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REPORT 2022

UNLOCKING
NEW **TELECOM** BUSINESS
HORIZONS WITH
**INTERNET OF
THINGS**



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Executive Summary

In the modern hyper-connected and digitalized world, the Internet of Things (IoT) is one of the key pillars that powers global innovation. As IoT evolves at an unprecedented pace, offering an array of unparalleled opportunities for growth and development, today, companies across all verticals build or re-think their current business models to validate how IoT can enhance their competitive advantage, and telecom is not an exception. In fact, the telecom industry is in a unique position in comparison to other verticals, as it has the highest maturity rates in terms of IoT transformation and has the potential to easily adopt and offer new value-added services to the customers.

BY READING THIS COMPREHENSIVE REPORT, YOU'LL FIND:

- An in-depth overview of the current IoT landscape, including both global and European IoT market dynamics.
- Valuable insights on new profitable opportunities and innovative IoT-driven business models for Telecom carriers.
- Detailed analysis of the key players within the IoT value chain.
- List of the major challenges in IoT implementation and how Telcos can address them.
- Description of how Telcos can pursue the roles of IoT service enablers and providers.
- Case studies on how global telecom carriers have successfully paved their way to IoT solutions and service enablement.

COMPREHENSIVE REVIEW OF GLOBAL & EUROPEAN IOT MARKET



Extending Business Horizons with the Internet of Things

Rapid technological advancement, global connectivity expansion, and device proliferation are fueling the growth of the Internet of Things (IoT) – a network of physical objects that contain embedded technology

to communicate and interact with their internal states or external environments. As IoT features a diverse spectrum of applications, the technology has gone far beyond from being an integral part of Industry 4.0, smart

cities, connected cars, and e-health innovations. Today, IoT is also actively adopted in numerous verticals such as retail, banking, and telecommunications.

Global IoT Market Dynamics

The global Internet of Things market is expected to grow from \$170.6 billion in 2017 to \$561.0 billion in 2022, at a 26.9% CAGR according to [marketsandmarkets report](#).

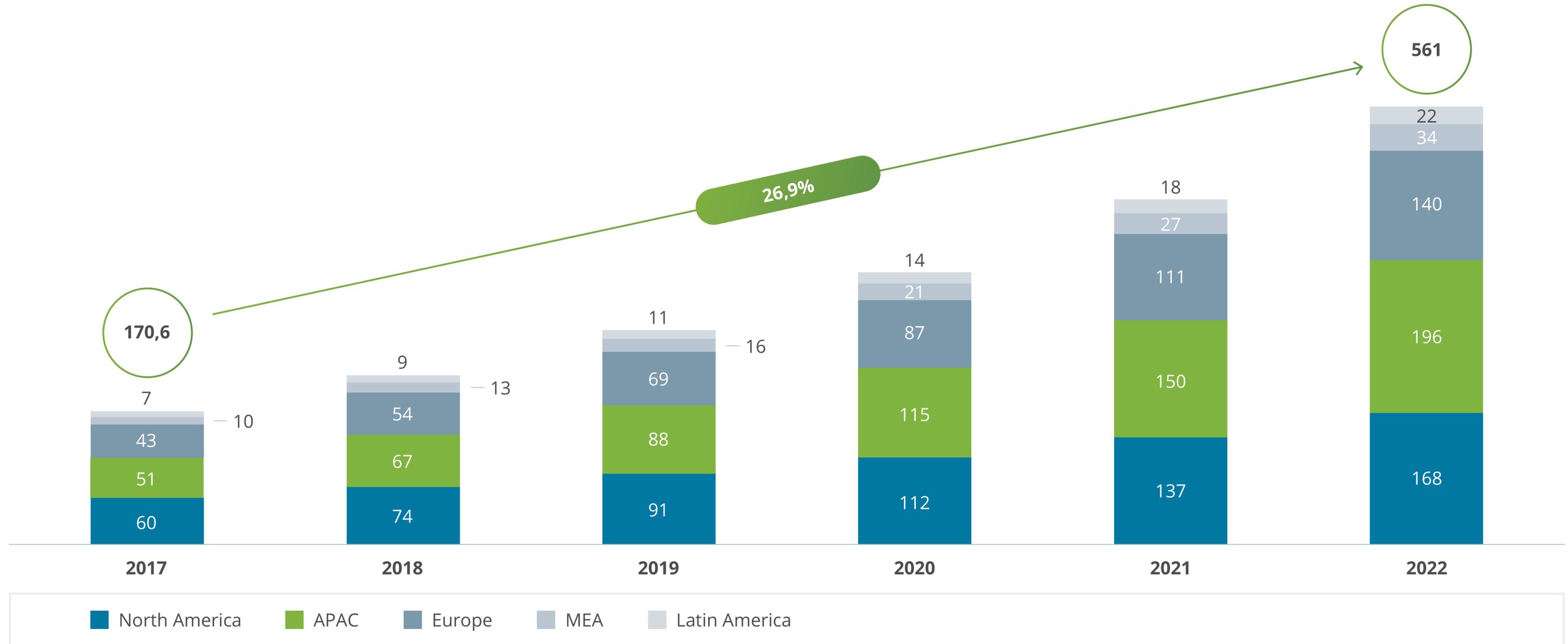
The main factors that are driving the growth of the IoT market are:

- rapid digitalization across various industries;
- a significant rise in the adoption of cloud platforms and utilization of smart devices;
- advancement and cost reduction of the sensor technology;
- the emergence of 5G networks and specific governmental initiatives.

THE GLOBAL INTERNET OF THINGS MARKET IS EXPECTED TO GROW FROM \$170.6 BILLION IN 2017 TO \$561.0 BILLION IN 2022, AT A 26.9% CAGR



IOT MARKET SIZE & GROWTH PREDICTIONS BY REGIONS

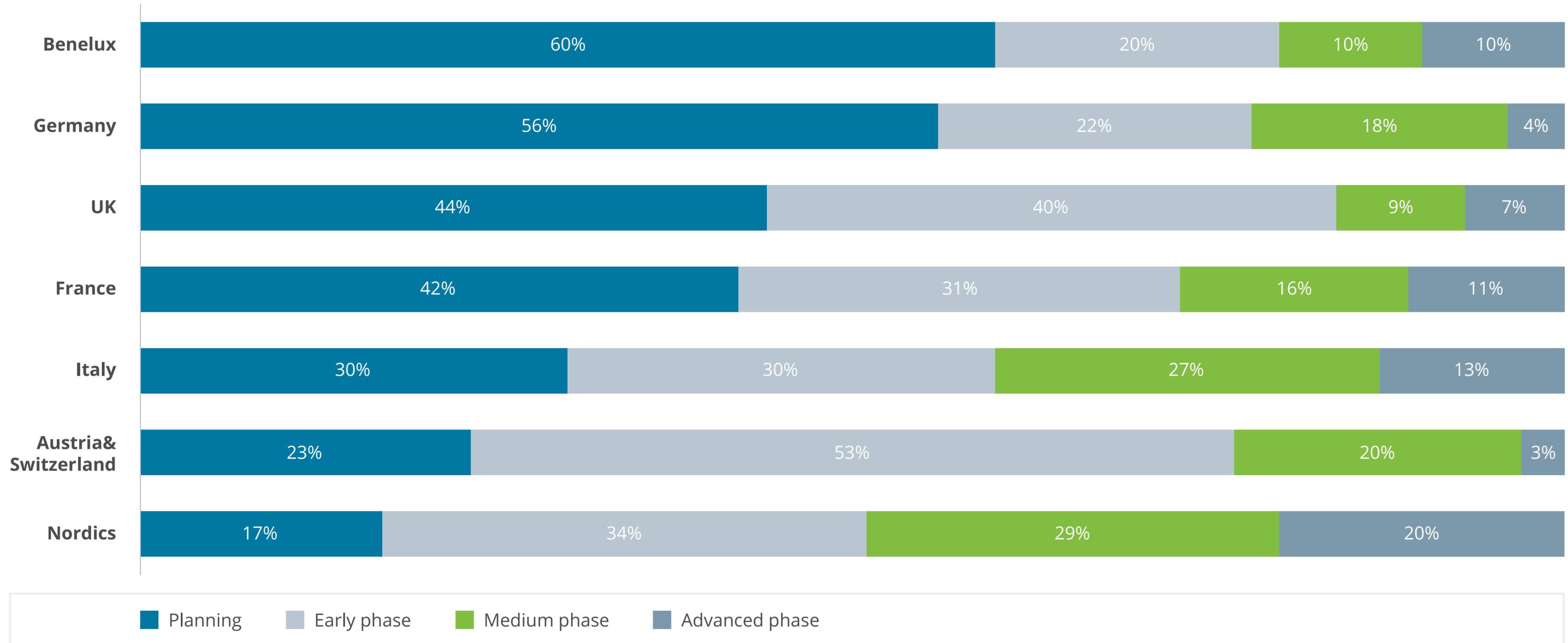


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In-depth Review of IoT Adoption Levels in Europe

European countries have considerable levels of IoT adoption, with over 60% of companies having live IoT projects at different phases according to the [Accenture survey](#). While some countries like Germany and Benelux are primarily at the stage of planning and evaluation of IoT initiatives, the overwhelming majority of European countries, including the UK, France, Italy, Austria, and Switzerland, are now in early or medium phases. The Nordic region is at the forefront of IoT adoption, with the highest levels of IoT projects being at an advanced phase.

CONTEMPORARY STATE OF IOT INITIATIVES ACROSS EUROPE



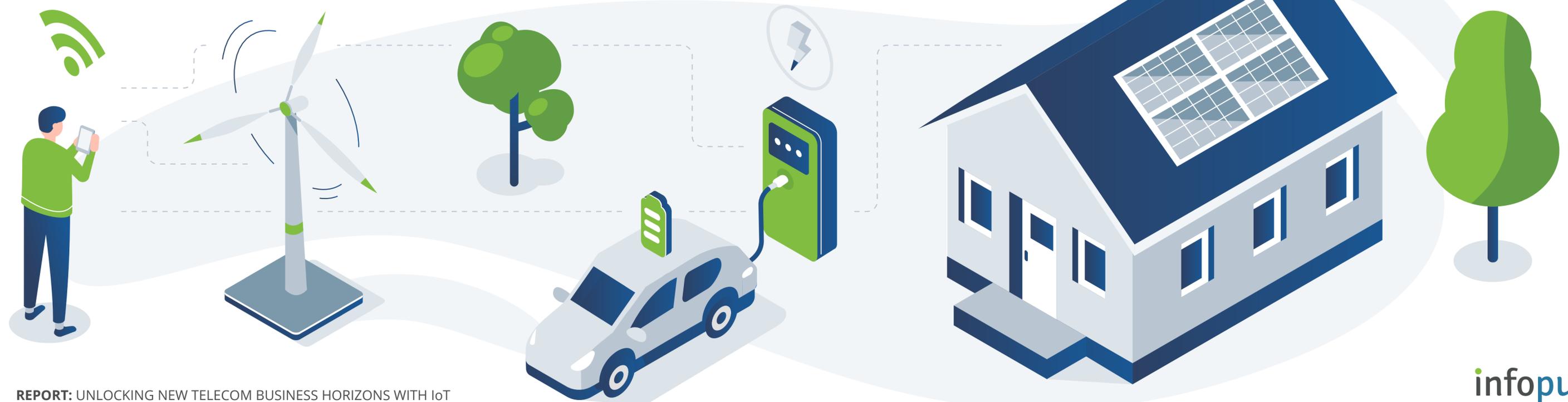
[Source](#)

The Internet of Things within the Connectivity Framework

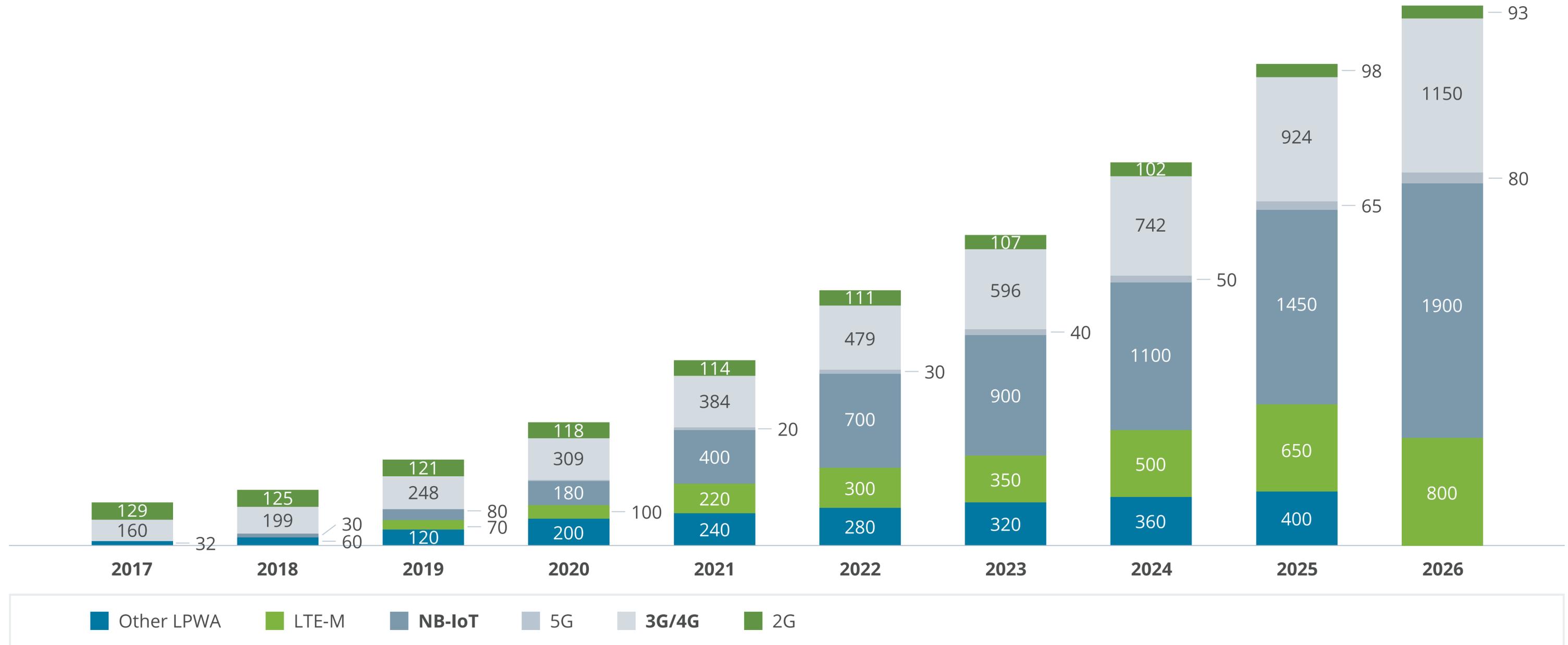
Due to the global ecosystem and numerous international standards supported by major telecom service providers, 3GPP-based technologies (3G/4G) are expected to account for the majority of IoT traffic, with over 384 million connections by 2021 according to [this study](#). To address the needs of IoT applications, the 3GPP consortium has advanced these cellular technologies. Now these technologies have increased network coverage, and ultra-reliable low latency (URLL). Recognizing the further expansion of IoT and

the subsequent growth in the utilization of Low-power Wide-area networks (LPWA), 3GPP has developed the **Narrowband Internet of Things (NB-IoT)** – a new radio interface that is central to future IoT connectivity, which will reach 400+ million connections by 2021 as [this study](#) shows. NB-IoT networks have extremely low bandwidth requirements, low device cost and complexity, stronger battery life, and higher connection density, which allows coping with the growing IoT volumes.

3GPP-BASED TECHNOLOGIES (3G/4G) ARE EXPECTED TO ACCOUNT FOR THE MAJORITY OF IOT TRAFFIC



LPWA CONNECTIVITY CAPACITY FORECAST



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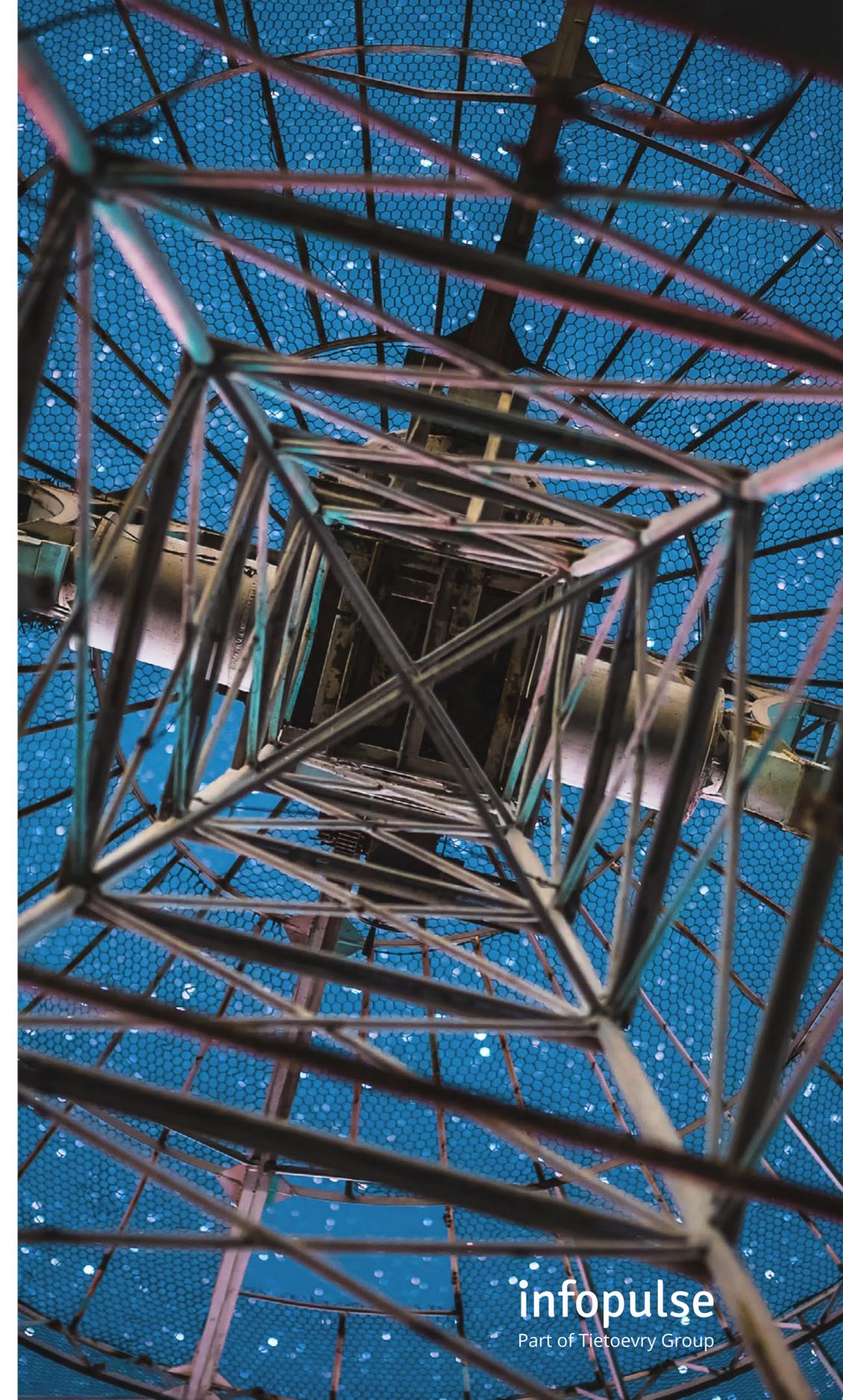
Demand for IoT Across Different Verticals

Business executives from different industries are searching for methods of utilizing IoT to enhance operational efficiency, improve product quality, increase customer satisfaction, reduce costs, and drive revenue from new business models. The key verticals that can receive maximum business benefits from the adoption of IoT are manufacturing, transportation & logistics, and the utilities industry, as IoT unlocks a wide range of valuable use cases for them.

