Capgemini invent

STATE-OF-THE-ART IOT STUDY

A generic maturity model of the “Internet of Things” across the manufacturing, automotive and healthcare industries

CONTENTS

EXECUTIVE SUMMARY

The Capgemini Invent state-of-the-art IoT Study was conducted during Q4 2018 & Q1 2019 to assess the progress and achievements of industrial companies in their transformation towards digital service providers. The maturity assessment based on the dimensions IoT Transformation and IoT Technology in this study was designed in collaboration with the University of Applied Sciences Munich and can be used by prospective partners to evaluate their own progress in the field. Transformation, based on Osterwalder, consists of the areas Strategy, Business Model and Organizational influences. The technological dimension IoT Technology, designed based on Porter, consists of the areas Application, Platform, Connectivity and Product. The dependencies identified between all dimensions and the success of mature companies lead to our recommendations for actions.

Key Results:

The assessed dimensions Strategy, Business Models, Organization, Platform Connectivity and Product of the maturity model have a major impact on the IoT transformation. The dependencies between the technological and transformation dimensions have been higher than expected. IoT Masterminds are transforming all dimensions faster than Laggards.

- Companies **with an IoT vision and strategy** anchored in the company strategy show **better financial KPIs.**
- Leaders apply more and different business models and **transform towards recurring revenues** while extending the B2C interface.
- Leaders have dramatically **changed into** an **agile organization** supported by new agile processes, governance, culture and leadership change.
- Leaders believe in a **platform in platform strategy** to enable DevOps while having an enterprise platform architecture.
- The connectivity dimension is underestimated in most industries, while leaders are **focusing on partnerships** inside their digital ecosystem.
- Leading participants have already **shifted** the product portfolio **into a digital value stream structure** to empower DevOps while reducing physical complexity.

Recommendations for action:

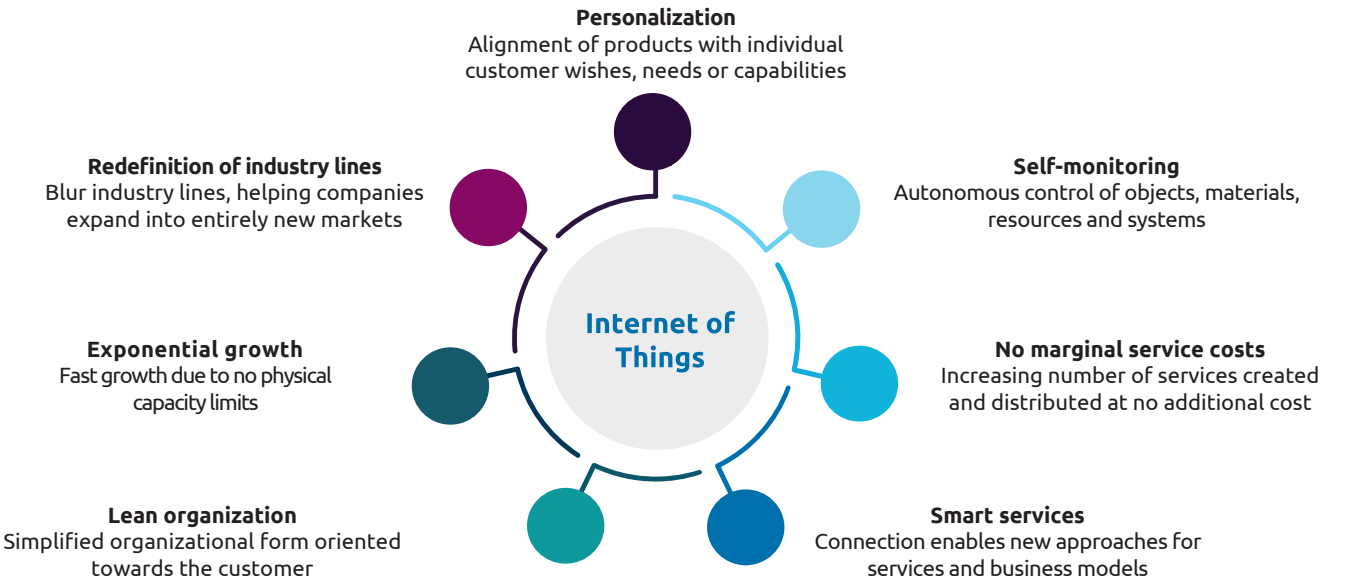
1. Anchor IoT vision and strategy in the company strategy
2. Transform into a service-oriented business model and extend it based on an ecosystem view
3. Establish an agile working environment, methods, processes and tools
4. Ramp up the integration landscape and identify a platform in platform strategy
5. Identify ecosystem partners and standardize communication protocols and interfaces
6. Reshape product development structures and digitize complexity

1. INTRODUCTION

Throughout economic history, there are numerous examples of enterprises that have missed out on technology trends or have recognized them too late and have consequently disappeared from the market: well-known examples are Nokia, Kodak, Yahoo or Blockbuster. Today, the term Industry 4.0 describes the fourth industrial revolution based on digitization, which affects not only the manufacturing industries but the entire economy. Globally, digital change leads to the creation of new and innovative business models challenging traditional industrial value systems and established businesses. Among others, the Internet of Things (IoT) is sought out to be one of the key technologies and is defined as the extension of the digital world to the physical world, through the collection and sharing of information and the behavior adaptation of objects to their environment. Considering 30 billion connected devices by 2020, seven billion of which in the business environment, as predicted by IDC research, one can infer the significance of IoT on the economy. Moreover, the implementation of IoT provides a wide range of opportunities for companies to overcome industry lines, facilitate decision-making, improve customer experience, decrease costs of operations and create new revenue opportunities. Figure 1 illustrates some of the key values delivered by IoT.

Although many experts view IoT as one of the most promising technologies for future economic growth, the degree of IoT implementation presently still varies between companies and industries due to ambiguous needs, requirements and capabilities, a lack of service-oriented thinking and an insufficient sense of urgency. Hence this study provides a report based on our Capgemini Invent *IoT Maturity Model,* which can be used by organizations to determine their current state of IoT implementation and subsequently derive organizational and technical action measures to be undertaken. To ensure the validity of the IoT Maturity Model, a survey amongst several companies within different economic sectors was conducted.

