From product to a connected product-as-a-service
A guide to transforming the business model through IoT

Full Report
As companies embark on the journey of connecting their products to realize the benefits of IoT, the initial business case is often focused on cost savings. However, a big opportunity lies in creating new business models to build deeper customer relationships and increase revenues. One such way to redefine the business model is to turn a traditional product into a connected product-as-a-service. This type of servitization entails a fundamental shift in mindset from selling a finished product in a single transaction to providing solutions to customer problems and charging for usage or performance.

Implementing such a model requires a business transformation that impacts the whole organization. This is a challenging process but it can bring significant benefits both to the enterprise and to its customers. Enterprises can improve their offering by receiving data on product usage and performance, launch new services and build stronger customer relationships centered around service, support and resolving customer problems. In addition, enterprises can improve sales by lowering the initial investment for a customer and offering better tailored pricing models, which together with cost savings on maintenance and more predictable revenue streams result in improved overall profitability and cash flow.

Transforming the business model to a product-as-a-service through IoT impacts the whole organization - from strategy to processes, people and technology. Companies face a range of considerations and strategic questions pertaining to:

- **Customers**: Who are the new customer segments and how to transition existing customers?
- **Value proposition**: How to redefine the value proposition from focus on selling an asset to delivering a service for a fee?
- **Business case**: What is the impact on revenues and costs? What pricing model to use and how to manage cash flow impact?
- **Product development**: What product redesign is needed? Do product development processes support after-sales updates?
- **Sales and distribution**: What is the impact on sales roles and incentives? Are new distributors needed?
- **IT systems**: What new systems and capabilities are needed? How to manage data ownership, privacy and security?
- **Partners**: What should be done in-house or provided by partners? How to form the ecosystem and what role to play?

There are some best practices that have proven useful in helping enterprises succeed on this journey. Already from the start, it is important to put strategy in the lead and ensure that technology serves the strategic objectives. Transformation is also unlikely to succeed unless there is strong support and commitment from the management team. Forming a dedicated, cross-functional team with both technical and commercial expertise often helps companies innovate and make faster progress. A key to success is also to start small, with a few customers and selected use cases, in order to test and adapt the model. Last but not least, companies should scale and deploy fully the model once they feel confident that the risks have been addressed and the outcome is predictable.
Is your company ready to realize the benefits made possible by the Internet of Things? IoT is high on the agenda for many enterprises and there is little doubt that the impact and potential are tremendous. The initial business case for connecting products is usually focused on realizing cost savings, for example, by optimizing service and maintenance. Most companies that have deployed IoT are still at this initial stage.

For many enterprises, there is an even larger opportunity that lies in creating new business models to build deeper customer relationships, improve the value proposition and increase revenues. One such way to redefine the business model is to turn a traditional product into a connected product-as-a-service.

However, to implement and fully capitalize on such a new model, an enterprise needs to make some fundamental changes and transform its business. Such a journey poses a series of strategic questions. What are the main benefits to the enterprise and its customers? What are the key considerations and challenges in the process? What are the best practices that can help to ensure a successful transformation?

This paper aims to act as a guide about the journey from product to a connected product-as-a-service business model, providing insights on the key questions above.

1.1 CONNECTED PRODUCT-AS-A-SERVICE BUSINESS MODEL

What does a connected product-as-a-service entail? It is a business model, in which the enterprise sells an integrated package that includes hardware, software, connectivity, maintenance, customer support, installation and other value adding services for a recurring fee. Such a business model innovation centered around service orientation is often referred to as “servitization”. The most fundamental change is the shift in mindset from selling products to providing solutions to customer needs and problems, whereby customers pay for the performance, usage or outcome.

The as-a-service model in itself is not new. It is widely adopted by technology companies such as Microsoft and IBM offering software-as-a-service (SaaS). SaaS has become a standard delivery model for many business applications, including office software, and has made subscription services generally accepted, thus paving the road for product-as-a-service.

The sharing economy

One variation of a connected product-as-a-service is found in the growing sharing economy, especially for cars and bicycles. The shared use of such assets reduces both the cost and the environmental impact, thus expanding substantially the potential target group.
DriveNow is one example of a company that offers car-as-a-service. Customers can via the app quickly find, reserve and unlock an available car in their vicinity and use the car as long as needed. When finished, they simply leave the car at the closest public parking and end the booking. Pricing is usage based (per minute) and includes insurance, tax, parking and fuel.

