Digital Industrial Transformation with the Internet of Things
How can European companies benefit from IoT?

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INTRODUCTION

Europe’s industrial companies, pressured by the competitive and fragmented European markets, ongoing economic headwinds and growing operational costs, need to streamline operations and boost their product and service offering should they wish to build momentum and increase their competitive advantage.

Due to the asset-intensive nature of their business, players have traditionally invested more in their operational technology (OT) than in information technology (IT), many of them being hamstrung by decades-old legacy systems and processes. But as new digital technology developments take place, solutions that could integrate the OT and IT worlds are beginning to emerge. This integration could mean unlocking opportunities to make processes more efficient and products more valuable. The Internet of Things (IoT) is one such concept that brings the paradigm of connectivity into the business, and enables the integration of people, assets and processes into a single point of view, paving the way for obtaining valuable business insights for industrial players.

But how serious are industrial companies about moving forward with IoT and what do their IoT roadmaps look like? This study sets out to explore how European industrial companies are approaching IoT initiatives from an investment, implementation and strategy perspective. Based on interviews with 250 senior CXO-level, business and technology decision-makers, this report explores the strategies and approaches that process manufacturers and discrete manufacturers are taking in order to embed IoT solutions into the core of their business and enable digital transformation.

The study also outlines specific IoT use cases from industry that companies have recently undertaken, and looks at what they are trying to achieve through this investment.

The study makes vital and interesting reading for senior decision makers at European industrial companies that are looking to better understand the progress their peers are making on the increasingly important topic of IoT.
KEY FINDINGS

72% of the companies will increase their IoT spending in the next three years.
A solid amount of companies plan to keep this increase between 10% and 30%, while some of them are willing to raise spending by more than 30%.

60% of the companies are already involved in IoT initiatives.
More than half of these, however, are still in the early stages of deployment and have some ongoing IoT projects.

Cost reduction is seen as the biggest driver of moving IoT initiatives forward for 69% of the companies.
However, the fact that product improvement and development of new business models took second place on the list of drivers shows how IoT investment can be channeled towards driving top line growth rather than just reducing costs.

Investment decisions for IoT solutions are mostly made within IT departments but line of business executives also have considerable influence.
This, however, largely depends on the country in question and the scale of the projects under consideration.

Data security and privacy concerns top the list of challenges that are slowing down IoT adoption for 70% of the companies.
Apart from fears of cyber attacks, there are also mounting regulatory burdens, especially ahead of the General Data Protection Regulation (GDPR).

Companies cannot bear the fruit of the IoT on their own, and will require assistance along the way.
More than 50% of them are strongly involved with IT services companies and consulting firms, which is reasonable bearing in mind that successful IoT requires significant expertise both from a solution delivery and business advice perspective.
KEY TRENDS

Key trends by industry

Automotive and discrete

63% have ongoing IoT projects and, apart from being driven by cost reduction, companies think significantly about creating connected products as well as improving customer experience and product quality, with more than 50% of them seeing these as major drivers of IoT initiatives.

51% of companies are strongly involved in working with IT services companies on IoT developments.

56% have started their IoT initiatives, which are mostly driven by IT departments (45%), but at some companies (22%), digital business units have a prevailing influence. 67% plan to increase their investment in IoT whilst 92% expect to measure the success of these initiatives in terms of cost reductions. The majority of the companies (56%) are strongly involved in collaboration with consulting companies, and the majority of the companies surveyed (81%) need the largest amount of assistance in terms of solution design and prototyping.

Process

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Key trends by region

France

Apart from cost reduction, French companies see process automation and improvement of product quality as equally strong drivers of IoT adoption. 80% say they plan to increase IoT spending.

Germany

52% of German companies do not see the development of connected products as a driver for IoT. They are more reluctant to use IoT for connected product applications, as people in Germany are more sensitive to data protection and privacy issues.

Nordics

The Nordic countries are the most advanced region in terms of IoT adoption where 83% of companies are already running IoT initiatives. Cost reduction is seen as equally important as developing new connected products.