Figure 1: Value drivers of the Internet of Things



2. THE CAPGEMINI INVENT IOT MATURITY MODEL

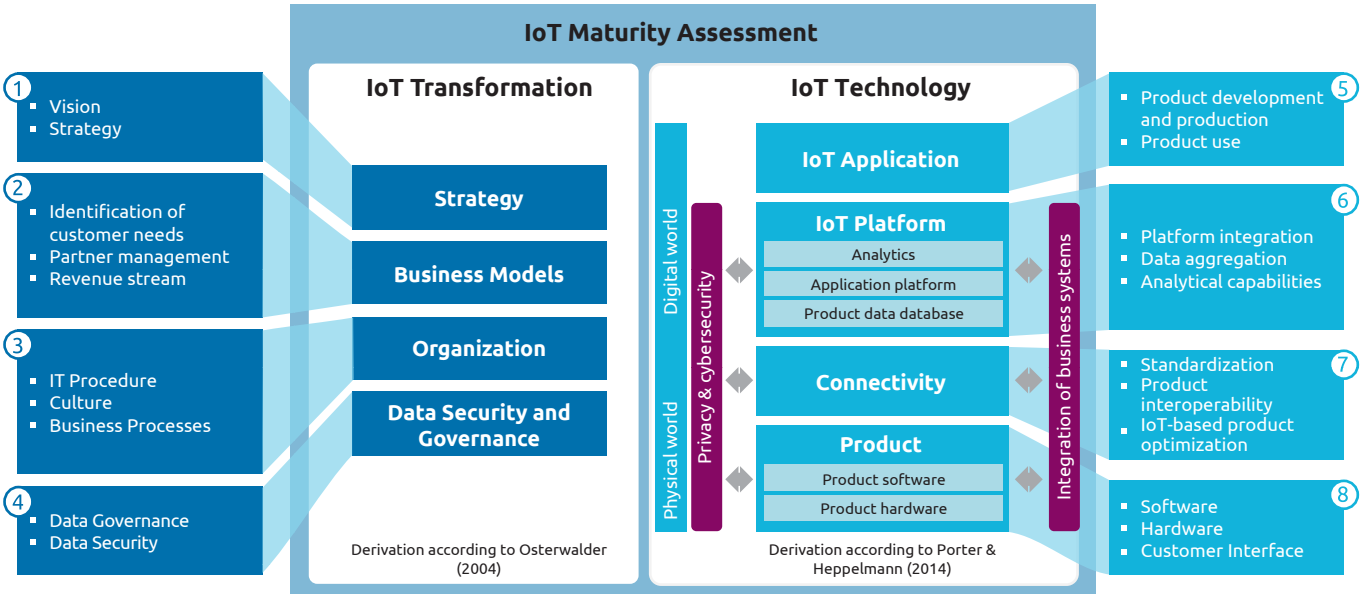
The Capgemini Invent IoT Maturity Model offers an approach to identify a company's IoT maturity. It is based on two maturity level indications – the IoT Technology and the IoT Transformation. The IoT maturity is partly characterized by the IoT Technology and the benefit it has to offer to the business, under the assumption that the IoT Technology is used in a meaningful and useful way and the maximum potential benefit is exploited. It is also characterized by the level of IoT Transformation. This dimension covers several supporting non-technological aspects, which facilitate the realization of maximum IoT benefits and hence promote IoT maturity.

Each of the dimensions is subsequently characterized by several variables. While the technological dimension addresses the aspects IoT Application, IoT Platform, Connectivity and the Product itself, the term Transformation refers to a company's Strategy, Business Models, Organization and Data Governance and security in respect to IoT. Figure 2 presents the Capgemini Invent IoT Maturity Model, consisting of the two main levers IoT Transformation and IoT Technology.

For each of the model's eight aspects, companies achieve one of the following four levels of maturity.

- **Beginner |** The company is in an early stage of development. The maturity of the transformation as well as that of the technol-ogy is low and visible at most in some lighthouse-projects.
- **Technology Driver |** The company drives IoT via the technology. The maturity of the transformation prevents the company from realizing its full potential.
- **Transformers |** The company drives IoT via the transformation. The maturity of the technology prevents the company from realizing its full potential.
- **IoT Mastermind |** The company is a leader in IoT and benefits from a successful maturity of technology and transformation. It can realize the potential economically.

Figure 2: The Capgemini Invent IoT Maturity Model



3. PARTICIPANTS

This study was conducted across the Automotive, Industrial Manufacturing and Healthcare industries, containing a total of 12 companies. Around 25 participating companies are expected before the end of Q4 2019. 33% of them focus their business on the automotive sector; 42% on the industrial manufacturing sector, which includes asset management, electronics and engineering and 25% are global leaders in healthcare market.

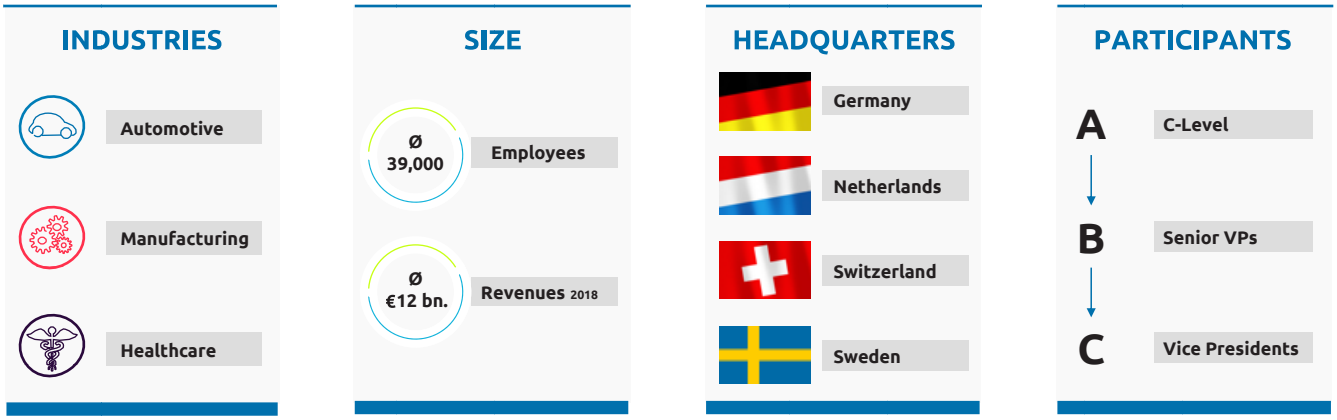
The participants of this study have an average of around 39,000 employees. The average revenue per business year is EUR 12 billion. In total, the participants' revenues range from EUR 200 million to EUR 60 billion per year.