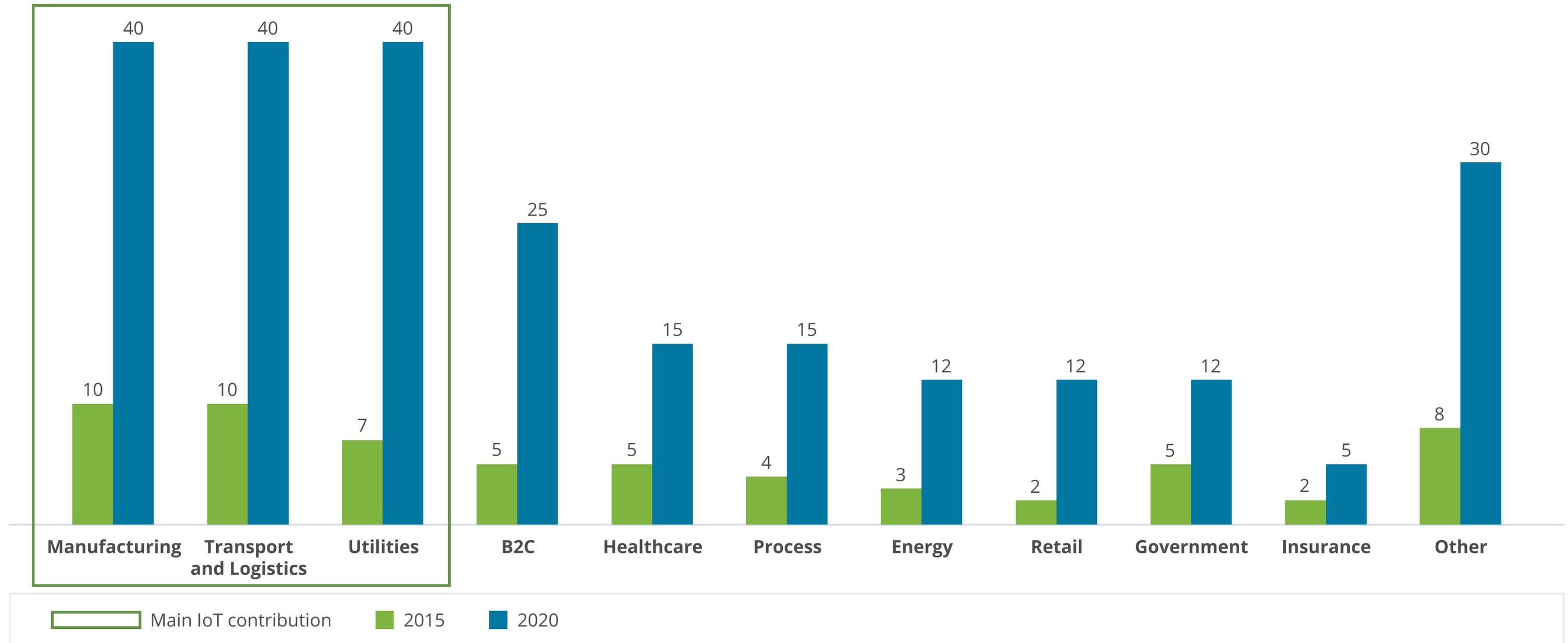
The spectrum of possible IoT use cases for these verticals includes:

- IoT-enabled predictive maintenance
- Automated inventory management
- Real-time remote infrastructure monitoring
- Optimized fleet management
- Distributed energy generation and storage

As for the Telecom industry, currently, it is in a unique position in comparison to other verticals, as it has the highest rates of IoT maturity. Better IoT readiness enables Telcos to receive additional business value from acting as IoT service providers. This approach opens an array of new opportunities for IoT monetization and provides CSPs with access to new business models.



GLOBAL IOT INVESTMENT RATES PER INDUSTRY



[Source](#)

The Spectrum of IoT Monetization Models for Telcos

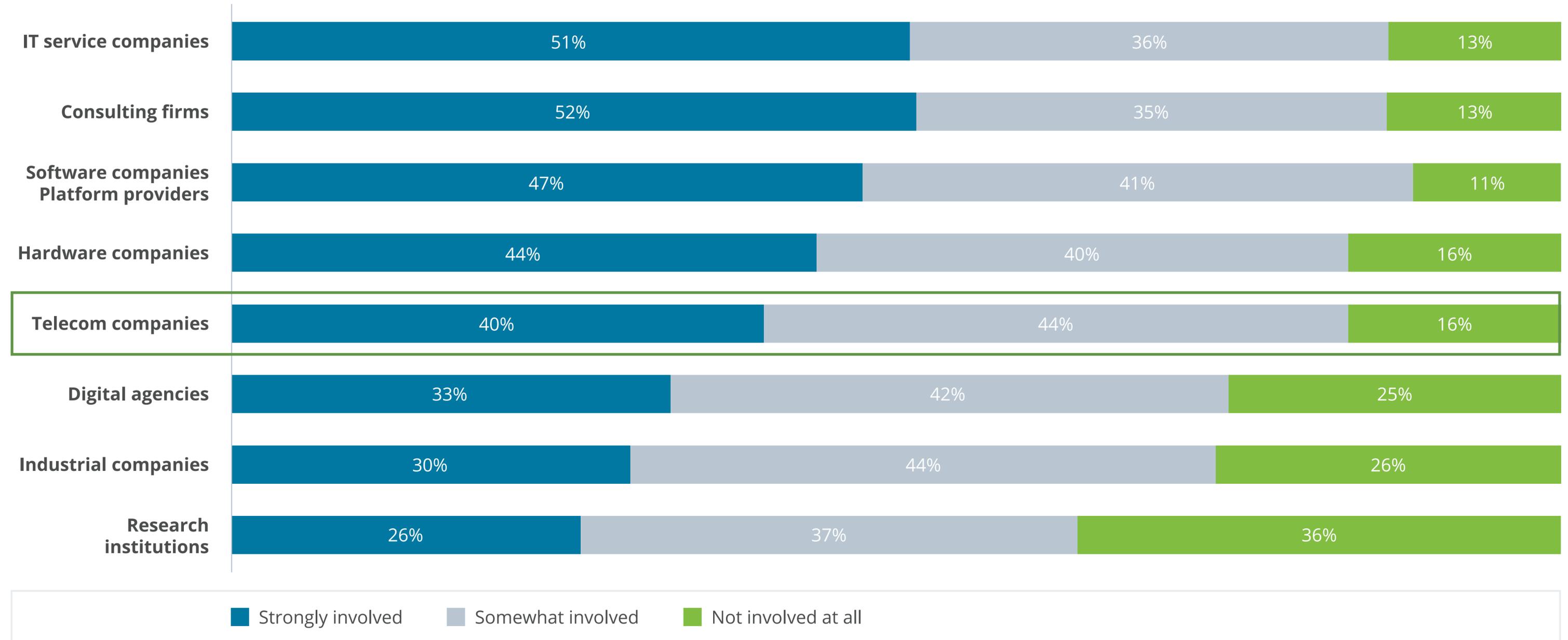
Telecom clientele within the IoT landscape is subdivided into three major categories – solution providers, end-user business, and consumers. All of them require a certain extent of connectivity services from telecom enterprises, like provisioning of NB-IoT or LTE networks. Moreover, solution providers often request additional services from Telcos, e.g., hardware supply, connectivity management, or network/device diagnostics. As a result, 40% of telecom enterprises are strongly involved in IoT initiatives [according to Accenture](#).

In addition to providing connectivity services, Telcos can develop and monetize proprietary IoT solutions. Although this model requires a clear strategy and significant investments, the development of IoT solutions within mature use cases, such as predictive maintenance or remote monitoring, ensures fast ROI and subsequent revenue growth. Alternatively, Telcos can forge partnerships with IoT solution providers to resell their products via white-labeling or co-branding; in addition, they can orchestrate and enhance their own IoT platforms.

40% OF TELECOM ENTERPRISES ARE STRONGLY INVOLVED IN IOT INITIATIVES



THIRD PARTIES ENGAGED IN IOT INITIATIVES



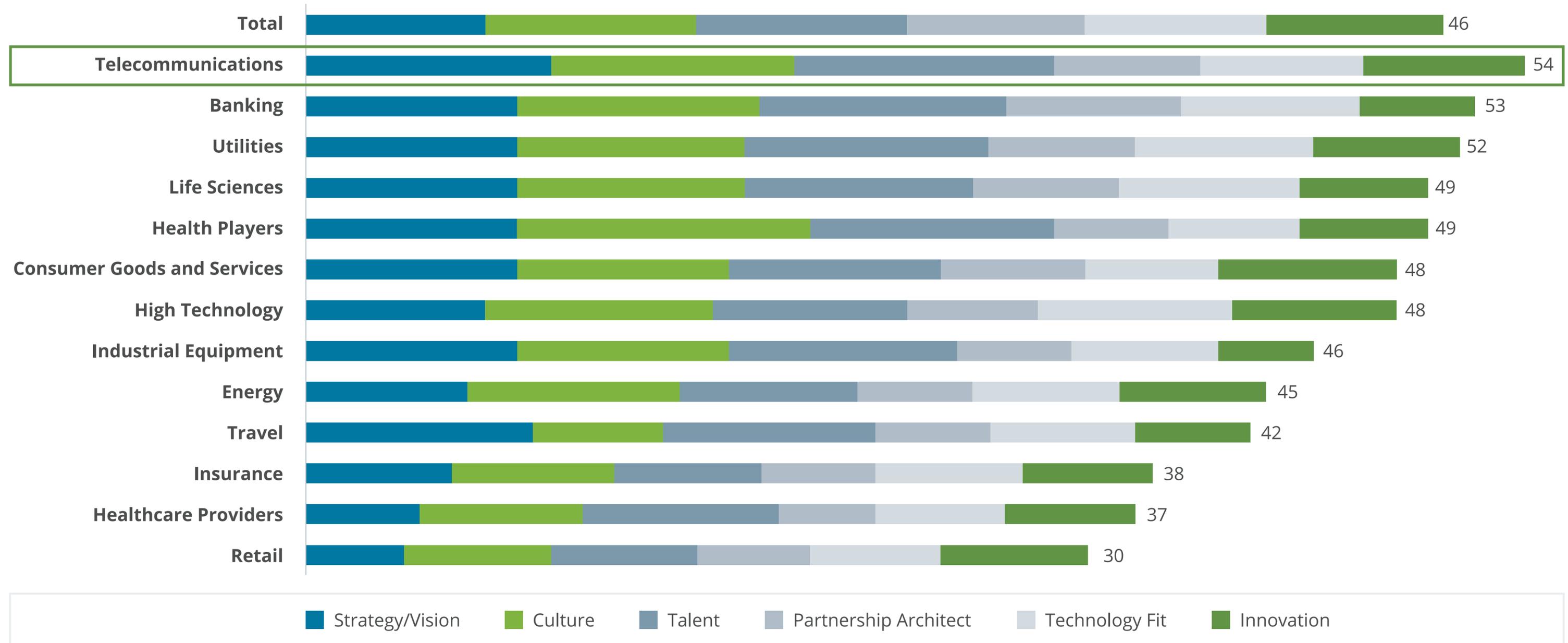
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Telcos at the Forefront of IoT Transformation

Having the capacity to provide secure and reliable connectivity across different locations and complex value chains, Telecom is the most mature industry in terms of IoT transformation. This maturity enables Telcos to evolve into fully-fledged IoT service providers and use their extensive expertise to leverage their services and infrastructure to enhance low-latency cloud computing and highly demanded QoS-enabled connectivity. Moreover, based on numerous factors, including strategy, culture, and talents, Telcos are better positioned to drive value from IoT ecosystems in comparison to other verticals, [according to Accenture](#). By forging partnerships with IoT platform providers, Telcos can generate revenue from value-added services, e.g., connectivity management and asset maintenance for the platform users.



IOT ECOSYSTEM READINESS INDEX BY INDUSTRY



[Source](#)



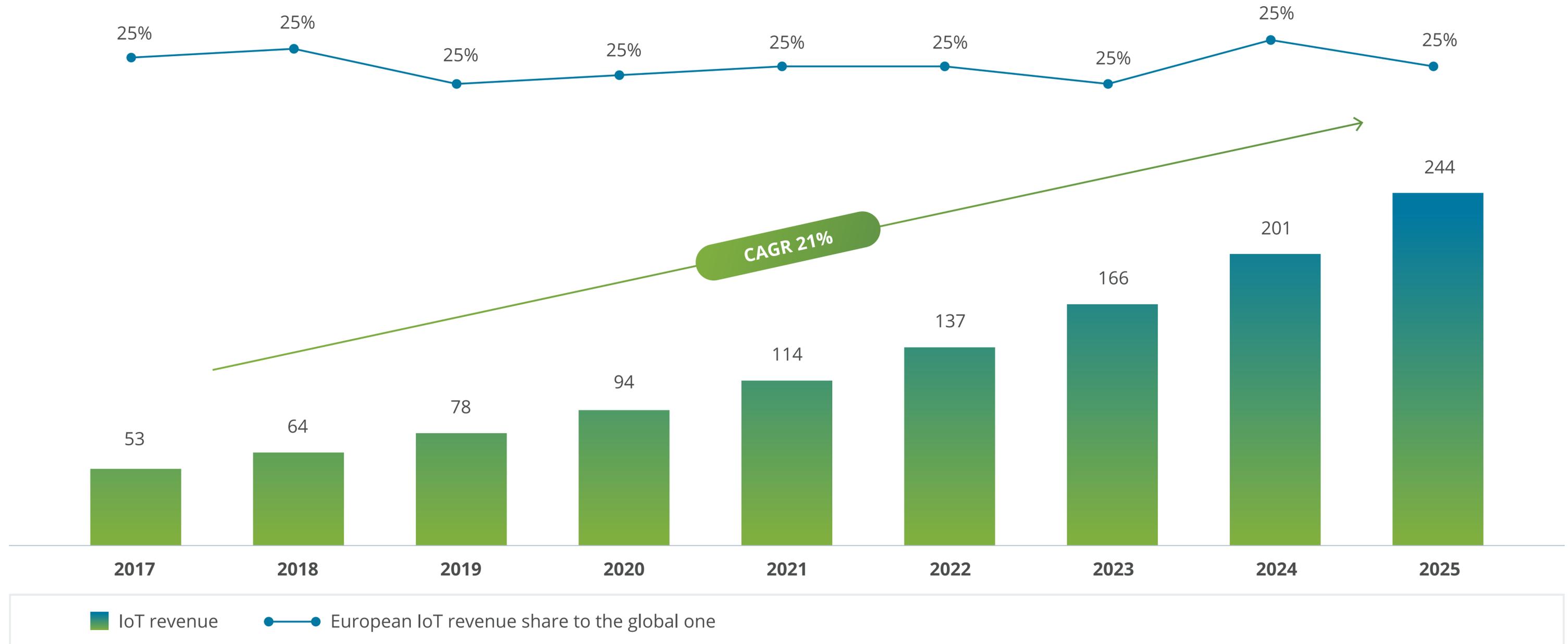
The Scale of IoT Growth in Europe

Revenue from IoT will reach **\$244 billion** (€210 billion) in Europe by 2025, up from \$53 billion (€47 billion) in 2017, with a CAGR of 21% over the period. IoT revenue in Europe will account for **22%** of total global IoT revenue by 2025. Market players from different industries, including

telecom, IT, and device manufacturers are competing to capture a portion of this opportunity. IoT applications, platforms, and services (which include cloud, data analytics, and security) will account for the largest share of Europe's revenue.