Another example is Connected Cycle, a French startup that has built a smart bike pedal equipped with GPS, sensors and connectivity. When the user starts pedaling, the sensors activate and track location, speed and incline. It can be used as a fitness tracker but also to locate the bike in the case of theft. The company has also developed a fleet management solution that can be used by bicycle sharing programs or bike rental businesses to offer a connected bike-as-a-service.

As illustrated in the two examples above, the ability to receive and analyze data is essential in order to deliver the value in product-as-a-service. This makes IoT a key enabler and a foundation for this transformation.

When is it appropriate to adopt such a model?

It is well suited particularly to large and expensive assets with long lifecycles, such as industrial machines, jet engines, trucks and more. Therefore, product-as-a-service business model is likely to be more prevalent and develop faster in B2B rather than B2C customer relationships.

In B2C, the model can be applied to products that certain customer segments have low interest or possibility to own, due to high cost or infrequent use, as with the car and bicycle examples above. But generally, for products that a customer perceives of low cost, the incentive to buy through such a business model would be lower.
2. Benefits of transforming the business model

The transformation to a connected product-as-a-service should consider both the benefits that the enterprise can realize, but also the enhanced value and benefits to its customers. Both of these aspects are discussed below and summarized in Figures 1 and 2.

2.1. BENEFITS TO THE ENTERPRISE

Enterprises can realize benefits from IoT enabled product-as-a-service in a number of ways that directly or indirectly lead to cost savings and higher revenues:

<table>
<thead>
<tr>
<th>Offering</th>
<th>Sales</th>
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<tr>
<td>• Improved offering optimized for customer needs</td>
<td>• Easier to sign new customers</td>
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<td>• New services and revenue streams</td>
<td>• Pricing better tailored to the customer</td>
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<td>• Greater differentiation and customization</td>
<td>• Deeper customer relationships and increased customer loyalty</td>
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<td>• Cost savings and higher margins</td>
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<td>• Recurring and more predictable revenues</td>
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**Figure 1. Benefits to the enterprise**

**Offering**

- **Improved offering optimized for customer needs.** The enterprise can receive data on how the product is used by the customer onsite. This enables product developers to respond to customer behavior and through software updates to regularly provide new features and improvements. Services such as repair and maintenance can also be optimized, which improves customer experience. The focus shifts to delivering solutions to customer problems in a real-time and predictive manner rather than selling a finished product.

- **New services and revenue streams.** A connected product-as-a-service enables new services based on data generated insights and greater understanding of the customer problems.
For example, sensors measuring carbon dioxide in buildings can be used not only to ensure fresh air but also to optimize office cleaning by correlating it with human usage. In manufacturing, it can increase the selling of consumables and spare parts as they can be ordered proactively. Additional premium maintenance services can be offered to customers with more critical needs. IoT also allows enterprises to address new segments or expand into new value adding areas such as platforms and applications and create ecosystems.

• Greater differentiation and customization. With a product-based model, even when it includes a service aspect, there is very strong competition on the hardware features as the core of the offering. Product-as-a-service, on the other hand, is an integrated offering of hardware, software, installation, maintenance, customer support etc. This gives enterprises more parameters on which to differentiate and gain competitive advantage. In addition, software updates based on data-generated insights also allow to further customize and differentiate the offering.

Profitability and cash flow

• Cost savings and higher margins. Thanks to connectivity, enterprises can do predictive maintenance and optimize the sourcing of spare parts. These cost savings can result in higher margins. For some enterprises there are also opportunities to restructure the whole value chain, for example by eliminating the need for distributors, which can increase margins.

• Recurring and more predictable revenues. With product-as-a-service model the enterprise can “smooth” its revenues and cash flow, thus avoiding the highs and lows of a cyclical business.

Sales

• Easier to sign new customers. Shifting the cost from an upfront capital expenditure to operating expenses reduces the risk to customers and can thus make it easier for the enterprise to sign new customers and reach new customer segments.

• New pricing models better tailored to the customer. In a product-based model the manufacturer usually needs to set a fixed price, which may be higher or lower than what some customers are willing to pay. This prevents the company from maximizing its revenue. A product-as-a-service model allows more flexibility and better tailored pricing. The enterprise can introduce new pricing models, for example, charging the customer based on usage.

