



## [The Internet of Things in Europe](#)

The European market for Internet of Things (IoT) solutions is growing. Western and Northern Europe are especially promising. Both consumer and business IoT offer opportunities, but specialisation may give you a competitive advantage. The home, health and finance sectors are front runners. National and European initiatives are working to stimulate the roll-out of Industrial IoT solutions and lower barriers. The shortage of skilled specialists continues to drive outsourcing.

### Contents of this page

1. [Product description](#)
2. [What are the challenges when it comes to outsourcing IoT services?](#)
3. [Which European markets offer opportunities for IoT services?](#)
4. [What trends offer opportunities on the European market for IoT?](#)
5. [What requirements should IoT services comply with to be allowed on the European market?](#)
6. [What competition do you face on the European IoT market?](#)
7. [Through what channels can you get your IoT services on the European market?](#)
8. [What are the end market prices for IoT services?](#)

## 1 . Product description

### What is the Internet of Things?

The Internet of Things, or IoT, refers to (even everyday) objects being connected to the Internet. They are embedded with electronics, sensors, software, actuators and network connectivity.

This allows these 'things' to:

- sense / measure their environment to collect data;
- perform computations on this data;
- react autonomously to the collected data;
- connect to other devices or systems to send and receive data.

There are various definitions, but we distinguish two types of IoT:

### Consumer IoT

Consumer IoT systems connect devices that consumers buy for personal use. The purpose of these devices is to improve consumers' daily lives, for example, by making them safer, healthier, or simply more enjoyable. It includes things like wearable health and fitness monitoring devices, and smart home appliances.

# Industrial IoT

Industrial IoT refers to the connection of industrial devices over the Internet, with a focus on the transfer, command and control of mission critical information and responses. Its systems connect non-consumer devices, which organisations like companies, government and utilities use in their service delivery to improve operational efficiency.

For example, industrial IoT allows organisations to monitor crucial infrastructure or movement of people. Companies can use it to increase their productivity, or develop new and/or value-added services. It includes areas like retail automation and health-care equipment.

In manufacturing, industrial IoT systems can connect the components of a production process in a factory. Their purpose is to allow for 'smart manufacturing'. In smart factories, cyber-physical systems monitor physical processes and make decentralised decisions. Via their IoT connection, these cyber-physical systems can communicate and cooperate with each other and with humans in real time. Connected devices include manufacturing equipment and robots.

Cyber-physical systems are based on principles such as:

- interoperability - allowing components from different vendors and humans to connect and communicate;
- virtualisation - enabling the infrastructure to emulate various operating systems, to allow previously incompatible systems to run on the same infrastructure and integrate;
- digital twins - using a logical representation of the factory and sensor data to create a virtual copy of the smart factory;
- decentralisation - making autonomous decisions locally, with no (or limited) dependence on a connection to a central infrastructure;
- real-time capability - collecting, analysing and translating data into insights immediately;
- service orientation - creating systems that are purely exposed and sold based on the resulting outcome (the service) rather than the actual system;
- modularity - creating flexibility by building systems as a collection of relatively independent individual modules, allowing the option of replacing or expanding components instead of whole systems.

Industrial IoT can benefit European companies by monitoring operations, providing insights and suggesting improvements. In fact, [companies that use Industry 4.0 technology can perform 10 times better than their peers](#) by being more effective, more efficient and/or faster. For example, they use smart devices, connected objects and sensors, cloud technology and big data analytics.

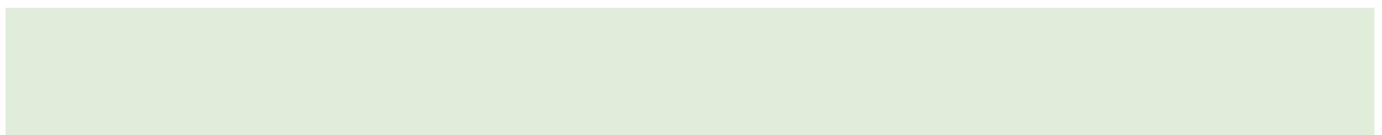
## What are IoT services?

There are several types of IoT services. The large volumes of data IoT generates are especially suited for outsourcing. The cloud is ideal for managing IoT data, which requires considerable scalable resources. Big data skills and solutions are needed to analyse, interpret and base predictions on IoT data.

