5 Predictions

How IoT will drive the connected economy

With analysis from **Northstream**™

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Prediction 1/5

Enterprise data will take the lead in data trading

Innovative collaborations between businesses will uncover the hidden value of IoT data.

The abundance of data coming from connected ”things” in the IoT has opened up new markets in which data is bought and sold in many forms.

While it has been predicted that collected consumer data will be a valuable asset for many companies, there are still many privacy issues hindering the trade personal data.

In contrast, enterprises which deploy connected devices and products have an advantage when it comes to turning data into revenue. Aggregated, non-personal data coming from ”things” in the IoT will be the ”hotbed” of the emerging data trading industry.

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1. Enterprise data will take the lead in data trading

Enterprises will shift their efforts towards monetising enterprise data, which is typically non-personal. New revenue opportunities and business model innovation will be the two main drivers behind large-scale enterprise data trading.

Some industry segments have adopted the Internet of Things (IoT) faster than others, mostly because it makes business sense; 'smart' utility meters and 'connected' cars are examples of such segments. In general, the enterprises in these segments have a value creation thought-process that looks inward, focussing on their operational processes, on their customers and on their partners.

Now that their 'things' are connected, these enterprises are starting to realise that they have more data than they can make use of. Similarly, other enterprises realise that there is value in externally sourcing data to enrich their own data.

For enterprises generating data, 'what else can we do with the data?' is a question that many are working to address. Some have done it by striking partnerships, e.g. in-car parcel delivery partnership between Volvo and Postnord, road surface condition between Volvo and the Swedish traffic authority. Such collaborations reveal that the generated data has a vast potential in ways not yet imagined.

However attractive the opportunity may be, enterprises have been cautious to trade personal data, especially in the context of the Facebook & Cambridge Analytica incident. Enterprises also recognise that perhaps consumers are not yet comfortable with the monetisation of their private information.

This was confirmed by a recent survey[1] which indicated that US consumers would welcome further regulation similar to the EU's General Data Protection Regulation (GDPR); in addition, the survey found that 66% of the respondents were concerned with the collection of their private information by web-scale companies.

However, this does not imply that there are no opportunities worth pursuing, as illustrated by BMW CarData[2], which has taken the 'transparency' approach when monetising data that belongs to the end consumer, even if it might not necessarily be of personal nature.

"In our view, enterprises have the opportunity to leverage technology advances, particularly in analytics, distributed ledger and artificial intelligence, to monetise enterprise data. While consumer data will remain attractive, we envisage that consumer privacy issues will hinder its progress; something that enterprise data does not have to deal with."

Enterprise data, on the other hand, is subject to less scrutiny and therefore offers a real possibility for large scale monetisation. To this end, several data exchanges (e.g. IOTA, DAWEX, Streamr and Terbine) are working to enable enterprises to sell and/or source data. These exchanges offer a plethora of data types from IoT sensor data (e.g. environmental sensors), to census data, to power grid statistics, to real-time vehicle occupancy, etc.; they all have one common characteristic which is that the data being exchanged is largely non-personal in nature.

We observe at least two primary drivers behind further adoption of enterprise data monetisation:

A. The opportunity for new enterprise revenue: let's take the example of Farmobile[3], a data trading platform specialising in monetising agronomic data (e.g. soil condition, crop yield, etc.) and machine data (e.g. tractor telematics) from farming businesses. Through Farmobile, farmers have found the possibility to sell vast and rich non-personal datasets that would otherwise have been unexploited – a true case of untapped potential.

B. Enabling completely new use cases based on machine economy: for example, autonomous electric vehicles (EV) will be expected to find EV charging stations, charge up and settle the bill autonomously. It's in this context that Elaad NL, a Dutch operator of EV charging stations, is exploring connecting its charging stations to the IOTA data exchange[4]. Use cases involving machine-to-machine transactions, which often involve micropayments, would not be possible unless there was a way for interested parties to safely discover and transact between each other.

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1 https://blog.treasuredata.com/wp-content/uploads/2018/12/ATD_StateOfPrivacy_Survey18.pdf
2 https://www.press.bmwgroup.com/global/article/detail/T0271366EN/bmw-group-launches-bmw-cardata:-new-andinnovative-services-for-customers-safely-and-transparently?language=en
3 https://www.farmobile.com/
4 https://www.elaad.nl/news/how-elaadnl-built-a-poc-charge-station-running-fully-on-iota-and-iota-only/

Prediction 2/5

Digital value will be unlocked faster

IoT newcomers will “leapfrog” the complexity of digitalisation faced by first movers.