Customer relationship

• Deeper customer relationship and increased customer loyalty. The nature of the relationship changes from an initial transaction when selling a product to a continuous relationship with the customer that is more centered around service, support and resolving customer problems. A satisfied and engaged customer is more likely to remain loyal and generate repeat business. This can be a critical survival strategy in industries where product engagement is low and competition centers around price.
2.2. BENEFITS TO THE ENTERPRISE CUSTOMERS

Most of the benefits to the enterprise described in the previous section translate also into benefits to its customers. Summarized in Figure 2 below are some of these main benefits.

**Offering**

- **Improved offering, technologically more up to date.** With a product-based model, the customer buys ownership to the product, which over time is becoming technologically obsolete and depreciating in value. With a connected product-as-a-service, the customer can continuously use the latest software features and the hardware is automatically replaced at the end of its useful life. The customer benefits from increased focus that the manufacturer puts on service and maintenance, and on resolving customer problems.

- **Product and service features adapted to actual needs.** When the manufacturer gets visibility into how the product is used and performs, the customers’ needs are better met.

**Cost**

- **Lower upfront investment.** With product-as-a-service model, the customer transitions from a large upfront capital expenditure to having operating expenses spread over a longer period. This lowers the initial risk and allows to fund expenses through operations.

**Operations**

- **Improved maintenance and uptime.** In an as-a-service model, especially when the customer is charged based on usage, there is an extra incentive for the manufacturer to repair the faulty equipment as soon as possible and even before it breaks (i.e. predictive maintenance), which results in the customer benefiting from less operational downtime.

- **Cost savings.** Predictive maintenance and better tailored pricing by the enterprise translate into cost savings for the customer.

- **Predictable total cost of ownership.** With product-as-a service, the service aspect becomes an integral part of the offering rather than an add-on and when unexpected failures occur, the customer has better predictability in the total cost.
What are the main considerations in transforming a company’s business model from a traditional product into an IoT enabled product-as-a-service? Servitization brings many benefits to the business and creates value for its customers but from an organizational perspective it may be challenging. It requires a shift in mindset and impacts strategy, processes, people and technology.

In Figure 3 below, we summarize some of the main considerations in the journey of transforming business model. Naturally, the starting point is the customers, and the other areas can be evaluated consecutively or in parallel, depending on the company’s situation.

Each of these is addressed in more detail on the following pages.

![Figure 3. Main considerations](image-url)
CUSTOMERS

Redefining the business model requires the enterprise to evaluate both what is the impact on existing customers and who are the potential new customers. Increasing the revenue means to generate new business from new customers and/or more business from existing customers.

One of the biggest advantages of product-as-a-service model is that the threshold to becoming a customer (the entry price) is reduced with less capital expenditure, thus expanding the potential customer base for the company. Who are the new customer segments? What are their needs and how can they be addressed best?

A good example of serving new customer segments through a lowered threshold is the car sharing service ReachNow, launched by BMW Group in northern USA. With this service, BMW targets new customers who are willing to drive but not own a car. The service is based on subscription model and it charges the customers for usage.

The enterprise needs to also educate existing customers about the benefits and transition them to the new model. How and when would the transition happen? Would it be done for all customers at once or in stages? Some of the customers may be comfortable with the existing model and resistant to change. In that case companies should look for ways to introduce the new model in gradual steps and allow customers to try it before making a leap of faith. The enterprise may need to accommodate exceptions and run the two models in parallel for some time. How would that complexity and its financial impact be managed effectively? A roadmap and plan for the migration are crucial.

Product-as-a-service changes also the nature of the business-customer interaction, shifting it from a transaction into a relationship. To be successful, companies need to understand how the customers are using the product, and what are their (evolving) needs and business objectives. The relationship with the customer develops towards value co-creation since the focus is on solving customer problems and achieving their desired business outcomes.

VALUE PROPOSITION

Offering product-as-a-service allows to create a stronger value proposition to customers but it requires a complete rethinking of the offering and how the value is created and delivered. With a traditional product, the value proposition is built around selling an asset with certain features and quality. In a product-service offering, the value proposition is centered around providing reliable performance when needed or offering specific outcomes for the customer.

Rolls Royce is a good example of a manufacturer that has successfully transformed from a product/technology company to a services and customer centric company. “TotalCare” is their jet engine-as-a-service offering, designed to guarantee engine availability and charge customers (airlines) based on engine flying hours. Rolls Royce thus redefined their value proposition from what can be described as “we sell engines” to “we supply power by the hour”.