IoT software services include:

- traditional software development;
- IoT product development, like co-creation with specialised hardware manufacturers;
- improvement of existing products with IoT ('smart') features.

Developing IoT products also offers further opportunities for global market expansion. For example via innovation and development of disruptive technologies, attracting investments (possibly via crowdfunding) and establishing start-up companies as spin-offs of your company, often in collaboration with the producer of the physical machinery/sensors in question.



### Tip:

- For more information, see our studies on [big data](#) and [cloud computing](#).

## Why do European companies outsource IoT services?

### Cost reduction

[For 60% of executives, cost reduction is their main reason for outsourcing information technology \(IT\)](#). This confirms that cost reduction continues to be the main driver for European companies to outsource IT, like IoT services.

### Tips:

- Offer competitive pricing, but don't compromise on the quality of your services.
- Be transparent in your pricing: avoid hidden costs.

## Expertise, specialisation and flexibility

Another key advantage of outsourcing IoT services is that European companies don't need to hire in-house expertise. [A lack of expertise is the main concern among companies implementing Industrial IoT](#). IoT services require excellent knowledge and technical skills, which most European companies don't have in-house. Specialised expertise is especially valuable. Specialisation in a vertical sector, or even a specific context within a sector, gives you a competitive advantage.

Outsourcing these services also gives European companies flexibility. IoT projects often evolve from their original concept during the process. Service providers have access to the knowledge and skills required to successfully deal with such evolving demands. To benefit from this, you need to be flexible. To make sure their operational needs are met, European companies may require a try-before-you-buy experience. For example, a pilot project or demo.

### Tips:

- Emphasise your expertise and flexibility in your marketing activities.
- Clearly communicate your specialisation in a vertical sector or specific context.
- Develop consulting skills to advise potential buyers on how they can benefit from IoT and how you can realise this for them. The earlier you are involved in the project, the better.
- Follow the latest technological developments to keep your knowledge and skills up to date.
- Be flexible and be prepared to adjust the scope of your project along the way.
- European companies often require proof of your technical skills. Provide references, testimonials and examples of recent work, preferably on your website.
- Offer potential buyers a pilot project or a demo to demonstrate transparency and capability. This also establishes trust.

## 2 . What are the challenges when it comes to outsourcing IoT services?

### Data security and intellectual property protection

Data security and intellectual property protection are of the utmost importance to European companies. This is especially relevant to outsourcing IoT services.

For example:

- Software developers may have access to sensitive project and company information.
- Connected devices can generate large volumes of data that must be managed securely.
- Hackers can target IoT devices - [attacks on IoT devices increased by 600% in 2017](#).
- Hackers can use the hacked devices in Distributed Denial of Service (DDoS) attacks.

European companies generally perceive offshore data security to be of inferior quality. [The European Union currently considers data appropriately protected in a select number of countries](#):

- the 28 countries of the European Union;
- the three countries inside the European Economic Area - Iceland, Liechtenstein and Norway;
- countries with 'adequate' data protection laws - Andorra, Argentina, the British Islands, Canada, Faroe Islands, Israel, New Zealand, Switzerland and Uruguay, as well as the United States of America (limited to the [Privacy Shield framework](#)).

This makes it even more important for you to show potential European buyers that your IoT services are secure.

#### Tips:

- Provide clear information about your company's data security and privacy measures.
- Apply for standards like the [ISO 27000-series on information security](#) to support your commitment to data security.
- Offer a Non-Disclosure Agreement.
- Make sure you comply with [European data protection rules](#). Look at the requirements section for more information.
- Also pay attention to data security within the software you develop. All software has bugs, which you need to handle appropriately.

### Clear communication

Good communication between customer and service provider is essential to IoT services. Unclear communication may cause misunderstandings and disagreements, which can lead to disputes with your buyer.

Developing a good IoT product starts with defining what it should do. Ask your buyer for example:

- What features should the product include?
- What is the target group (users)?
- How should it interoperate with other connected products, cloud infrastructures and third-party services?

And for Industrial IoT specifically:

- What process should the application innovate or disrupt?

- What are the key performance indicators to monitor?

As well as, of course:

- What is your budget?
- What are the deadlines of the project?

