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Bc. Jan Hruška

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How Internet of Things changes business model of Microsoft OEM team

Author:

Bc. Jan Hruška

Supervisor:

Ing. Michal Andera

Declaration of Authenticity

I hereby declare that the Master's Thesis presented herein is my own work, or fully and specifically acknowledged wherever adapted from other sources. This work has not been published or submitted elsewhere for the requirement of a degree programme.

Prague, May 17th, 2017

Bc. Jan Hruška

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Abstract

The main goal of this thesis is to discover how an emerging technological megatrend, the Internet of Things, changes the business model of the Microsoft OEM team. OEM business is fully dependent on sales of Windows licenses; however, the PC market is declining and whole Microsoft is shifting into offering of cloud services while being financed by the OEM revenues. Nevertheless, the strategy of how the OEM team fits into the future of cloud offerings is clearly missing. To discover what changes should be made inside the current business model, 13 interviews with managers across Microsoft were conducted and analyzed. Identified themes were assigned to business model building blocks, ranked by the importance, and supported by relevant quotes from interviews as well as the theoretical background. The most important subjects of changes were identified as partners, activities and value proposition; however, changes will be seen in every aspect of the OEM business. As a result, specific changes in building blocks are described and the first steps towards the Internet of Things strategy suggested. That will ensure the relevance of the conservative OEM team in the connected future.

Keywords:

Internet of Things, IoT, Business Model, Business Model Canvas, Business Model Innovation, Smart Products, OEM, Original Equipment Manufacturers

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Abbreviations

AI	Artificial Intelligence
B2B	Business to Business
B2C	Business to Customer
BM	Business Model
BMC	Business Model Canvas
BMI	Business Model Innovation
CEE	Central and Eastern Europe
IoT	Internet of Things
IIoT	Industrial Internet of Things
M2M	Machine to Machine
NFC	Near Field Communication
OEM	Original Equipment Manufacturer
RFID	Radio-Frequency Identification

1 Introduction

With more than 20 billion devices to be connected to the internet and about trillion-dollar value added by the year 2020, Internet of Things is expected to influence everyday life as well as business models of companies. Some of the researchers expect the IoT to influence businesses just the way how the rise of computers during 1960s and 70s and the beginning of the internet in the late 80s did. Almost every technological company believes and bets on this trend by pushing its services to the cloud and making connected smart devices possible. Microsoft is no different and as the PC market is shrinking and is pushed by competitors to turn its operating system into costless service, moving into cloud and upsell of additional services to their customers seems like a good strategic decision.

However, the OEM team that is still making most of the revenue by selling software to device manufacturers seems to be lagging behind the whole company strategy wise. It is a team with an uncertain outlook as it is missing guidance about how to get involved in the service offering business. The Internet of Things is perceived as a great possibility to turn device manufacturers into service providers, however, the corporation headquarters is very careful to make changes in target and quotas of their precious cash cow that is fueling new ambitions. However, without targets there is only limited incentive for the team with highest revenue per employee to invest resources into an unsure trend of the Internet of Things without clear business rewards in form of attributed revenue.

The goal of this thesis is to make sure that the Microsoft OEM team is ready for the future and understands that changes of their current business model are crucial for the world of connected devices. This goal is answered with help of managers from across Microsoft during detailed interviews about future of the OEM team as well as possible challenges and next important steps. Changes were demonstrated on Business Model Canvas presented by Alex Osterwalder in 2010. Main changes were identified in the Key Partners, Key Activities and Value proposition building blocks. These changes are further described by trends discovered in the interviews analysis and claims supported by quotes of the interviewed employees.

The thesis is divided into multiple logical parts and firstly explains the term Internet of Things. For better understanding of the phenomena it also describes its historical roots and offers a simplified definition. Secondly, based on the definition, three basic layers of IoT are described. Then the business potential of the trend is commented along with identification of success drivers and possible challenges that must be tackled for the Internet of Things to achieve its full potential. After the Internet of Things, Business Model and its innovation is being described as well as possible ways how IoT can influence Business Models in general. After this theoretical base is laid down, methodology is being described and steps for the practical part are planned.

The practical part firstly introduces the Microsoft Corporation and explains the role of the OEM team and Windows devices in general. Than it focuses on specific devices that are used for Internet

of Things scenarios in strategic verticals set by the company, supported by a case study that illustrated new possibilities for OEM partners. Afterwards, short analysis of tier 1 competitors for Microsoft IoT offerings is being made along with identification of main advantages and disadvantages compared to Microsoft solutions. In the last part interviews are analyzed, Building Blocks importance is ranked and main changes in them are identified and discussed.

The results of this thesis will be presented to Microsoft OEM teams in Germany and the Czech Republic along with suggestions of first steps towards the Internet of Things future. Further analysis of business implications of the Internet of Things along with a more detailed business plan are possible subject of future researches.

2 Understanding the Internet of Things

The term Internet of Things is being used in media on daily basis. In the last CES conference where device manufacturers presented their newest additions to their portfolio, IoT devices were among the most common along with headsets for virtual and augmented reality. But the IoT is not all about gadgets such as smart toothbrush or remotely controlled heating - it is far from being a new trend that is going to vanish in upcoming years. The Internet of Things is extremely broad topic that many people and companies call the next technological revolution. First part of this thesis will explore the history and evolution of the term Internet of Things and briefly explain its main components.

2.1 History of Internet of Things

Simply said the Internet of Things is the connection of any object, including cars, human implants or vending machines to the internet. This thesis will mainly focus on the Things in the IoT world. Connection of things to the internet became a reality shortly after the adoption of the concept of Internet and years before the first appearance of the term Internet of Things.

First connected things are believed to be ATMs around the year 1975 (Marr, 2015). It is questionable whether such a primitive connection to a network similar to Internet can be called the first IoT scenario.

Next thing connected to internet that is comparable to modern IoT appliance is the Coke vending machine in the Carnegie-Mellon University. Group of students equipped the vending machine with micro switches and wired it to the university network to check for the level of stock of pop and even to examine the temperature of the beverage. This is not only showcase of the typical IoT scenario but also first one that solved a real issue faced by students - "In the mid-seventies expansion of the department caused people's offices to be located ever further away from the main terminal room where the Coke machine stood. It got rather annoying to traipse down to the third floor only to find the machine empty - or worse, to shell out hard-earned cash to receive a recently loaded, still-warm Coke. One day a couple of people got together to devise a solution." (Lane, 1992)

In the year 1988 scientist Mark Weiser introduces the term "Ubiquitous Computing" that is very close to the term Internet of Things. Weisner describes the idea of personal computing just as a transitional step toward achieving real potential of information technology. He describes the Ubiquitous Computing as computing devices that can provide service to the end user no matter the time or location. The technology would be in the pads and boards that would be used completely naturally without need of personal computers. (Weisner, 1991). Weisner in his paper even describes the concept of virtual reality and tablet computer years before it became known to public. Recently, companies Google and Levi's announced cooperation in the smart fabric by introducing

the first ever smart denim jacket. Weisner might have foreseen the future of the next 25 years by stating: “The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it”. (Weisner, 1991) Year before he died in 1999, he created a water fountain that through its height and flow mimicked the volume and price trend of the stock market.

In 1990 at the Interop Internet networking show young entrepreneurs John Romkey and Simon Walter introduced the first ever internet connected toaster. It was a toaster with a computer powerful enough to connect to the internet and it allowed the owner to turn it on from any location on the planet. It had just a minor hitch, it still required a human to insert the bread. This problem was corrected a year later at the same show by introducing a little robotic hand that was controlled over the internet and could pick up a bread, insert it into the toaster and after toasting it to the desired level of crispiness, pick it out, hence automating the whole system from end to end remotely. (Deoras, 2016)

In the year 1991, another problem solving IoT scenario was born and called Xcoffee. As the name suggests it was created to monitor level of filtered coffee within the Computer Laboratory of the University of Cambridge. “I was working on ATM networks in a part of the Computer Lab known as the Trojan Room, (a name which, perhaps, causes some amusement to American readers). There were about fifteen of us involved in related research and, being poor, impoverished academics, we only had one coffee filter machine between us, which lived in the corridor just outside the Trojan Room. However, being highly dedicated and hard-working academics, we got through a lot of coffee, and when a fresh pot was brewed, it often didn't last long.” (Fraser Q. S., 1995) The coffee level was monitored through series of photos of the coffee pot every 20 seconds that were sent to the internet. With hundreds of thousands views since 1991 the coffee pot is probably the most famous one in the world although as author says the coffee didn't become any better.