Italy

Companies show that their biggest drivers – apart from cost reduction – are improving asset servitization and the improvement of supply chain management.

UK

88% need assistance in terms of solution design and prototyping but are less involved in collaboration with third parties than peers in other countries.

Benelux

Companies show the least amount of willingness to increase their investments in IoT compared to other regions.

Austria & Switzerland

77% are strongly involved in collaboration with IT services companies and mostly need solution design and prototyping services.
DIGITAL READINESS AND APPETITE FOR IOT

At the heart of the digital transformation of asset-intensive industries, such as manufacturing, is the leveraging of emerging technology to streamline decade-old processes and operations, improve existing products and launch new ones, create new channels to the customers and develop new business models. As a result of this transformation, industrial companies should be able to increase their value in the value chain by becoming organizations that are more agile and lean and that know more about their customers’ needs and can tailor their products accordingly.

Bearing in mind the asset-intensive operations of their heavy machinery, industrial companies need to find a way to reduce operating costs and release pressure. A good example of what happens when pressure rises too high can be found in the food-manufacturing sector. Here companies often turn to product “shrinkification”, which basically involves reducing the pack size of the product while keeping the price constant. This obviously isn’t the best practice for keeping customers happy and loyal, and to release the cost pressure companies should look elsewhere, like for example at the shop floor.

72% of industrial companies in Europe plan to increase their IoT spending in the next three years.
Implementing IoT-based digital solutions at any part of the enterprise, from the shop floor to the back office, brings an opportunity to trim costs and increase revenues and, as such, IoT should be at the top of their digital agenda.

There are many examples of companies which, by incorporating a digital mindset and adopting IoT solutions, are one way or another bearing the fruits of their investments, either by boosting their products or cutting operational costs. One such company is ESAB, a Swedish manufacturer of welding equipment, which managed to cut the time to market of its products by 40%. Philips, on the other hand, used to be a light bulb manufacturer but, by implementing IoT into its products, evolved into a provider of smart lighting solutions and services. Carmakers like BMW, Renault or Mercedes are also good examples of early IoT adopters, which enabled them to enter the transport market by offering mobility services through car-sharing or ride-sharing initiatives. With these offerings, they can now address the needs of a wider audience, targeting customers that don’t want to own a car and that were previously out of their reach.

The bottom line of what IoT brings to a company is maybe best encapsulated by the EVP of crane manufacturer Konecranes, Juha Pankakoski: “The industrial Internet brings machinery alive”. This means that the IoT provides real-time insight into any machine or asset that makes its data available for processing, after which different actions can be taken. But more importantly, embedding IoT into the product also creates a real-time connection with the customer and opens up a valuable channel that can be used to build upon the customer relationship and experience, enabling services to be provided in a more personalized way.

**But are these examples indicative of wider progress and success, and to what extent are European industrial companies responding to IoT?**

This study sets out to understand the existing appetite of European industrial companies for IoT solutions going beyond Industry 4.0 concepts that focus on the internal “production & logistics” silos to more holistic and externally oriented IoT applications within an enterprise, such as the development of connected products and new services. We also evaluate the major concerns standing in the way of faster IoT adoption.

These findings are based on interviews with 250 senior business and IT decision makers at large and medium-sized manufacturing companies in both process and discrete manufacturing – a more detailed breakdown of the sample is available at the end of this document.

**One of the first key questions to set the scene for the rest of the analysis is do European industrial companies plan to increase their investments in IoT in the next three years?**
Fig. 1: Will your IoT investment increase, stay the same or decrease in the next 3 years?

The answer consolidating the responses from all European regions reveals the trend that the majority of the companies have a willingness to invest in IoT solutions in the short term, regardless of the particular local market, the type of manufacturing company and its size. Nevertheless, some companies in some regions such as Germany, France and Italy are more eager to invest than companies in other regions.