IOT REVENUE IN EUROPE WILL ACCOUNT FOR 22% OF TOTAL GLOBAL IOT REVENUE BY 2025

GROWTH FORECAST & GLOBAL SHARE OF IOT REVENUE IN EUROPE



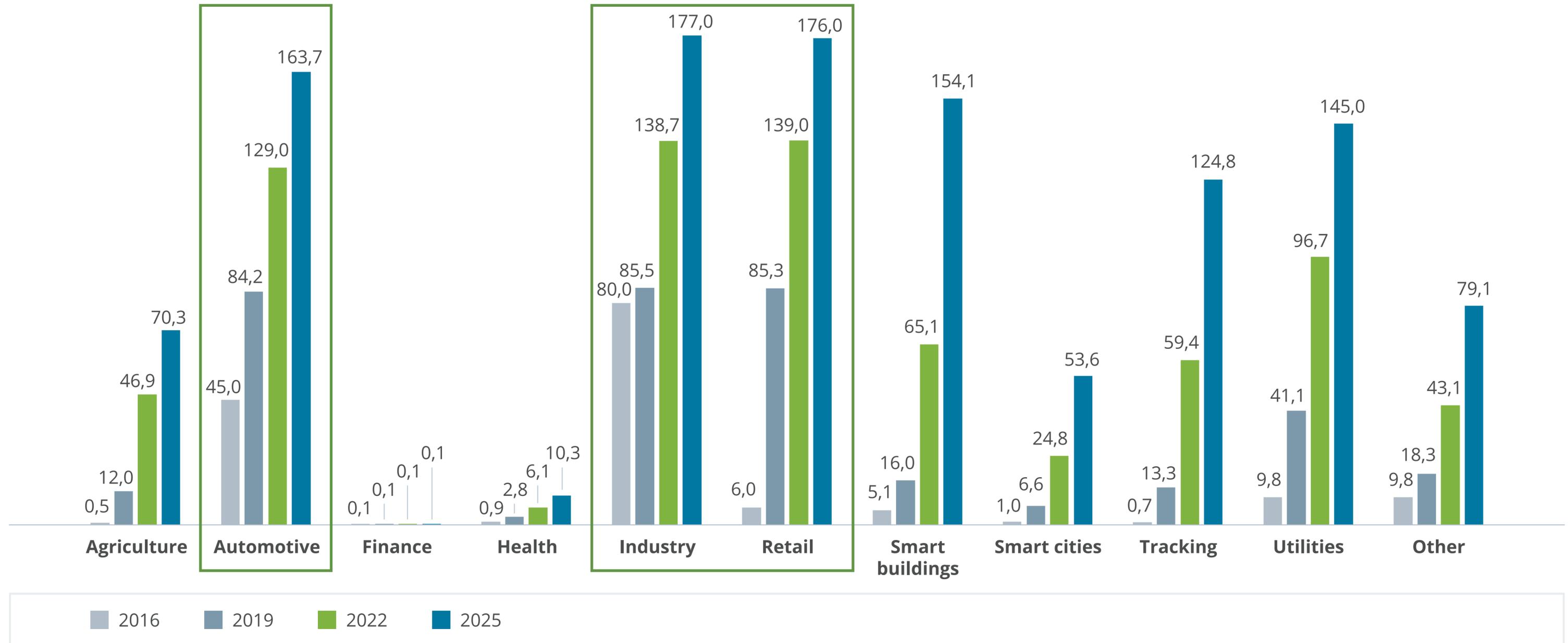
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IoT Service Delivery Opportunities for Telco's

The rapid growth of **sensor technology** utilization is seen in numerous verticals, with the automotive, manufacturing, and retail industries being on top of the list. The data transmission is growing respectively to sensor utilization, which generates demand for connectivity services. Telcos can seize the opportunity and receive tangible business benefits from providing connectivity and other value-added services for verticals that are actively implementing IoT technology.

QUANTITY OF ACTIVE IOT CONNECTIONS PER INDUSTRY IN EUROPE



Source

IoT Expansion & Its Further Convergence with AI

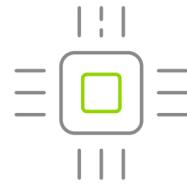
As the surge of device utilization, the emergence of Big Data, cloud and fog computing, and increased venture capital funding are driving the growth of IoT and the subsequent rise of data volumes, AI is becoming central to the IoT landscape. By managing and analyzing IoT-generated data, AI transforms it into actionable insights that enable predictive maintenance, thus reducing the risks of equipment failure and downtimes. Moreover, AI can be used for real-time monitoring and swift automated responses in cases of security incidents within the IoT ecosystem.

The convergence of both technologies is often referred to as **AIoT**, a term that represents advanced AI-based technologies, such as computer vision and NLP, which are combined with IoT to drive innovation within a broad spectrum of industries. Currently, AIoT is an integral part of smart homes, connected cars, and intelligent retail systems.

BIG DATA, CLOUD AND FOG COMPUTING, AND INCREASED VENTURE CAPITAL FUNDING ARE DRIVING THE GROWTH OF IOT



Major Drivers of IoT Adoption



DECREASING COST OF CPU, MEMORY & STORAGE



INCREASING DEVICE PROLIFERATION



CONVERGENCE OF IT & OPERATIONAL TECHNOLOGY



DECREASING COST OF MEGABIT/SEC



ADVENT OF BIG DATA & CLOUD/FOG



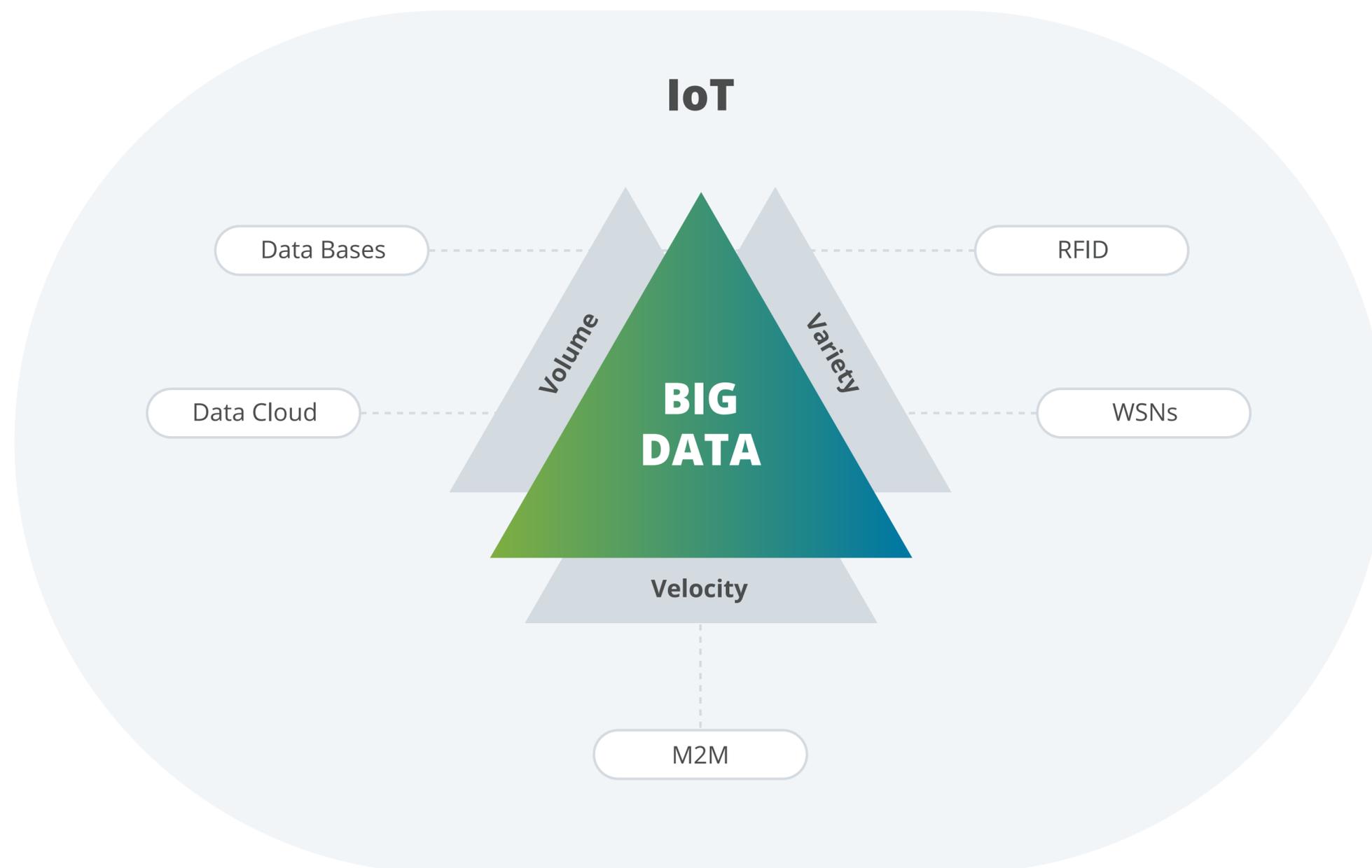
INCREASE IN VC SPEND AND INVESTMENT

[Source](#)

Big Data – Another Significant Part of the IoT Landscape

Immense volumes of data triggered by IoT require classification, processing, and accurate analysis for commercially viable usage. **Big Data mining and analysis** algorithms are designed to process large quantities of data generated from Radio Frequency Identification (RFI), Wireless Sensor Networks (WSNs), and Machine-to-Machine (M2M) communications, and, consequently, find hidden patterns and correlations within this data flow. This allows for gaining real-time insights and significantly improving the decision-making process. Furthermore, the implementation of Big Data reduces costs by enabling flexible and scalable IoT data storage while ensuring robust security by eliminating data loopholes.

INTERRELATION OF BIG DATA & IOT



[Source](#)

NEW MARKET ROLES AND BUSINESS MODELS FOR TELECOS WITHIN THE IOT VALUE CHAIN

New Opportunities for Telcos within the IoT Value Chain

Telcos have an unparalleled competitive advantage in terms of connectivity service provisioning, as it is the central and the most cost-efficient component of their business. However, rapidly evolving technologies are altering the market and unlocking new opportunities within the IoT value chain. By developing new competencies and partnering with IT companies, **Telcos can shift their accustomed market roles and benefit from newly emerging business models.**





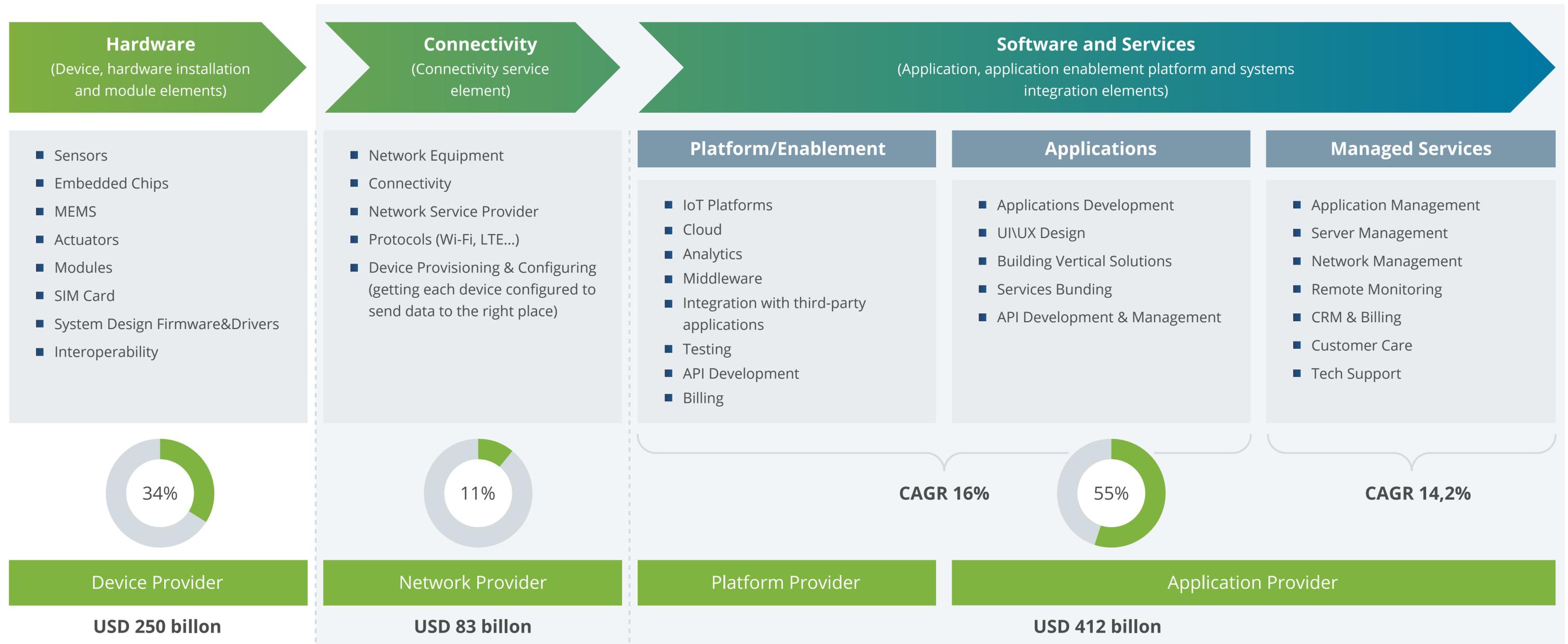
Potential Telecom Growth Areas within the IoT Value Chain

IoT Value chain is comprised of three major groups – hardware, connectivity, and software. The hardware segment is rather unattractive, as the majority of Telcos do not have the required competence to produce sensors or embedded chips, and have to forge partnerships with device vendors to drive value from the hardware segment. Currently, Telcos focus on connectivity services, as it is the most convenient and risk-free segment that is steadily growing. However, Telcos can gain additional incremental value by switching their focus to the software and services segment.

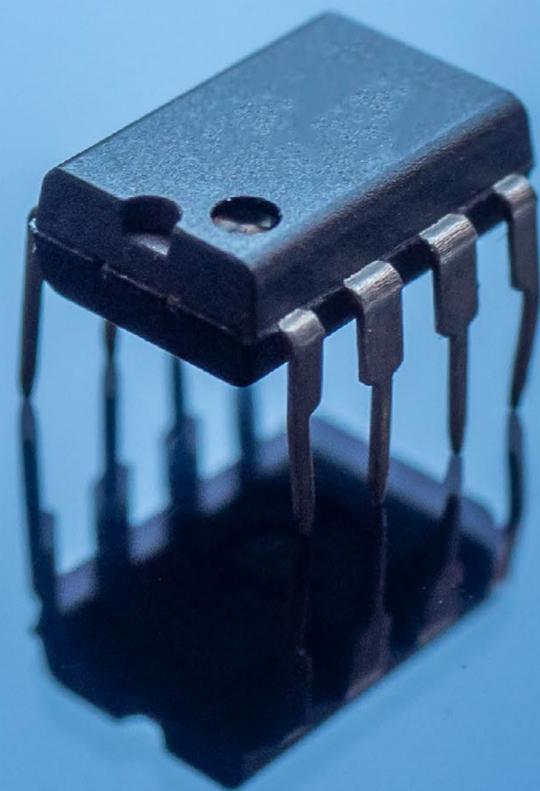
By building new expertise and partnering with IT companies, Telcos can deliver new value-added services to their customers, including IoT platform enablement, application development, or system integration services. **Entering the software segment can help Telcos expand their customer base and significantly increase their revenue.**

**TELCOS CAN GAIN
ADDITIONAL
INCREMENTAL VALUE
BY SWITCHING
THEIR FOCUS TO
THE SOFTWARE AND
SERVICES SEGMENT**

IOT VALUE CHAIN COMPOSITION



Source 1
Source 2



An In-depth Overview of the IoT Market Segments Development in Europe

The IoT technology is based on a diverse spectrum of modules – electronic devices that are embedded into objects to send and receive data via wireless networks. IoT modules can differ in size, complexity, and may be designed to execute different functions.

According to this [research](#), the **simplest tag type** modules, used for merchandise tracking, will grow to **€6.6bln** in value by 2025, making it the largest IoT hardware segment. **Basic IoT modules** that are embedded into streetlights or used for utility network monitoring, will grow to **€1.6bln**. More sophisticated **active** and **real-time modules**, utilized for automation and time-sensitive applications, will have a value of **€0.8bln** and **€0.6bln** respectively. The last and the most advanced segment – **high-performance modules** that are used to support the most demanding applications – will grow to **€0.4bln**.

IOT MODULE MARKET GROWTH FORECAST IN EU BY 2025

Type of module	Description	Installed base of modules, 2025	Value of modules sold in 2025 (EUR billion)
1. Tag	Passive or semi-passive tag, some data-transfer capability	20.8 billion	6.6
2. Basic	Low-frequency data collection, some control	4.6 billion	1.6
3. Active	One or few sensors, input/output, monitoring, and control	520 million	0.8
4. Real-time	Multi-sensor, multi-input/output, advanced real-time control	300 million	0.6
5. High-performance	Highly advanced control	4 million	0.4
Total		>26 billion	10.0

Tag. The bulk of objects (21 billion units valued at €1.6 billion) will be equipped with tags, the simplest form of module. They will be used primarily on merchandise for tracking, inventory, or localization purposes.

Basic. These modules (4.6 billion units valued at €6.6 billion) will provide low-frequency data collection and limited control. They will have a broad range of uses including pillboxes, street light control, and utility network monitoring.

Active. Objects requiring a combination of sensors and continuous control, such as white goods automation, use active components (520 million units valued at €0.8 billion).

Real-time. This includes time-sensitive applications, such as precision farming drones or fire and burglar alarm (300 million units at €0.6 billion).

High-performance. These modules (4 million units at €0.4 billion) support the most demanding applications, requiring the synchronization of a large number of sensors and actuators, in a time-sensitive manner. It includes components embarked in autonomous cars or for the control of plane engines.

[Source](#)

LPWA connectivity will have the highest growth rates with approximately **€11.5bln** in service revenues by 2025 according to this [research](#). The reason for LPWA expansion is that it offers low-throughput, low-energy consumption, and can address the needs of IoT applications across different industries. **Narrowband 3GPP-type connectivity** that is necessary for applications requiring permanent connectivity will grow to **€4.5bln** in service revenues, while **broadband 3GPP**, used for applications that require higher data throughput, will grow only to **€1.0bln**. Local networks and tag-reading equipment will generate only marginal revenues for connectivity service providers.



IOT CONNECTIVITY MARKET GROWTH FORECAST IN EU BY 2025

Type of connectivity	Description	Installed base of modules, 2025	Value in 2025 (EUR billion)
1. Local	Local connectivity (WiFi, low-power Bluetooth, Zigbee)	4.8 billion	Assumed to leverage existing connectivity
2. Tag readers	Tag-reading equipment	20.6 billion	
3. LPWA	Low-power Wide-area (3GPP, NB-IoT, LoRa, etc)	620 million	11.5
4. Cellular (old generation)	3GPP connectivity, narrowband	150 million	3.6
5. Cellular (new generation)	3GPP connectivity, broadband	4 million	0.8
Total		>26 billion	16.1

Local and tag readers. A vast majority of objects (more than 25 billion) will connect to the network through existing local area networks and generate only marginal revenues for connectivity providers

LPWA. The new breed of connectivity that offers low-throughput, low-energy consumption and low-cost solutions for non-moving objects (or objects that do not require a seamless handover of connectivity). LPWA will meet the needs of many IoT applications in the utilities industry, as well as infrastructure monitoring and fleet management applications. New players have been emerging (for example, SigFox and Arquiva) to address this opportunity with dedicated infrastructure.