The required extent of communication with your buyer about a project depends on the type of contract:

## Fixed

With a fixed-price contract you agree on specifications, budget and deadlines in advance. During the application development you keep your buyer up to date, but you don't need to negotiate further. This type of contract is suitable for relatively simple and clearly defined projects.

## Flexible

More flexible models are especially suitable for relatively complicated projects. This often applies to IoT projects, where the scope may develop along the way. Especially interesting for IoT development projects are co-investment and revenue sharing models, where you and your buyer share the risks and rewards of the project. These types of contracts require a high level of trust and communication with your buyer.

### Tips:

- Listen carefully to your buyer's ideas, problems and wishes and thoroughly document them. Ask questions to better understand what your buyer wants.
- Regularly update your buyer on the progress you are making.
- Be prepared to communicate with your buyer during their office hours, even if they are in a different time zone.
- If you use a fixed-price contract, make clear agreements with your buyer on a structured plan and the expected timeline of the project.
- For more information on the different types of contracts, see Cleveroad's [Types of Contracts in Outsourcing: How to Make a Wise Decision](#).

## Lack of knowledge about Industrial IoT outsourcing

[Companies are often unsure about which Industrial IoT services to outsource and who would be suitable providers.](#) They need to decide which services would benefit from a partnership with a third-party service provider and which should be handled in-house. If they aren't familiar with the field of Industrial IoT service providers, this further complicates their decision.

### Tips:

- Clearly communicate what services you provide and what the benefits are of outsourcing these services to you.
- Read more on how to come into contact with buyers in our chapter on market channels.

### 3 . Which European markets offer opportunities for IoT services?

#### Europe is responsible for nearly 40% of the global IoT market

As IoT becomes more mainstream, the technology becomes cheaper. However, the market continues to grow due to the considerable increase in the number of IoT devices. [Europe has about a 39% share of the world's IoT market.](#) This share is expected to remain fairly stable in the coming years. The European IoT market size was €366 billion out of a worldwide €939 billion in 2014. This is predicted to increase to around €1.2 trillion out of €3.0 trillion in 2020.

#### The European IoT market is growing

There are around [11 billion connected 'things' in 2018.](#) This could be as many as [20 billion connections by 2020,](#) about [6 billion of which in Europe.](#) Of these, 60-65% are consumer devices.

[More than 65% of businesses are expected to use IoT products by 2020,](#) compared to 30% in 2017. [Europe accounts for more than a third of global Industrial IoT investments](#) by 2020. The market is expected to grow at an impressive average annual rate of 22%. Reaching a value of €287 billion in 2020, [Industrial IoT is Europe's largest IoT market.](#)

Many IoT technologies are rapidly becoming commodities, like mobile applications and cloud computing did before, for example. This means your window of opportunity in new technologies / business models / market segments is limited.

#### Tips:

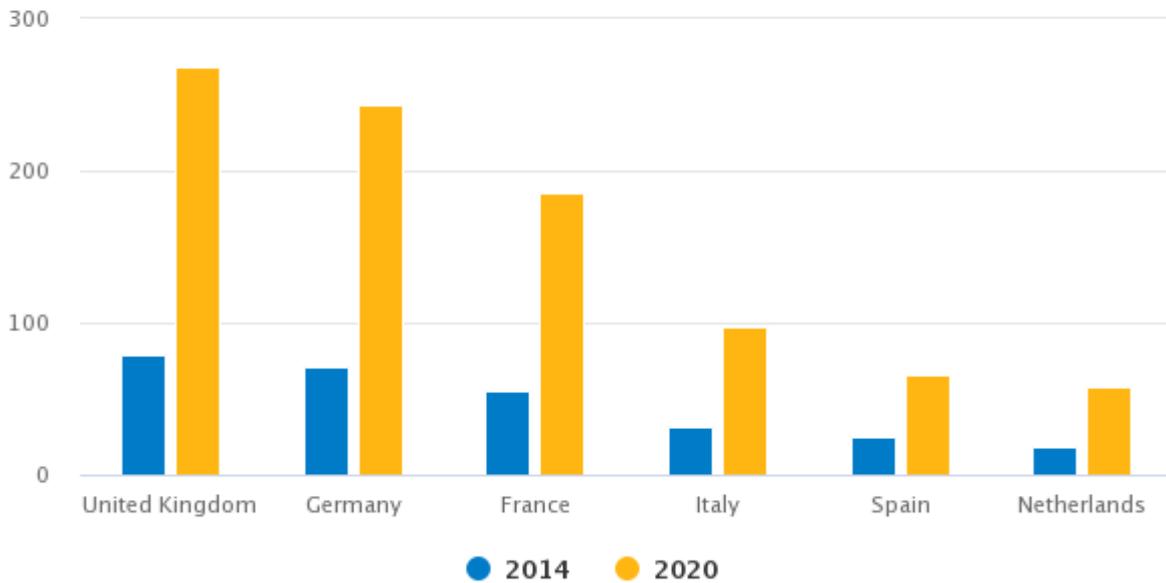
- To establish your position in this market you need to move fast, building your capabilities and experience in IoT services.
- Provide examples of how your Industrial IoT services have optimised operations for your clients. Include the concrete (financial) benefits this generated for them.