When looking at this from a company size perspective, it seems that larger manufacturers with 2500+ employees show more eagerness to invest in IoT than smaller players. PAC sees that bigger, established players have a much stronger imperative to change in order to keep pace with smaller, more agile competitors as well as to accommodate market difficulties such as volatile economies and cost pressure.

From a type of manufacturing company perspective, it seems that discrete manufacturers (75%) are more likely to invest in IoT than those in the process manufacturing segment (67%). This is in line with what PAC sees in the market, as discrete manufacturers have a strong B2C orientation, especially in industries like automotive, FMCG or electrical appliances, unlike those in process industries (for example chemicals). IoT can have many applications in customer-facing roles and it is therefore understandable why their appetite for and investment in IoT solutions is bigger.

**But are these claims backed up in terms of current IoT activities and at what stages are existing IoT developments of industrial companies?**
The results show that IoT adoption is considerable, with 60% of the companies being beyond the planning and evaluation stage, indicating that manufacturers are well aware of IoT, and the majority of them having live IoT projects of different scales. It is also clear that large-scale projects are still limited as less than 10% of the companies have reached an advanced stage of IoT adoption, with the majority being at the PoC (proof-of-concept) stage. This is completely aligned with what PAC sees in the market on the vendor side: a large number of vendors have many IoT PoC projects but the number of those large-scale IoT projects addressing more than one problem is still very limited.

A deeper look into the results reveals that the Nordic region is at the forefront in terms of advanced phases of IoT initiatives with 20% of companies at this phase, whereas companies in the Benelux region seem to have the slowest adoption, with 60% at the planning stage. One would expect Germany to have a much larger overall adoption than 44%. German companies have been increasingly adopting IoT solutions over the years, but these are mostly focused on shop floor related applications such as automation, predictive maintenance and connected factory, and fall under Industry 4.0. However, industrial companies could use IoT in many other applications such as for empowering their products to make them smarter and develop new services. According to the Head of Digital CX & IoT at PAC, Klaus Holzhauser: “German companies could fall short in the IoT adoption survey results as the development of smart and connected products is not as widespread as Industry 4.0 applications of IoT. This is mainly impacted by data privacy concerns and regulations in the German market.”

**Fig. 2: Which of the following options best describes the current status of your IoT initiatives?**

- **Planning**
- **Early phase**
- **Medium phase**
- **Advanced phase**

![Graph showing IoT initiatives by region](image_url)
As companies are unlocking the doors of digital transformation, decisions need to be made regarding how to split the digital budget cake and which initiatives are at the top of the list of priorities. This list is quite extensive, including aspects aimed at boosting the IT infrastructure, enterprise mobility, digital customer experience or automation among others, but also IoT.

Fig. 3: How much of the total digital transformation spend is dedicated to IoT?

IoT gets a solid piece of the companies’ planned digital investment budget. More than half of the companies will spend up to 20% in IoT, which reflects a sound awareness of the technology and shows readiness to transform.

PAC sees two important factors that will significantly impact the amount of investment companies are willing to pour into IoT solutions. The first one is the IoT strategy of the company – whether they are planning to experiment with IoT on a small scale or they already have an enterprise-wide IoT strategy that assumes the integration of the entire enterprise from the front-end to the back-end with the help of IoT. The former would probably opt in for the more cautious approach and invest up to 10% of their digital budget. The latter, on the other hand, would require probably more than 30% of their digital spend to be channeled into IoT.

Another aspect impacting the decision on the size of the IoT budget slice is the position within the organization where IoT decision makers sit, this place being most commonly positioned within the boardroom, line of business, digital business unit or IT department.

The results of the study show that IoT decision-making mostly takes place within IT departments. However, this is just an overall view. As the European market is highly fragmented, this trend does not stand in all the countries examined. For example, in the Nordic region, which comes out as the most mature in terms of IoT deployments, the IoT decision makers are mostly found within the lines of business (LoB). On the other hand, in countries like Italy and the UK, for example, more than 50% of the companies make their IoT-related decisions within the IT departments, while in Germany, in a solid number of companies, decisions are being made straight from the boardroom.