Cellular (old generation). More traditional 3GPP-type connectivity will continue to be necessary for applications requiring permanent connectivity and handover that have fewer energy constraints such as drone operations or control of fire and burglar alarms or vehicles.

Cellular (new generation). For more demanding applications that need higher data throughput, the most recent 3GPP-type connectivity (4 million, with €1.0 billion in service revenues) will be required, such as for drones, autonomous cars, and home hospitalization.

[Source](#)

Valuable Opportunities for Telcos within the Software & Services Market

IoT market segments, occupied by Telcos, demonstrate steady growth. The overall value of the **hardware segment** is projected to reach **€10bln**, while the **connectivity segment** will grow up to approximately **€16bln** by 2025. However, the growth of hardware and connectivity is rather slow and steady, unlike the soaring expansion of the software and services segment. **IoT platform enablement** and **application development**

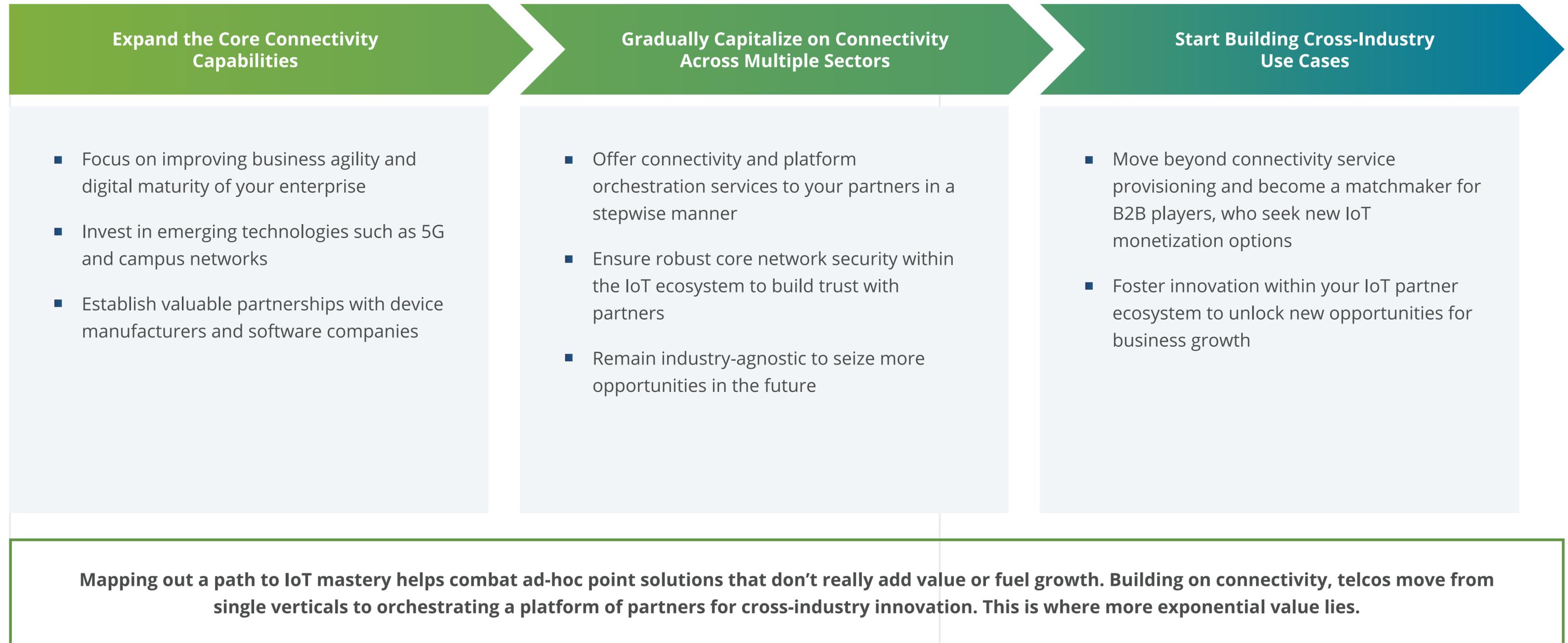
market in the EU is projected to reach **€18bln**, and **system integration services** will grow up to €22bln by 2025 according to [this research](#).

Telecom enterprises that want to drive new revenue streams and secure their competitive advantage must **pave their way into the software and services market.**

IOT PLATFORM ENABLEMENT AND APPLICATION DEVELOPMENT MARKET IN THE EU IS PROJECTED TO REACH €18BLN, AND SYSTEM INTEGRATION SERVICES WILL GROW UP TO €22BLN BY 2025



STEPS TELCOS MUST TAKE TO ENTER THE IOT MARKET



[Source](#)

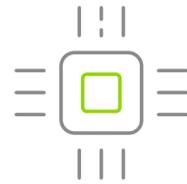
KEY PLAYERS OF THE IOT LANDSCAPE

Understanding the IoT Market and Its Leaders

This section is dedicated to the main players within the IoT market. It indicates the market segments, in which the key players operate, and describes the types of solutions they offer. By analyzing the activities of the market-leading organizations, Telcos can understand what is required to enter a particular IoT market segment. Most importantly, Telcos can identify sectors with strong competitive tension and select a market niche that suits their business objectives.



Key Players within the IoT Value Chain



The hardware segment is dominated by major vendors, such as Telit, Intel, Bosch, etc. These players focus on developing IoT devices and module elements, in addition to offering hardware installation services. These companies also produce hardware for IoT-enabled predictive maintenance, specifically, machine condition monitoring hardware and elements for control systems, such as PLC/DCS, that enable industrial automation. Each major market player is focused on producing hardware specific to their business, for example, Bosch provides hardware for smart homes, while Intel and Qualcomm focus on producing hardware for smart factories or mobile networks.



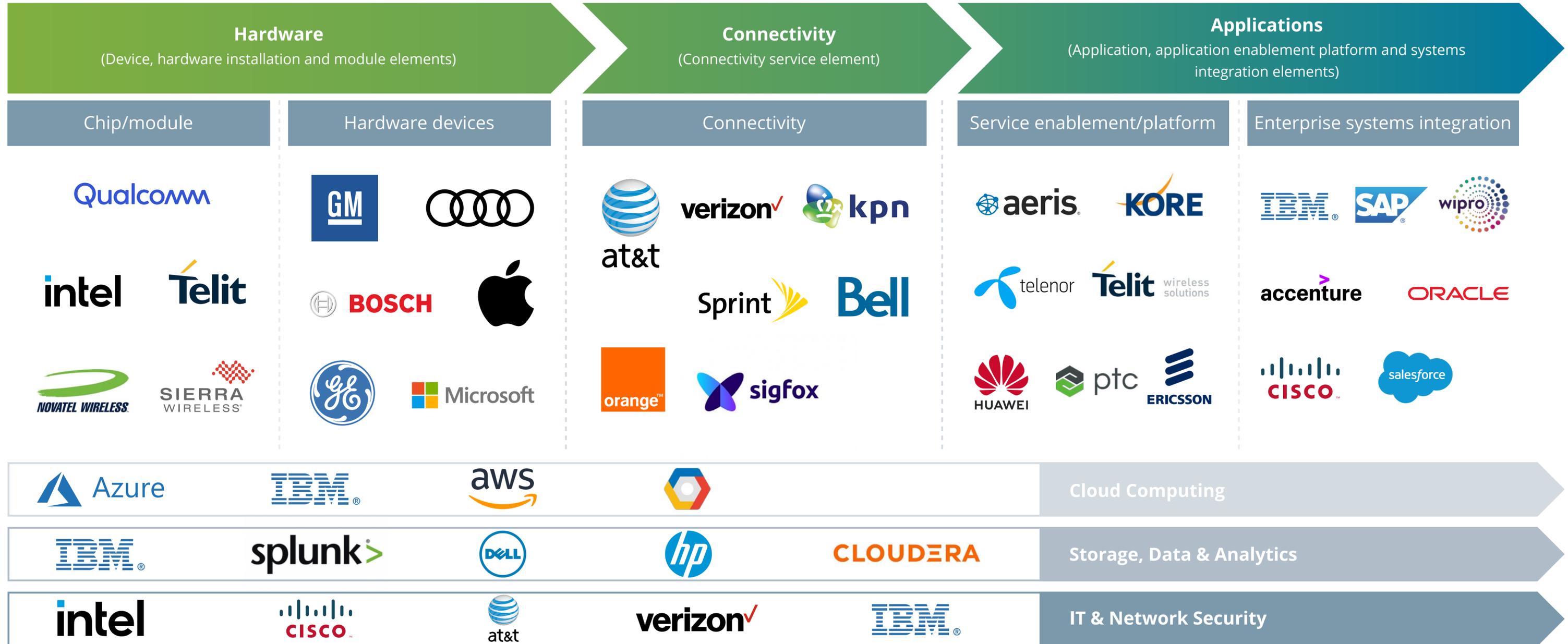
The connectivity segment is occupied by large telecom enterprises (Verizon, Sprint, AT&T, Orange, etc.) that offer wired or wireless connectivity via modules, gateways, and managed M2M connections.



The software segment is led by companies such as Huawei or Ericsson that focus on IoT platform development.

However, some global IoT enablers (e.g., Telit) are present in both hardware and platform development segments. Lastly, tech giants, namely, IBM, Oracle, SAP, and Accenture, are at the forefront of IoT integration, offering a diverse spectrum of services that include architecture design and data engineering, as well as device, platform, and application management.

MAJOR PLAYERS IN HARDWARE, CONNECTIVITY AND SOFTWARE SEGMENTS



Source

Service Focus & Competencies of Key Players

Customers that require IoT-related services try to avoid cooperation with multiple service providers, as each additional provider is associated with extra costs, efforts, and higher risks. Considering this, Telcos develop specific competencies to become fully-fledged service providers within one or multiple IoT segments.

The major players within the IoT value chain focus on providing the following services:

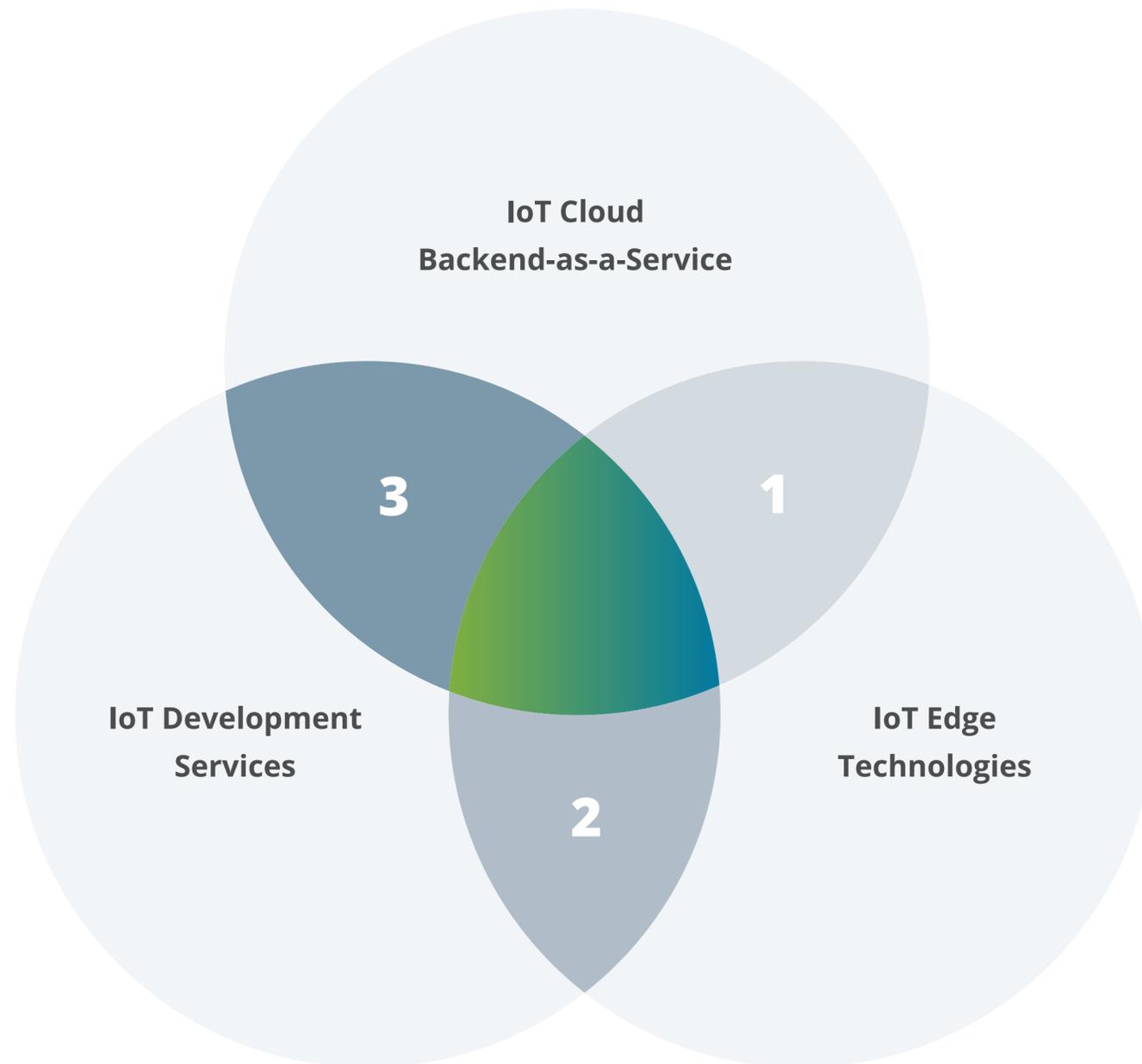
- **IoT Backend-as-a-Service** – IoT-specific backend development and cloud infrastructure maintenance that includes device management with software and firmware updates, security, and other platform services.
- **IoT Edge Technologies** – edge device provisioning, development of edge software components that include complex event processing, AI/ML models, and other edge-related services like data management and support.
- **IoT Development** – IoT-specific coding, modeling, and a range of management services that facilitate IoT implementation.

Large-scale telecom enterprises, such as AT&T and NTT Communications, primarily focus on IoT Cloud Backend-as-a-Service. Other global Telcos (e.g., Vodafone) occupy both cloud and edge domains. The only company that operates in all three domains is Deutsche Telekom.

While IoT Cloud Backend-as-a-Service and the Edge technologies domains flourish with competitors, Telcos can consider **developing competencies for IoT development services**, or take a step further and provide both development and edge services, as these segments have less competitive tension.



ROLES OF KEY PLAYERS WITHIN THE IOT VALUE CHAIN



IoT Cloud Backend-as-a-Service

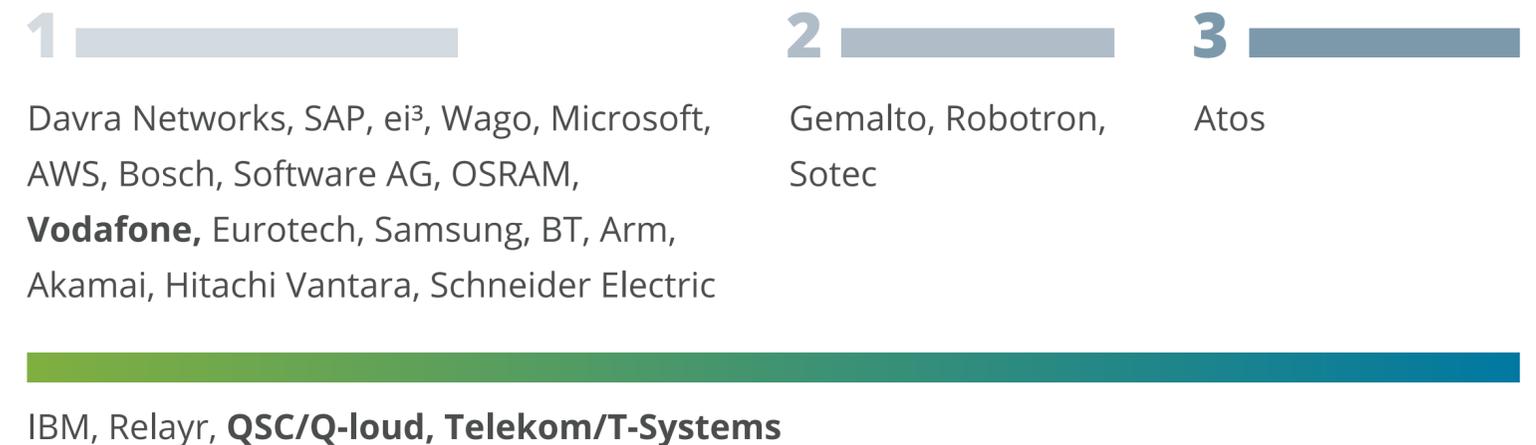
Ayla Networks, GE, PTC, C3 IoT, Oracle, **AT&T, NTT Com**, Salesforce, Siemens, Google, M2MGo

IoT Edge Technologies

Cisco, Advantech, Device Insight, Huawei, FogHorn, Beckhoff, VMware, Digital Concepts, iTAC, ioBroker, Telit, Cybus, Adlink, ABB, Axoom, Dell

IoT Development Services

Capgemini, Concise Software, Tresmo, Zühlke, FIT, Infosys, CGI, iXperta, PLVision, Infopulse, Accenture, Nordcloud, Cognizant



[Source](#)