2 years later, in the year 1993 professor Thad Starner started using the head up display that was like the Google Glass wearable on daily basis and became hooked to it ever since. Along with other students from MIT that were sharing his vision he founded the Wearable computing project as a part of MIT Media Lab. He used his head up display to access his calendar or look for an information during conversation without need of interruption. However, the technology was not advanced enough and it was necessary to navigate through the interface in time consuming manner hence having to stop the conversation anyways. His vision was appealing to an internet giant Google and Thad Starner became the leader of the Google Glass project that set the course of the Augmented reality. (Starner, 2013). In the same year project KARMA was born and it transferred the IoT world outside the everyday devices to manufacturing and servicing world. They used the head up display to overlay the real object (laser printer) with reparation instruction so that even non-skilled service man could do the reparation by himself. (Feiner, MacIntyre, & Seiligmann, 1993)

The real potential of Internet of Things was unlocked in the year 1993 by Siemens that created a GSM Data module called “M1” for machine-to-machine (M2M) industrial applications. This module was used to monitor and track tracing application in the early point of sales terminals and vehicle telematics. (Computerwoche, 1996) This invention was essential to the commercialization of the Internet of things because it enabled unlimited scenarios in the B2B sector.

As the real father of the term Internet of Things is recognized American technology pioneer and entrepreneur Kevin Ashton who worked at MIT in the Auto-ID research center that introduced the global concept of connecting radio frequency identification (RFID) sensors to the Internet. The term was firstly used during the presentation for P&G in the year 1999 that described how RFID technology could change P&G supply chain by connecting to the internet. (Ashton, 2009).

Since the year 1999 IoT became much more than just a theory about connecting RFID sensors to the internet. In the year 2000 LG introduced its plan for the first internet connected fridge. The Internet of Things started to take off. The first mainstream journal that published article on IoT was Forbes in the year 2002 where the authors Chana Schoenberge and Bruce Upbin wrote an article “The Internet of Things” that was discussing the way IoT can change the retail business: “Stores have eyes. Now they’re getting ears and brains. Soon tiny wireless chips stuck on shampoo bottles and jeans will track all that you wear and buy.” (Schoenberger & Upbin, 2002)

Within a year after Forbes the IoT found its way into many other mainstream periodicals such as The Guardian, Scientific American and the Boston Globe. In the year 2005, United Nations published their first report on the IoT topic calling the trend a new dimension added to the world of information and communication technologies. (International Telecommunication Union, 2005)

In the connected devices world, a big disruption came in the year 2005 from Italian Interaction Design Institute Ivrea. Group of faculty members created a breakthrough microcontroller for their students that was both cheap and extremely easy-to-use. It was named Arduino and it enabled anyone prototype their own IoT solution without capital intensive investments. Arduino is still among the most used devices for such purposes. (Barragán, 2014)

Between the years 2008 and 2009 the Internet of Things was officially born. At least according to Cisco Internet Business Solution Group that identifies it as a point where number of connected devices exceeds the size of human population. And it was just the beginning of this new technological revolution. (Press, 2014)

2.2 Defining the Internet of Things

There is not a single correct definition of Internet of things. Many companies and individuals tried to describe this trend in very different ways. In this subchapter, the most known definitions from IoT companies and individuals will be described and summarized in a simple and easy to understand manner.

Many tech companies are trying to get dominance on the IoT market. However, some of them stand out in the matter of market share, solution offerings and number of executed deals with their customers. There are many small, startup companies entering this very promising market, however it would be way out of scope of this thesis to try to describe the view on IoT of all of them, therefore, this thesis will focus mainly on the well-established multinational companies that will eventually partner with or acquire the smaller ones. The companies selected for this part of thesis are: Amazon Web Services - currently considered as number one player on IoT market mainly because of the scope of their cloud business and current market share in the cloud of about 31%, then Microsoft with its Azure services and 9% share of the market that excels in the year over year growth of 124% followed by Google and IBM. (Panettieri, 2016) Other important companies in the IoT world are device manufacturers that might not have an outstanding cloud platform but are very strong in the first part of Internet of things – the things and its connection to internet. Among them are AT&T, Bosch, Dell, Cisco or GE.

Amazon is in the definition referring to the founder of Internet of Things, Kevin Ashton. Furthermore, it is emphasizing the value inside Internet of Things that lies in the connection of parts of the whole ecosystem and pays closer attention to the connection of devices and analytics. This is also their main domain, taking into consideration their strong cloud background. “The Internet of Things (IoT) is a term coined by Kevin Ashton, a British technology pioneer working on radio-frequency identification (RFID) who conceived a system of ubiquitous sensors connecting the physical world to the Internet. Although things, Internet, and connectivity are the three core components of IoT, the value is in closing the gap between the physical and digital world in self-reinforcing and self-improving systems.” (Amazon, 2012)

IBM is in its definition very straight forward. “The Internet of Things refers to the growing range of connected devices that send data across the Internet.” (IBM, 2011) Microsoft is far more cautious about defining such a broad trend and simply describes how IoT can transform business of its customers and partners using Microsoft Azure and its services. Google is rather referencing to lack of clear, single definition and adds to the simple definition the unlimited possibilities of IoT applications: “Internet of Things (IoT) is a sprawling set of technologies and use cases that has no clear, single definition. One workable view frames IoT as the use of network-connected devices, embedded in the physical environment, to improve some existing process or to enable a new scenario not previously possible.” (Google, 2010)

Device manufacturers and connection provider are referring commonly to their business expertise. Intel, mainly known for manufacturing microchips and heaving monopoly on PC processors describes the IoT with following statement: “The Internet of Things (IoT) is fueling innovation in nearly every part of our lives. Simply connecting the “things” that were never connected before is leading to new data insights that translate into meaningful change.” (Intel, 2013) Bosch is using

very straightforward definition with emphasizes on billions of devices to be connected: “The physical essence of the Internet of Things (IoT) is billions of connected devices providing data – in many cases in real-time – and sending it back to businesses that can remotely and automatically control this physical infrastructure.” (Bosch, 2008) AT&T uses the following definition: “The Internet of Things links together networks, devices, and data. It helps you learn more about the things vital to every level of your business. To build your IoT solution successfully you need agile products, services, and networks that enable you to gain real-time insights about the things your company values most.” (AT&T, 2010).

More profound and complex definitions can be found in the books by authors specializing in the technology of Internet of Things. In the book *Architecting the Internet of Things* authors offer a minimalistic but complex definition of this trend: "A minimalist approach towards a definition may include nothing more than things, the Internet and a connection in between. Things are any identifiable physical object independent of the technology that is used for identification or providing status information of the objects and its surroundings. Internet in this case refers to everything that goes beyond an extranet, thus requiring access to information for more than a small group of people or businesses." (Uckelmann, Harrison, & Michahelles, 2011) In the book, authors are deeper focusing on the comparison of the term Internet of Things and other similar concepts such as ubiquitous computing, Internet Protocol, communication technology, embedded devices and are emphasizing that the term IoT is the combination of all the aspects and technologies. This approach is like definition of What the Internet of Things is NOT by the popular technology blogger and head of Data Analysis and Interaction at Airbus Group Tomas Sánchez López who in his blog post further describes all the aspects that are not Internet of Things by themselves. (López, 2010)

The lack of single definition of the Internet of Things is mirroring its today stage as it is being used from marketing buzzword all the way to research publications and conference titles. The term is extremely complex and includes everything from devices, connection to internet and data analysis in the cloud. This complexness is perhaps what makes the Internet of Things so appealing to everyone with stake in any of the part of this trend. What all the definitions have in common is the need to have devices that are generating data and transferring them to internet through connection capabilities and all the data are then used to control the devices more effectively and with minimal human intervention. The goal of this work is not creation of definition of Internet of Things but rather tearing down multiple definitions into simple and understandable manner, therefore for further part of this thesis simplified concept of Internet of Things will be used consisting of three main parts that must be interconnected in every solution that would be considered IoT as one cannot function without other: Devices, Connectivity and Data analysis.

3 Devices, Connectivity and Data Analysis

To better understand a concept of three parts of Internet of Things a simplified scheme of devices and their connection to the cloud was created and can be seen on the Exhibit 1.

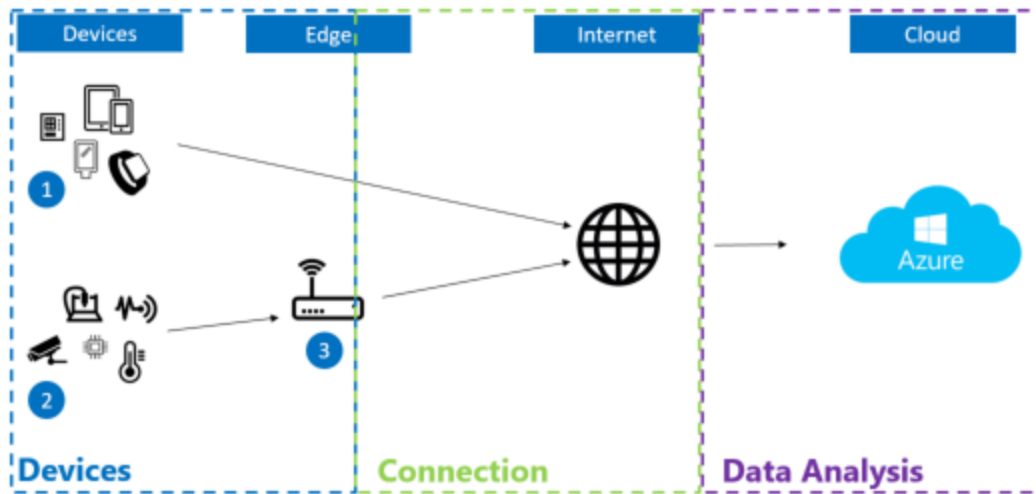


Exhibit 1 Simplified scheme of Internet of Things. Source: Author

This scheme helps demonstrate how can things be connected to the internet and collected data further analyzed in the cloud service. In this part of the thesis, each of the three components will be briefly described and most commonly used technologies enabling the connection to the cloud mentioned. For further simplification, we will consider only cases where data are analyzed in the cloud or at the Edge – the place where data leave the physical location and are sent to the cloud. Many companies still use the on premise servers located in the facility for the data analysis. However, this solution is not technically considered Internet of Things as it is missing the last part of the chain, which is data analysis in the cloud. This further demonstrates the need of all three aspects to be incorporated to call a technical solution by the term Internet of Things. This overview is covering basic information about all three parts of IoT however, further in the thesis more emphasis will be on the devices as they are the main theme of this thesis.