The representatives of the individual participants interviewed during the study are on the management levels VP, SVP and C-level. Considering only the highest level of each participating company, 33% of the representatives are part of the executive board (C-level); 42% are senior vice presidents and 25% occupy a leading position on vice president level.

83% of the participating companies are global leaders of their business and conduct their business around the world. The headquarters of the companies are mainly located in Germany, the Netherlands, Switzerland and Sweden.

The participants' product portfolios are diverse concerning the key facts listed above and range from a single product to a wide product portfolio across the industry. Despite the diversity of the participants, we were able to derive a strong correlation between the two dimensions of the maturity model. In addition, we were able to identify distinct transformation patterns by the leaders of the study.

Figure 3: Participants



4. KEY RESULTS & BEST PRACTICES

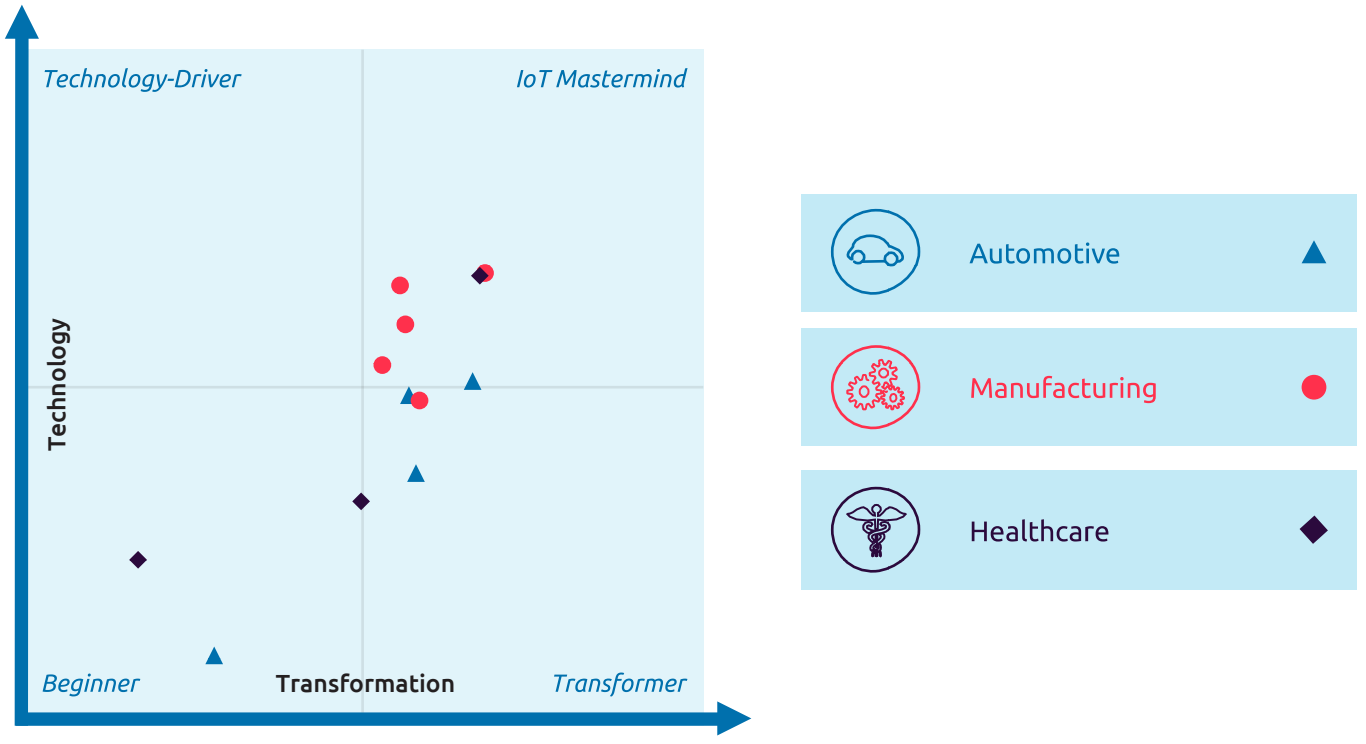
Based on several hypotheses, the two main dimensions and the underlying subdimensions of the maturity model were formulated. Furthermore, these hypotheses were used to design a questionnaire, which served as a validation approach to test the model in the field. Figure 4 visualizes the results following the logic of the IoT maturity model.

As illustrated below, the maturity model and the study distinguish between the two dimensions IoT Transformation (horizontal axis) and IoT Technology (vertical axis). Based on these two dimensions and the differentiation of IoT influencing factors and maturity factors, the final IoT maturity of each participant was calculated. The participants are depicted as triangles, circles and diamonds, depending on their sector, and are positioned in the matrix according to their overall maturity score.

Participants that show strong capabilities in the transformation dimension, as well as strong capabilities in the implementation dimension lead the way as IoT Masterminds. In contrast, companies with few capabilities in both IoT Transformation and IoT Technology are referred to as Beginners. Although most participants show similar efforts in both dimensions, some participants invest more effort in one dimension. We refer to companies leaning towards IoT Technology implementation while neglecting IoT Transformation as Technology Drivers. If the reverse is the case, companies are called Transformers. Regarding the classification of the participants, it is notable that especially the industrial manufacturing sector shows a high overall IoT maturity degree, while the healthcare sector is just recently starting to address IoT.

Although the classification of companies according to their IoT maturity already provides valuable insights, recommendations and action measures are required to advise companies on how to advance maturity. The next chapters outline these recommendations, which were derived from the study's results and findings.

Figure 4: Results IoT maturity matrix



4.1. STRATEGY

Strategy in IoT

Setting up connected services and products based on IoT begins with a vision followed by a strategy of how to pursue it. As IoT continues to change the way companies communicate and interact with their customers, these two components are essential prerequisites for companies to drive IoT maturity. Here, the expansion of business to consumer (B2C) interfaces is also a key component to increase exposure and interaction with consumers.

Hypothesis Development

The hypothesis was designed to quantify the impact caused by strategy and vision on the overall IoT maturity of participants.