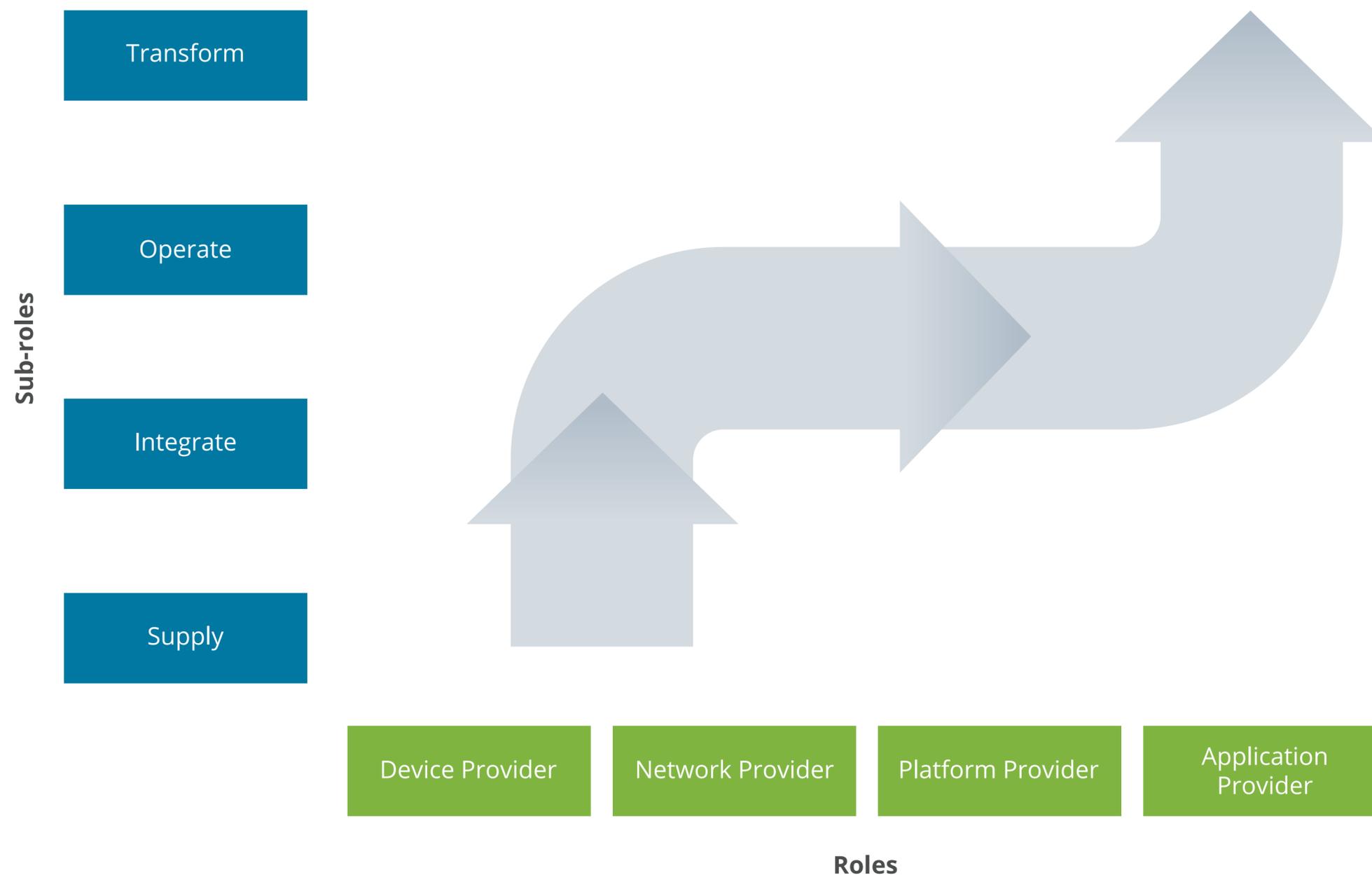
Adoption of New Roles to Seize the IoT Opportunity

Telecom carriers can move up in the IoT value chain by providing **additional value-added services** on top of their offerings. Currently, connectivity providers can start offering cellular and non-cellular IoT network integration services (integrate) or device lifecycle management services (operate). In the future, Telcos can develop new competencies to provide additional advanced services, e.g., platform or application development.

This opportunity can be illustrated on the example of the self-driving cars use case. As the number of self-driving cars will grow, fast and reliable connectivity will have a higher demand. However, in parallel with their connectivity services, Telcos could also offer additional applications or platforms that enable communication between self-driving cars. To seize this and other valuable IoT opportunities, Telcos must **begin investing in new competencies** and expand their business ecosystem by **acquiring new companies** or **forging new partnerships**.

[Source](#)

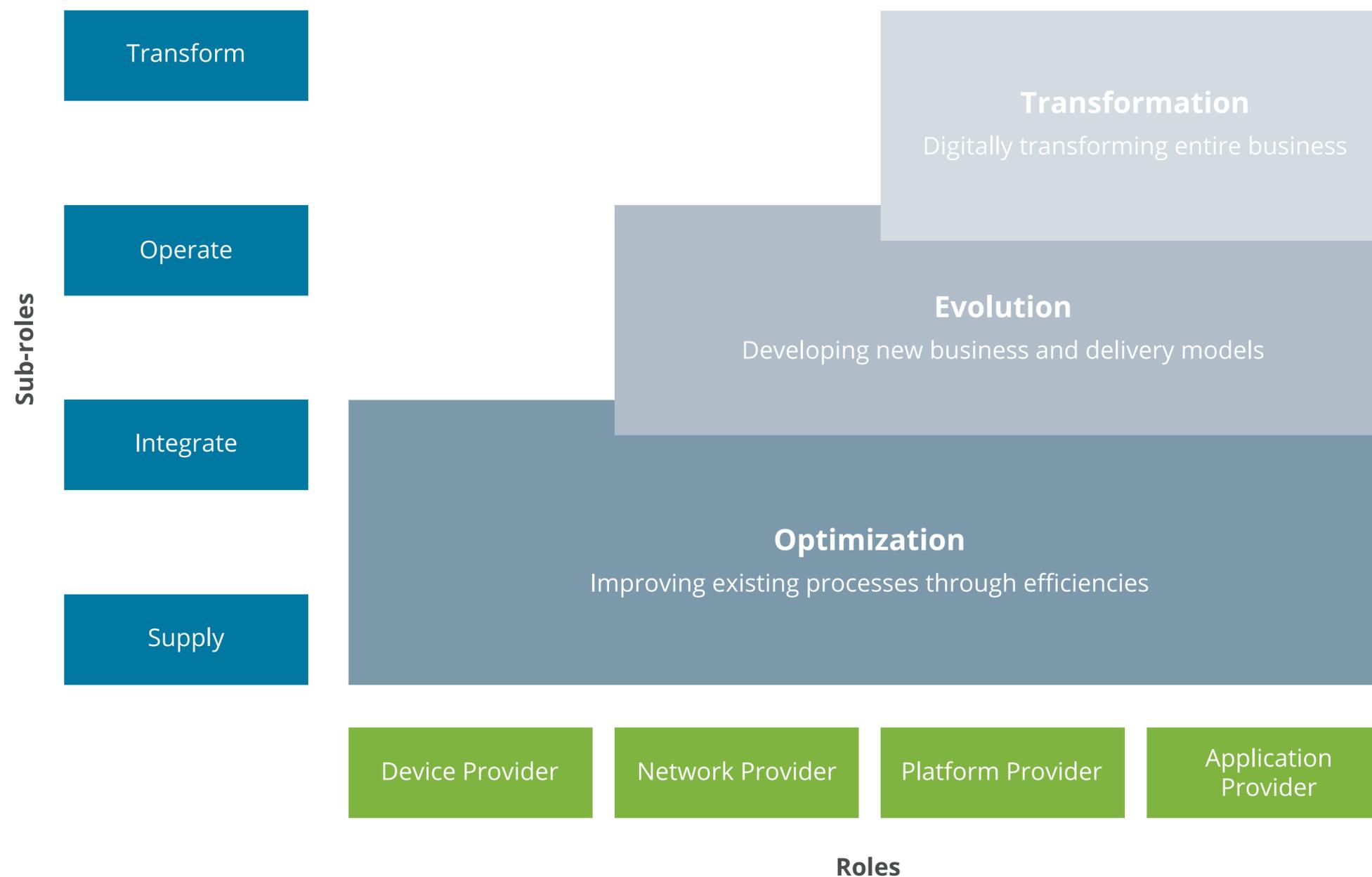
HOW TELECOM CARRIERS CAN MOVE UP IN THE IOT VALUE CHAIN



Pursuing the Roles of Service Enablers and Creators

By entering the IoT market, Telcos can reinvent their processes and ultimately transform their business. By optimizing the existing business processes, developing new competencies and delivery models, Telcos can evolve into **service enablers** or **service creators**. These new roles can empower Telcos to orchestrate IoT platforms, launch new IoT services, and create end-to-end solutions for the customers. To embark on the path of becoming a service enabler or creator, Telcos need to **reconsider their conventional business processes** (e.g., generating revenue per subscriber). Instead, Telcos need to focus on extending their service scope beyond connectivity and **switching to revenue sharing models with their new partners**.

HOW TELCOS CAN EVOLVE IN THE IOT VALUE CHAIN



[Source](#)

PAIN POINTS & BENEFITS OF IOT ADOPTION FOR TELECOM CARRIERS

A Comprehensive Review of the IoT Implementation Journey

Before tapping into the IoT opportunity, Telco's must have a full understanding of the reason why such a complex business initiative like IoT implementation is high on the agenda for many modern organizations.

This section provides an in-depth overview of all aspects that impact the IoT implementation journey, specifically:

- The key benefits that enterprises seek from IoT initiatives;
- The primary internal and external drivers of IoT adoption;
- The major areas of concern that hamper IoT implementation;
- Who are the key decision-makers of IoT projects;
- How third parties can impact the IoT journey.

Having answers to these pivotal questions will allow Telcos to direct their newly developed IoT service offerings into the right course, thus increasing their revenue and ensuring business growth.

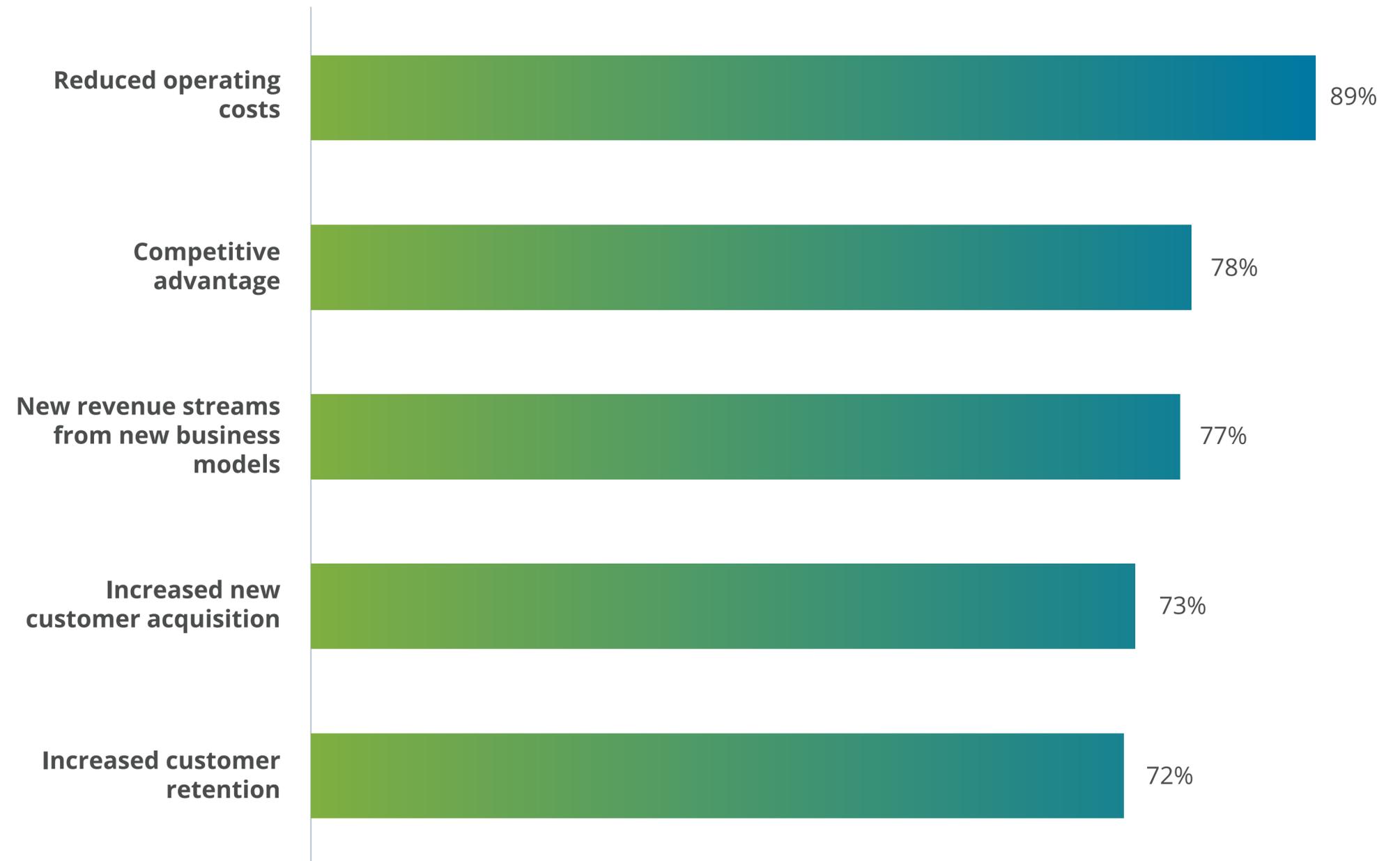


What Benefits Do Businesses Expect to Receive from IoT?

IoT has the potential to provide an array of tangible benefits in numerous business segments.

- The overwhelming majority of businesses focus on adopting IoT to reduce operational costs, as well as improving process efficiency and decision-making [according to Accenture](#).
- Other businesses focus on enhancing the customer experience with IoT, which will increase the rates of new customer acquisition and their subsequent retention.
- Lastly, companies seek to drive business value from innovative business models that will unlock new revenue streams.

KEY AREAS OF IOT INVESTMENTS



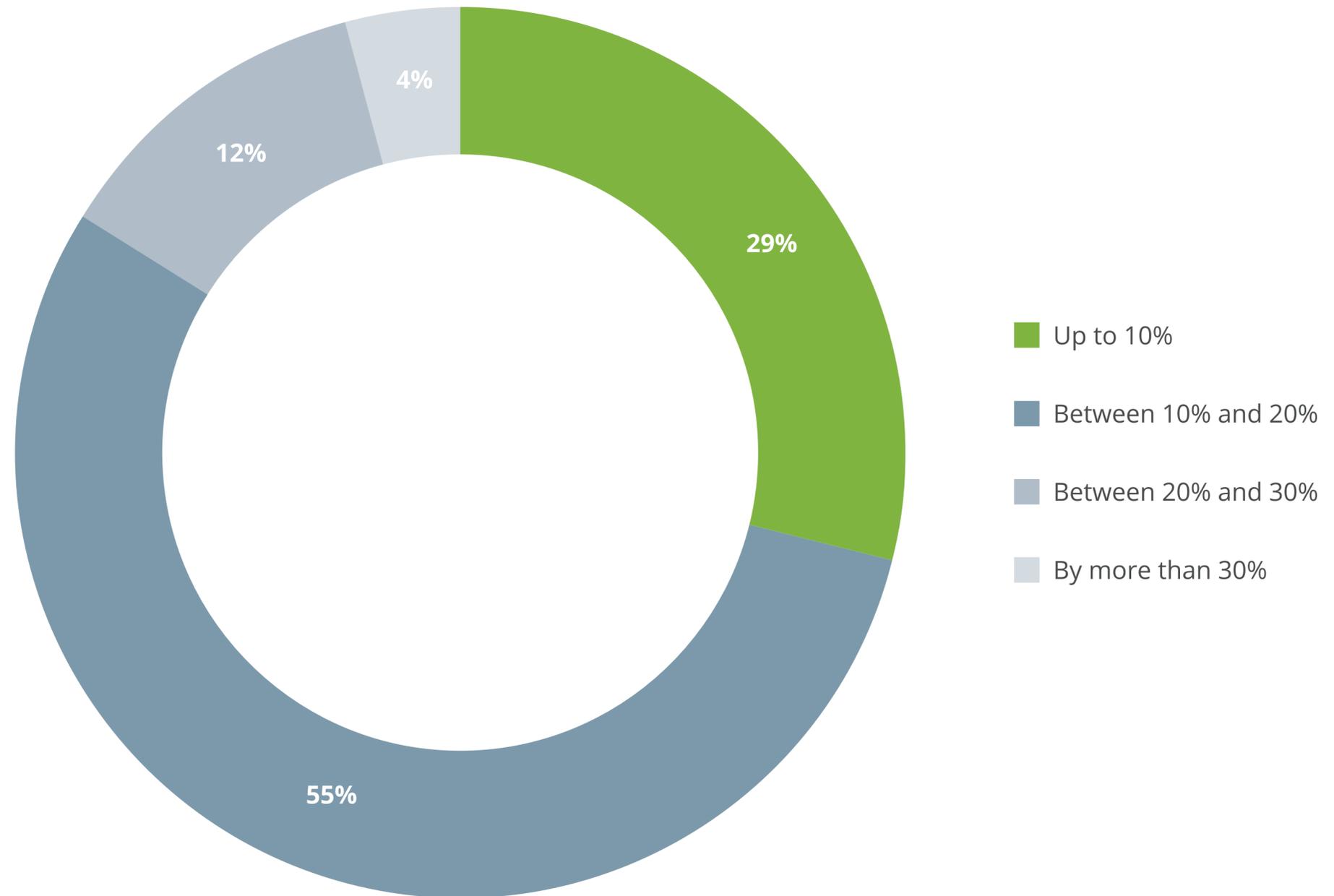
[Source](#)

How Much Digital Transformation Expenses Are Channeled into IoT?

As businesses pave their way to digital transformation, the executives must decide which digital initiatives are at the top of their priority list. The list may include a wide range of other technologies in addition to IoT, for example, AI/ML and RPA for business processes automation, or Cloud technologies for IT infrastructure optimization, etc. However, IoT projects get a significant share of the business's planned digital investment budgets. Approximately **55% of businesses are willing to invest up to 20% of their digital transformation budget on IoT**, while 29% focus on spending up to 10%, [according to this report](#). This indicates that businesses are well aware of the potential benefits of IoT and are channeling more funds into the implementation of IoT projects.

[Source](#)

BUDGET SPENDING SHARE DEDICATED TO IOT



A man in a white shirt is shown in profile, looking down at a laptop he is holding. He is in a factory or industrial setting, with machinery and equipment visible in the background. The lighting is bright and even.