Each company needs to consider, what is the best way to deliver more value in a way that differentiates the offering? What do customers expect and value with respect to the pricing model, repair and maintenance guarantees, software updates providing new features?

NRG Home Solar is another good example of how the value is delivered in a product-service model. The company offers solar panels-as-a-service to residential customers, which pay predictable rates per kWh. The product ownership and responsibility for the system performance and operation remain with the enterprise. The value proposition is based on providing clean energy, at no upfront installation costs, while customers can enjoy predictable rates and even reduce monthly electricity bills.

BUSINESS CASE

Quantifying the business case is one of the main challenges that enterprises face since IoT is still a relatively new area and the impact of a new business model may be hard to assess. However, understanding the effect on revenue streams and costs, and the resulting return on investment are important in the decision making process and to ensure the buy-in of management and other key stakeholders.

Costs

The cost side of the business case should consider both the capital and operating expenses as well as the expected cost savings.

The CAPEX includes investments into new IT systems and capabilities (such as analytics platform) and adding incremental layers to existing systems (such as billing, CRM), which typically entails development, installation and integration costs.
The OPEX mainly consists of the cost of using third party systems and services, running costs for in-house systems, and subscription fees for connectivity.

A connected product-as-a-service can also create cost savings for the enterprise over time. The cost savings are typically realized from improved (e.g. predictive) maintenance, optimized operations and supply chain, automated monitoring and more.

**Revenues**

In calculating the revenue side of the business case, enterprises should consider the direct revenues and the strategic benefits that create competitive advantage, differentiation and customer loyalty, thus increasing revenue over time.

Direct revenues from customers include the recurring revenues from existing customers and the recurring revenues from new customer segments that can be addressed through product-as-a-service.

With a connected product enterprises can also generate direct revenues from partners and other vendors. One way to achieve that is to create an ecosystem and act as a platform for other suppliers to reach the same customers. In the connected car, for example, automakers bring together insurance, infotainment, parking and other services from third parties. The enterprise can monetize through revenue share, or provide free access to such partners in order to enhance its overall value proposition.

Since companies are in a position to collect significant amount of data, some of that data can be of value to other actors in the ecosystem. Monetizing data by selling it to third parties can create another revenue stream, as long as privacy and regulation compliance are ensured and the customers’ trust is not eroded.

A connected product-as-a-service, as discussed earlier in the paper, also entails improvements in product performance and quality and a deeper customer relationship, which can increase customer loyalty. These benefits may be hard to quantify but should be considered in the analysis.

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**Figure 4. Business case considerations**

<table>
<thead>
<tr>
<th>Business case considerations</th>
<th>Direct impact on revenues and costs</th>
<th>Other benefits</th>
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<tbody>
<tr>
<td><strong>Revenues</strong></td>
<td><strong>Direct revenue from customers</strong></td>
<td><strong>Direct revenue from partners</strong></td>
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<tr>
<td></td>
<td>• Recurring revenue from existing customers</td>
<td>• Ecosystem building (platform enabler)</td>
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<td></td>
<td>• Recurring revenue from new customers</td>
<td>• Data monetization</td>
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<tr>
<th><strong>Costs</strong></th>
<th><strong>CAPEX</strong></th>
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<tbody>
<tr>
<td></td>
<td>• New IT systems and capabilities</td>
<td>• Using third party IT systems</td>
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<td>• Integration into existing systems</td>
<td>• Operating in-house IT systems</td>
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<td></td>
<td>• Connectivity</td>
<td>• Connectivity &amp; operations</td>
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<th><strong>Cost savings</strong></th>
<th><strong>Differentiation and strategic benefits</strong></th>
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<tbody>
<tr>
<td></td>
<td>• Improved product and service performance</td>
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<td></td>
<td>• Increased customer loyalty</td>
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| **NPV**                     |                                           |

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Pricing models

Apart from identifying the revenue streams, one of the key considerations is how to price the product-as-a-service. Some of the pricing model alternatives are:

- Subscription model – monthly recurring payment based on the set contract duration and selected package;
- Usage-based model – the customers pay according to the actual usage of the service (for example jet engine hours);
- Outcome-based model – the customer pays for the achieved results.