PAC believes that going forward with enterprise-wide digital transformation initiatives, companies need to forge closer working
relationships between business and technology decision makers, as lines of business leaders have considerable influence in shaping the direction of IT investment. They also need to scale the innovation happening at the edges of the business such as LoB and build best practices into the heart of the organization. This is often achieved by establishing centralized digital units headed by Chief Digital Officers or maybe even Chief IoT Officers that overlook the entire spectrum of IoT initiatives.

**Fig. 4:** In which of the following departments of your organization are the budget decisions made for IoT initiatives?

**How do companies measure the success of their IoT initiatives and within what timeframe do they expect to see real benefits?**

Companies expect IoT to bring them benefits in various segments of their business, from reducing costs to making their customers happier, which can result in increasing sales or maybe even developing completely new revenue streams. However, the study reveals that the top priority for companies is to reduce operating costs, as indicated by 89% of them.
Finally, when working on their IoT strategies, industrial companies, apart from defining their measures of success, need to set their expectations in terms of the timeframes within which they hope to feel the benefits of IoT solutions and get their return on investment. For this question, there is a clear consensus and the majority (71%) expects it in between one and three years. Therefore, industrial companies should search for solutions with these facts in mind and examine what is the best way to get there: is it by investing in internal capabilities in order to develop and implement IoT solutions in-house or by engaging with third parties to speed up the entire process. PAC believes that industrial companies should have a formal IoT strategy that encapsulates three types of initiatives. The first one is about proving that IoT can work. This can be done by betting on several smaller-scale projects, which could be developed and implemented either internally, or with smaller, innovative third parties such as start-ups. The second one refers to the medium-term initiatives, in which companies need to think about how to redevelop entire processes and ensure that the business can operate more efficiently. The third one should start once a certain level of internal efficiency is achieved. Companies can engage with third-party specialists to develop new products or strategies to access additional revenue streams.
IOT OPPORTUNITIES VS CHALLENGES

IoT solutions can come in various shapes and sizes and can be applied across an entire enterprise, helping companies to reach their digital momentum. These include using IoT to improve internal performance such as on the shop floor, empowering the workforce and improving their performance, as well as transforming back-office operations with IoT-enabled enterprise mobility solutions. On the other hand, it can be used on the more customer-facing side of the business, such as embedding the IoT in products that can provide better service to customers and collect valuable customer data.

But which of these IoT applications have raised interest from companies in Europe, in which direction are their IoT investments channeled, and what benefits are they looking to achieve with IoT?

IoT applications can be roughly divided into two categories: the first one aims at improving a company’s internal capabilities while the second one aims at making their external customer-facing capabilities better.
In the former category, the majority of European companies (almost 70% of them) see the IoT as a tool for driving their operational costs down, which could enable them to unlock cost savings and improve operational efficiency. This finding does not come as a surprise as these companies mostly have tight margins and operate expensive industrial machines and systems integrated into complex production processes and production lines. To get there, industrial companies look for IoT solutions that integrate their operational technology with existing IT infrastructure and include applications such as predictive maintenance or asset monitoring. A good example here is Rolls Royce, the British jet engine manufacturer that embedded IoT sensors in its engines and streams data to run predictive analytics on top of it. This enables Rolls Royce to improve the jet servicing it offers to customers as it can monitor the jet performance during its lifetime. ThyssenKrupp, a German elevator manufacturer, is another good example of an industrial company that found a great use for IoT. It embedded the technology into its elevators but it also offers its own predictive maintenance solution and services to the market. This is another great example of how a company moved up the value chain by adopting IoT and enabling new revenue streams.

Another important driver for IoT initiatives, especially in France and Italy, is improving the automation of business and production processes. For example, there are initiatives to implement robotic solutions that could co-exist with humans in factories and support them in their work activities. This is particularly useful on assembly lines where, for example, a robot could assist people by providing them with the parts and tools they need throughout the assembly process. Some experimental work is being done in this area at Audi.