#### Northern and Western Europe are the main markets

In the coming years, [the IoT market is expected to grow across Europe.](#) Most of the front runners are Western European countries, which have traditionally invested more in IT.

## Figure 1: IoT market size in Europe

in € billion



Source: European Commission

Together, these top six countries make up more than 75% of the European IoT market. Another interesting country is Sweden, which boasts the highest average annual growth rate (24%) generating a market size of €50 billion in 2020. In addition, Germany, the Netherlands, Sweden and the United Kingdom are leading in capability and initiatives within Europe. This makes them especially promising target markets.

Although [Industrial IoT readiness is traditionally greatest in Northern and Western Europe](#), now [some Eastern European markets are joining the leading countries](#). This suggests there might be good opportunities for Industrial IoT solutions in markets such as Estonia and Poland as well.

### Tips:

- Study your options in Northern and Western European countries, as well as emerging Eastern European markets.
- Research the IoT market in your target country to optimise your offer. For example:
- Study websites of local IoT service providers for insights into buyer requirements and current offerings.
- Check websites of trade associations and journals for insights into market trends and developments.
- Attend relevant industry events to meet potential buyers and find out their needs.

## Both consumer and industrial IoT offer opportunities

[IoT is made up of about two thirds consumer devices and one third business devices](#), making consumer IoT an interesting market for you.

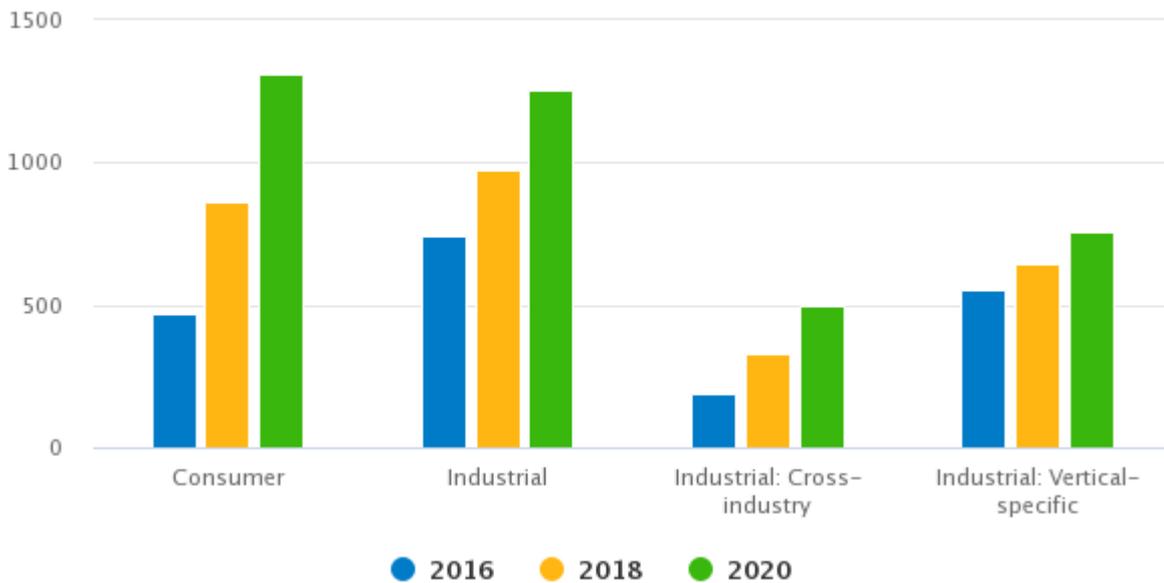
By 2020, industrial IoT is predicted to consist of:

- 60% cross-industry devices - used in multiple industries, mainly to save costs;
- 40% vertical-specific devices - used in a specific industry to improve efficiency/accuracy.