3.1 Devices

Devices can be further divided into two different categories: those labeled as number one on the Exhibit 1 are devices that can be directly connected to the internet and second group consists of devices that must be connected through gateways (number 3 on Exhibit 1). To further understand the wide variety of devices that can be connected to the internet, both group 1 and 2 will be further analyzed and real life examples will be described. What is important to bear in mind is how much is the IoT world segmented into different use cases. Devices in both groups consist of anything from wearables, through connected coke machines, huge industrial robots and small sensors measuring pressure, temperature or weight. The possibilities are almost limitless.

3.1.1 Directly connected devices (1)

Mostly phones, tablets, computers, smart wearables and basically anything that can be directly connected to internet without a need of gateways. Basic ways on how to connect those devices directly to the internet can be Ethernet cable, Wi-fi or cellular connectivity such as LTE or 3G. Such device can be imagined easily as almost everyone reading this thesis is probably using at least one of them on daily basis without even realizing that it is part of the Internet of Things – smart phones and computers connected to the internet.

Another easy to understand example of a device connected directly to the internet might be an IP capable security camera that connects to the Wi-Fi through the router and transmits its captured video to the internet and the camera owner can view the image on their phone in real-time. Examples can be also found in the business/enterprise level. Imagine a connected ATM machine that tracks possible failures of hardware and software errors and through internet connection informs the manufacturer about such an issue.

3.1.2 Devices connected through Gateways (2,3)

These devices mostly cannot be connected to the internet directly and therefore a Gateway device is used (number 3 in Exhibit 1). This device connects data from devices like sensors, microchips or low cost wearables and “prepares” those data before sending them to the cloud.

Gateways can have many different form factors, for example a phone can be used as a gateway device for wearable connected directly through Bluetooth. Inside a phone, sensors that cannot be connected to the internet directly can be found, however the data can be transferred through cellular modem in the phone. There are many different cases of devices connected through phone, one interesting example is a concept of smart shoes created by Pizza Hut that are connected through phone and with just a press of a button on the sneaker, pizza is delivered to user’s current location. (PizzaHut, 2017)

The real driving devices of IoT are sensors that work like human senses and are collecting data from basically anything as they have become incredibly cheap. Those sensors cannot be connected directly to the internet; however, they can be connected through communication protocol to the gateway. Those sensors can monitor anything: light, acceleration, electricity levels, water leaks, force, pressure, flow of liquids, chemical, sound, moisture, temperature, motion proximity etc. Due to its small size and simple hardware, their battery life can last for as long as 10 years. One of the examples of what sensors can monitor, are smart containers. Sensors are monitoring the level of trash and once it is filled, it sends info to the gateway and city is notified about the situation. Other example is the monitoring of water flow in the building tubes. If there is any abnormality like excessive water flow, sensor can notify the landlord or close the pipe immediately, through a gateway.

3.2 Connectivity

Connectivity is a huge topic in IoT solutions as there is not one universal connectivity protocol that would be understood by all the devices. The main two subcategories that can be identified are connections between devices and connection to the internet. Connection to the internet can be further divided into connection of the device directly and connection through the gateway – in that scheme, connection can be simplified as: Sensor > connection between devices > Gateway > Connection to the internet (this appliance is shown on Exhibit 2). In that case, both connection types are in place.

3.2.1 Connection between devices

This type of connection can be easily showcased on the case of transferring data from the sensors to the IoT Gateway. We can easily imagine a situation in a factory where hundreds of different kinds of sensors are used and are supposed to transfer various data to one point, where they are

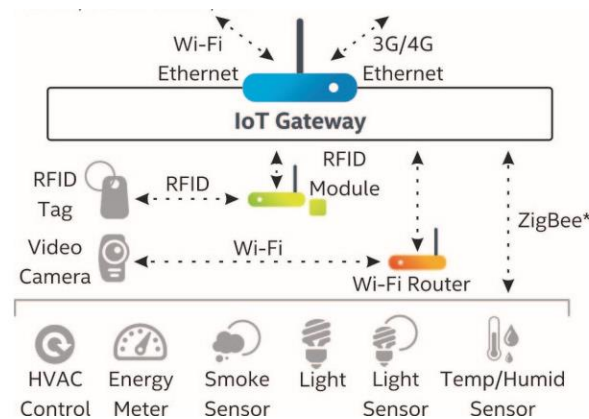


Exhibit 2 Connection between endpoints. Source: Intel IoT Blog (Free, 2015)

consolidated and eventually sent to the internet. The most basic and convenient way how to connect device is through **Wi-Fi** due to the wide adoption of this technology. However, wi-fi is not compatible with every IoT scenario as adapters enabling this connection are quite hardware demanding and therefore drastically lower battery life or are not compatible with the sensor at all. Other popular way of connecting to the internet is through **Bluetooth** but it faces similar problem, as the wi-fi and modules enabling connection through this technology are still quite expensive and considered unsecured. However, the situation might change because the Bluetooth company introduced a new product directly for the IoT world named Bluetooth Low Energy that features better energy management, 128-bit AES data encryption and easy development. (Bluetooth, 2014). Other common and newly founded technologies for communication in the IoT world are for example ZigBee or Z-Wave and Czech emerging communication standard IQRf. **ZigBee** became widely used namely in industry or smart city scenarios as it is communicating through a secure

protocol and is highly scalable because of its low cost and range of up to 100 meters. **Z-Wave** is on the other hand commonly used in the smart home scenarios as it is using less secure protocol that is sufficient for home use. It is also communicating on lower frequency than the above mentioned and as an outcome it does not interfere with Wi-fi or Bluetooth which would be frustrating for family members. All these standards can communicate with the gateway on certain range up to 100 meters. There are some protocols that can communicate just by touching the receiver or being very close, those are the RFID tags, NFC standard or simple wired connection.

3.2.2 Connection to the internet

As already mentioned, there are more ways of how to connect devices directly to the internet. First and probably most obvious one is to simply connect the device through **Wi-fi** and router wired through Ethernet port as known from personal computers today. Other very popular way is the standard **Cellular** connection (3G/4G/LTE). Those two options might be suitable with devices that we use on everyday basis as the battery consumption is not a big issue, we also need a very fast transfer speed and usually we need to transfer big amount of data on very large distances. In the IoT, both lower costs and battery savings are important. Two emerging players in connectivity in IoT are gaining significant market share - **Sigfox** and **LoRa**. Those protocols are working on longer distances than Wi-Fi or Cellular, also they are using just a fraction of device energy and are in most cases free to use or very cheap. Many new players are trying to become the right standard for IoT which is creating confusion on the market. However, neither one was able to dominate the market across the whole Internet of Things.

3.3 Data analysis in the cloud

Cloud is an essential part of the IoT scheme that has been presented. However, not every IoT like scenario is using its benefits. Other alternative is to use servers located directly in the factory/house where the data from sensors are gathered. This has some obvious advantages such as having 100% control over the data, being able to access them instantly and keep them seemingly secure. Disadvantages are: higher expenses on hardware (servers) and IT specialist, inability to scale the server instantly and access it from anywhere. Cloud computing can be explained as a set of servers in datacenters that are scattered around globe. Data are sent to them over internet and taken care of. It is becoming popular due to higher availability, ability to increase capacity of server space by few clicks instead of buying new hardware and security of the servers which is the main priority of cloud providers who are spending millions of dollars to take care of their customer's data. These investments are way higher than any company can spend on their inhouse server security.

In the IoT scenarios neither of those options are used exclusively but are rather combined. One example would be a factory with hundreds of sensors which are monitoring every machine they have and therefore generate huge amount of data. It would be very expensive to store all the data in the cloud and would fill up local servers very soon. Collecting and storing all the data has also

other disadvantages apart from the storage problem. If something goes wrong in the factory the information about the problem must be transmitted to the server/cloud, analyzed and then the information have to be sent to a technician. For better understanding of the data overload problem, research has been made by IDC and one of the findings was that 90% of data in existence in 2014 have been generated during the previous 2 years. The same source says that 50 billion of devices will be connected by the year 2020 and all the storage available globally will be able to store just 15% of the digital universe which size would be 44 trillion gigabytes. (IDC, 2014). Those are the main reasons for the increasing popularity of the following topic - Edge analytics.