As an example of revenue streams and pricing model with product-as-a-service, the aforementioned NRG Home Solar offers a usage-based model to its customers. In its Elevate Plan, the customer receives a complete package, including the panels, installation and maintenance. The customer pays the company based on the monthly kWh produced. In the case of production exceeding consumption, there is a possibility to sell back the power to one of the utilities that are in the NRG Energy’s (parent company) partner program.

Other financial considerations

Enterprises need to consider also the cash flow impact. Product-as-a-service model can provide more stable revenues over time, but going from a transactional model with large upfront payments to smaller payments collected over a period can present cash flow differences that need to be managed. In addition, there may be balance sheet implications since the company retains ownership of the assets in a product-as-a-service model.

As companies make the financial analysis for adopting IoT and transforming the business model, it is also important to remember that there is a potential risk and cost in doing nothing and falling behind as competitors disrupt the market with new services and business models.

Existing products may need certain initial redesign to integrate connectivity modules and electronic components, such as sensors and controllers. The software layer is critical and it should be possible to upgrade the software over the air in order to activate different components or provide new features. In addition, the enterprise needs to consider how much functionality and intelligence should be put in the end-device and how much in the cloud.

In a forward looking design, some enterprises may also choose to integrate more hardware components than currently used, to be able to provision future needs. For example, in October 2016, Tesla started to sell all new cars with the hardware needed for full self-driving capability. That ability is still likely years away but when commercially ready, the new features will be available through over-the-air software updates. Thus, Tesla ensures that their current cars are designed to meet future requirements and the “pay to unlock” model is a smart way to monetize the new services while providing their customers with the latest technology.

In a traditional manufacturing process, products are typically designed in a way to accommodate a pre-defined set of requirements. However, with the help of connectivity, manufacturers get (real-time) data on the product performance and usage. The analyzed data can be used to continuously update, improve and further customize the product-service as well as to enhance the development of the next generation offering.

BigBelly is a company providing smart solutions for waste management through a product-as-a-service model. In order to optimize the emptying process of trash bins, the enterprise equipped the bins with connectivity. Based on the data generated, BigBelly has been able to develop actionable route planning for trucks emptying the bins, automated collaborative mode, optimized cleaning and customer support.

PRODUCT DEVELOPMENT

Product development is a key activity impacted in the process of connecting the product and implementing a new business model. There is both a short term impact - initial (re)design, and a long-term impact of transforming the whole product development process based on user data.
CASE STUDY: XYLEM

This case study is provided by Telenor Connexion

About Xylem and their connected product-as-a-service

Xylem is a world leader in water technology, committed to developing innovative technology solutions to help solve the world’s most pressing water challenges. The company has a broad portfolio of products and services that address the full cycle of water - from collection, distribution and use to its return to the environment. Xylem has operations in more than 150 countries.

Xylem’s water and wastewater pumping systems are used within the commercial building, municipal and industrial segments. The company is further investing in smart water technology which among others enables cloud based monitoring services.

One of the target customer segments for this offering is municipalities and property owners that have not been traditionally remotely connected. Both customers and service personnel have a need for a solution that is technologically sophisticated but interactive and easy to use. For this target customer segment it is vital to be able to track problems in current installations by a web interface and SMS. To meet this demand Xylem introduced a service package including a connected pump station and a contract covering managing planned and unplanned call outs.

Xylem saw clear benefits and gained useful learnings when implementing a connectivity solution and evolving the offering towards product-as-a-service.

Benefits

- Cost savings and decreased environmental impact achieved by minimizing both planned and unplanned maintenance call outs.
- Improved customer experience since the problems are being managed before they occur.
- Data collected on the pumps’ performance is used to frame after sales offering; also serves as a foundation to develop future products and services.
- The service contract increases the customer experience as Xylem is involved in optimizing pumping operations.

Challenges

- The project team found that they had to educate and sell the idea not only to customers, but also internally to their autonomous sales offices. The project team identified a new market segment for this offering which had strong interest and potential to grow.

Key success factors

- A dedicated team was formed to investigate how IoT can benefit the customer. The team included employees with both commercial and technical backgrounds.
- Members of the Management Team had the IoT project as one of their KPIs during the implementation.
- In an early stage a demo service was developed in order to help customers and employees to understand the concept. This was very helpful to receive feedback in an early stage of the process.
- The implementation was staged with a simpler version of the product/service that the customer could adopt according to their demands. The focus was to first educate and on-board the customer and then build adoption rate.
- The offer development model evolved from a classical ‘waterfall’ project management to an agile development model.
- By using an open cloud application, Xylem ensured that sales offices can add suppliers locally in the future if needed for invoicing or other functions.

