5 connected devices for North Americans.

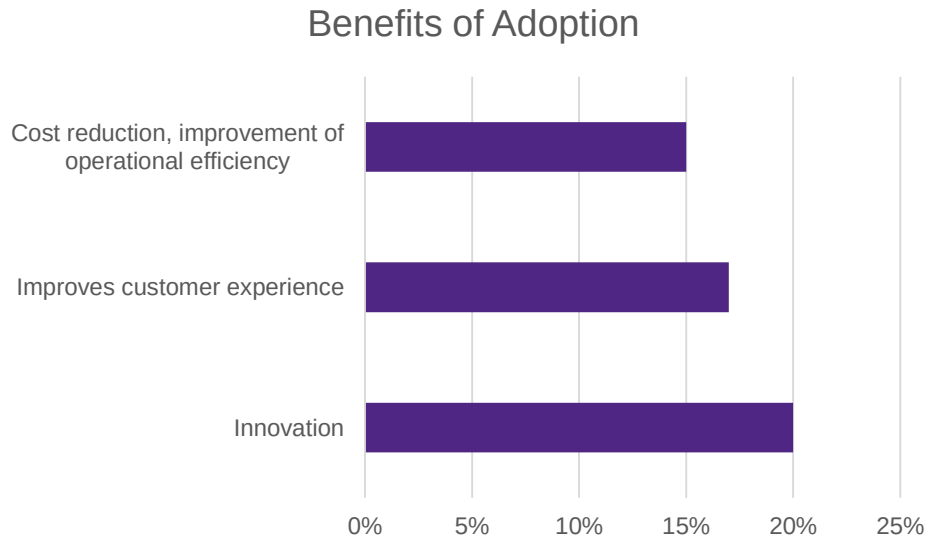
Number of IoT Connections in Latin America



Source: Statista 2018







Latin America Analysis

Source: Iot Snapshot – Logicalis, November 2018

Conclusion

Conclusion

- We have started a new era, a new industrial revolution.
- Technology has changed the way we communicate, work, drive, play sports, entertain ourselves, etc.
- New ways of manufacturing and providing services have arrived.
- Our country, like other countries in the region are behind in the adoption of these new technologies.
- Security, including that of people, is one of the great risks of this revolution.

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