**Fig. 7: With respect to internal capabilities, will the following aspects be a major, minor or not a driver (goal) of your IoT initiatives in the next 3 years?**

<table>
<thead>
<tr>
<th>Major driver</th>
<th>Minor driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driving cost savings and operational efficiency</td>
<td>69%</td>
</tr>
<tr>
<td>Improving asset servitization with predictive maintenance and reducing unplanned downtime</td>
<td>48%</td>
</tr>
<tr>
<td>Achieving process automation</td>
<td>48%</td>
</tr>
<tr>
<td>Enabling digital workforce and improving mobility</td>
<td>47%</td>
</tr>
<tr>
<td>Improving schedule optimization</td>
<td>42%</td>
</tr>
<tr>
<td>Improving health, safety or environmental monitoring</td>
<td>40%</td>
</tr>
</tbody>
</table>

"Not a driver" not shown

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Innovation in action: Krone

More than a century old, this German manufacturer of farming machinery and equipment adopted IoT technologies to transform its machinery. Its machinery is now equipped with sensors that collect real-time data during the farming process. With additional sensors placed at the farms, all the data collected is sent to the cloud where it is processed and made available to the farmers. They can get an insight into the quality of their crops, adjust the nutritive values of the food given to dairy cows, as well as adjust and plan the usage of fertilizers. This is a best practice example that shows how the adoption of IoT increases the value of the product.
Other IoT drivers such as improving schedule optimization as well as health, safety and environmental monitoring didn’t come up as important as the aforementioned drivers. This is probably because industrial companies already have systems in place to support these processes and there is not enough room for improvement.

On the other side, a glance at the IoT drivers that could improve the external capabilities of an industrial company shows that they are mostly geared to boosting their products, which could enable the development of new services and business models. Such IoT applications have the potential to shift the paradigm of manufacturers and turn them into service providers – these applications are especially appealing to companies that directly interact with consumers. Examples of IoT applications in consumer-oriented products are numerous and vary from wearables to home appliances. These products usually have their digital side as well, in the form of mobile applications that customers use to manage the device and get useful data. These services can either be free and serve as a competitive advantage and differentiation or can generate additional revenue streams such as the case with connected car services in the automotive sector. In terms of areas, manufacturers in the Nordic region are very keen on investing in IoT solutions that can enable connected products, new services and business models. This is the most advanced of all the regions as it has the same level of priority and represents a major driver to 70% of the companies.

Improvement of the supply chain as a driver for IoT adoption has divided the companies and approximately the same amount of them see it as major and a minor driver. The reason for this might be that manufacturers in Europe have quite mature IT departments with supply chain management (SCM) software in place for decades. However, there is always room for improvement by integrating real-time data about the condition of assets into it. For example, by integrating predictive maintenance applications into the SCM software, spare parts for the asset or its replacement could be

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Data security and privacy concerns are seen as the most challenging issues in IoT initiatives and strategies.
automatically ordered in the SCM system before an outage occurs. Such solutions would contribute further towards reducing unplanned downtime and enabling more optimized servitization, which in this case would not have to be periodically but instead could be done based on the actual condition of an asset.

What are the main challenges making companies hesitate with their IoT investments?

![Major challenge vs Minor challenge diagram]

Understandably, data security and privacy is perceived as the major challenge by more than 70% of companies. This fear is certainly justified due to a general growing number of cyber attacks but also the fact that IoT significantly increases the number of potential entry points into the network. With IoT, every connected machine or asset becomes an endpoint that could potentially be breached if not properly secured. On top of cyber attacks, mounting compliance and regulatory burdens in some of countries like Germany or the upcoming General Data Protection Regulation (GDPR) can also raise concerns and slow down the pace of adoption.