This project entailed not only adopting IoT, but also a new service based business model, a new technical platform and agile development.
SALES & DISTRIBUTION

The shift to a deeper and longer customer relationship means that the role of account managers becomes more important. Working closely with customers after sales to understand their evolving needs is the best way to ensure that the enterprise delivers continued value. Upsell and cross-sell opportunities increase, and revenues as a result. This shift in the nature of the relationship requires companies to retrain their sales force and account managers. The sales compensation model also needs to be adapted accordingly to make sure that the right incentives are in place.

Another important shift is that since services (installation, maintenance and repair, customer support etc.) become such an integral part of the offering, all the people involved in these touchpoints need to act as ambassadors for the company.

Old and new distributors

As connected products enable and necessitate enterprises to have a more direct relationship to customers, to what extent do enterprises still need their traditional distributors? The benefit of eliminating the middlemen is known - increased margin and direct customer ownership. Such a model is more easily implemented for new products or addressing new customer segments, where no legacy relationships exist. Tesla Motors is one good example of a company that has disrupted the automotive value chain by selling cars directly to the customers, bypassing traditional car dealers.

However, for existing products, enterprises should not underestimate the knowledge that distributors possess and the relationship they have with customers. For most companies, it is best to work together with their distributors to adapt the business model, ensuring that the distributors have continued incentives.

Are new distributors required to complement existing ones in order to address new customer segments? For example, professional construction or gardening tools sold through specialized retailers may not be the most suitable channel to reach consumers who would not own such a tool, but may be interested in a more limited use through as-a-service model.

IT SYSTEMS

Connected product-as-a-service entails a number of important IT considerations. What are the new technologies, infrastructure and skills the enterprise needs to have in place to deliver an end-to-end solution? These include connectivity technology, application enablement and analytic platforms, customer facing applications, and more. In selecting IoT connectivity technology, in particular, enterprises face many considerations, which we have described in a previous report.

A connected product-as-a-service business model does not need to entail a major IT infrastructure overhaul, but rather adding incremental layers to the existing systems. System integration therefore plays a vital role, as one of the main challenges enterprises face is in piecing together all the components of an end-to-end solution.

Billing systems need new capabilities in order to be able to handle billing and invoicing of recurring revenues and the flexibility to define new types of offerings. Not only the software, but also the surrounding processes need to be transformed. The billing system needs to be also in sync with other systems such as CRM, ERP, customer portals.

CRM systems also face impact. Enterprises need to be able to bring data from sensors and devices into their customer relationship management software, combine that with data from other customer interactions (such as social media), and perform analytics to derive business insights that can be used to improve sales, marketing and customer service.

Interoperability

An important consideration in designing the technology solution behind a connected product-as-a-service is interoperability. How should the company’s product interface to other adjacent products and services that the customer is using? For example, light bulbs from one manufacturer may not be interoperable to a light switch or light control system by another vendor. The value of the whole ecosystem (e.g. connected home), and opportunities for innovation may be diminished due to fragmentation and closed solutions. An open system entails using open and standardized interfaces, that can provide access to other players to build synergies and additional value. In choosing their approach, enterprises need to evaluate competitive positioning, technical constraints, cost and time to market.

1 Connectivity technologies for IoT, Northstream, October 2016
Skills and competence

One of the important aspects in realizing the benefits of IoT and a product-service model is to ensure that the right talent and organizational structure exist in the enterprise. Companies often need to acquire new competence and skills, for example, in software and big data/analytics. Identifying what are the competence gaps and implementing a recruitment and/or training plan should be high on the agenda.

Data ownership, privacy and security

The data generated by connected products is a key resource and lies at the heart of value creation. Sometimes it may be hard to determine in the initial design phase what data may be relevant in a future context and it is useful to have the possibility to retrieve more data than currently needed. The focus though should not be on simply amassing as much data as possible, but on the intelligent collection and use of data that leads to customer benefit and creates value that the customer is willing to pay for. Key considerations with respect to data are data ownership, privacy and security.

Who owns the data - the customer, the enterprise or any of its partners? For example, would the data from connected tires be owned by the vehicle owner, the tire manufacturer or the automaker? Should the enterprise additionally monetize data by selling it to third parties? These are some of the considerations that enterprises struggle with; the approaches can vary depending on the use case and type of data collected.