3.3.1 Edge Analytics

Ariel Stern describes the edge analytics as the process of analyzing information directly on the network edge before relaying the throughput back to a server. He also adds that it is quickly changing the model of how the Internet of Things (IoT) functions. (Stern, 2017). In the case of fictional factory described in previous section, the data sent from hundreds of sensors would be sent to the gateway that is hardware capable enough to go through all the data in real time, pick up the most crucial ones and send them to the cloud or act immediately. Servers would not store useless data and the company therefore saves money on the cloud storage. The main problem of edge analysis is that already deployed gateways in IoT scenarios are rather lightweight with very limited processing power and hardware manufacturers are challenged to introduce more capable options. (Stern, 2017)

3.3.2 IoT Cloud

Many companies are betting on the success of IoT and are offering their own cloud platform to support any IoT solution. Microsoft has the Azure IoT Suite, Amazon is using the name AWS IOT, Google has Google Cloud IoT, IBM is betting on the famous name Watson IoT, GE is using their Predix cloud solution and ThingWorx uses, well, ThingWorx.

All above mentioned platforms consist of three main parts: Edge, System Management & Connections and Insight & Action. (Scully, 2016) In the edge part of the devices are being connected and managed through cloud. Devices can be assigned roles and permissions as well as secured and updated remotely. The edge is closely interconnected with the next step: System Management & Connections where the data from the devices can be stored, interconnected and series of event logic and alerts can be made. Data can also be stored and application for the devices would also run on this level. Next step is Insight & Action plan that is usually the most interesting and essential for the business audience. In this stage, all the visualization of the data is happening and dashboards that shows the insight can be made for example with Microsoft Power BI as shown on the Exhibit 3.

The data are translated into language that is understandable by humans. Also by doing the analysis of the huge amounts of data, problems can be predicted before they occur which is a good selling

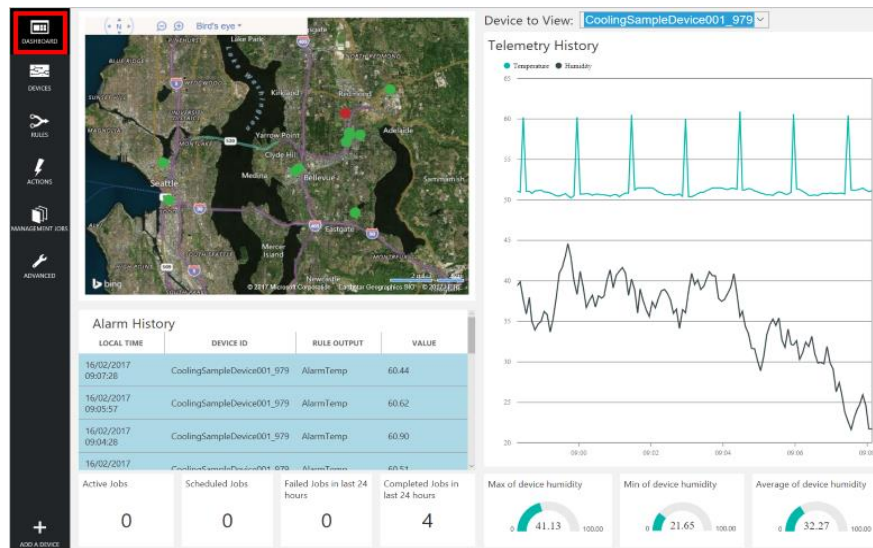


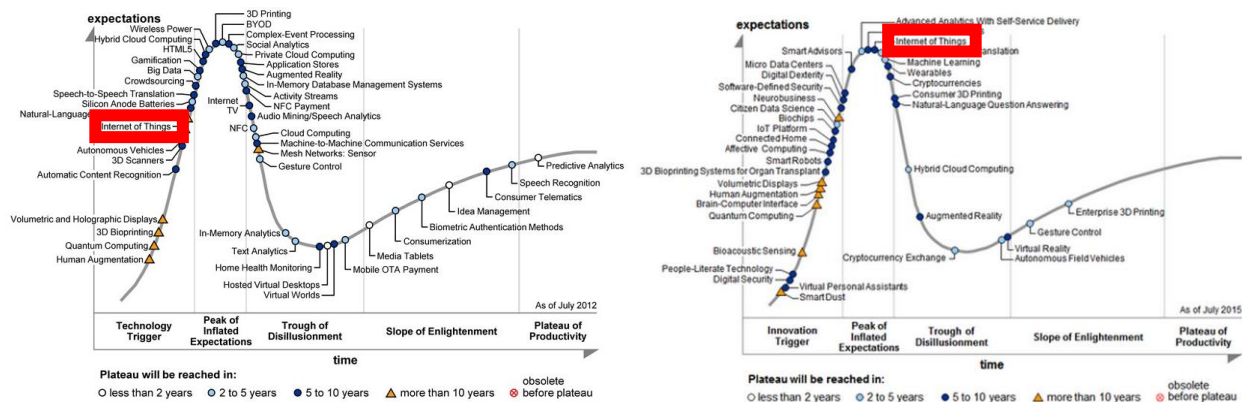
Exhibit 3 – Dashboard for Internet of Things. Source: Microsoft Azure Blog (Microsoft, 2017)

point for industrial Internet of Things. An example can be seen on the Exhibit 3 where we have a map of temperature and humidity sensors connected to the internet. Chart on the right side shows how both measures changed over time and in the lower right part averages and maximal level of humidity are shown.

4 IoT as business opportunity

Many companies see huge potential in the internet of things and they are trying to guess the total number of connected devices and generated revenue usually by the end of 2020. In this thesis, most usually cited forecasts will be compared. Furthermore, main reasons for rapid growth of IoT will be explained in this chapter along with possible roadblocks and challenges that technological companies will have to overcome to keep up with the very promising forecasts.

There is a big amount of hype among technological companies around Internet of Things and the way how it can affect the technological landscape. For companies to understand which emerging and embryonic trends they should examine for competitive advantage, Gartner creates a “Hype Cycle” of technologies that are emerging that year and how long it will take for them to become important. In the Exhibit 4 it can be easily observable how the IoT trend has been becoming important for the last few years. And that is one of the reasons why companies are thinking about this trend as transformational among many industries.



4.1 Internet of Things forecasts

Forecasts are usually done in two different ways – by economic value generated by this trend and more importantly for this thesis, number of connected devices.

Predicting economic value of such a big trend is very complex and complicated task and every company approaches it differently. For example, Cisco defines value as “Value at stake” and states that it will reach 19 Trillion dollars between years 2014-2024. (Cisco, 2016) Gartner takes different approach and calculates the economic value as “global economic value added” and assumes that it will reach 1.9 Trillion dollars in the year 2020. (Weissberger, 2016). Different approach of calculating value is by the total spending in the IoT and according to a new International Data Corporation (IDC) Spending Guide, worldwide spending on the Internet of Things will grow at a 17.0% compound annual growth rate from \$698.6 billion in 2015 to nearly \$1.3 trillion in 2019. (IDC, 2015)

Second mentioned measurement focuses on number of connected devices and has many pitfalls as well. For example, there is not a single guidance on how the number of devices should be calculated. This means that different companies are using different measures. Some of them are counting cell phones and tablets as devices for IoT and other companies are excluding them. Other problem is, how to count sensors as some companies are counting connected car as one device and others are calculating all the sensors that are present inside, which in the end might have a big effect on overall results of forecasting. Even though some companies were expecting the number of connected devices to be 1 trillion by the end of 2015 in the year 2012 (Jon Iwata, 2012) more recent forecasts seem to be more realistic ranging from 18 to 50 billion. This thesis will work with forecasts of Cisco, IDC, Gartner and Ericsson.

Cisco predicted 50 billion of devices connected to the Internet of Thing by the year 2020 in a whitepaper in 2011 “Looking to the future, Cisco IBSG predicts there will be 25 billion devices connected to the Internet by 2015 and 50 billion by 2020. It is important to note that these estimates do not consider rapid advances in Internet or device technology; the numbers presented are based on what is known to be true today.” (Evans, 2011). This bold statement which suggested, that the number of 50 billion might be underestimated due to the rapid evolvement in the technology was redefined in the year 2016. In a press release by Cisco that defined that number of connected devices in the year 2015 was 16.3 billion and it will increase to to 26.3 billion until the end of 2020 which would mean 3.4 connected devices per capita. (Cisco, 2016)

IDC is usually focusing more on total value created by IoT trend, however, in the year 2016 Vernon Turner, senior vice president of enterprise systems at IDC, presented a keynote speech on IoT and stated: “IDC forecasts that by 2025, approximately 80 billion devices will be connected to the Internet. To put that in perspective, approximately 11 billion devices connect to the Internet now. The figure is expected to nearly triple to 30 billion by 2020 and then nearly triple again to 80 billion five years later.” (Weissberger, 2016) This gives us a glimpse of how the internet of things might look in the year 2020 by different perspective.