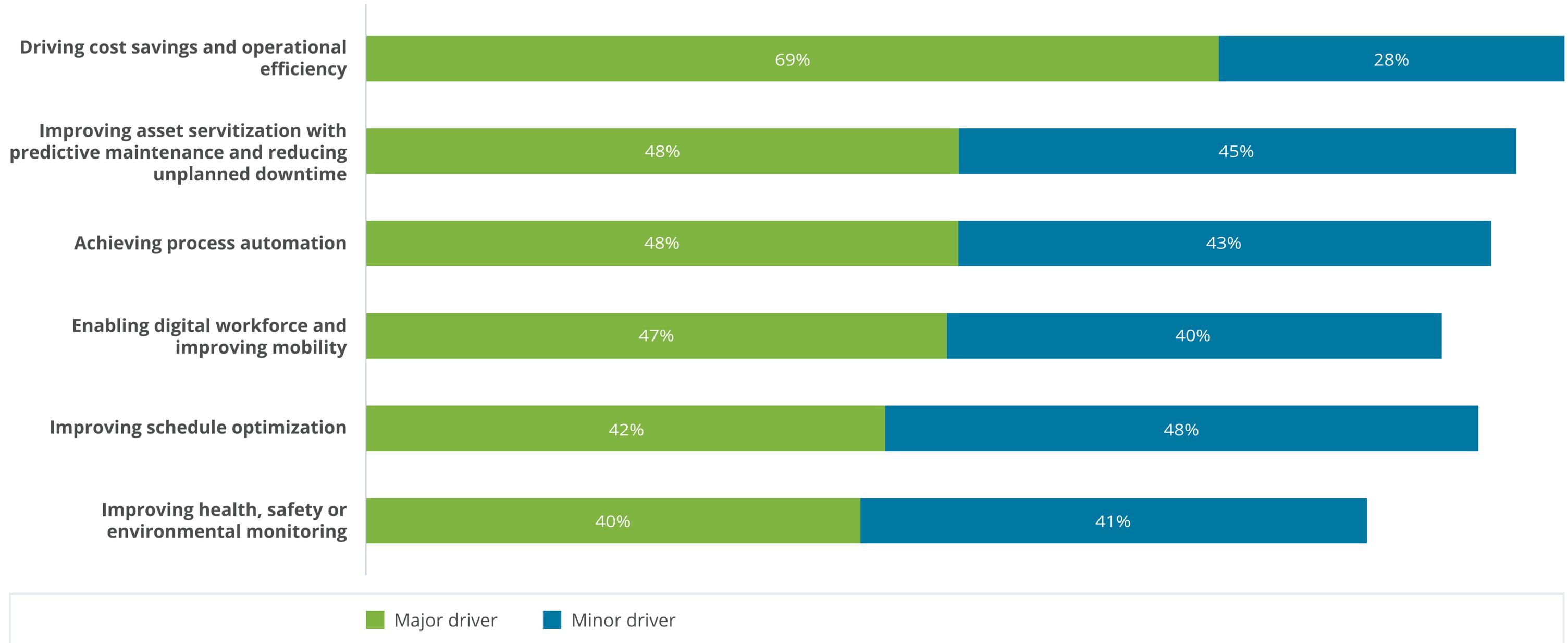
ALMOST 70% OF EUROPEAN ENTERPRISES CONSIDER COST REDUCTION AND ENHANCED OPERATIONAL EFFICIENCY THE MAJOR FACTORS FOR IOT ADOPTION

What Factors are Driving the Adoption of IoT?

Almost 70% of European enterprises **consider cost reduction and enhanced operational efficiency the major factors for IoT adoption**, as this [study](#) shows. Manufacturing companies are currently at the forefront of IoT adoption since they operate expensive industrial machines and have complex production processes that require optimization.

Other major drivers of IoT adoption include the **implementation of predictive maintenance** to exclude unplanned downtimes, and **business process automation** to reduce manual workload.

PRIMARY INTERNAL DRIVERS OF IOT ADOPTION

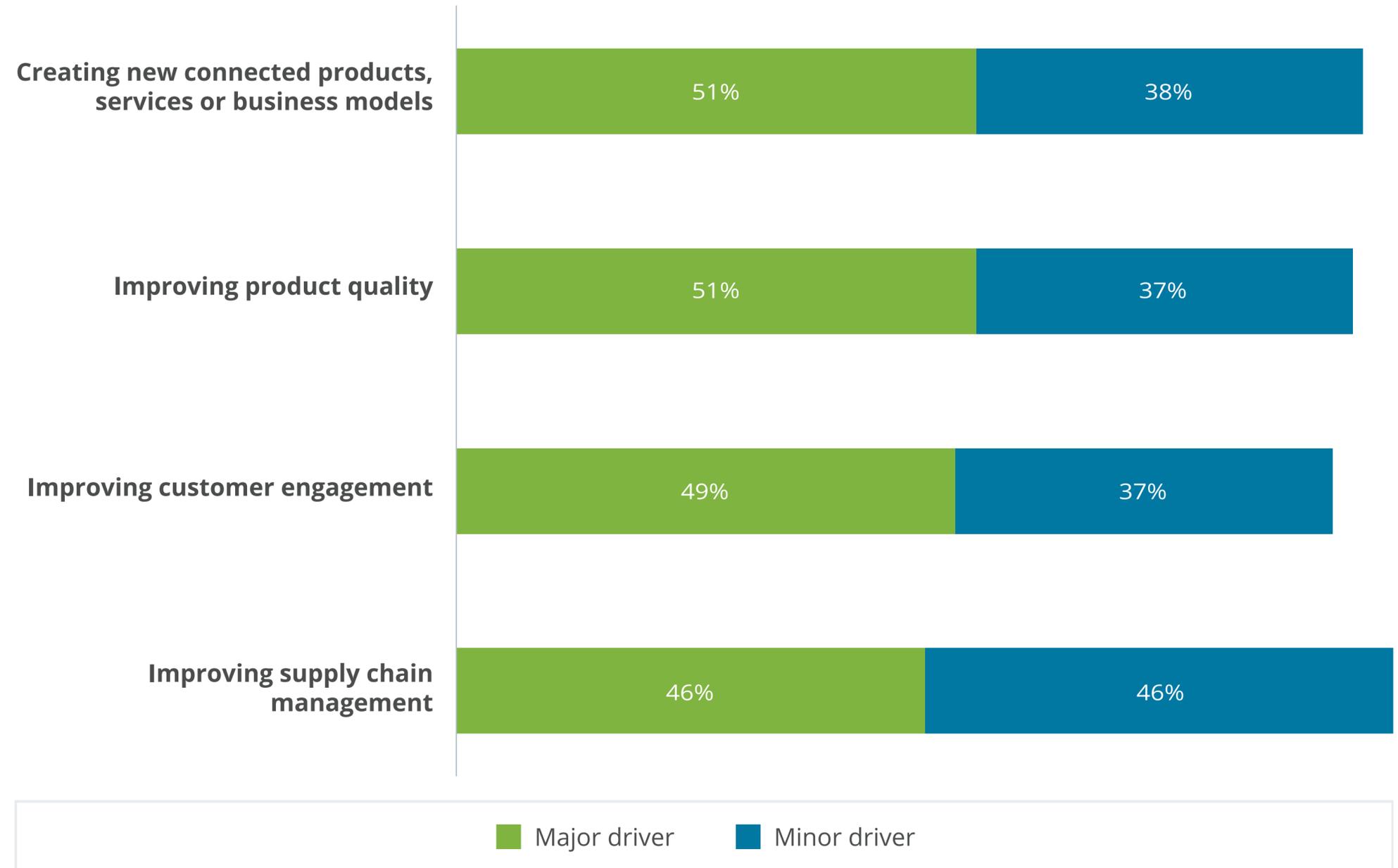


[Source](#)

External Reasons for IoT Adoption

The external factors that drive IoT adoption for 51% of European businesses include the need to create innovative connected products, offer new value-added services, and pursue new business models, [as per Accenture](#). Other companies see the need for the implementation of IoT solutions to improve their product quality and enhance customer engagement and retention. Lastly, 46% of enterprises state that another critical factor accelerating IoT adoption is the need for supply chain optimization.

MAJOR EXTERNAL DRIVERS OF IOT ADOPTION

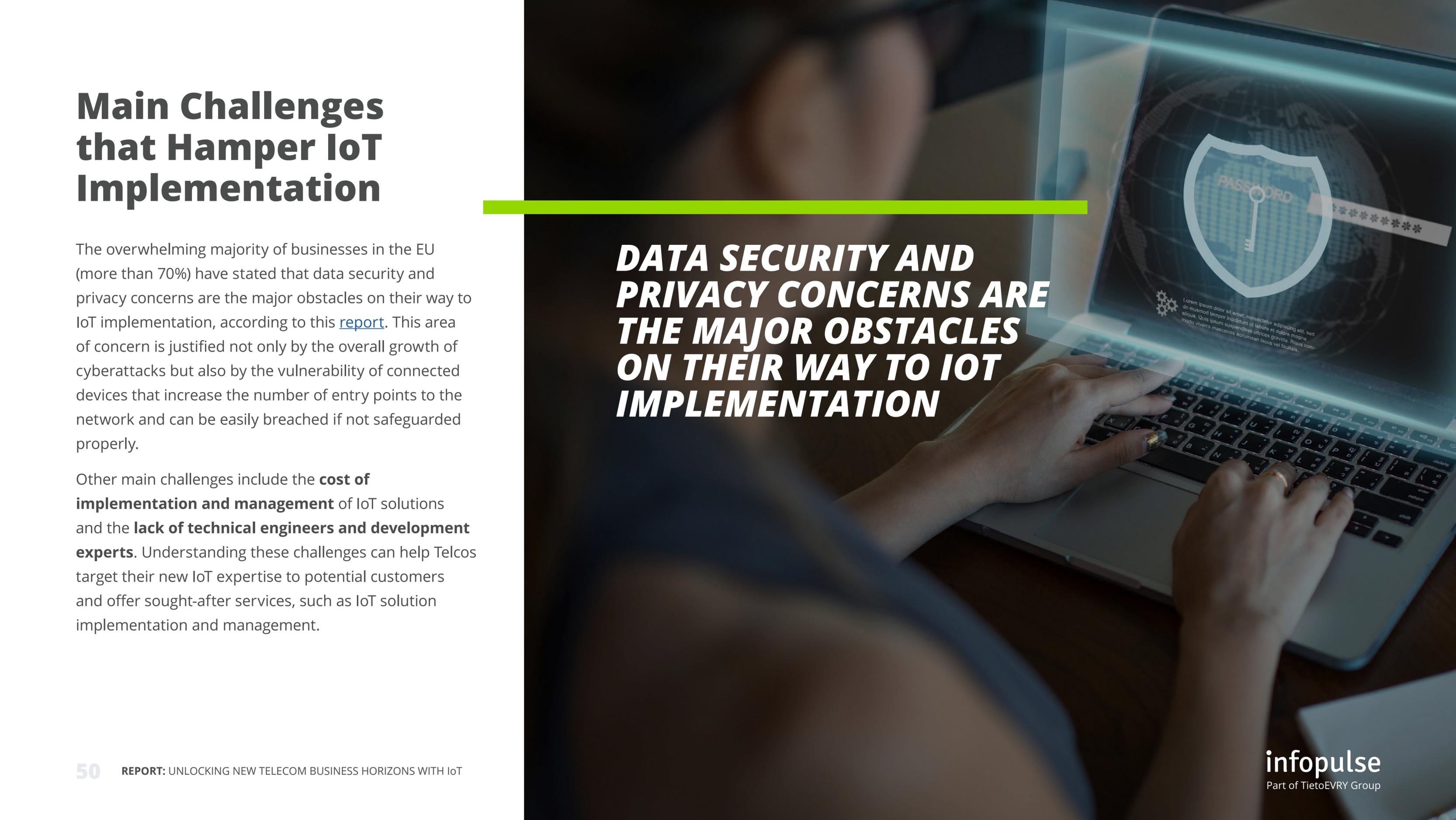


[Source](#)

Main Challenges that Hamper IoT Implementation

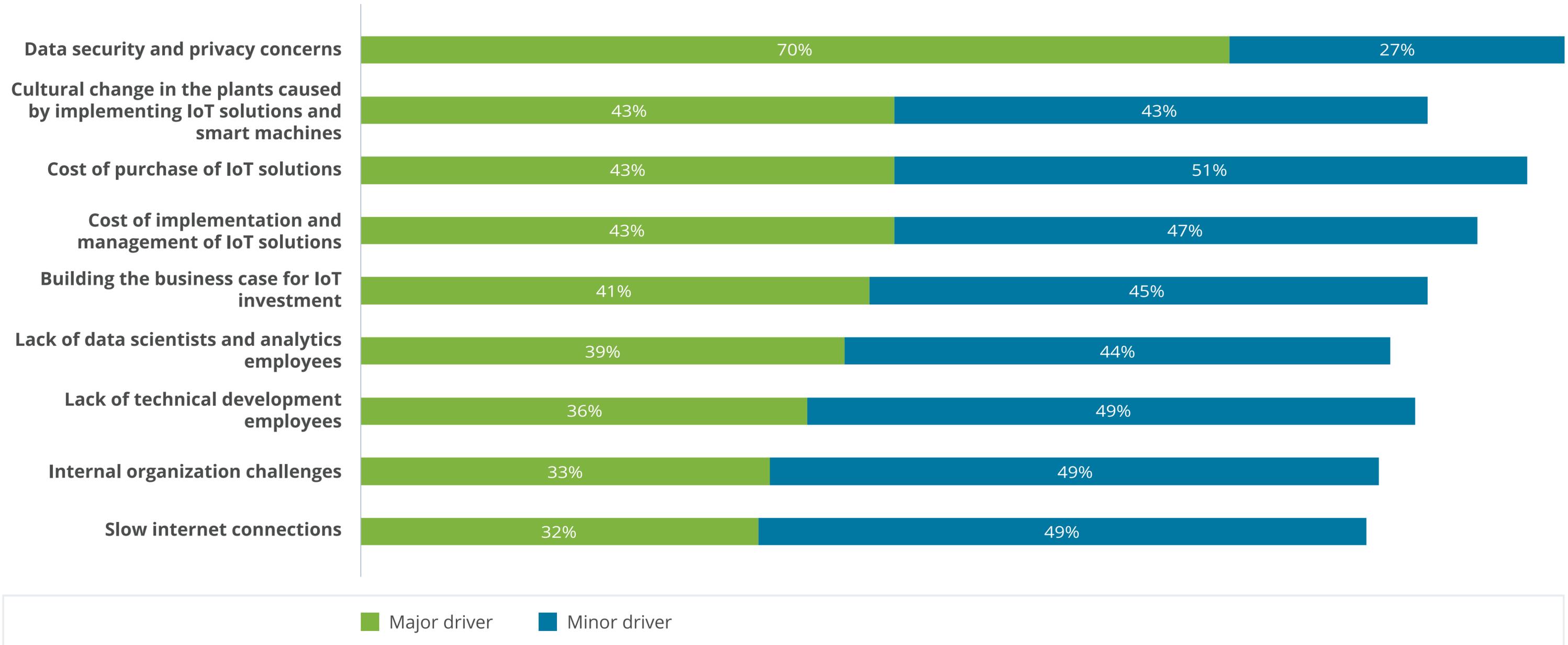
The overwhelming majority of businesses in the EU (more than 70%) have stated that data security and privacy concerns are the major obstacles on their way to IoT implementation, according to this [report](#). This area of concern is justified not only by the overall growth of cyberattacks but also by the vulnerability of connected devices that increase the number of entry points to the network and can be easily breached if not safeguarded properly.

Other main challenges include the **cost of implementation and management** of IoT solutions and the **lack of technical engineers and development experts**. Understanding these challenges can help Telcos target their new IoT expertise to potential customers and offer sought-after services, such as IoT solution implementation and management.



***DATA SECURITY AND
PRIVACY CONCERNS ARE
THE MAJOR OBSTACLES
ON THEIR WAY TO IOT
IMPLEMENTATION***

PRIMARY AREAS OF CONCERN THAT MAKE BUSINESSES HESITATE WITH IOT INVESTMENTS



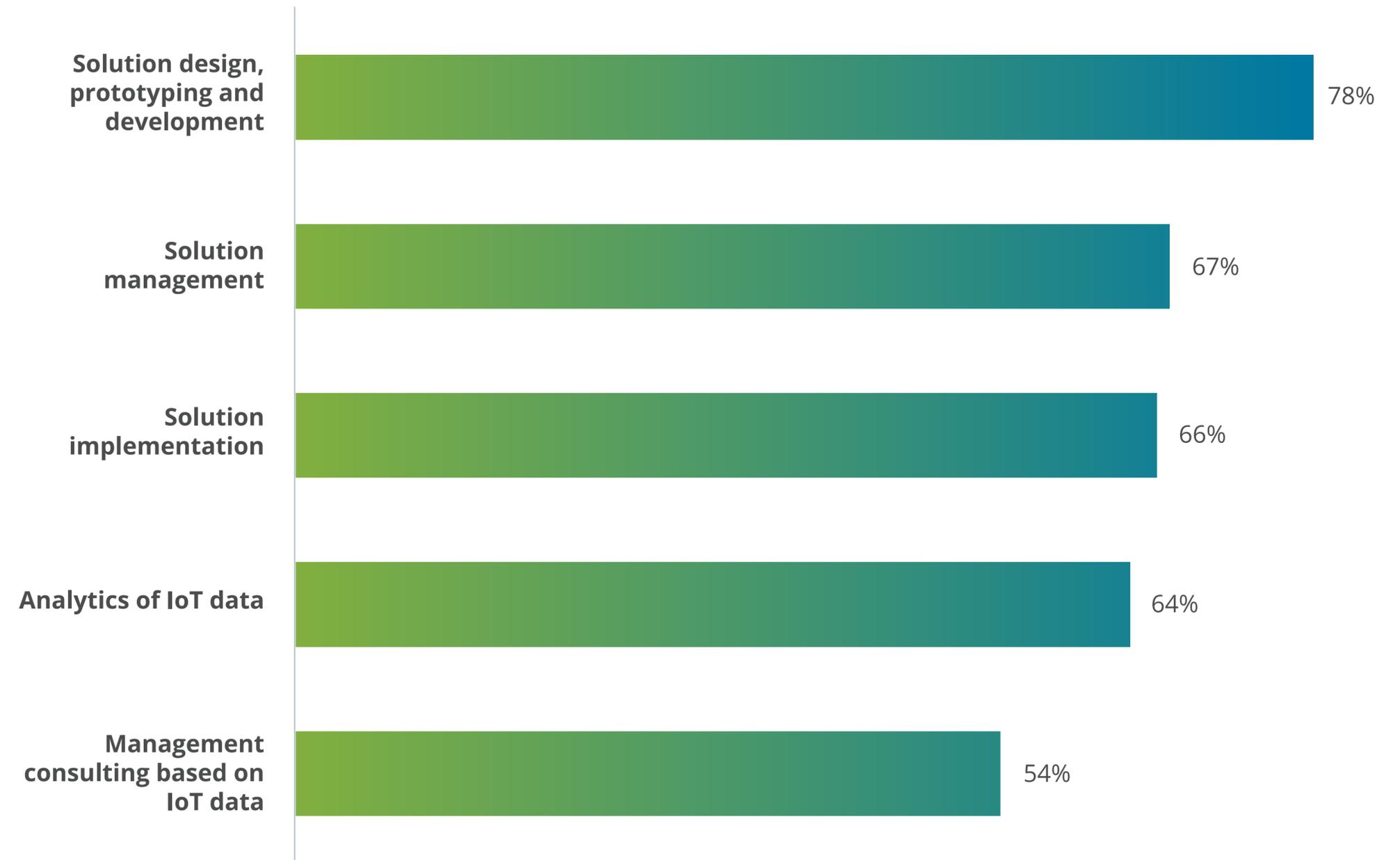
[Source](#)

Importance of Third Parties in the IoT Journey

Businesses across all verticals seek partnerships with third parties to accelerate their IoT implementation journey. In the UK and Benelux region, approximately [80% of companies opt for working with third parties](#) on IoT solution design and development, which indicates that these companies lack IT expertise. Businesses from other EU regions often seek assistance in IoT solution management and analytics of IoT data. Hence, Telcos with IoT expertise can understand at which stage businesses may involve them as third parties, and which types of IoT services are currently in the highest demand.