Industrial IoT also offers good opportunities, as the average spending per device is much higher in this sector. This makes total spending on consumer and industrial IoT about equal by 2020.

Figure 2: IoT market size per sector

in € billion



Source: Gartner

Based on US Dollar: Euro exchange rates in October 2018, the global average spending on IoT devices is expected to be:

- €102 per consumer device;
- €114 per cross-industry business device;
- €239 per vertical-specific business device.

### Tip:

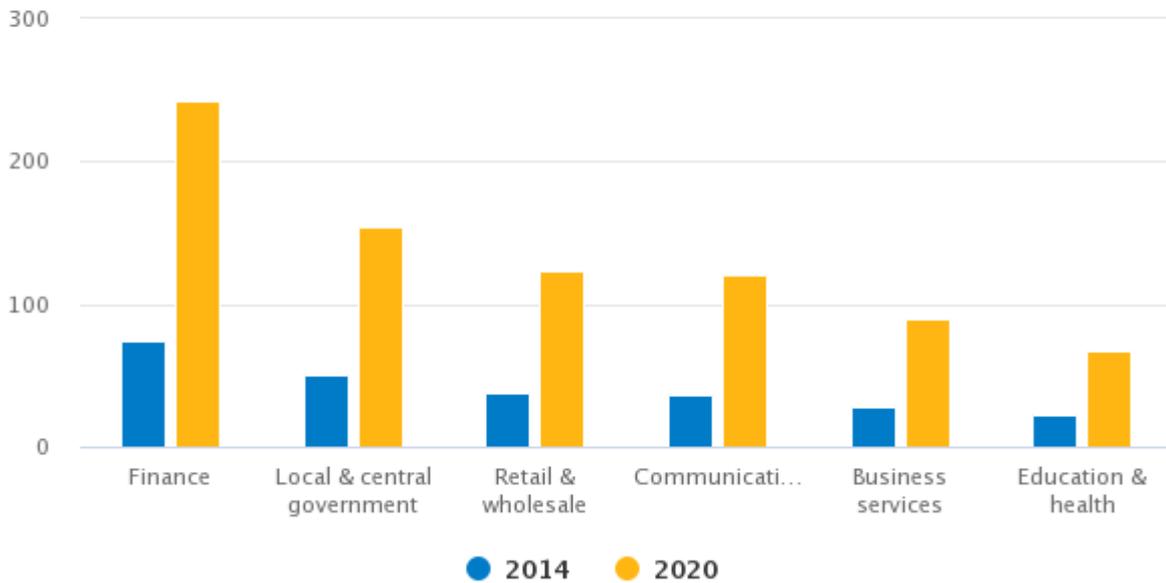
- If you are experienced in a specific vertical industry, focus on this to benefit from relatively high prices per device. Examples: healthcare or finances.

## Homes, health and finance are Europe's most promising smart environments

Similarly, IoT is expected to affect all vertical European markets. Again, markets that have traditionally invested more in IT are the front runners.

Figure 3: Vertical IoT market size in Europe

in € billion



Source: European Commission

Based on this, the European Commission has identified [which smart environments offer the most promising business opportunities](#):

## Smart Homes

The widespread use and affordability of smartphones and tablets stimulates the use of home automation solutions. For example, smart solutions for:

- home security - cameras, sensors;
- energy management - climate control, ventilation, lighting;
- appliances - kettles, fridges, washing machines.

## Smart Health

Both consumers and the healthcare industry increasingly use IoT solutions. For example, in:

- generic personal wellness - (wearable) fitness monitors, calorie counters, sleep trackers;
- health-specific personal wellness - (wearable) heart rate, glucose level or blood pressure monitors;
- remote health monitoring - devices that remotely collect medical data and deliver the data to a monitoring station;
- telehealth systems - systems that exchange medical information between sites (medical professionals and/or patients).

## Smart Finance

The use of IoT in the financial sector started out with a focus on security, but is moving into the development of new services:

- security - remote asset security, smart ATMs;
- financial services - car, house or health insurance policies and rates, based on customer behaviour.