Gartner forecasted that 26 billion units of devices will be connected by the year 2020 (Gartner, 2013) however they also lowered their expectations in the year 2015. In the press release they stated: “Gartner, Inc. forecasts that 6.4 billion connected things will be in use worldwide in 2016, up 30 percent from 2015, and will reach 20.8 billion by 2020. In 2016, 5.5 million new things will get connected every day.” (Gartner, 2015) this statement means that according to Gartner number of connected devices in the year 2015 was nearly 4.5 billion and it is expected to be almost 21 billion until the end of 2020.

Ericsson always saw a huge potential in the IoT trend and was among the highest forecasting companies. Back in the year 2010 Ericsson forecasted that in the next ten years, number of connected devices will skyrocket up to 50 billion connected devices. However, this estimation also includes connected phones, smart TVs and other devices which are no longer considered as a part of Internet of Things. Ericsson has quietly slashed the number by more than 20 billion in the new mobility report released in 2015 that estimates the number of connected devices to 28 billion by the year 2021, 26.5 billion in the year 2020 and suggested that there were 16 billion devices connected in the year 2015. All these numbers include PCs and cell phones, smart TVs or gaming consoles, they also count connected car as one thing rather than collection of tens of sensors. (Ericsson , 2015)

4.1.1 Number of connected devices

If we compare predictions of companies described in previous chapter we can see various methods and outcomes. The concept of Internet of Things is very broad and when companies started to forecast the number of connected devices they might have been overwhelmed by the adoption rate of new technologies that spiked during the introduction period. The predictions are

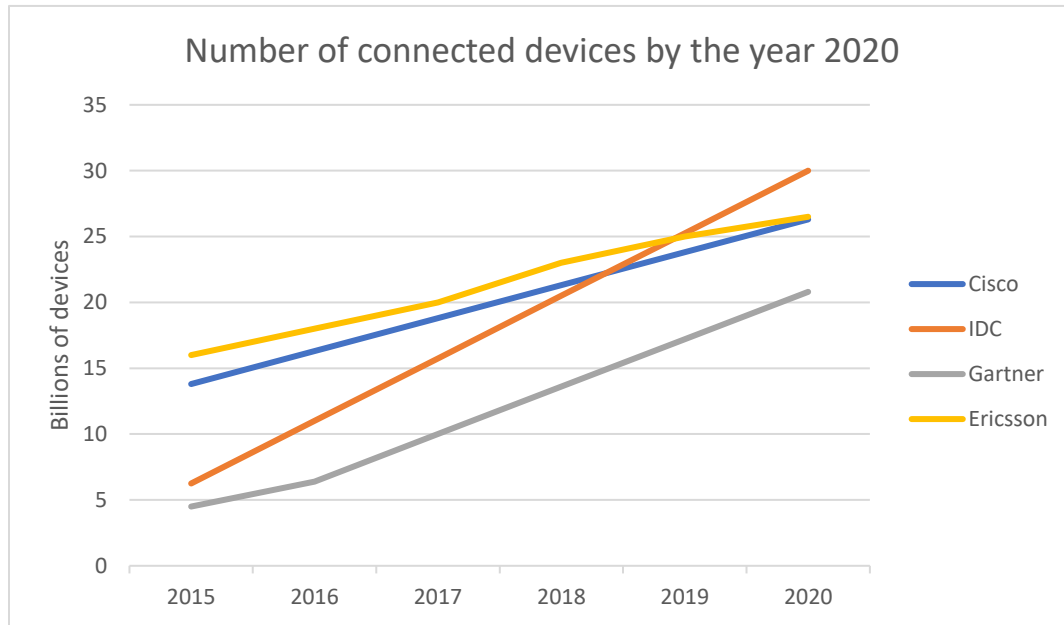


Exhibit 5 Number of devices connected to internet by the year 2020. Sources: Cisco, IDC, Gartner, Ericsson presented by Postscapes (Postscapes, 2017)

often connected to the perception that by the year 2020 everything that can be connected will be. That is however a very brave statement considering legislative and security restrictions that are big point of concern for enterprises and public sector. Another important note is that a lot of those connected devices will not be new, there is a big demand for connecting legacy devices and machines to the internet as companies want to get new sources of information and utilize their investments as much as possible. When comparing the forecasts side by side differences can be seen not only in the forecasted number of connected devices in the year 2020 but also in the year 2015. This is a result of multiple types of measurements and lack of methodology for such forecasts.

Graphical comparison was made to better understand various trends of each prediction. The model was simplified as data were not available for each year between 2016 and 2020. The data were added through linear function in Excel. In the year 2020, according to those four studies and as shown in Exhibit 4 there should be between 20 and 30 billion of devices connected to the internet.

It is unclear how those predictions were made as the companies are providing very limited information about methodologies of their studies. Eduardo Siman tackled this problem by doing his set of calculations and assumption in the article “There will be EXACTLY 18.995 billion connected IoT devices by the year 2020”. In this article Siman comments on the variety of data sets from companies and compares it to financial situations: The first thing we notice in the chart is - they all don’t start in the same place! The initiation point ranges from 6 B to 14 B for 2014. “That’s like having 10 stock analysts predict the future price of a stock in 5 years and all 10 have a different price on their Bloomberg terminal. Certainly, a cause for worry. The second key point is that the rate of growth varies tremendously - from 14% to 23%. If this were a discounted cash flow model, and these ranges were being used to predict sales growth, the model wouldn’t have much validity, would it?” (Siman, 2016). He demonstrated how easy it is to make his own estimation of number of connected devices by adding numbers of maximal number of personal phones and computers connected to the internet and number of silicon chips that will be produced but not used on production of computers and smartphones. This simple math leads him to the number 18.995 billion which is not far from assumptions of the biggest companies trying to predict the future of Internet of Things. He also states that by simply rising the number of produced chips to maximum estimation, he found in researches, he would get to the number 23.21 billion devices by the year 2020 (Siman, 2016) and that is very close to the most recent forecasts from ones of the most profound research agencies.

5 IoT Success drivers and possible roadblocks

The term Internet of Things is known already for about 20 years. Why is everyone talking about it recently so much? There are numerous reasons why the time of IoT is starting just now, but one of the most significant ones is that technological companies want Internet of Things to become big as it is a very smart way on how to sell its services not only to their current customers but also to new verticals and use cases. Cloud services are among the most profitable with margins close to 50% (Microsoft, 2016) and Internet of Things is a great way on how to get customers into cloud. Apart from this reason there are also few others that are driving the importance of IoT. This thesis will further focus on three main drivers of Internet of Things as well as three threads that are identified as possible roadblocks for wider adoption.

5.1 Success drivers

Apart from the above-mentioned reason, that technological companies simply need Internet of Things to become big and therefore make huge investments not only into marketing of IoT success stories but also acquisitions of IoT oriented startups. There are also other factors that are important for upcoming development of this trend, namely: Lower cost of sensors, cheaper processing of Big Data and growing number of successful implementations.

Lower cost of sensors – As it was already mentioned sensors are essential part of Internet of Things and they are ears and eyes of every IoT implementation. The cost is decreasing with the rising demand and is expected to drop to an average cost of \$0.38 which is a notable change from the \$1.30 which was average price in 2004 (Goldman Sachs , 2014) in the case of manufacturing company or smart city appliance where thousands of sensors are being used, the cost reduction can be significant. Great example might be an oil rig that is festooned with as many as 30 000 sensors

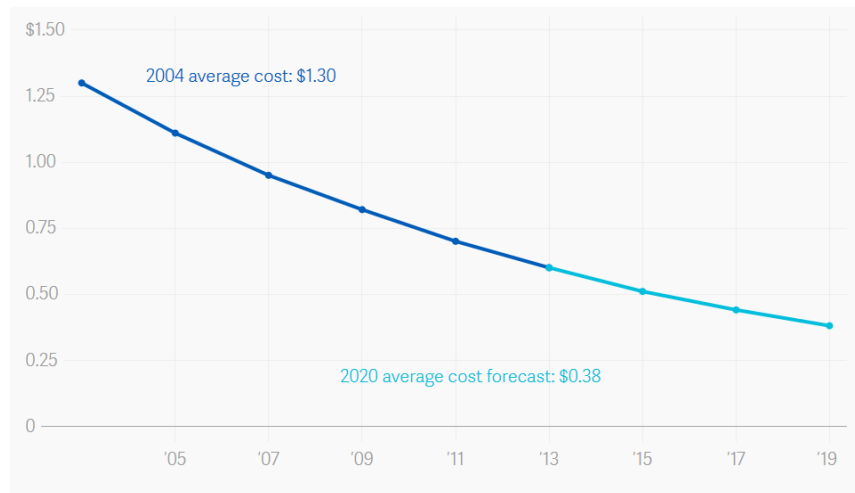


Exhibit 6 – The average cost of IoT sensors is falling. Source: Goldman Sachs, BI intelligence Estimates (Goldman Sachs , 2014)

(McKinsey, 2015). As the Exhibit 6 suggests the price goes down gradually and is driven by the growth of demand for IoT solutions.