[Source](#)

KEY AREAS OF COLLABORATION WITH THIRD PARTIES DURING IOT IMPLEMENTATION





Who Are the Key Decision-Makers of IoT Projects?

The primary decision-makers for IoT initiatives are IT departments, lines of business (LoB), and digital business units. This [study](#) shows that IT departments are the key decision-makers for IoT initiatives in the majority of the EU, including the UK, Germany, Austria, and Switzerland, etc. However, this does not apply to every country, as the EU market is rather fragmented.

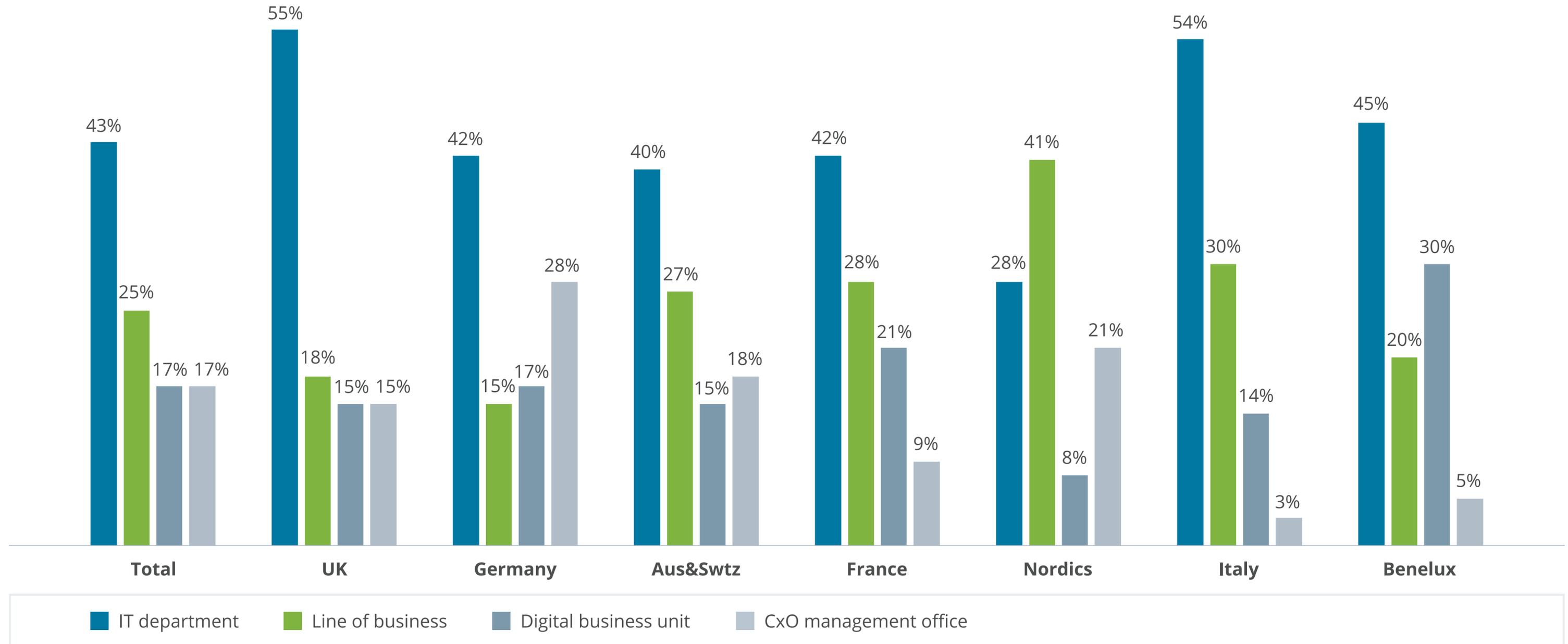
For example, in the Nordics, one of the most mature regions in terms of IoT, lines of business primarily

carry out the decisions on IoT implementation, while a significant part of companies in Benelux delegate IoT decision-making to digital business units.

By understanding who are the key decision-makers for IoT initiatives, Telcos that want to expand their IoT clientele can contact the respective departments and tailor their IoT offerings accordingly.

IT DEPARTMENTS ARE THE KEY DECISION-MAKERS FOR IOT INITIATIVES

BUDGET DECISION-MAKING DEPARTMENTS FOR IOT INITIATIVES



[Source](#)

The Relevance of IoT Data Analytics

Data analytics is an integral component of any IoT strategy, as it allows gaining valuable business insights and using them in business decision-making. Any organization needs to ensure precise data analytics with the help of cloud-based tools or applications, either on their own or with the help of third parties. According to this [report](#), **54% of companies across the EU will focus on leveraging precise IoT data analytics within the next 3 years**, while 30% are already benefiting from it.

NUMBER OF COMPANIES UTILIZING IOT DATA ANALYTICS IN THE EU

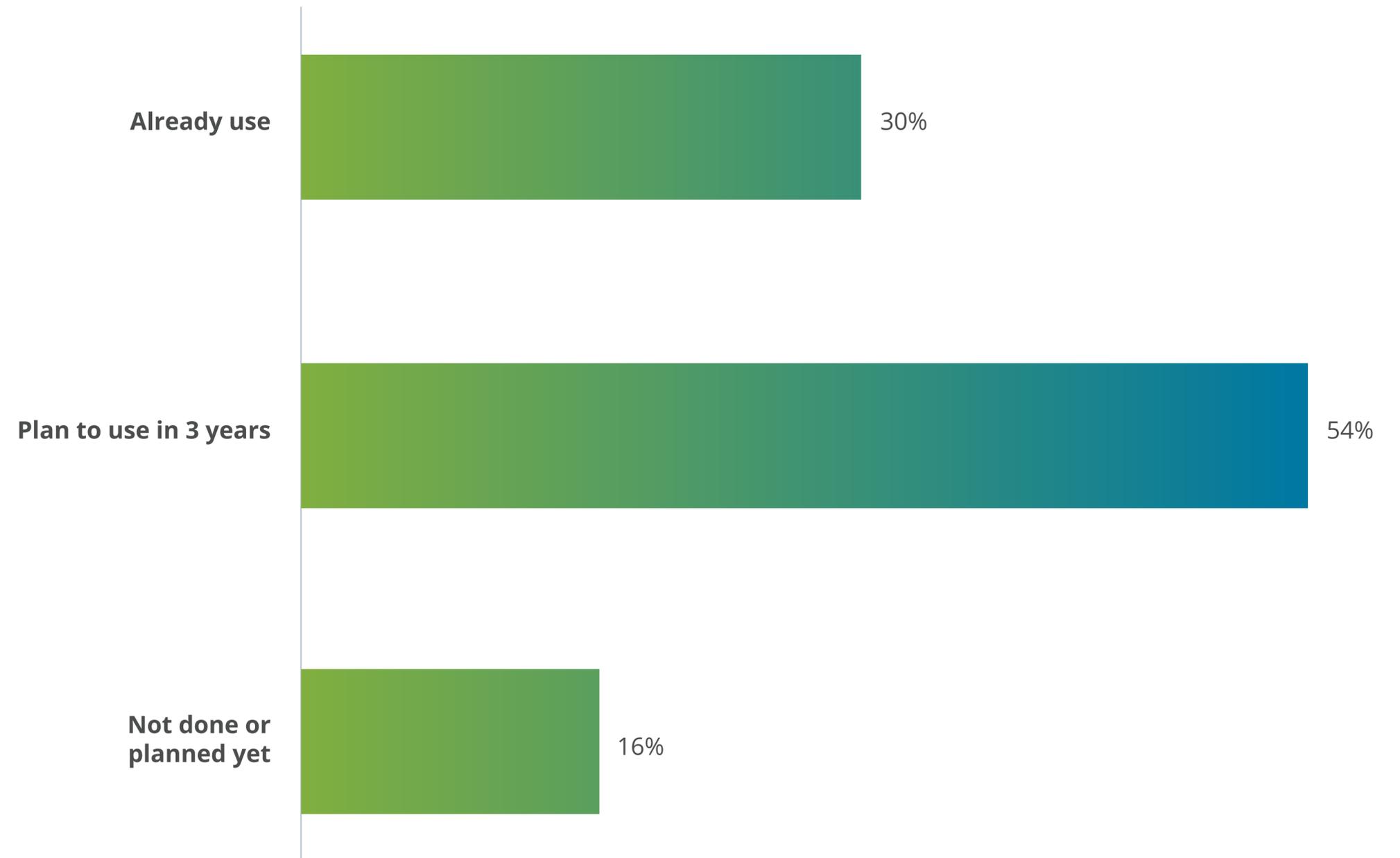


[Source](#)

There are three major ways by which IoT data analytics is performed – **on-premises, in the cloud**, and by using **edge technologies**. Currently, cloud-based IoT data analytics is the most popular method, as it enables complex data analysis and remains the most cost-efficient option. Some companies still use the on-premises approach; however, this legacy method is likely to be replaced with Cloud or edge technologies. Although edge analytics look promising, as they are capable of providing near-real-time IoT data analysis, it is still in development.

The majority of organizations are likely to shift their IoT data analytics to the Cloud or edge. Telcos can use this opportunity to **offer edge service provisioning, or IoT analytics solution design, development, or integration services**.

HOW IS IOT DATA ANALYTICS PERFORMED ACROSS THE EU?



[Source](#)

CASE STUDIES: TELCOS AT THE FOREFRONT OF IOT EXCELLENCE

How Telecom Carriers Pave their Way to IoT Services

Moving beyond conventional connectivity to IoT service provisioning may seem challenging for Telecom companies. However, many operators have successfully shifted their roles, and now reap the benefits of acting as IoT hardware, service, solution, and platform providers.

This report section is dedicated to the most valuable IoT monetization options and numerous case studies that show how different Telcos across the globe managed to deliver successful IoT projects in various verticals.



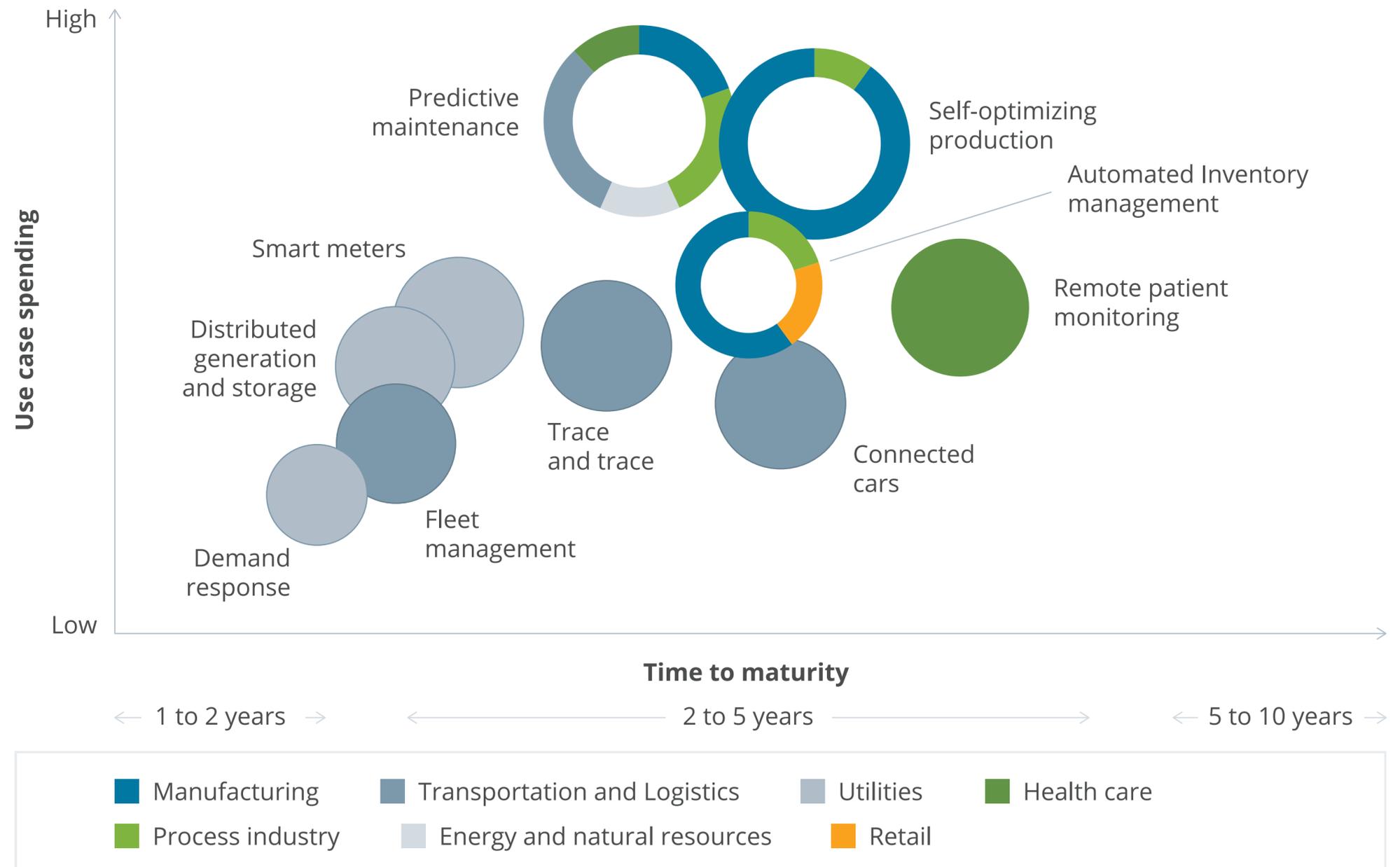
IoT Use Cases Poised to Mature Rapidly an Experience Widespread Adoption

IoT-driven predictive maintenance is one of the most widely implemented use cases, as it helps to detect or predict when a specific machine requires maintenance, thus eliminating unplanned downtimes and reducing costs. This use case rapidly gains traction across a host of verticals, including manufacturing, logistics, energy, and healthcare.

IoT solutions can be utilized for **industry-specific use cases**, e.g., **remote patient monitoring**, which enables physicians to track patient data in real-time. This solution can help healthcare providers improve patients' health outcomes and reduce healthcare costs.

Another quickly maturing industry-specific use case is **IoT-based fleet management**, which is beneficial for transportation and logistics companies. IoT fleet management delivers real-time data on the location, usage, and condition of vehicles, improving logistics efficiency, reducing costs, and excluding congestion via dynamic rerouting.

TOP TEN IOT MONETIZATION USE CASES



[Source](#)

OTHER NOTABLE IOT USE CASES THAT MAY BE USED IN MANUFACTURING, LOGISTICS, UTILITIES, AND RETAIL INDUSTRIES INCLUDE:



Self-optimized production makes automated adjustments to production processes to enhance efficiency and reduce waste.



Automated inventory management provides a deeper insight into the supply chain and inventory-related processes, and allows reducing stock out and pileups, as well as monitoring the inventory condition in real-time.



Track and Trace use case enables manufacturers to monitor the status of products at the assembly line and can be used to locate tools and materials.



Smart meters can help consumers track the usage of utilities and generate real-time billing data.



IoT-driven demand response improves the users' interaction with utilities by enabling remote appliance control.



Distributed generation and storage balance the energy usage across the grid, thus reducing energy costs.



Connected cars featuring enhanced navigation systems and improved safety functionalities.



CASE STUDY #1

Global Telecom Carrier Develops an Advanced IoT Platform

[BICS](#) is recognized as a top global voice carrier and the leading provider of mobile data services. Its innovative suite of solutions for Voice, Messaging, Data & Connectivity, Business Intelligence & Analytics, Fraud &

Authentication, Roaming, MVNE, and Asset Monetization bring value to customers' businesses by enabling them to offer state-of-the-art communication services. BICS has recently developed a platform that features access to a

fully virtualized international mobile network tailored for IoT applications. This [case study](#) shows how healthcare providers can implement the BICS platform to ensure advanced remote patient monitoring.



SOLUTION'S REQUIREMENTS



International multi-network coverage



VoIP & SMS capabilities



Connectivity options for numerous devices



Real-time data monitoring and management



Local numbers for enhanced customer service

SOLUTION'S APPLICATIONS



24/7/365 remote patient monitoring



Real-time injury alerts



Integration with the systems of first responders (paramedics, attending nurses, physicians, etc.)