### Tip:

- Focus on the most promising smart environments: homes, health and finance.

## European IT outsourcing market continues to grow

[Forty-four per cent of European companies plan to increase their IT outsourcing](#), according to Whitelane Research. Another 33% intend to continue outsourcing at their current rate. Twelve per cent hadn't decided and a mere 11% planned to decrease their IT outsourcing activities. This indicates that the European IT outsourcing market continues to be a promising target market.

## 4 . What trends offer opportunities on the European market for IoT?

### Competing standards and platforms

An important challenge in IoT product development is the lack of universal standards and platforms. Currently there are various competing [standards](#) and [platforms](#) in the IoT sector.

Products using different standards and platforms are generally incompatible. This is a major concern for companies. Both the IoT products companies use in their business processes and those they sell to their customers need to be able to connect and communicate. To achieve this, [the European Commission is now working on the development of European standards](#).

#### Tips:

- Clearly map and agree with your buyer which standards and platforms their IoT product should be compatible with.
- Keep up-to-date on the [development of European standards](#).
- When the standards are released, comply with them to ensure access to the European market. Clearly communicate your compliance to your potential European buyers.

### Skills shortage

As IoT continues to expand, there is an increasing need for specialised developers. However, there is a considerable lack of IT training, certification and experience in the European workforce. Due to the rapid technological innovations in IT, the skills of IT graduates do not match the needs of the market. The European Commission expects that [the shortage of IT-skilled staff could reach 825,000 by 2020](#).

Because of this, European companies need to outsource their IoT services to providers with the required expertise. This offers you good opportunities. Key skills include MySQL, AutoCAD, data visualisation, security analysis, embedded systems and machine learning.

#### Tips:

- Closely follow upcoming IoT developments and build capacity in these technologies.
- Emphasise your professional skills in your marketing, as well as the lower cost you offer.
- Ensure your access to skilled professionals. For example by working with universities, setting up training courses or centres, systematically collecting and analysing CVs and maintaining a partner network of companies and individuals.

## Technological developments

The technology behind IoT is advancing rapidly, becoming faster, cheaper and more efficient. For example, smart watches have evolved considerably since their debut. Their processors now have more than double the capacity, while using a fraction of the power. Technological developments are expected to drive demand for IoT devices in the coming years.

## National Industry 4.0 initiatives

Several European countries have launched or are launching national initiatives to stimulate Industrial IoT implementation. Examples are [Plattform Industrie 4.0](#) in Germany and [Smart Industry](#) in the Netherlands. These initiatives can have a positive effect on the national market. They often invite companies to participate, for example via [working groups with stakeholders](#).

### Tips:

- Check the European Commission's [list of national Industrial IoT initiatives](#) for programmes in your target countries.
- Keep track of new initiatives that can boost national markets for Industrial IoT services.

See our study about [trends on the European outsourcing market](#) for more information on general trends.

## 5 . What requirements should IoT services comply with to be allowed on the European market?

### What legal and non-legal requirements must you comply with?

#### General Data Protection Regulation

Europe's new [General Data Protection Regulation](#) (GDPR) came into effect on 25 May 2018. This regulation is designed to protect European citizens from privacy and data breaches. Under the GDPR, any company or individual that processes data is also responsible for its protection. The GDPR applies to all companies processing the personal data of European subjects, regardless of the company's location. This means it also applies to you directly!

The personal data this regulation protects can range from a name or email address, to bank details, social media content, a photo or an IP address. Some key consumer rights you must comply with include consent, right to access, data portability and the right to be forgotten. You also need to practice privacy by design, meaning data protection should be included from the onset of designing systems.

### Tips:

- If you process data of European citizens, make sure you comply with the GDPR.
- For more information on the GDPR (and other European legislation), see our study about [buyer requirements on the European outsourcing market](#).

## Copyright - Legal protection of computer programs

The European Union has established specific rules to protect computer programs by means of

copyright. The [Directive on the legal protection of computer programs](#) (2009/24/EC) means that you have to make sure not to breach any copyright when placing your computer program on the market. However, it also protects your products against unauthorised reproduction.

### Tip:

- Read more on the [legal protection of computer programs](#) on the website of the European Commission.