Newcomers will ”leap” over the complexity that first movers experienced and develop IoT solutions in a shorter amount of time and at a much lower cost than previously possible.

Early IoT adopters had to do the groundwork of integrating disparate systems and standards. The development of web services will allow IoT newcomers to quickly deploy the infrastructure needed for digital applications, with considerably less effort, time and resources than their predecessors.

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2. Digital value will be unlocked faster

Technological maturity, particularly that related to web services, will enable enterprises to unlock digital value faster, more affordably and with greater scalability than their 'early adopter' peers.

The digitalisation trend started with leading industries that had an incentive to fundamentally change how they conducted business. They embarked on digital transformation programmes which allowed them to innovate new business models such as those based on product as a service (e.g. Netflix in the media industry). They also redefined the customer value proposition and how it would be delivered, such as better customer journey, quicker service delivery, better customer service, etc. Retail banking is one such industry, where leading banks aimed to harmonise customer contact points to offer an omnichannel user experience with a focus on mobile banking which would result in operating cost reduction.

In general, the main motivation of the early adopters of digitalisation, whom we also refer to as digitally advanced enterprises, has been about achieving decent returns on their digital investments in terms of revenue growth, improved customer satisfaction and reduced operating cost[5]. However, on the journey to digitalisation, many of these enterprises have created a new digital/IT landscape, often comprised of disparate systems with complex interactions between them, and often relying on some form of manual intervention in order to keep the end-to-end processes coherently integrated. For some industries such as banking or telecom, enterprises often found it too risky to completely migrate the core data structure on which all business logic is built or to relinquish control of the infrastructure. As the digital landscape expands (by digitalising more processes), these early adopters might have to settle for diminishing returns on incremental investments due to the increasing complexity[6].

In many cases, the reason why many of the digitally advanced enterprises fall in this 'digital saturation' situation is related to the transformation strategy adopted and how it was implemented – i.e. incremental transformation built on a mixture of old and new infrastructure, coupled with legacy data architecture, rather than creating a clean slate on which to build a digital native business.

"Due to the unprecedent level of enterprise agility offered by web services and the network effect resulting from an increasing rate[9] of adoption by industry, we believe that enterprises which are now considering digitalising have a good chance of reaching their goal much more efficiently than digitally advanced enterprises have achieved."

If we fast forward to the present, the enterprises which are now considering to kick-off their digital transformation (by deploying sensors and leveraging data analytics) also include the small to medium size category, which usually have access to less resources in terms of capital and technical competence relative to their larger peers. It would be very challenging for a smaller late entrant to replicate the approach of their larger peers; however, thanks to technological advances, they have a significantly better starting point than their peers had when they embarked on their digital transformation journey.

The primary technological development that makes life easier today is related to web services such as those offered by Amazon, Google and Microsoft. These services can now allow organisations with very slim IT departments to quickly deploy infrastructure (e.g. provision application servers on the go) and begin to build their digital applications, often with relatively light coding effort[7]; which allows their IT organisation to spend more time on delivering real value to the end-user (i.e. developing features to solve real-life use cases) rather than spending substantial effort on procuring, operating and maintaining hardware and software on which the digital applications would run. And of course, besides the scalability benefit offered by web services, they are also a perfect environment in which to expand capabilities because they additionally offer the latest tools in data analytics and artificial intelligence as a service.

Faster, easier and more efficient digitalisation imply that new entrants can expect the benefits of digitalisation to materialise relatively more quickly. According to a recent publication by BCG[8], the expected impact of digitalisation has been quantified for some cases: 6% to 10% increase in revenue growth from personalisation, 25% increase in operating margin from digitising manufacturing functions, two to four times faster speed to market from agile ways of working, 75% reduction in service costs from smart maintenance.

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5 2015 Global Digital IQ 7 Survey, PWC

6 As the IT landscape becomes more complex, it becomes more difficult to maintain the same level of tangible impact with additional investment; more resources have to be spent on dealing with the complexity and maintain the baseline.

7 Time to market can vary depending on the development approach, it's significantly shorter when one utilises a development framework which removes common complexities such as infrastructure configuration, data structuring, etc.

8 https://www.bcg.com/publications/2018/digital-common-sense-speed-new-scale.aspx

9 According to a survey by LogicMonitor, public cloud environment will overtake on-premise by 2020

Prediction 3/5

Connectivity will be at the centre of digital product innovation

Connectivity must be considered from the beginning of the product development process.