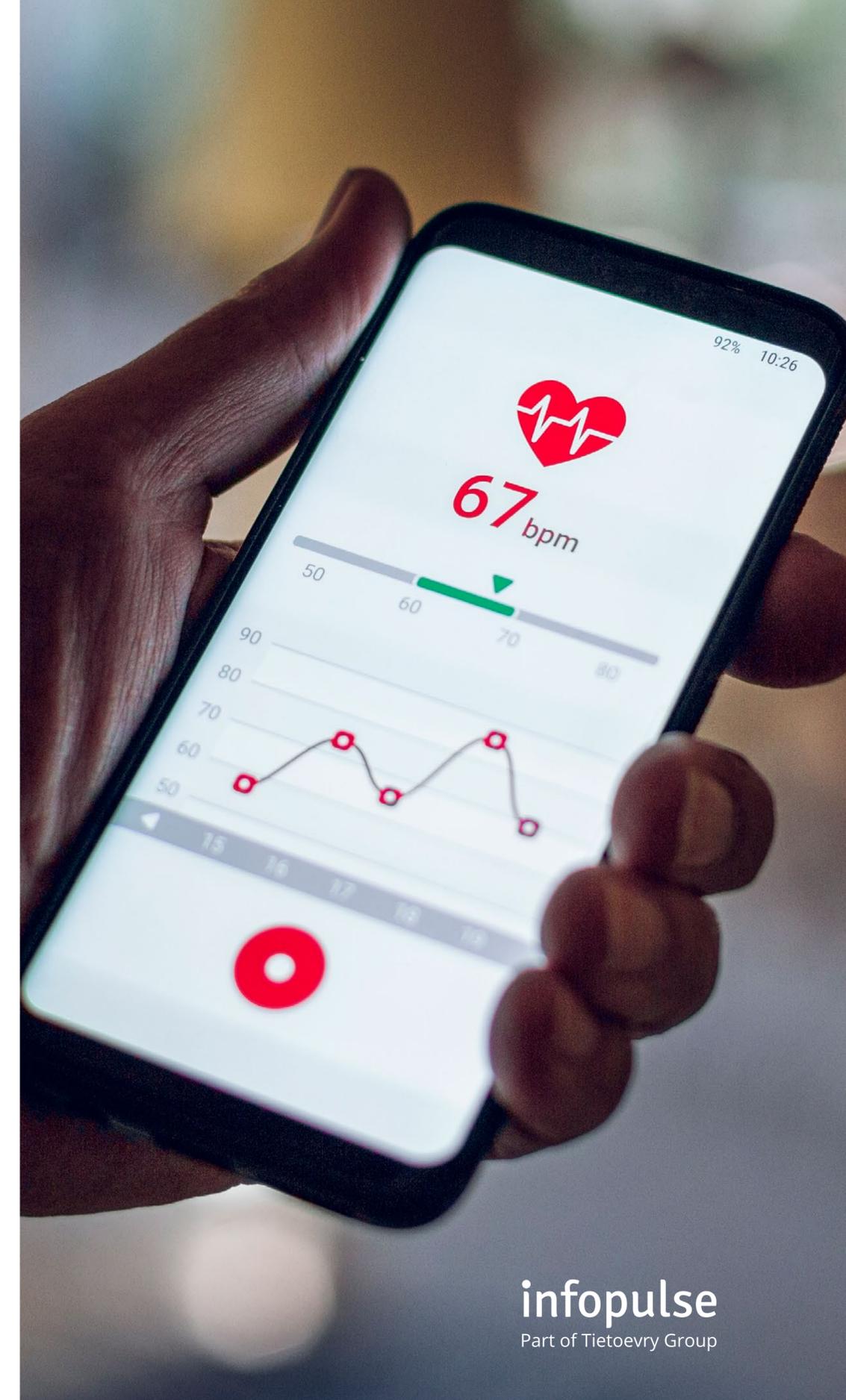
Possibility to trigger environmental sensors



Voice and SMS connectivity

BICS SIM for Things (SFT) solution offers reliable worldwide coverage and international calling capabilities for connected medical devices, which is imperative for healthcare providers. The platform enables physicians to check the patients' statuses via local numbers by using VoIP that will generate a stream of data between the SIM and provide an update on the patients' health conditions. Moreover, the platform features simple and convenient data management options and ensures robust patient data security on the device, network, and application layers. BICS SFT is an advanced IoT platform with reliable global connectivity, real-time visibility, and voice-enabled connections that can empower healthcare organizations with precise real-time monitoring and enhanced patient experience.

Infopulse has been an outsourcing partner of BICS for 10+ years. Since the start of the partnership, Infopulse provides a full scope of services to BICS, including software development, telecom operations services, QA, IREG testing, customer support, and BPO. Throughout many years of cooperation, Infopulse has helped BICS achieve their business objectives by developing a [portfolio of 60+ BSS & OSS applications](#) and a complex and highly-efficient [Core Network Services solution](#). Being fully satisfied with our services, BICS has [extended the partnership](#) with Infopulse until 2030.





CASE STUDY #2

Deployment of 5G, Edge Computing, and Machine Vision into Haier's Manufacturing Environment

Haier

This [case study](#) shows an outstanding example of how a telecom company (China Mobile) has created a subsidiary company (China Mobile IoT) that focuses on delivering IoT business services, applications, and hardware. China

Mobile IoT has partnered with GSMA, Huawei, MStar, and Haier to implement a 5G-connected MEC (mobile edge computing) platform, along with its integration into Haier's manufacturing environment. The solution

was developed to ensure high-volume image processing with minimal latency, which would exclude production delays, product defects, and optimize manufacturing performance for Haier.

PARTNERS & ROLES



China Mobile

Integration of the 5G system with MEC



HUAWEI

Huawei

MEC platform development and hardware installation



MStar

Machine vision application provisioning and algorithm training

Haier

Haier

Development, installation, and management of advanced robotics



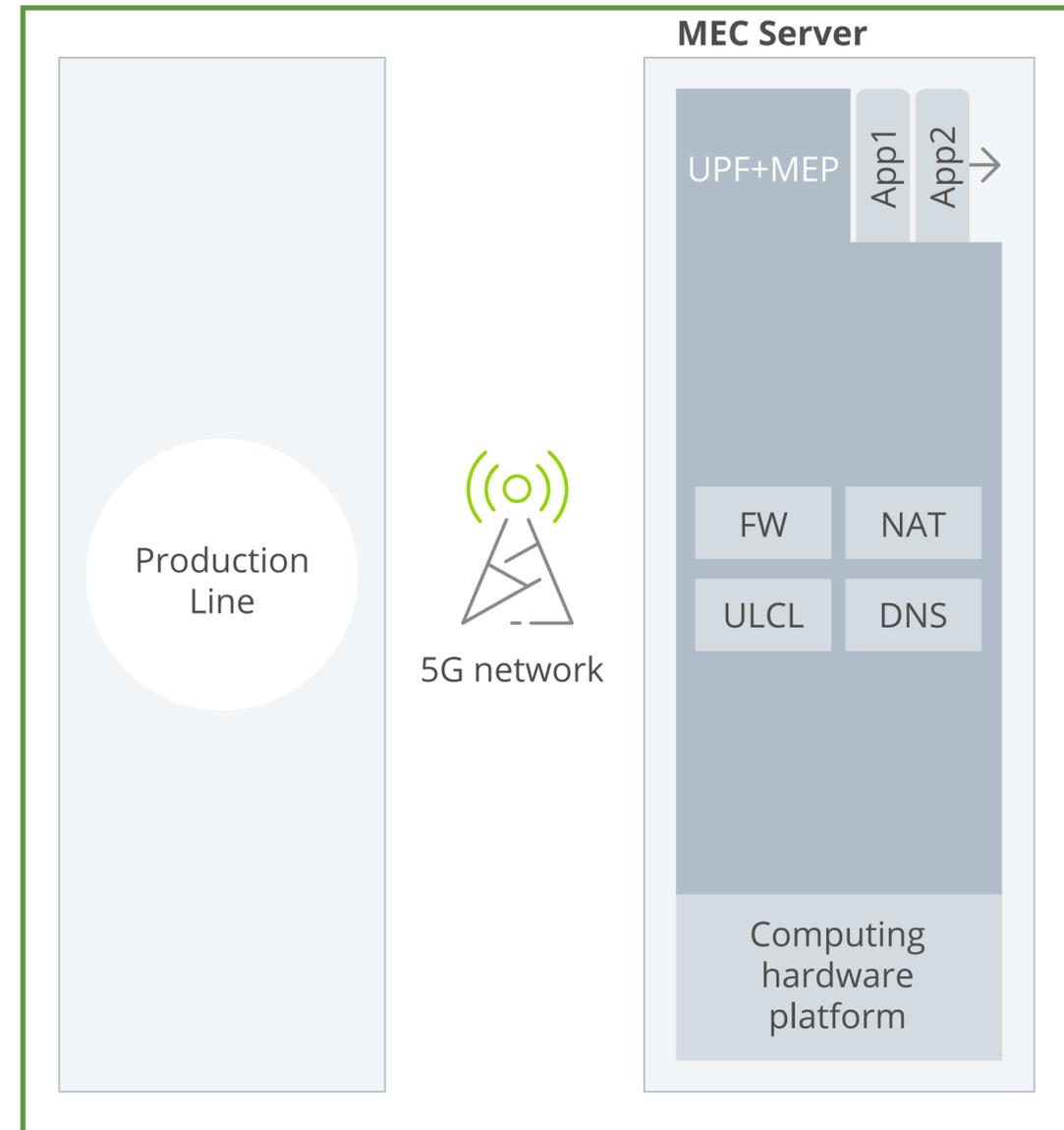
GSMA

Project management

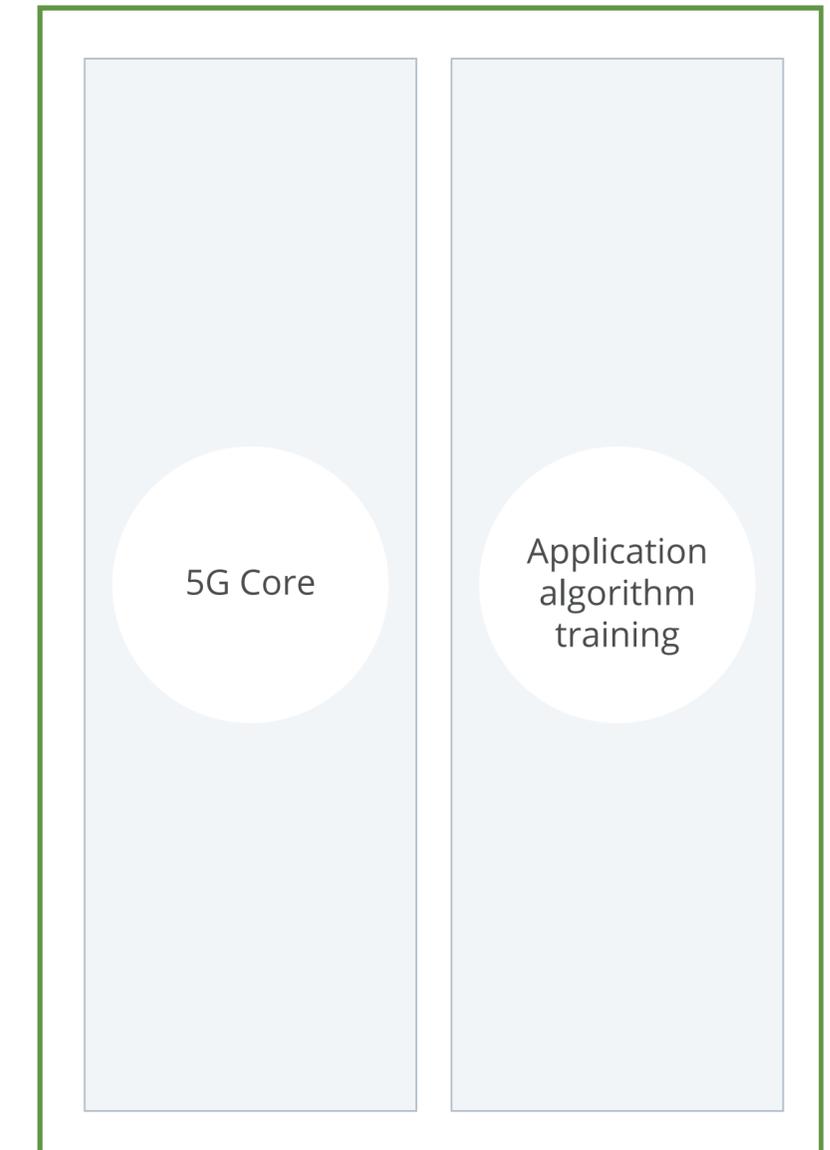
The 5G connectivity supplied by China Mobile enables effective MEC deployment as the user/control planes may be divided. Due to this, 5G network functions can be driven closer to the production line, which reduces latency and enhanced the reliability of the data flow. The edge server is used to host the MStar’s machine vision, while all data processing is conducted within Haier’s production facility. Huawei’s MEC platform works to designate and adjust available resources so that the machine vision is able to function at peak efficiency the whole time, while the data processing workload on the server remains balanced. Moreover, MEC further facilitates Haier’s product monitoring by sending data analytics reports to the end-users.

SOLUTION’S ARCHITECTURE

On Haier Site



Off Site

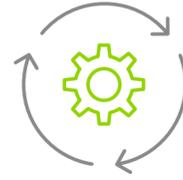


[Source](#)

PROJECT OUTCOMES



Swift Implementation. Due to the extensive offsite algorithm training conducted by MStar, the 5G MEC infrastructure was installed and implemented on Haier's manufacturing facility in just 1.5 days. In contrast, the installation and implementation of legacy systems would require up to 35 days. Moreover, the solution's integrated HPF and MEP design significantly simplified the configuration, setup, and testing, which resulted in saving approximately 100 man-days.



Optimized Space and Resources. The integration of UPF and MEP in a single server and localized telecommunications equipment enabled the 5G MEC to operate in a confined space near the production line with low latency.



Precise Product Quality Monitoring. The cutting-edge machine vision monitoring has significantly enhanced product quality across the entire production line by promptly detecting any defects. As a result, Haier improved customer satisfaction rates and reduced product returns.



CASE STUDY #3

Telenor's Advanced IoT Solution for Fleet Management

Telenor Group is a leading telecommunications company across the Nordics and Asia. Telenor has established a dedicated IoT unit – Telenor Connexion, which designs, implements, and operates IoT solutions on a global

scale. This [case study](#) shows how Telenor Connexion has developed an advanced IoT-based fleet management solution for Scania, a major Swedish manufacturer of commercial vehicles.





CHALLENGE

Scania has partnered with Telenor to develop a complex solution that would improve fuel cost-efficiency and maximize vehicle uptime for truck fleet owners across 100+ countries. Another crucial requirement was to ensure a significant reduction of vehicle emissions, as Scania aims to contribute to global sustainability.



SOLUTION

Telenor has developed an easily accessible and convenient IoT-driven solution that consolidates data of daily fleet operations, enables real-time vehicle monitoring, and ensures seamless integration with different telematics systems.

The solution's key features include:

- Driver and Vehicle Evaluation – evaluates fuel consumption and tracks the vehicle's key parameters, including fume emissions.
- Vehicle tracking – monitoring of the fleet's position and status (e.g., low engine oil pressure).
- Fuel, events, and environmental impact reports – to indicate positive and negative tendencies over different periods (weekly/monthly/annual reports).
- Messaging service – a swift communication channel for drivers/operators to report vehicle faults.



BUSINESS VALUE

Scania can utilize the IoT solution to access the required information on the vehicle status and the driver's behavior. The subsequent driver coaching enables fleet owners to optimize fuel consumption and reduce emission rates. Moreover, advanced reporting provides a comprehensive overview of the fleet performance, which allows identifying and analyzing short and long-term patterns to further enhance fleet operations. Lastly, a convenient messaging service enables drivers to swiftly report vehicle faults, which reduces downtime.



CASE STUDY #4

KDDI Japan Develops an IoT Solution for Weather Tracking on Mount Fuji



This [case study](#) shows how Japan's leading telecom operator KDDI has partnered with numerous municipalities to develop a high-end IoT solution that would help climbers safely tackle Mount Fuji. KDDI has provided IoT connectivity via an LTE-M network, and supplied IoT sensors for this project.

Since climbing trails can be crowded, KDDI utilizes an LTE-M network to track the number of mountaineers at the ascent, which helps to avoid congestion at Mount

Fuji's climbing routes. Moreover, IoT sensors are installed at the ascent points to track the temperature and humidity levels. The data is then sent to a specific web portal, which can be accessed by mountain climbers. After viewing the data, they can plan their schedule, clothing, and equipment accordingly.

The IoT-driven monitoring solution may generate other valuable insights that can be used to improve climbing trails and other facilities near Mount Fuji. For example,

the solution revealed that most visitors constantly walked through a specific hiking trail without climbing the summit. In response, KDDI installed VR equipment near the trail center, so that these visitors could immerse themselves in the Fuji summit view while remaining at the trail.

KDDI'S MOBILE IOT STRATEGY

KDDI began pioneering the IoT landscape in 2018. It was then that the company launched a nationwide LTE-M network coverage. The network plays a crucial role in KDDI's IoT service enablement. Currently, KDDI provides SIM management services via a dedicated web portal, which can track traffic volumes, billing data, connectivity status, and other valuable data.

Moreover, the operator has joined forces with Accenture to offer a comprehensive IoT data analytics solution. KDDI plans to implement mobile IoT technologies for a wide range of use cases, including spanning telematics, smart meters, industrial equipment monitoring, vehicle tracking, and management, etc.

Recently, KDDI has implemented an advanced IoT solution for the agricultural sector. The solution includes LTE-M-enabled sensors installed in the paddy fields that collect the data on water levels and allow farmers to monitor the growing conditions from a PC or a smartphone.



Conclusion

The Internet of Things is an inevitable part of our future that fuels technological innovation across all business sectors on a global scale. Now is the right time for telecom carriers to extend beyond the connectivity framework, choose the fitting IoT market segment, and develop the required competencies. More than that, telcos should act as IoT service enablers and providers to deliver added value to the customers and benefit from a wide range of profitable IoT monetization options. The IoT-focused business development vector for Telecom companies promises to create an outstanding competitive advantage at present and in the years to come.

About Infopulse

Having almost 30 years of experience in bringing innovative technologies to life, [Infopulse](#) is the one-stop-shop for the digital transformation of your telecom company. Our [comprehensive telecom services](#), including Messaging, VoIP, Roaming, Capacity Signaling, and Mobile Data, as well as [full-cycle IoT development](#), architecture consulting, and hardware design ensure that we address our customers' needs in the most efficient manner and in line with the top industry standards.

Contact us today to empower your telecom business with IoT-driven solutions!

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