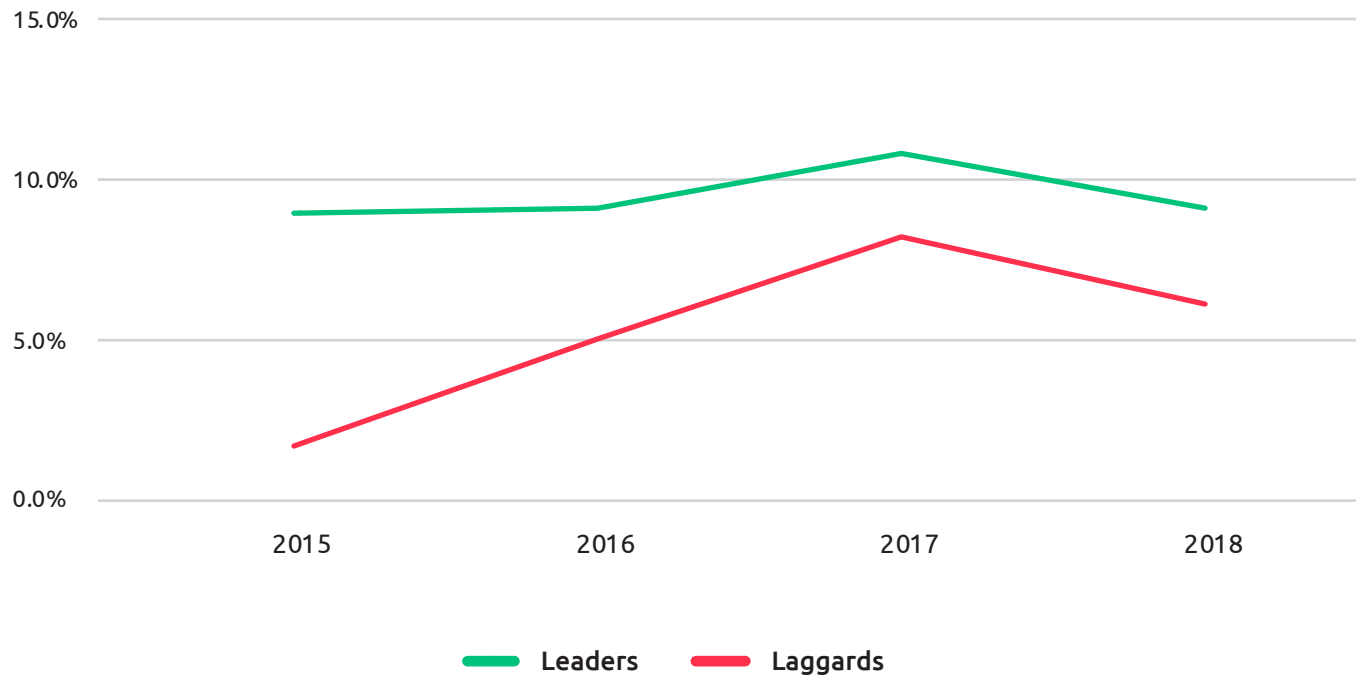
H: Companies with a customer benefit-oriented IoT service strategy and vision are characterized by better profitability and a notably higher IoT maturity.

Pairing the results of the IoT study with profitability figures taken from business reports indicate that companies with a customer benefit-oriented IoT service strategy are not only more mature but also show a higher profit turnover margin than other companies. Figure 5 illustrates the profitability difference between leaders and laggards over the past three years.

Leaders in this context refer to those participating companies whose IoT maturity is fairly advanced. Moreover those leaders focus on acting more closely to the customer through end-to-end IoT services.

However, most participants quoted that the topic IoT is a crucial part of the overall company strategy. In addition there are companies in the study that have not decided on an IoT vision corresponding to their strategy. Consequently, this carries the danger of internal miscommunication & misunderstanding.

Figure 5: Profit Turnover Margin



H: Particularly mature companies invest primarily in the expansion of B2C interfaces.

Both leaders and laggards indicated value and investment in B2C measures along the IoT value chain. Leaders, however, were further in both the investment and implementation of IoT initiatives.

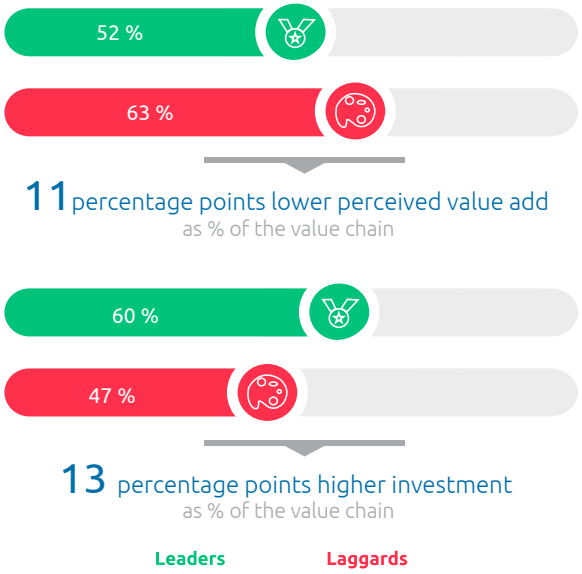
In terms of investment, leaders indicated 13 percentage points higher investment in B2C initiatives. Meanwhile, leaders on average had already achieved the implementation phase of their B2C measures, while laggards were still in early stages.

Key Insights

Both leaders and laggards realize the importance of having a customer-oriented IoT service strategy and vision. IoT leaders, however, focus on acting more closely to customers through end-to-end IoT systems.

Mature companies are aware of the fact that their placement in the value chain and market position are key determinants of their success. They continuously extend their IoT ecosystems to offer added value and meet their customers' product and service needs.

Figure 6: Value add and investments in B2C*



*B2C includes ecosystem as well as product-related services

Strategy Best Practices

Automotive – A leading IoT Mastermind, which has defined the vision to become the premium mobility service provider, extends the portfolio with cooperations for example in the real estate industry. The leader will provide mobility, parking and further services while simultaneously enhancing the value chain and reducing multihoming.

Healthcare – Health World is a holistic view designed by a leading healthcare company, which delivers the most technologically advanced solutions to patients, practitioners and healthcare providers by the application of IoT to monitor all stages of healthcare. Based on this approach, the organization has been restructured.

Manufacturing – One leading mastermind with strong focus on the retail market started to offer furniture within a leasing model "Living as a Service". In addition, a partnership with an IoT platform company was established to extend the functionality of the whole product portfolio and create additional customer touchpoints around the smart home.

4.2. BUSINESS MODELS

IoT Business Models

While connected products and services are abundant in terms of development, commercializing these products and services is another story.

IoT has the potential to bring disruptive value to customers and transform organizations. It creates opportunities for new business models and value delivery methods, especially through offering IoT "as-a-service". How an organization creates, delivers, and captures this value is crucial to the success of IoT investments.