Cheaper processing of data and Big Data analysis – another important success driver for further IoT development. The costs of transferring data, its collection and further analysis dropped nearly 60x over the last 10 years (Goldman Sachs , 2014). The reason for such a development is also the demand for solutions by companies realizing the potential of data analysis which results in decreasing price of CPU memory and storage, which makes the collection of big data and subsequent analytics possible. More cloud platforms therefore offer elastic repositories for storing and analyzing the onslaught of data generated by sensors. (PwC US, 2016) There is still a huge opportunity in analysis of data as only about 1% of all generated data is being analyzed so far, which leaves a big untapped opportunity. The reason is that information is mostly used to detect and control anomalies—not for optimization and prediction, which provide the greatest value. (McKinsey, 2015)

Successful implementations – What transforms the hype of Internet of Things into real and serious business opportunities are real business cases that prove the concept. Many companies would like to have some Internet of Things scenarios but lack the knowledge of this problem and cannot imagine how IoT can change their business. With more appliances that proved to be successful, companies can see real business results that can be easily implemented into their business model. This includes companies that are usually selling hardware but with IoT they can

expand their offering by including new monitoring and servicing models that enable them to generate additional revenue. Other companies are seeing significant cost savings and increase in efficiency by adopting IoT scenarios in an early stage. According to a study made by HP Enterprise which consists of interviewing 3100 IT and business decision makers, most of them experience better-than-expected business results which will be a key driver in further adoption. In greater detail the study revealed that “only 16% of business leaders projected a large profit gain from their IoT investment, yet post-adoption, 32% of executives realized profit increases. Similarly, only 29% of executives expected their IoT strategies to result in business efficiency improvements, whereas actual results show that 46% experienced efficiency gains.” (Hewlett Packard Enterprise, 2017). This will be crucial for IoT in general as it proves that the hype around this topic is justifiable.

5.2 Possible roadblocks for IoT adoption

As much as the IoT is promising there is also a very big concern about the feasibility of this concept. The number one problem and possible roadblock is security. And with rising number of devices connected and controlled to the internet this concern is getting serious. Other aspect which might slow the adoption of Internet of Things is the question of privacy and lack of standardization. There are many more issues that are being currently discussed like energy demand, waste disposal or lack of space for all the data generated, however, the three described below are the most serious.

Security, Security, Security – Security is listed as number one issue within Internet of Things almost in every article and on every conference. And there is a reason why. With perception of 20 billion devices connected to the internet by the end of 2020 IoT will become number one interest not only for companies realizing the advantages that it brings but also for hackers that can take control over those devices. It might start with small cases such as innocent hacked smart toilet that keeps flushing, overheating the toilet seat and closing the lid which, as the toilet maker states in their advisory “not only rises the water usage but also causes discomfort or distress to user.” (LIXIL Corporation, 2013). David Jacoby tried how “hackable” his home is in an experiment. He tried to hack his connected devices such as network attached storage, smart TV, Satellite receiver, router or printer. After working for 15 years in computer security he was sure that his home is not vulnerable but found significant insufficiencies that gave him control over most of his devices. (Jacoby, 2014). This can eventually lead to loss of personal data which is unfortunate, however, it can be much worse. Connected cars for example that are also self-driven can present a much bigger problem as it is not only about causing discomfort to the user but putting him into life threatening situation. In the year 2015, a Chrysler car was hacked while driving, letting the hacker take control over entertainment systems, air condition but also disengaged the car’s transmission which made the vehicle undriveable. This security flaw has shown that more than million Chryslers were vulnerable worldwide and the company had to secure its system instantly. (Bray, 2015)

It is important for IoT device manufacturers and connectivity providers that the IoT business is not just about manufacturing a device that can be connected to the internet but also about making it secure, otherwise no company would adopt IoT scenarios. It can have devastating business impact not only to manufacturing companies but in case of healthcare scenarios the impact could be fatal. The already mentioned study from HP Enterprise revealed that from current IoT applications in companies, 84% have experienced an IoT-related security breach and more than half of respondents declared that external attacks are a key barrier to embracing and adopting an IoT strategy (Hewlett Packard Enterprise, 2017).

Data privacy – Privacy of data is usually taken as part of security; however, it is very important to distinguish between those two topics. Even though the device is perfectly secure it is constantly monitored by 3rd party companies. Which means that information about how we use a product are no longer only our own concern but someone else can access them easily and further use them for reengineering the devices or selling it to other companies. Captured data are creating stories that are important for other companies to sell us products or services based on our behavior. The problem with data privacy is that there is not an effective legislation that would control how much data can be collected and used and therefore, companies can take advantage of such a legislative gap. User's profile created based on usage of smart products can be further used by other companies as FTC report suggests: "Companies could use collected data that consumers willingly offer to make employment decisions. For example, an insurance company might gather information from you about your driving habits through a connected car when calculating your insurance rate. The same could occur for health or life insurance thanks to fitness trackers." (Federal Trade Commission, 2013)

Lack of Standardization – The last described roadblock is often overseen but is the root of problems of security and privacy. Almost every company, that is creating IoT devices and solutions is creating their own ecosystem, which results in the lack of standardization and communication between devices of different manufacturers. How the lack of standards can slower the IoT deployment was very well described by Devarajan Ganesan: "The lack of common standards and platforms inhibits widespread, efficient IoT adoption. Different standards, connectivity patterns and stages of maturity heighten security risks with availability of multiple touch-points for hacking. Further, competing standards, vendor lock-in, proprietary devices and private networks make it hard for devices to share a common security protocol. Common standards by definition mean better security, whereas different standards, connectivity patterns and stages of maturity will allow IoT hackers to be successful." (Ganesan, 2017) There is a need for standardized protocols which would enable full potential of Internet of Things without locking in customers to one ecosystem and according to Jason Hope: "But that is where the problem lies. The companies investing in the development of the Internet of Things need to profit from it. If they turn their focus away from individualized platforms and embrace a standardized approach, they could potentially lose money. So, these companies are not in a hurry to standardize." (Hope, 2015), Creation of

those standards is critical for the security and privacy challenges and might help fulfill the predictions of 25 billion connected devices by the end of 2020.

6 IoT and Business Model Innovation

To further explore how business models can be innovated through the Internet of Things, it is essential to lay down basic concepts of business models, business models frameworks and finally Business Model Canvas that will be used as a foundation for practical part.

6.1 Business Model

Mutaz M. Al-Debei with his coworkers defined the term business model as following: “It is an abstract representation of a business, be it conceptual, textual, and/or graphical, of all core interrelated architectural, co-operational, and financial arrangements designed and developed by an organization presently and in the future, as well as all core products and/or services the organization offers, or will offer, based on these arrangements that are needed to achieve its strategic goals and objectives.” (Al-Debei, El-Haddadeh, & Avison, 2008) They came up with this definition by examining definitions that were presented beforehand by various economists, managers and researchers that described business models from different perspectives.

The history of the term Business Model is relatively young phenomenon (Osterwalder, Pigneur, & Tucci, 2005) that became widely recognized in the era of rising dot.com companies. However, the term “business model” was firstly used in an academic article in the year 1957 (Bellman & Clark, 1957). In the late 1990, this concept that originally came from the concept of business strategies became almost a synonymous for e-business as many researches on the business model topic were focused on how to transform traditional business successfully to an e-business model. Unfortunately, the companies adopting the internet into its business model focused too much on the sore fact that their business will be on the internet rather than improving efficiency and lowering cost. “In the late 1990’s the mere naming of companies as ‘dot-com’ was enough to signal that the business model of the company was potentially profitable or at least attractive for investors. However, after the tech stock crash, analyst and investor behavior changed so radically that signaling dot.com had the opposite effect.” (Nielsen & Lund, 2014) The concept of business model in the era of dot-com strategies focused mainly on channels and its transformation based on Internet availability.

After the crash of dot-com bubble many companies and manager tried to define the “business model concept” and the topic became very abstract and fuzzy just like the definition of Internet of Things discussed before. However, unlike the Internet of Things, there are some business model definitions that are widely used for describing how businesses work and how they deliver value to the customer. This thesis will work with the definition described by Alex Osterwalder and collective based on identification of 9 most common building blocks among business models in the literature:

“A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams” (Osterwalder, Pigneur, & Tucci, 2005)

6.2 The Business Model Canvas

The founder of the Business Model Canvas Alex Osterwalder in his book Business Model Generation gives its readers three questions: Are you an entrepreneurial spirit? Are you constantly thinking about how to create value and build new businesses, or how to improve or transform your organization? Are you trying to find innovative ways of doing business to replace old, outdated ones? If the reader answers any of those questions positively the book should be a handbook for visionaries, game changers striving to defy outmoded business models and design tomorrow's enterprises. (Osterwalder & Pigneur, 2010) Authors are further offering a simplified definition of the business model in aforementioned book: “A business model describes the rationale of how an organization creates, delivers, and captures value”

The business canvas is being used in many different cases as its concept is very easy to understand and well structured. Alternations of this business models were created and the business canvas is used as fundament for many canvas techniques for different niche markets or purposes. One of the most successful adaptation of Business Canvas was created by Ash Maurya who recreated the canvas for start-up purposes under the name Lean Canvas. (Maurya, 2010).