Today, connectivity is a crucial part of product performance, and thus, the technical aspects and impact cost of connectivity must be considered at an early point in the product development cycle.

However, connectivity is still too often an afterthought. To enable new digital products and experiences, considerations related to connectivity technology, technical competence and commercial models will be important to consider at the very beginning of the product development process.

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3. Connectivity will be at the centre of digital product innovation

In order to enable new digital products, connectivity aspects, such as technology, technical competence and commercial models, will be more tightly integrated into the overall product development cycle from as early as conception.

Driven by the ever-increasing capabilities of fixed and mobile broadband networks, the role of connectivity in the lives of consumers has distinctively moved from being a nice-to-have add-on to an absolute must-have requirement. Buoyed up by these advances in connectivity technologies, the performance of products and services has matured substantially, which further increases expectations on connectivity as an enabler. Yet, in many cases, the connectivity layer (within the broader technology stack that enables digital UX) appears as either an afterthought or a simple commodity, similar to electricity.
For example, take the case of the Google Maps module that is often embedded in products (e.g. in-car navigation for logistics trucks). Google Maps services work best when the device is connected to the internet. The designers therefore make an implicit assumption that the logistics company in this example will always have or afford internet access. In the event this is not the case, product performance is negatively affected unless there are adequate fall-back mechanisms.

A well-functioning and accessible connectivity solution is hence a crucial part of product performance. Aside from its overall reliability and affordability, users also expect their connections to be appropriately responsive – something that is technically known as latency. Depending on the nature of the use case, only minimal delays can be tolerated; even for less critical applications such as smart thermostats or smart home assistants, there is a limit for delays before end customers will start asking themselves whether the product is actually working.

In order to assure for a satisfactory UX, product development teams are required to ensure that lags in responsiveness are kept to a minimum and/or resolved by design.

But there is more that is demanded of a connected product or service. While earlier, non-connected offerings limited the customer relationship to that between the manufacturer[10] and the end user, connectivity has brought about an entire ecosystem of additional stakeholders who are integral to a successful digital offering. It is thus essential for any connected offering to be able to interface with third-party products and services in order to provide value to the end user. This is particularly important as the world transitions towards the sharing economy, which often involves B2B2X[11] types of business models.

In our view, the very success of future digital products and services, of which UX is one of many success factors, critically depends on the ability for all stakeholders to interact, i.e. connect and communicate in various forms. Take for example, the smart building management systems which need physical controllers and gateways in order to enable third-party service providers and property administrators to control a variety of appliances and services on the premises; or alarm systems which are required to integrate with third parties such as fire stations, dispatch centres, smart lock systems, etc.; both of these examples rely on multiple types of connectivity to address several use cases.

The above points indicate that considerations about connectivity are a vital element of the overall product/service development process of a connected offering. As connectivity and the capabilities or features that depend on it are really key enablers of the digital offering, development teams across all relevant domains and disciplines, including connectivity, are increasingly required to closely collaborate throughout the entire product development cycle, just as it is generally required for any complex product development.

We therefore believe that future digital products/services will be best developed by tightly integrating connectivity aspects into the overall product development cycle. The main two of these aspects will be:

A. Technical product development: we expect technical aspects of connectivity to be further integrated into the agile methodologies that are usually limited to front and backend domains. Product developers will increasingly appreciate the criticality of the connectivity technology choices that they must make and will therefore increasingly rely on connectivity competence as part of the core development team;

B. Business model design: we further expect the cost impact of connectivity on the overall profitability of digital products and/or services to be more carefully considered, particularly in the cases where data volumes are likely to unpredictably fluctuate; and including operational aspects such as multi-country service support for the full product/service lifecycle.

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[10] Or distributer/reseller, depending on the commercial model.
[11] Here "X" can be another business or the consumer.

Prediction 4/5

Connectivity will push eCommerce even further

Connectivity technologies will be one of the main forces driving eCommerce forward.

In an increasingly competitive eCommerce market, mobile connectivity creates a link to the logistics industry which is allowing innovative online retailers to differentiate and stay ahead of the game.

By inter-linking the logistics ecosystem, connectivity also facilitates real-time parcel tracking and fulfilment centre optimization. Increased integration of connectivity and logistics, combined with other technologies such as AI, will continue to bring highly advanced products and services to the logistics field.

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4. Connectivity will push eCommerce even further

Logistics companies are leveraging connectivity technologies, from connected delivery boxes to connected autonomous forklifts, that will enable personalised and transparent shopping experience.