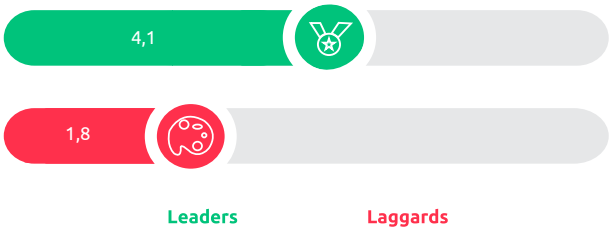
Digital natives like Amazon or Airbnb are extending their digital platform ecosystem continuously with additional business models. Their platforms have been extended with subscription models like Prime, Freemium or Razor Blades like FireTV, Pay-per-use for Cloud services, digital-addons and more. The extensions are crucial to increase the network effect and enlarge the business while reducing the risk of disintermediation.

Hypothesis Development

Based on our research, the ecosystems grow together and a business model mix is key to scaling up connected products. The maturity is indicated though the focus on recurring revenues to drive and stabilize a digital platform.

H: Even companies with mature IoT strategies still require improvements in their service business models.

Figure 7: Average amount of used IoT business models



While leaders typically use a mix of more business model types (see Figure 7), the study indicated that leaders still struggle in achieving recurring revenue.

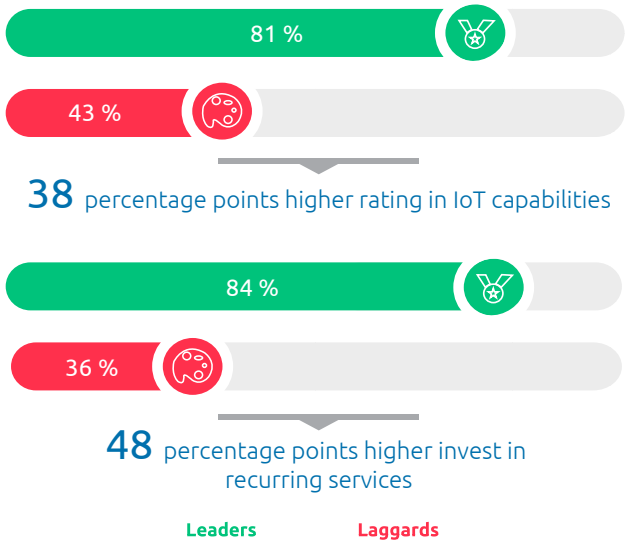
The mentioned business cases that have been identified in the study show that they are integrated into a digital platform strategy overall, and industries are not using the network effects which we see in the portfolio of pure digital players. In addition, the industrial companies struggle in bridging networks to other ecosystems and in leaving space for pure digital players for multihoming. But also well-known IoT services like Uber and other sharing platforms struggle to realize profitability. In fact, other studies, indicated around 75% failure rate of IoT projects.

During the study different business models have been analyzed:

- **Subscription model:** continuous payments
- **Outcome-Based model:** cost based on usage or outcome
- **Asset-sharing model:** split ownership
- **Physical Freemium:** free basic product or service with upselling potential
- **The "Razor Blade" model:** low product cost but high operation costs
- **Data as a service:** selling usage data
- **Product as a point of sale:** selling customer touch points
- others

H: Particularly mature companies are currently transforming their business models faster towards recurring services than average, while also developing capabilities faster.

Figure 8: Capabilities and investments in recurring services



The success of IoT business models that focus on recurring services is moreover highly dependent on the realization of strong customer benefits. In this sense, offering solutions as a services helps the customer bring down its operational and maintenance costs (e.g. predictive maintenance), which consequently frees up funds for other projects and initiatives.

Key Insights

IoT creates a variety of new business and value driving opportunities. In particular, it enables businesses to develop recurring revenue streams which are more profitable in the long run.

In attempting to collectively use different business models, companies are still not achieving optimal value and profitability from their initiatives. Developments in commercializing IoT service offerings and achieving profitability are necessary, even for IoT leaders, to achieve business model sustainability. If a digital platform business model is pursued, five key actions should be considered to support the sustainability of the digital platform. Firstly, companies should aim to strengthen network effects and build clusters of similar networks. In addition, the risks of disintermediation and multihoming should be reduced while bridging networks.

Business Model Best Practice

Automotive – Two key automotive players have created a mobility ecosystem including a range of services beyond driving, i.e. parking and charging.

In addition, they bundle their autonomous driving capabilities to enhance the impact. Also, the funding of air mobility companies outlines their ambitions. Further network bridging activities are on the roadmap.

Healthcare – One leading healthcare company is currently extending the product portfolio and partnering with a key supplier to become a hospital as a service provider. They outlined that the IoT B2C market is too far away from the core business and that it is already lost to Apple. They expect to buy data in the future from digital players for product development, but still have the chance to secure access to the assets.

Manufacturing – One leading manufacturer has found success in shifting its original packaging and processing offering to a full-service provider model with end-to-end service solution models. Services include maintenance of equipment, derivation of business insights and full-plant improvement analysis based on IoT Technology.

4.3. ORGANIZATION

Organization in IoT

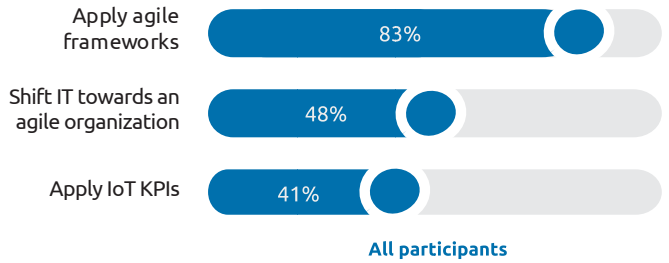
The transformation towards a digital player requires a suitable organization to support it. In the context of our IoT maturity model, this dimension consists of the IoT organization (understanding and approach), organizational leadership, the corporate culture, business processes, roles and skills.

Hypothesis Development

From our experience of previous IoT and digital transformation projects, we know how important the organizational transformation in the mentioned dimensions is to achieve state-of-the-art IoT service development. Software as well as IoT solutions require an efficient environment to deliver the right pieces of code fast and reliably.

H: The development of industrialized IoT services requires the anchoring of agile working methods, processes and tools within the organization. This agile integration is particularly pronounced amongst IoT leaders.