## Which additional requirements do buyers often have?

### Voluntary data security ISO standards

Data security is one of the main challenges for service providers. This includes both data protection and recovery systems. Many European buyers expect you to have information security and management systems in place, especially in industries where security is essential, such as finance and banking or mobile applications. The [ISO 27000-series on information security](#) contains common standards for information security.

### Tips:

- Make sure you have effective security processes and systems in place: from business-continuity and disaster-recovery to virus protection.
- Ask your buyer to what extent they require you to implement a security management system like the [ISO 27002 code of practice for information security](#).

See our study about [buyer requirements on the European outsourcing market](#) for more information.

## 6 . What competition do you face on the European IoT market?

Competition on the European IoT market does not differ significantly from the outsourcing market in general. See our study about [competition on the European outsourcing market](#) for an overview. Also refer to our [top 10 tips for doing business with European buyers](#).

### Nearshoring more popular than offshoring

European companies prefer to outsource services to providers within the same country (onshoring). When outsourcing abroad they prefer nearshore locations because of proximity, language, cultural similarities and little or no time difference. These are usually Eastern European countries, due to their relatively low wages. Examples include Poland, Bulgaria and Romania.

However, prices in nearshore countries are rising. This makes service providers in these countries less competitive for offshore service providers, and makes European companies more open towards outsourcing to destinations further away. You can choose to form subcontracting partnerships with these nearshoring providers, or compete with them.

[Offshoring destinations with the strongest potential](#) are:

- India
- China
- Malaysia

- Indonesia
- Brazil
- Vietnam

### Tips:

- Limit the potential disadvantages of being offshore. Provide excellent communication, availability in the required time zone and good security and privacy measures.
- Differentiate yourself from onshore and nearshore providers to remain competitive. Emphasise how you are different in your marketing message. Do not only compete on price, but also analyse what other advantages you can offer, such as access to skills, specialised industry expertise or around-the-clock operations (24/7).
- Research what your competitors are doing right and wrong. This can help you differentiate yourself from them.
- Partner with nearshore service providers, as Eastern European companies are looking for cheaper destinations. Many service providers in developing countries have not yet recognised this opportunity.

## 7 . Through what channels can you get your IoT services on the European market?

### Subcontracting by European service providers

Subcontracting by European service providers is your most realistic market entry channel. It means that European service providers subcontract (Industrial) IoT services to you that end user companies have contracted to them.

### Tips:

- Decide on a business model. Either develop your own IoT solutions, or focus on development services for a European partner.
- Target service providers whose size is in line with your capacity.
- Focus on companies that serve the same industries as your company.
- Attend relevant industry events in your target country to meet potential partners. This also allows you to learn more about their business culture. For example [IoT Tech Expo](#), [IoT World Europe](#) in the United Kingdom and [AUTOMATICA](#) and [Hannover Messe](#) in Germany.
- Use industry associations to find potential customers in Europe. Examples include [Bitkom](#) in Germany, [Nederland ICT](#) in the Netherlands and [UKITA](#) in the United Kingdom.
- National outsourcing associations can also be interesting sources to find potential customers. For example [Global Sourcing Association](#) in the United Kingdom, [Outsourcing Verband](#) in Germany and [Platform Outsourcing](#) in the Netherlands.
- Develop good promotional tools, such as a professional company website and a company leaflet. Also invest in Search Engine Marketing, so potential customers can easily find your company online.

## Intermediary

You can approach European service providers and end users of (Industrial) IoT services directly, or through an intermediary. A local contact person is an advantage, especially if you are located in a lesser-known outsourcing destination. Intermediaries, such as a consultant/matchmaker or sales/marketing representative, can therefore be an important channel to establish contact with potential buyers.

See our study about [market channels and segments on the European outsourcing market](#) for more general information. Also refer to our study on [finding buyers in the European market](#).

## 8 . What are the end market prices for IoT services?

Price is the main reason for European companies to outsource IoT services to developing countries. Staff salaries make up a large share of the costs of these services. This means outsourcing them to countries with lower wages can lead to considerable savings. For example, the average annual salary of a software developer in Western Europe is between €36,000 and €50,000. In offshore destinations, this is usually significantly lower.

### Tips:

- Research the average salaries in your European target country. For example via [Payscale](#), a global database for salary profiles.
- Emphasise the potential salary savings in your marketing.

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