Other evaluated concerns were not flagged as major ones by the majority of companies, at least when the results of the analysis are consolidated on a European level. Cost-related challenges are not considered as a major concern, which indicates the certain amount of readiness to invest in the IoT. Concerns related to internal capabilities are also more considered as minor than major ones, which outlines the certain level of confidence companies have when it comes to IoT initiatives and strategy.
A deeper dive into individual country data shows that:

- Italian manufacturers are put off by the cost related to IoT solutions. 67% percent see the cost of purchase as a major challenge whereas 73% see the cost of management and implementation as the major challenge.

- The French companies see business-oriented challenges as bigger concerns than their peers from other European countries. More than 50% of them see the lack of data scientists and building the business case for IoT investment as major challenges.

- 55% of Belgian manufacturers are concerned over insufficient infrastructure and slow internet connections that cannot support IoT applications.

- Similarly to France, companies in the Nordics region also see making the business case for IoT investment as the major challenge.

- The study reveals that German companies are fairly confident when it comes to the challenges of IoT adoption, especially ones related to internal capabilities such as lack of data scientists, lack of developers, as well as internal organization challenges.

The results relating to these challenges show that almost half of the manufacturing companies feel fairly confident about their internal capabilities, such as technical development, analytics and business, and one senses a certain level of confidence that they can transform their internal organization to support the deployment of IoT solutions.
MOVING FORWARD WITH IOT

Despite showing a certain level of confidence in internal capabilities with regards to deployment of IoT and the required transformation, industrial companies are working very closely with the third-party providers. These include the likes of technology players in the software and IT services space, as well as other emerging players entering the IoT market such as digital agencies, hardware companies and industrial companies that have reinvented themselves to offer various IoT value propositions.

The question remains which of these players are the most involved in helping industrial companies transform themselves with IoT and what types of engagement are industrial companies after?
Fig. 10: Are the following third parties strongly, somewhat or not involved in developing your IoT strategy and initiatives?

The overall European results show that industrial players are mostly taking the hand of IT services providers and consulting companies. This doesn’t come as a surprise as the former are those with already built PoC’s and have already deployed these solutions for their clients. They also take care of end-to-end solution design, delivery and management, which is favorable for those industrial players wanting to stay focused on their products and be more agile in operations. The latter, on the other hand, comes from the need to justify an IoT solution with a business case and make the most use of the gathered IoT data, which is where consulting firms take the lead.

A bit less involvement can be seen from software companies, platforms providers, hardware companies and telcos. This is probably because these types of players grow mostly through the channels and partnerships network, hence their smaller involvement in IoT initiatives. Other players such as digital agencies and some of the industrial companies are mostly new entrants in the IoT market and still have to develop their capabilities to win new deals. Finally, the least heavy involvement in IoT initiatives comes from academia and research institutions, but still it cannot be neglected, especially for the prototyping stages of new solutions and technologies. However, these collaboration trends heavily depend on the country and local IT market.

For example, only 33% of the companies in the Nordics region stated they are strongly involved in working with any of the third parties, which is another sign of advanced development and internal capabilities of industrial companies there.

Innovation in action: Piaggio

The Italian motorbike manufacturer is using IoT and other digital technologies such as predictive analytics to drive sales of its vehicles by improving the customer experience and enabling personalization. Users will benefit from the mobile application via which they can remotely locate and manage their vehicles as well as enjoy a personalized customer experience. The entire solution is integrated into Piaggio’s existing IT systems, which allows the performance of advanced analytics on gathered customer and vehicle data. This use case outlines the application of IoT for improvement of customer experience and personalization, as well as a good practice of integration, which provides an opportunity to derive maximum value from the data.
In Italy, on the other hand, the stakeholders which most Italian companies (87%) collaborate with are consulting firms, whereas in the Benelux region the majority of companies (67%) work with software and platforms providers. Meanwhile in Austria and Switzerland, it seems that industrial companies are taking the hand of both consulting firms and IT services companies with 63% and 77% respectively. In the industrial sector in Germany, 54% of the companies are working with hardware players on deployment of IoT solutions whereas collaboration with other third parties is much lower. This is because German companies are confident in their internal capabilities and have an engineering mindset, which makes them more likely to keep the work in-house.