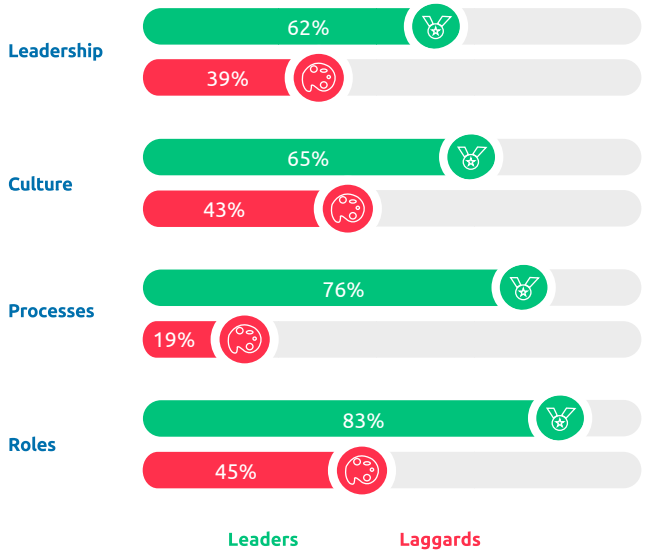
Figure 9: Prevalence of organizational initiatives



Several agile frameworks have been developed to transform the organizations. Independent from the origin of the frameworks, which are, for example, IT oriented or customer centric driven, an individual company approach is required, especially if it influences the development structures of the established business models. Several participants claimed that the barriers in engineering and research and development departments are particularly high.

Furthermore, our maturity model focuses on the key indicators of the agile organization transformation and shows the differences between Leaders and Laggards.

Figure 10: Estimated agile transformation progress



The result indicates that top level driven dimensions (leadership & culture) are lacking and are influencing the dimensions processes and roles with a strong correlation.

Key Insights

As visualized in 9 & 10, agile working methods are abundantly used across participants – still, the progress of agile adoption as well as the agile toolchain can still be optimized to advance the degree of progress transformation. Specifically, this also includes the IT department of the organization, which only applied agile principles at 48% of the participants. KPIs can be used to better measure and focus progress of IoT initiatives. However, these are not yet prevalent in most participant organizations.

Organization Best Practice

Automotive – Two leading IoT Masterminds have established new IT strategies to adjust their future target capabilities. Both have defined measures to focus the business back on the core IT topics. Key target was to get two and three times faster in software delivery as well as extending the knowledge of agile tool chains. Both worked while reducing cost transfers by 80%.

Healthcare – A new KPI framework called 360-degree was established to support the agile transformation. It provides a view on the product portfolio/features including head-counts and budgets. It also enables the leader to be more accurate in driving the organizational strategy and it enables the value stream driven teams to reduce silos and optimizes the team structure.

Manufacturing – One leader has spunoff an IoT consulting and implementation division. The division focuses on business consulting following a use case driven approach to support the internal divisions with cross industry knowledge and experiences. The experts support the business units as a Center of Excellence with the right capabilities.

4.4. APPLICATION

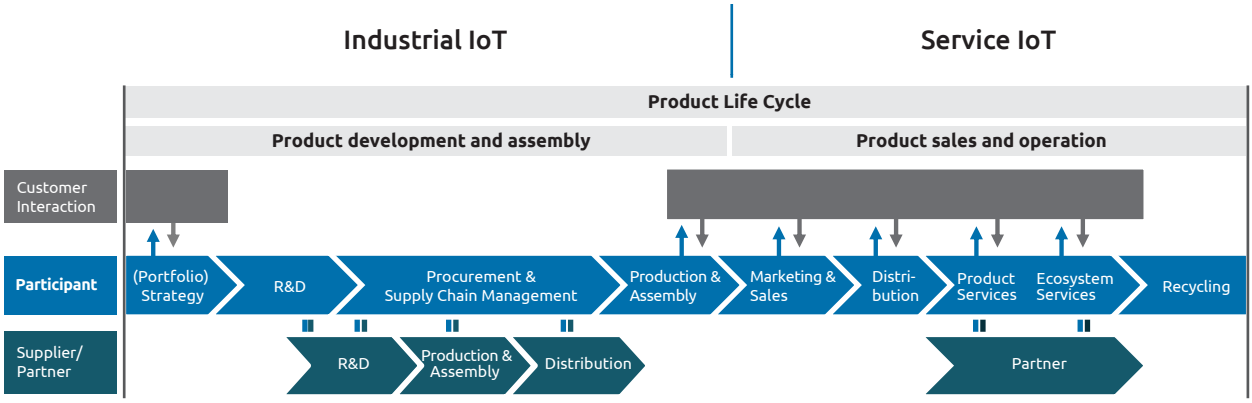
Application in IoT

One of the key value drivers of IoT Technology in an organization is its application to the business processes and operation. Due to the different participants as well as business areas, the identification of current state-of-the-art implementation maturity is quite difficult.

Hypothesis Development

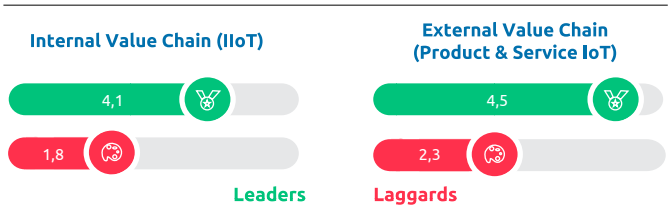
For this reason, the study is designed based on two major impact factors. On one side, a use case driven short list was assessed, on the other side a customized value chain for industrial companies was considered. This value chain was used to identify sector-specific focus areas as well as investment and maturity levels in addition to a value analysis.

Figure 11: Value analysis



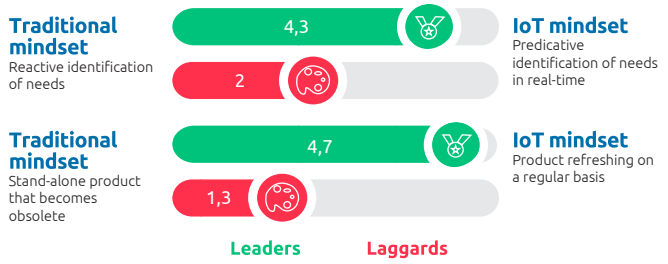
H: Focusing on B2C offerings or internal value chains in IoT integration is not enough. IoT leaders focus on simultaneous development of internally as well as externally networked ecosystem services.