Osterwalder created the canvas to simplify the way how companies can capture the logic of how company intends to make money in a way that is easily understood by everyone which makes it easier to reflect on current business model and further innovate and change it if necessary. To create such a shared language 9 building blocks were created: Customer Segments, Value Proposition, Channels, Customer Relationship, Revenue Streams, Key Resources, Key Activities, Key Partnerships and Cost structures. These blocks can be seen on Exhibit 7 and will be further described in greater detail for purposes of this thesis.

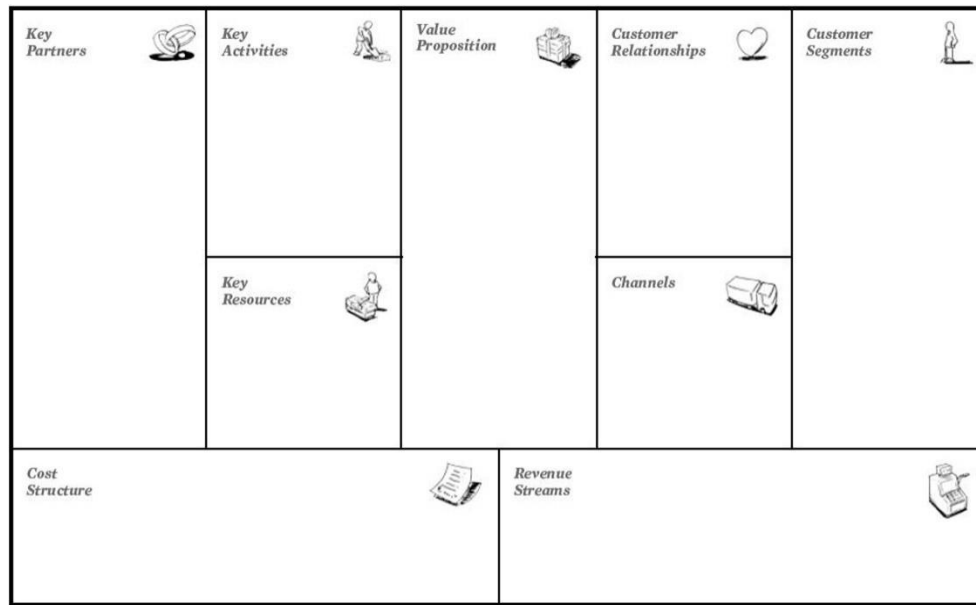


Exhibit 7 - Business Model Canvas. Source: Canvanizer (Osterwalder & Pigneur, 2010)

Customer Segment – This building block defines the different groups of people or organizations an enterprise aims to reach and serve. (Osterwalder & Pigneur, 2010) According to Osterwalder it is a heart of any business model because company without customers that are able to pay for their products cannot survive. For better understanding of all customers, they are further segmented based on their common behavior, needs or other attributes. Each company can have more than one specific target group and it must carefully decide which of them to ignore and which to serve. The target segments might differ in size, purchasing power and other important aspects but they should be internally homogenous and externally heterogenous.

Osterwalder further specifies examples of different types of customer segments. Mass market that doesn't distinguish between multiple customer segments and is often found in the consumer electronics sector. Niche market, focusing closely on very specific and small market segment. Some companies such as Amazon are serving two totally unrelated customer segments on one side they are selling books to internet users but on the other side selling cloud services to web companies. Other type is a multi-sided platform, great example is a credit card company that needs a huge number of credit card users on one side and merchants accepting credit cards on the other. (Osterwalder & Pigneur, 2010)

Value proposition – This block describes the products or services that create value for the customer segment. Company should not only satisfy customers need but solve his problem. Some can be innovative and create disruption on the market other might add features to already existing offers. The offering can produce value for example through its newness, performance, Customization options, helping customers get certain jobs done, superior design, brand or status,

premium or high price strategy, cost or risk reduction, accessibility or convenience. Each of the examples needs deeper understanding, however for purpose of this thesis more emphasis will be given on specific cases in the practical part.

Osterwalder with his colleges dug deeper into the topic of value preposition and created a standalone canvas as an addition to the Business Model Canvas for the sole purpose of deeper understanding of the connection between added value and customer segments. (Osterwalder, Pigneur, & Bernarda, 2014)

Channels – This building block describes how company reaches its customer segments to deliver a value proposition. Channels are customer touch points and way how to interact with the company and consists of communication, distribution and sales channels. It also discovers what channels are most effective for reaching different target groups. Osterwalder further describes multiple types of channels as well as 5 different phases as can be seen on Exhibit 8

Channel Types			Channel Phases				
Own	Direct	Sales force	1. Awareness How do we raise awareness about our company's products and services?	2. Evaluation How do we help customers evaluate our organization's Value Proposition?	3. Purchase How do we allow customers to purchase specific products and services?	4. Delivery How do we deliver a Value Proposition to customers?	5. After sales How do we provide post-purchase customer support?
		Web sales					
		Own stores					
Partner	Indirect	Partner stores					
		Wholesaler					

Exhibit 8 – Osterwalder channel types and phases. Source: Business Model Generation (Osterwalder & Pigneur, 2010)

Customer Relationship – This building block describes types of relationships a company establishes with specific customer segment. Relationships are driven by customer acquisition, retention and possible upselling and deeply influence the overall customer experience. Multiple kinds of relationships can be built with each customer segment ranging from personal assistance, self or automated services, creation of communities all the way to co-creation of value with customers through reviews or ideas for new product.

Revenue Streams – represents the cash company generates from all customer segments. Each of the stream can have different pricing mechanisms that can be divided into two basic groups: Transaction revenues from one-time payment or recurring revenues from selling service based on fees or providing customer support. There are several ways to generate revenues, Osterwalder lists following: Asset sale, usage fees, subscription fees, lending/renting/leasing, licensing, brokerage fees from intermediation services performed on behalf of two or more parties and advertising. (Osterwalder & Pigneur, 2010)

Key Resources – Resources can be divided into following categories: Physical, Intellectual, Human and Financial. These resources are the most important assets required to make a business

model work. They are used for creating and delivering of value proposition, reaching market, maintaining relationship and earning revenues.

Key Activities – This block describes the most important things that company must do to make its business model produce value. In the example of Microsoft, the key activity is developing software. Osterwalder further categorize activities as follows: Production, Problem solving and Platform/network offering.

Key Partnerships – Describes the network of suppliers and partners that make the business work and partnerships are built for many different reasons. Osterwalder describes some of them – Optimization and economy of scale, Reduction of risk and uncertainty and finally Acquisition of resources and activities.

Cost structure – The last building block includes all the costs that incur to operate the whole business model. Those are costs that are paid for each of the building blocs described above. Osterwalder distinguishes between two main categories of business models in regards of costs: Cost-driven that are focusing on lowering costs as much as possible and Value driven business models that focus on increasing value rather than saving on costs and are betting on premium value proposition. Cost structures can also have following characteristics: Fixed costs, Variable costs, Economies of scale and Economies of scope.

6.2.1 Uses of Business Model Canvas in Enterprises

The Business Model Canvas can be used for many different purposes and the most popular are being collected and further examined by Alex Osterwalder and his team on Strategyzer blog. In one of the blog posts, Benson Garner describes the 14 innovative Business Model Canvas uses. Among those applicable on enterprises and innovation are for example: Strategic planning and development of whole company or even per business unit as the canvas works as a shared language across various teams. Other use relevant for this thesis is creation of Portfolio of Business Models: “A particularly interesting area for application of the BMC is the idea of developing a portfolio of business models, ranging from improving existing business models all the way to inventing new business models. While product and brand portfolios are relatively well mastered in large organizations, business model portfolios are an entirely new phenomenon.” (Garner, 2015) The portfolio further helps understand and highlight which business models are making cash now and which are important for cashflow in the future.

It is also used for sketching the business models of company customers and better understanding of their needs and adaptation of value proposition accordingly. Next and very important use is in strategy diffusion and co-creation which helps the strategic alignment across the organization. According to a study made by Strategyzer 21% of BMC users use it for purposes of new product or service development within an existing model and 19% for purpose of strategic reorientation. (Amarsy, 2015)

6.3 Business Model Innovation

Another very young and not well described topic discussed in this thesis is Business Model Innovation (BMI). Although BMI has gained substantial importance in recent years, there is still a limited understanding of this phenomenon. (Wirtz, Göttel, & Daiser, 2016) To fully understand the term Business Model Innovation, it is important to understand its basics. The theory of business model was already covered, the term “innovation” remains. The basic understanding of innovation is creation of somethings new. Probably the first author that mentioned the phrase “Business Innovation” was professor Schumpeter that divided the innovation into five different categories: Introduction of a new product, Introduction of new method of production, the opening of a new market, the conquest of a new source of supply and the carrying out of a new organization. (Schumpeter, 1934) Many authors discussing the BMI are often referring to Schumpeter’s “new good”, “new method” and “new market” and it still serves as a base for BMI theory. (Taran & Boer, 2015)