It should be highlighted that the swing towards some of these categories also largely depends on which sector the industrial company operates in and what is its final product. For example, manufacturers of home appliances are more likely to collaborate with hardware companies that provide embedded technologies that can gather and process device data. Whereas manufacturers in the mining industry are more likely to work with IT services providers, as they require a partner with strong delivery capabilities on a global scale. Additionally, PAC acknowledges the importance of industrial companies for the IoT ecosystem because some of them have recently entered the IoT market as vendors, offering IoT solutions and platforms to other industrial companies. As such, they have optimized their own operations and developed IoT platforms, solutions and services along the way, and PAC expects their influence on IoT adoption to increase.

When it comes to the types of engagements that industrial players are working on with third parties, overall development and prototyping of solutions is the area where the largest amount of companies (78%) need assistance, whereas solution management, implementation and analytics take a slightly lower priority. The least amount of assistance is needed with using the IoT data and making the right business decisions based on IT.

**Fig. 11:** Which of the following areas of collaboration with third parties would you consider?

- Solution design, prototyping and development: 78%
- Solution management: 67%
- Solution implementation: 66%
- Analytics of IoT data: 64%
- Management consulting based on IoT data: 54%

Multiple answers possible
n = 253

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In the UK and the Benelux region, more than 80% of the companies opted in for working with third parties on solution design, prototyping and development engagements, which indicates that they probably lack development capabilities. In Germany, on the other hand, 64% of the companies would require additional help around management consulting, which is in line with the result relating to IoT adoption challenges, which indicates that most German companies see making a business case for IoT investment as a major challenge. In the Nordic countries, as well as Austria and Switzerland, 77% of the companies would consider working with third parties on the solution implementation part of deployments. On the other hand, 83% of Italian companies would pick third parties to help them with solution management.

In order to gain the maximum value from IoT solutions, companies need to strive to integrate and standardize the huge and escalating volumes of IoT data in order to provide a “single view of the truth”. Ideally, this data should be analyzed and, in order to do that, deployment of enterprise-wide IoT platforms that can manage the devices and assets, as well as collect and process the data is critical.

The results of the study show that a solid 30% of the companies have already implemented this type of platform, but the remaining 70% are still not taking concrete actions to implement it. Italy and the Nordics stand out here with almost 50% of companies having already implemented IoT platforms, whereas other countries show significantly lower levels of adoption. This is related to current adoption rates and investment plans for IoT, and it is likely that in countries where IoT adoption is lower, investments are smaller and projects are in the PoC stage and not based on enterprise-wide IoT platforms. On the contrary, those with a clearly set IoT strategy and projects in an advanced phase are more likely to have enterprise-wide IoT platforms already in place.

However, to get a “single view of the truth” across the entire enterprise, companies need to integrate their IoT data together with the data that sits across the organization in existing business applications such as ERP (enterprise resource planning systems).
Integrating these two together is quite a challenging task and, apart from investment and internal capabilities, requires an organizational strategy that accommodates the requirements of the task. As expected, the results show that the majority of companies are still not at this stage and 59% plan to get there within the next three years. Again, companies in the Nordics region show the most advanced level of adoption with 31% of them having already achieved this integration.

One of the most important pieces of the IoT strategy puzzle is data. It is not enough to simply collect and process it; it’s essential to gain valuable business insights out of it and use it in business decision-making. Be it with the help of third parties or on their own, industrial companies need to have a strategy in place as well as supporting infrastructure in terms of cloud-based tools and applications that can accommodate the analysis of vast amounts of data coming from IoT devices.

Are companies already using the power of data in their day-to-day business decision-making and where is the analytics currently performed?