Figure 12: Maturity across the value chain



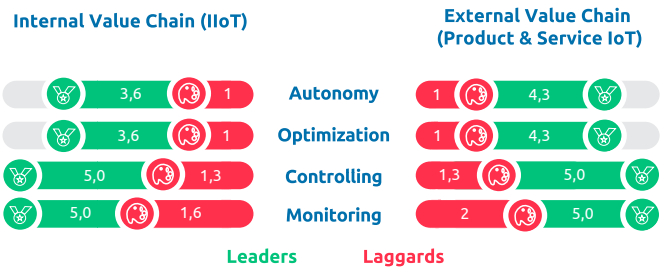
Especially with respect to addressing customers and new offerings, laggards clearly show a different, much more traditional, mindset with respect to IoT maturity. Identifying realtime and emergent needs in a predictive manner as well as refreshing products through over the-air updates by the application of IoT give leaders an immense competitive advantage with new scalable value creation potentials.

Figure 13: Value creation through addressing customer needs and offerings



Furthermore, the application of IoT bears huge opportunities, both for internal value generation as well as delivering customer value. However, realizing these opportunities require a variety of capabilities, which increase in complexity. While IoT leaders are already capable of using IoT to monitor and control internal processes and operations as well as products & services, few possess operate within a fully connected ecosystem. An even more important finding, meanwhile, shows that across all vital capabilities, IoT leaders outdo laggards by far.

Figure 14: Internal and external capabilities for value generation and delivery



Key Insights

The development of IoT systems for either internal or external use does not meet the full potential of IoT capabilities. It is essential for companies to simultaneously develop their internal and external systems to defend their business model inside the IoT ecosystems.

We expect that several industrial companies will have to buy the B2C data from digital companies in the future or establish a partnership. IoT cases will be used to secure the products through additional functions and transform towards fullservice providers.

Application Best Practice

Automotive – One automotive company exhibits both internal and external expertise. Internally, the leader is developing an IoT controlled factory which will trial 5G, with embedded radios in everything from the assembly islands through to intelligent picking systems. At the same time, the leader has built a mobility platform in the B2C market.

Manufacturing – A lead manufacturer of power train solutions levels its IoT approach to gain entirely new data insights on its own and customer assets. In combination with ML, their approach allows to maintain the railway system as well as the maintenance of the trains, while increasing availability of trains and improved risk management. Additional railway system services are already scheduled.

Manufacturing – A major aerospace OEM uses IoT to improve operational efficiency and develop new services. A platform was launched for predictive maintenance to provide insights about jet engine operations. By launching a platform, the OEM moves up the value chain and becomes a tech player rather than just an equipment manufacturer providing valuable services to the airlines and intending to take over air traffic control services in the future.

4.5. PLATFORM

Platform in IoT

As the IoT market matures, the platform market is consolidating to a few key players with rapid merger and acquisition activity, and large players are building on their offerings. Standardization is crucial for easing communication and enabling robust security across interfaces, but also for reducing the lock-in.

Hypothesis Development

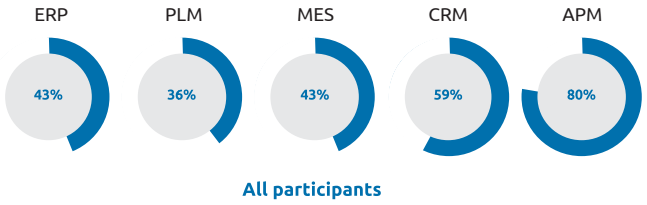
Due to increasing networking, partnerships are becoming more and more important for one's own offerings. Platforms play a central role here because they offer interfaces to involve customers and partners.

H: The introduction of a centralized, standardized IoT platform architecture and the integration of numerous emerging technologies is particularly common in mature industries.

Leaders typically engage more technologies and integrate more interfaces, especially in manufacturing. On average, leaders implement 4.3 technologies, while laggards only manage to implement 3 different ones.

In addition, leaders integrate more central business functions into the IoT ecosystem and some leaders mentioned a platform in platform strategy as a key strategic component to support the flexible and efficient way of working with DevOps teams. This requires the agile toolchain and a feature or value driven product structure.

Figure 15: Average integration of the systems into the IoT backbone



Key Insights

As the platform market matures, agreements need to be made on how data will be transmitted, so that systems can easily integrate with one another. IoT leaders typically engage more technologies and interfaces within their IoT platforms, indicating that more standardized IoT platform architectures facilitate better communication and more efficiency for leading IoT organizations.

Platform Best Practice

Automotive – Leading automotive companies are strongly investing in the agile organization transformation. Due to this mind change, the interaction between digital platforms becomes more and more the technological backbone. A flexible and use case driven Enterprise Architecture Landscape as a business backbone was identified as best practice.

Manufacturing – A leading lighting manufacturer is offering an IoT platform that's focused on connected lighting. It relies on various sensors and inputs (light, motion, sound, etc.) to trigger an action depending on the environment's condition. The platform can be used by customers from various industries such as grocery stores or hospitality to create one's own services and insights.

Manufacturing – Several IoT leaders are currently focusing on a platform in platform strategy. This characterizes a specific architecture like a single IoT platform for several operation units, but different applications are managed and developed by DevOps on top of a shared data model connected via centralized APIs. "One size fits all" solutions are outdated.

4.6. CONNECTIVITY

Connectivity in IoT

The IoT connectivity layer makes it possible to connect different products, services and people with each other. With all the possibilities this creates, it is important to note that full exploitation is only possible if all these different entities speak the same language. For this, it is of essential importance that connectivity and interfaces are compatible with each other. Due to the fact that the ecosystems, e.g. smart home and personal health, as well as others, grow together, the companies have to look beyond.

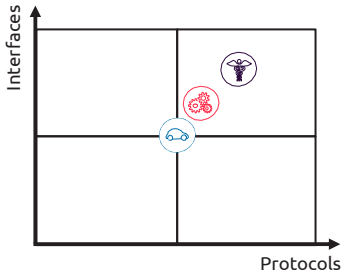
Hypothesis Development

The hypothesis was raised in awareness of the importance of uniform interfaces to successful IoT. The reason for this is, we expect a similar market development of open source standards in all industries as already happened in pure software sector.

H: Standardization of communication protocols and interfaces is essential to the success of IoT implementation. Still, even mature companies struggle to normalize these components.

Both laggards and leaders are still in the process of developing communication interfaces and protocols. The healthcare industry is most advanced in standardization, followed by manufacturing and automotive industries (Figure 16).