Security is critical to establishing trust in the use of IoT. The massive number of connected devices complicates the challenge. Security has a number of aspects - security of the end-device (poorly designed or non-upgradeable devices can expose customer data and become target for hacker attacks), security of data that is communicated from the end-device to the cloud and security of data that is managed and stored in the cloud. Ultimately, each enterprise needs to do a cost-benefit analysis. What are the customers’ expectations regarding security? What are the current and future security risks that the company may face? What would be the resulting damage from a potential security breach? And last but not least, what are the resources required to ensure a certain level of security?

Privacy is another integral element of trust in IoT and it needs to be appropriately safeguarded. Customers and enterprises often have different views on how private the data collected is and what constitutes fair use. This should be investigated and clarified.

PARTNERS

What parts of the end-to-end solution should be developed and operated in-house or would be outsourced to external partners (suppliers)? The main deciding factors are cost, availability of skills and competence in-house, impact on time to market and scalability, and the need for control of certain key activities and resources.

With a connected product-as-a-service it is important for the enterprise to view its suppliers as partners both in the transformation process and the new way of working that follows. The enterprise will be in a continuous business interaction and collaboration with its partners to deliver customer value. This type of relationship entails trust and openness (in sharing knowledge and data), mindset of co-creating value and benefiting from the new business model together.

A good example of an industry where partner ecosystems are being created are smart cities. To realize the full value, smart cities require not only that partners work together to deliver a vertical solution (such as smart street lightning), but also that they can unite these vertical solutions into one city-wide ecosystem.
**CASE STUDY: SWEGON**

*This case study is provided by Telenor Connexion*

**About Swegon and their connected product**

Swegon is part of Latour Group and market leader in energy efficient ventilation and indoor climate systems. Swegon delivers smart products and system solutions that create a good indoor climate and contribute to significant energy savings. The company’s approach is to continue developing innovative ventilation products with intelligence, so that they can communicate and be combined into efficient indoor climate systems. Swegon’s ultimate aim is to work for the health and comfort of people in buildings, while delivering the lowest possible life cycle cost to building owners.

In 2016, Swegon launched a unique IoT enabled climate control system, New Wise, utilizing Telenor Connexion’s and LumenRadio’s wireless connectivity and cloud services. The Wise system is a fully wireless, demand-controlled ventilation system optimizing the air conditioning of rooms and the power consumed. The radio communication also makes the system “self-healing” – if one of the components goes down, the system automatically will find a new communication way around the broken component. This means that the system always will be up and running.

With this new system, Swegon have also broadened their customer focus - moving from talking ventilation products to installers and consultants, to making value based argumentation also to end users, building owners and main contractors. A lot of the values in the system are related to the lifetime of the building, not just during but also before and after the installation. This means everything from planning of the building in an early phase to operation of the building for the upcoming 20 to 25 years. In the end, the building owner has a building with an optimal indoor climate to the lowest possible operating cost, both regarding energy and maintenance.

**Benefits of being connected**

- Meeting new environmental requirements and legislations for reducing energy consumption.
- Gaining competitive advantage – a fully wireless solution is perceived as most innovative by customers.
- Being able to resolve issues remotely and work preventively.
- Cost savings of up to 70% achievable with the fully wireless system compared to a traditional system.
- A “self-healing” system, always online.

**Challenges**

- The main internal challenges were in changing processes, systems and mindsets, for example getting the sales force to understand and want to sell value instead of products.
- Redefining relationships with the stakeholders in the value chain.

**Key success factors**

- Dedicated staff wanting to achieve change and focused on delivering value to the customer.
- Using available technology and adapting it rather than developing it in-house allowed faster time to market.
The success of adopting IoT and transforming the business model from product to a connected product-as-a-service is dependent upon multiple factors. Provided below is a guide with best practices that can help companies to ensure a successful process.

Figure 5. Summary of best practices

**Put strategy in the lead, not technology**

The idea of adopting IoT is often initiated by the R&D or product department with an objective to improve an existing process or to solve a specific problem. A proof-of-concept can also be conducted in a trial environment to test the feasibility of the technical solution. One of the common pitfalls though is to put too much focus on the technology in the early stage, while strategy remains in the back seat. While choosing the right technology plays an important part in the overall success, technology should always serve the strategy.

As part of the strategy, enterprises should first define the vision and objectives that they are trying to achieve with IoT both short-term and long-term. These can generally be to achieve cost savings and/or to increase revenues by enabling new services and business models.