A high-level view shows that the majority of companies (54%) plan to do so in the next three years whereas a solid 30% are already doing so now. Diving deeper into the results reveals Italy as the champion in this category with 67% already using IoT data for business decisions, which reflects the fact that 60% of Italian companies consider data analytics only as a minor challenge.
Fig. 14: Are you currently analyzing and using your IoT data in business decision-making? Is it planned within the next three years, or at least discussed, or is it not relevant?

Another important question that needs to be addressed when setting out an IoT strategy is where will the data be analyzed – in the cloud, on-premise, or on edge devices such as gateways?

All of these options have pros and cons. For example, cloud analytics allows for more complex data analysis with availability of a wide set of pre-made analytics tools and modules, which could be used on a PaaS basis. However, this choice means that all the asset data needs to be sent to the cloud, which could be a pricey option depending on the types of connectivity the solutions are based on, and also means that data is usually not processed in real time. On the contrary, edge analytics provides near real-time analysis but with limited resources. On-premise options can provide an extra layer of security but might not be the most cost-effective option. These are
the reasons why many companies decide to use multiple places for the IoT data analytics. Cloud is the most popular option followed by on-premise and edge analytics, which is still in early development phases but looks promising for the future.
CONCLUSIONS

Innovation has become an imperative for European industrial companies. Dealing with cost pressure tops the priority list for companies and technologies under the IoT umbrella can be powerful tools for addressing the major challenges in their internal operational performance. Companies are aware of this and the vast majority are planning to increase spending in this area.

Apart from improving operational efficiency, IoT solutions open the gates for innovation and put companies in a position to move up their value chains by offering better and connected products, and new services based on them, as well as to gather valuable customer data that can be monetized.

The majority of companies are already running IoT initiatives in different phases of deployment, maturity and scale, which confirms that the IoT is perceived as a potential solution of multiple issues and as the key to unlocking the doors of wider digital transformation of both operational technology and information technology systems. This is why IoT gets a significant amount of the overall digital transformation budget.

On the road to innovation, IoT companies are usually guided by third parties and are engaged with a range of stakeholders, the most prominent of which are IT services companies and consulting firms.

The pace of IoT adoption will depend on the internal organizations and decision-making rights in terms of IoT investments. Despite the fact that most companies make these decisions within the IT department, there is a significant amount of diversity as some companies lead initiatives from the lines of business or the boardroom. Integrating these departments and fostering collaboration will improve the chances of deployment of enterprise-wide solutions that could maximize the benefits to the business.

A major concern of most companies comes from a data security and privacy perspective which, due to growing cyber threats and burdening regulations, could slow down the overall adoption of IoT solutions.

Supporting IoT initiatives requires investment not only in IoT solutions but also in the underlying infrastructure such as IoT and analytics platforms, which need to be integrated into companies’ IT systems. Results show that there is a solid number of companies making steps in this direction.
This study is based on interviews with senior business and IT decision-makers with responsibility for driving innovation strategies at 250 large European manufacturing companies. The study was completed during the first quarter of 2017. Here is a more detailed breakdown of the participants in the study:

### Respondents by region
- UK: 20%
- Germany: 14%
- Austria & Switzerland: 12%
- France: 18%
- Nordics: 12%
- Italy: 12%
- Benelux: 8%

### Respondents by position
- CEO: 61%
- CIO / Head of IT: 8%
- Head of Digital: 6%
- Head of Data: 5%
- Head of IoT: 4%
- Head of Production: 7%
- Head of Product Development: 8%
- Other IoT decision-maker: 1%

### Respondents by industry
- Automotive and discrete industries: 59%
- Process industries: 41%

### Respondents by size of workforce
- 500-2,500: 60%
- More than 2,500: 40%

n = 253
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Founded in 1976, Pierre Audoin Consultants (PAC) is part of CXP Group, the leading independent European research and consulting firm for the software, IT services and digital transformation industry.

CXP Group offers its customers comprehensive support services for the evaluation, selection and optimization of their software solutions and for the evaluation and selection of IT services providers, and accompanies them in optimizing their sourcing and investment strategies. As such, CXP Group supports ICT decision makers in their digital transformation journey.

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