Figure 16: Interfaces and protocols development



Furthermore, both leaders and laggards are still in the process of developing communication between services themselves as well as between services and products. Dedicated IT strategies have been defined already.

Key Insights

Currently, most IoT devices primarily use proprietary technology, as no specifications exist in the market's early stage. Providers want to leverage their own technology to grow their market share; however, as the market grows and consolidates, moving to a standard will become more compelling for IoT vendors. Standardizing protocols and interfaces will ensure a stable and trustworthy data exchange between devices and platforms within IoT ecosystems.

Connectivity Best Practice

Automotive – One leader is currently testing 5G mobile phone technology in its new Digital Factory for standardized communication. Employees work with monitors and personal digital assistants, in order to communicate findings and avoid plant malfunctions with predictive maintenance. In addition, the autonomous shop floor transport system orchestrates the orders based on availability of the islands.

Healthcare – One healthcare company leads international standardization cooperations. Target is to provide the structured data models needed to advance the healthcare Internet of Things (IoT) for secure consumer and enterprise device interoperability, and streamline analysis of the vast amount of health and wellness data generated from around the world.

Manufacturing – A manufacturer of electric drives for buses uses AR technology to support employees of the manual assembly line. The solution is linked to 3D models and provides the information relevant to the moment in the worker's field of vision. They now need less time to analyze situations and understand workflows. This has enabled production speed and precision to be drastically increased.

4.7. PRODUCT

Product in IoT

The IoT movement is enabled by the ever-increasing magnitude and breadth of data availability through connected devices. But just as companies work to connect traditional products and services, they are also working to build insights from the additional available data attained through operations.

Analyzing this data supports the understanding of customer product and service wishes. Therefore, companies that successfully integrate IoT projects can accelerate their customer learning and develop products and services to address developing needs and changing consumer expectations.

Hypothesis Development

This hypothesis has been designed to evaluate whether companies are ahead of the competition generate a competitive edge through innovative product features and new services for the customer.

H: Particularly mature companies use IoT data for the identification of customer product and service needs. Leaders are adapting their product development & product structures based on the results.

Study results revealed that the manufacturing industry is furthest in developing its IoT portfolio strategy. The overall average was also quite strong, with participants indicating a 3.7/5 progress rating in terms of portfolio strategy maturity. This shows that companies are confident about their potential to integrate IoT into their offering to customers (Figure 17).

Our study also indicates a strong difference in the leaders' and laggards' approach to their customer strategy based on IoT data. Leaders are shown to be more mature in using their IoT data to identify customer needs (Figure 18). This skill is still being developed by both laggards and leaders alike.

Figure 17: Usage of IoT to derive the product portfolio

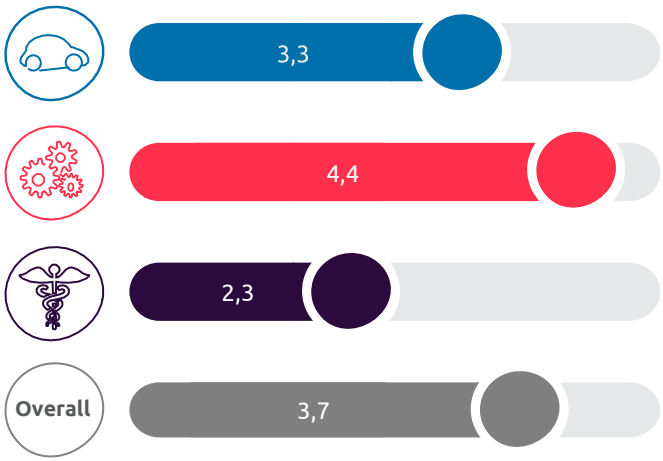
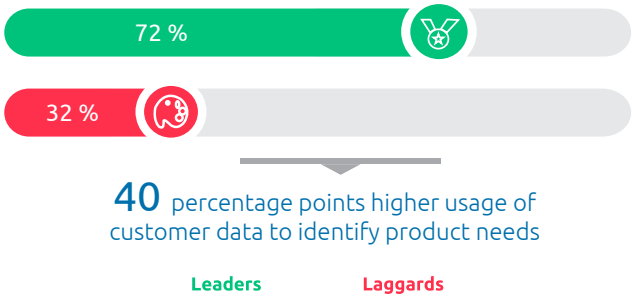


Figure 18: IoT data usage



Key Insights

Organizations that extend their data with IoT projects will benefit from the huge amount of insights attainable from additional disparate sensors, devices, "things" incorporated into their networks.

Devices offer the opportunity to increase sensory data collection to build a 360° view of processes and customers. Data needs to be actionable while avoiding siloed interaction.

Mature companies have already established agile organizations and processes to deal with changing customer requirements, and have adjusted their product portfolio based on features and digital services. The further agilization of product development organizations can be mentioned here as a recommendation for action.

Product Best Practice

Automotive – One leader created a feature driven product portfolio structure based on the value stream. The logical structure follows the top down approach from high level products into micro services. This allows to adjust the product portfolio as well as making additional services highly flexible while shifting the physical configuration complexity to digital. Many development processes have been synchronized based on agile periods.

Healthcare – A global leading manufacturer is currently working on an agile toolchain for the engineering. Key target is to harmonize the agile software and common hardware development. This will influence more than 4000 engineers and reshape the engineering from design to verfication and simulation.

Manufacturing – A leading manufacturer of heavy agricultural machinery continues to extend the connectivity of its own equipment to third-party platforms. This enables their own customers to take advantage of external offers. In this case, automatic interpretation of telemetry data from the tractor is transmitted to the farm platform via mobile communications. This leads to better product utilization, including field route optimization and an improved use of fertilizer.

5. ABOUT THE STUDY

The Capgemini Invent IoT Maturity Model was developed to show companies development regarding the Internet of Things. Using the Maturity Model, companies can assess themselves in the dimensions of IoT Transformation and IoT Technology. Based on the results, future necessary steps can be identified and initiated. The Internet of Things is just beginning to change industries and products. If companies want to remain competitive in the future, they will not be able to avoid implementing new business models or increasing efficiency based on the Internet of Things.

For more information about our product range and what we do:

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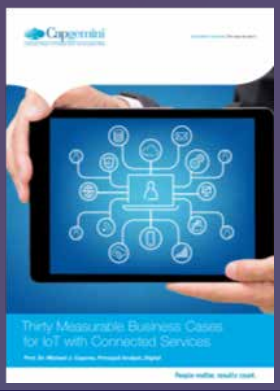

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