The initial business case is often focused on realizing the cost savings that come from improved service and maintenance. These low-hanging fruits of connectivity are a natural starting point as they are easier to prove and calculate.

An example of a company that is achieving significant cost savings with IoT is Trenitalia, Italy’s leading train company. The business problem they looked to address with an IoT solution was unplanned maintenance. Trenitalia has been fitting its fleet of trains with sensors to enable predictive maintenance on components such as brakes and engines. Trenitalia estimates that in the first year of operation, it will see up to a 10 percent decrease in annual maintenance costs. Most importantly, safety standards and passenger travel experience will be improved.

At the same time, many enterprises identify already early in the process the new revenue opportunities a connected
product-as-a-service can deliver. We believe that a large part of the value that IoT can create is unlocked exactly by this transformation.

Hitachi is one company that has embarked on an ambitious digitalization journey and a shift from selling hardware to providing end-to-end solutions. Hitachi has announced that as a part of a major deal in the UK it plans to deliver its trains as a service. The trains will remain the property of Hitachi and will be provided through a software-based lease service, in which Hitachi gets paid for the reliability of the trains.

Ensure management support

Although the idea for a connected product may often originate bottom-up as described earlier, transforming the organization to enable the benefits of IoT and a new business model requires an investment in time and resources. Such transformation is unlikely to succeed unless there is strong support and commitment by the management team, including the Board of Directors.

Form a dedicated cross-functional team

The responsibility for developing a connected product-as-a-service cannot be placed solely within R&D or IT department. It requires a dedicated cross-functional team to lead the effort, which includes representatives from all the main functions such as IT, R&D, product management, marketing, sales, finance, HR.

Some large companies even go as far as setting-up the dedicated team as a separate business unit with its own P&L responsibility, in effect forming it as an internal startup. Such set-up enables the team to innovate and make faster progress in driving change, reducing some of the barriers and complexity. It is important that all the members of the team are people who believe in and are passionate about the change and have the capacity to act as champions.

Start small and transform gradually

Companies should start with implementing IoT and transforming their business first on a small scale. For example, engage a few customers who are positive to trying the new services and business model, and focus on selected use cases. This gives the opportunity to test and adjust the model before it can be more widely adopted across the whole product line and organization.

Enterprises should also involve their partners, for example distributors and operators, to ensure that the model is viable to and supported by key partners.

Even in the initial small scale deployment, it is important to think about scalability and design processes and solutions so that they can be realistically applied to the whole organization later on.

Deploy fully when outcome is predictable

Gradually, the new business model is implemented to the whole product line and across geographic regions to reach major adoption. How long this step takes depends on the product development and production cycles as well as how agile the organization is in implementing change. A key success factor is to ensure that the model is not fully scaled until the organization feels confident that the outcome is predictable and potential risks have been mitigated.
ABOUT THIS PAPER

This white paper was written by Northstream with the aim to provide an objective and independent view on connected product-as-a-service business model. While the white paper was commissioned by Telenor Connexion, all opinions expressed are entirely Northstream’s and do not necessarily represent the opinions of Telenor Connexion.

ABOUT TELENOR CONNEXION

Telenor Connexion designs and operates Internet of Things (IoT) solutions. Building on almost 20 years of experience Telenor Connexion provides reliable IoT solutions to a number of global customers such as Volvo, Scania, Hitachi, Verisure Securitas Direct and Husqvarna. Headquarters and tech centre are located in Sweden and the company has regional offices in UK, Germany, US and Japan. Telenor Connexion is wholly owned by Telenor Group, one of the world’s major mobile operators.

www.telenorconnexion.com

ABOUT NORTHSTREAM

Founded in 1998, Northstream is an experienced management consulting firm providing strategic business and technology advice to the global telecom and media industries. We help our clients through independent and objective analyzes, advice, problem solving and support that are tailor-made to our client’s situation. Our work is based on a well-balanced combination of innovation, industry best practices and in-house methodologies. Northstream typically works with:

- Business strategy development and planning
- Strategic sourcing of systems and services
- Technology & product strategy evaluation
- Operational review, optimization and support
- Investment analysis and due diligences

Clients across the world include mobile operators, network and device suppliers, application providers, investment banks, regulators and industry fora. Contact us to learn more about how we can work together to ensure your success in the mobile voice and broadband business.

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