The logistics industry is undergoing rapid change, much of it driven by higher digital channel activity for retailers and the increased popularity of e-commerce platforms. In 2017, e-retail sales grew 24.8% worldwide and accounted for more than 10% of global retail sales[12]. The popularity of e-commerce and digital channel is likely to grow and with it, fierce competition among retailers will endure. In order to retain customers and win new ones, customer care and service quality have become major differentiators for retailers, where contextualisation, product discovery, frictionless payments, transparent distribution and flexible "last mile" delivery play a key role in influencing user experience and ultimately sales volumes.

Traditional logistics models are no longer able to fulfil the requirements of an increasingly sophisticated e-commerce value chain. Hence, smarter logistics, which is more time-efficient, sustainable and cost-effective, is indispensable. And connectivity is playing a critical and fundamental role by linking all stakeholders (e.g. suppliers, carriers, warehouses, freight brokers, infrastructures, the goods being transported, people and machinery). Of course, connectivity in logistics is not new, but it's expanding from 'high-value' assets to mass deployment due to the proliferation of sensors along the value chain.

With everything being connected, retailers are able to provide real-time and transparent tracking information of packages to the consumer. Real-time tracking has also optimized last mile delivery in other ways, such as 'all hour' delivery and 'all location' delivery. For example, Budbee, one of many start-ups in the logistics space, offers advanced last mile delivery solution in urban areas in Sweden where customers can not only track the package mile by mile but also decide where and when to pick up the package.

Similarly, as part of its last mile segment optimisation, DHL has built a network of smart lockers in cities as part of the smart city infrastructure in Europe, which allows the customers to pick up their package at their convenience.

"We therefore believe that, going forward, connectivity technologies will be one of the main driving forces behind logistics innovations that will power eCommerce."

Moreover, connectivity-enabled technologies have been widely applied by the eCommerce giants. Amazon launched inhome and in-car delivery (similar to the Volvo/Postnord partnership) which allows couriers to deliver packages directly into users' homes and cars in a fast and secure way[13]. The process can be real-time tracked on the Amazon app or even through live video (only in-home delivery). The in-home delivery requires the installation of a smart lock and cloud-connected camera, while the in-car delivery utilizes the connected technologies embedded in the vehicles. The Chinese e-commerce giant Alibaba is also investing heavily in their last mile delivery. In May 2018, Alibaba released a prototype of the Cainiao Box[14] which is an improved version of a smart locker that is installed outside users' homes. Delivered packages will be put into the expandable box and the user will be notified via text and in-app message. The box comes with sensors through which the temperature can be controlled via the app in order to keep the delivery cold or warm.

Another area where e-commerce players are applying connectivity technologies, is to optimize their fulfilment centres in order to accommodate the growing order volumes. Connectivity-enabled technologies such as AI, robotics and autonomous driving have helped to optimise the productivity of sorting centres. Another Chinese e-commerce giant, JD.com, opened up a fully automated fulfilment centre in September 2017, where robots and machines handle about 9,000 online shopping orders per hour, the workload of which is equal to 180 human sorters[15]. It uses artificial intelligence to scan and inspect packages as they're being processed and group them by region. They are then picked up by autonomously driven forklifts and brought to the corresponding truck for the last mile delivery. This automated sorting centre has dramatically reduced the cost and helped boost efficiency.

The examples above demonstrate the degree to which connectivity serves as the backbone that is making smart logistics innovations a reality; which in turn open up many opportunities for ambitious retailers seeking to stay ahead in the game.

Interested enterprises already have access to a range of connectivity options to pick and mix, which when combined with other technologies such as AI and sensors can deliver highly advanced products and services.

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[12] Statista
[13] https://www.amazon.com/b?node=17861200011
[14] https://ecommerceminute.co/episodes/alibabas-cainiao-smart-delivery-box/
[15] https://www.techinasia.com/china-fully-automated-sorting-center-jd-ecommerce

Prediction 5/5

Managed connectivity will be even more important

Managed Connectivity will be critical to success with connected products.

As connectivity becomes an increasingly important aspect of a product or service, higher requirements will be placed on connectivity technologies. Connected services must be highly reliable, and trouble-shooting or security issues can no longer be left to the end-user to handle on their own.

Reliable, managed connectivity solutions will thus become crucial to all types of businesses, requiring businesses to partner with connectivity service providers who can guarantee technical support and quality of service, including coverage, security, latency and reliability.

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5. Managed connectivity will be even more important

For a number of new use cases, the ability to operationally manage connectivity technologies will rise to be the primary selection criteria, in addition to their technical and commercial merits.

In spite of the continuous improvements in mobile connectivity technologies, e.g., through the emerging 5G, competing solutions that use unlicensed spectrum remain popular with customers across different application areas. In both the consumer and enterprise domains, Wi-Fi is expected to remain a central technology for both fixed broadband and mobile data transmission[16] even in the 5G era. The omnipresence of Wi-Fi has also made it popular as the primary connectivity option for many Internet of Things (IoT) solutions, particularly those which are expected to function in or around homes, offices or manufacturing plants. Generally, from the product developer's perspective, Wi-Fi tends to be a relevant option (besides its technical viability) when the product/service is aimed at a price-sensitive segment and on the assumption that operability issues will be tolerated by the end-user and won't affect the product/service provider's brand perception.

Therefore, when the decision to use private Wi-Fi as the main connectivity option is made, a number of critical operational choices are implicitly made by the product/service designers:

A. That the end-user's ISP is the connectivity supplier for the product.

B. That the end-user will serve as the installation technician (connectivity configuration) of the product.

C. That the end-user will serve as first line support (troubleshooting) and as a field service technician (physical inspection and replacement) of the product's connectivity aspects such as routers, repeaters, SSID keys, etc.

D. That the end-user is partly responsible for the end-to-end performance of the solution.

Obviously, consumers are often fine with taking on the operational responsibilities outlined above, partly because the price is perceived to be right and partly because the effort is usually minimal – usually the product is 'plug & play' and a simple router reset is the most that they will ever need to do. However, there is a growing number of scenarios where the assumption that the end-user will be willing to fulfil the operational role no longer holds, even if certain technical attributes of the technology, such as throughput, meet the requirements. To illustrate this point, we outline a couple of these scenarios below:

A. Enterprises with SLAs towards their end-customers: In this scenario, enterprises are more concerned with the assurance that a connected product/service will function within a certain probabilistic range. For this reason, the supplier of the product is usually pushed by the enterprise client to be legally responsible for the end-to-end solution, including connectivity. The supplier might opt to keep Wi-Fi with full control of all operational interfaces or may choose an equally suitable technology such as cellular[17] where operational obligations of connectivity are pushed towards the operator. A typical use case under this scenario could be video surveillance services offered by security companies.

B. Services which, by their nature, must be highly reliable: let's take the example of a smart lock which is linked to a mobile App for remote operation. The expectation is that such a smart lock has to work each time a command is sent. On a purely technical basis, Wi-Fi or cellular connectivity could work equally well. However, the probability of reliability differs greatly between the two options. Therefore, the smart lock supplier is faced with a choice that is driven by operational considerations. For many end-users, it is too much to expect them to troubleshoot and fix connectivity issues in order to access their property (or give access while they are away from the property). These issues are exacerbated in a commercial setting or when property insurance aspects are involved.

With the constantly growing importance of connectivity, it is all the more important to acknowledge the operational advantages and drawbacks of the different connectivity technologies, both in the B2C and the B2B context. Aspects such as coverage, reliability, security and latency that ultimately define the quality of service (QoS) delivered by a connectivity service will become even more critical in the future.

Managed connectivity solutions such as licensed mobile connectivity technologies or managed Wi-Fi possess advantages with regards to these QoS parameters that make them a better operational fit to serve certain use cases than is apparent from a purely technical perspective.

"As more and more applications which fall in the scenarios outlined above are rolled out, we expect to see a gradual redefinition of the 'technology-application fit' due to the rising importance of operability as a technology selection criterion, above all others."

[16] Also referred to as mobile traffic off-loading
[17] Also commonly referred to as mobile technology

IoT Predictions

2019

Prediction 1

Enterprise data will take the lead in data trading

Prediction 2

Digital value will be unlocked faster

Prediction 3

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Prediction 4

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Prediction 5

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Telenor Connexion is the specialised IoT company within the Telenor Group, one of the world's major mobile operators. Building on almost 20 years of experience, Telenor Connexion provides global IoT connectivity and cloud services to enterprises with large fleets of connected devices as well as third-party service providers.

We manage more than 10 million connected things in more than 200 countries for global customers including Volvo, Scania, Hitachi, Verisure Securitas Direct and Husqvarna. With headquarters and tech centre located in Sweden, the company has regional offices in the UK, US, Germany and Japan.

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