The literature often distinguishes between two types of changes in business. The Business model development and Business Model Innovation. (Johnson, Christensen, & Kagermann, 2008). So far, a clear distinction between those two kind of changes is missing. Business model development is mainly done to compensate for previous deficit or for underlining current competitive advantage. Stähler calls the differences “radical and incremental changes” according to him, business model development does not change the fundamental value proposition or revenue model and therefore, such developments can be characterized by minor adjustments and focus on already existing Business Models. (Stähler, 2002) It is important to understand that BMI is not an easy process and it should not be undertaken lightly as it is a very risky and resource intensive process. Often, a new disrupting product can be developed while operating with the same business model. Procter & Gamble, for example, created several “disruptive market innovations” for example, a disposable mop Swiffer or new air freshener Febreze. Both of those products were built on existing business model and could establish a dominance in household consumables market. (Johnson, Christensen, & Kagermann, 2008)

The BMI is frequently a reaction to changes in value creation and therefore focus on external environment rather than internal which is a clear contrast compared to the mostly internal oriented Business Model development. (Schneider & Spieth, 2013) According to Arnold and Kiel especially the fundamental changes are one reason for the difficulties companies face in terms of BMIs. When the company manager knows the current BM, is used to it and knows exactly how it works, every innovation that BMI represents is an inconvenient change, since they must give up their mental models and dominant logic. Therefore, in most companies, slight adjustment and further developments of existing BMs are favored over BMIs. (Arnold, Kiel, & Voigt, 2016)

6.4 How IoT innovates the Business Models

IoT is a huge opportunity not only in terms of its size. It is significant not only for technological companies selling IoT services or devices, but also companies that are willing to innovate its business model using Internet of Things capabilities. This part of thesis will emphasize the basic ways how companies can restructure and adapt their business model to stay relevant in today's rapidly evolving market. Companies that will be used as an example are that are customers of software providers like Microsoft, rather than sensor manufacturers or IoT platform providers themselves.

Many scholars describe the effect of Internet of Things on business models as revolutionary and transformational to many industries and some, like Porter, call it a third technological revolution. "Twice before over the past 50 years, information technology radically reshaped competition and strategy; we now stand at the brink of a third transformation." (Porter & Heppelmann, 2014) and compares it to the way how rise of computers transformed business during 1960s and 70s by automating individual activities in the value chain. He states that the second disruption due to technology advance was in 1980s and 90s when the new technology of Internet transformed the way how company operate. "The first two waves gave rise to huge productivity gains and growth across the economy. While the value chain was transformed, however, products themselves were largely unaffected" (Porter & Heppelmann, 2014) The third wave enabled by IoT is different by involving also products connected to the cloud and monitored remotely. Basic capabilities of such devices can be further divided into: Monitoring, Control, Optimization and Autonomy. According to Porter, when those smart products interoperate and control each other it creates a System of Systems which can be explained by example of Smart Home with many smart products in place (Light bulbs, Smart Coffee machine, Smart thermostat etc.)

IoT enables companies that are usually selling products change the way how they create and capture value by offering services along with the smart products and therefore reinvent and restructure their business model. That is a simple way how to implement IoT into the way how company does business. The difference can be showcased on the example of a customer purchasing classic product. "The consumer, ideally, moves through the phases of awareness, consideration, action and then on to loyalty. The journey starts with the customer somehow becoming aware of the product. Then, once aware, they might consider its purchase by trying it out, reading a review, or doing a competitive analysis. The customer will then take an action, ideally, purchasing the product. At that point, in traditional businesses, the relationship with the customer may have ended, with a subset of businesses focusing on the post purchase relationship to drive cross sell or upsell. " (Fraser J. , 2016) connecting and monitoring the sold device creates the ability to rethink this process and change it to a more dynamic experience for the customer. By offering connected products we can build better relationship and increase the customer loyalty. "The journey still contains those high-level phases of awareness, consideration and action, but also includes the new phases of usage and new services. In this new connected world, the relationship with the consumer

starts with the purchase. Then, ideally, based on product usage (about which the business can gather data) the business can offer new services. These new services can be in the form of additional functionality, or related products and services. The consumer then enters the customer journey again, needing to become aware of those new services so that they can consider them and decide if they are interested in engaging with them.” (Fraser J. , 2016)

Internet of Things can change many aspects of how companies do business. It is not just about connecting things to the internet to show that it is possible. It can change how companies generate revenues, it can greatly affect their costs, relationship to customers. New kind of partnership and resources are needed that enable the IoT transformation. To further analyze how Business Models can be innovated through Internet of Things all the building blocks in the Osterwalder Business Model Canvas will be linked to IoT capabilities and real life use cases will be used to showcase how companies are leveraging this technological trend.

Customers – First Business Block can be greatly influenced by IoT as new technologies allow companies to acquire new customers by collecting data about their product usage and further selling them. Data are a very valuable asset that many companies are willing to purchase. This can further highlight the problem of data privacy in the Internet of Things, however, companies are mostly selling anonymized data where no individual can be identified and they only show general patterns of behavior. An example of Fitbit can be used. Fitbit is a sport wearable collecting data about physical activity of its owner. Some companies in the US gives away free Fitbits to its employees so that they can track their physical activity and get better insurance deals by showing how healthy their staff is. (Smith, 2014)

Other example of how companies can sell data and create a new, very lucrative side business, is in the automotive industry. Here at least 2 new customers can be identified: insurance companies and meteorologists. Car is already equipped with all kind of sensors that are collecting insight about driving: Speed, shifting patterns, breaking, acceleration etc. but also about environment such as temperature, amount of rain, frozen windows and roads. By heaving car connected to the internet insurance companies can offer drivers “usage-based insurance” that tracks client’s activity and offer discount or rewards for healthy and safe behavior. It is expected that by 2020 over 50 million US drivers will have tried UBI insurance. (Greenough, 2016). As for the weather data, Finnish meteorologist Pekka Pouta buys the vehicle generated data for his company Foreca that is reselling data not only about what happens in the air but also under the car wheels with only one goal: “Up-to-date, high-quality and valid road weather data make driving safer. In Europe, about a third of traffic accidents are at least partly caused by rough weather conditions. We wish to help save lives and avoid injuries and unnecessary costs. In addition, road weather data avails people to optimize their use of time and to keep to their schedules” (Foreca, 2016)

Value Proposition – Value proposition is among the most important in terms of change due to IoT adoption. (Dijkman, 2015) And it is not only case for end customers, but also and perhaps

even more significant for companies purchasing internet-enabled machines. More than 90% of companies suggested, that they can offer better value for its customer by offering data-based scenarios. They can offer functionalities as remote monitoring and preventing damage due to data from sensors, increasing effectivity thus lowering costs due to monitoring of usage of the machine and suggesting changes to the operations. Another useful function is pushing updates to the devices remotely without a need of on-site technician present in the plant. (Arnold, Kiel, & Voigt, 2016). This further helps to establish a deeper connection of OEM and its customers by offering more effective servicing scenarios and further adapting to customer's needs.

For end customer, the main advantages of IoT are: convenience, personification and longer product life cycle as the product can be updated over the air. The business model is no longer just about identifying the customer's need and creating a best possible solution, but also about the ability to adapt to need of customers and capture value in every stage of product life cycle. A mindset shift of how the businesses create and capture value can be seen on Exhibit 9, where Gordon Hui,

THE INTERNET OF THINGS REQUIRES A MINDSET SHIFT			
Because you'll create and capture value differently.			
		TRADITIONAL PRODUCT MINDSET	INTERNET OF THINGS MINDSET
VALUE CREATION	Customer needs	Solve for existing needs and lifestyle in a reactive manner	Address real-time and emergent needs in a predictive manner
	Offering	Stand alone product that becomes obsolete over time	Product refreshes through over-the-air updates and has synergy value
	Role of data	Single point data is used for future product requirements	Information convergence creates the experience for current products and enables services
VALUE CAPTURE	Path to profit	Sell the next product or device	Enable recurring revenue
	Control points	Potentially includes commodity advantages, IP ownership, & brand	Adds personalization and context; network effects between products
	Capability development	Leverage core competencies, existing resources & processes	Understand how other ecosystem partners make money

SOURCE SMART DESIGN

HBR.ORG

Exhibit 9 - How value is created and captured. Source: Harvard Business Review (Hui, 2014)

strategist of startup Smart Design, explains how business owner should think about value in the era of Internet of Things. (Hui, 2014)

Perfect example of how IoT can simplify life is the pHin super easy pool maintenance system. (pHin, 2014) It is a small device that, when placed into a swimming pool, monitors the amount of chemical that are needed to keep the water crystal clear. When some of the chemical level drops, the device notifies customer's phone and tells him, how many prepaced chemical by pHin to toss into the pool. All this is part of the monthly fee that also includes the chemicals needed and always delivered when customer is running low on supplies. Convenience value added is clearly visible as anyone can take care of the pool without need of serving company looking after the quality of water. Therefore, it saves the pool owner high costs connected to such a service.

Channels and Customer Relationships – Those two blocks are linked together as they are closely interconnected in the Internet of Things scenarios. Customer Relationship is significantly affected when connected devices are monitored remotely. The manufacturer can connect data about how the device is used by the customer and further personalize its functionality by predicting his or her needs. In the B2B scenarios servicing models are highly influenced, as serviceman can remotely check the behavior of the machine, and go on site only when its needed or when the failure is about to happen. 86% of industrial companies in the industry sector are expecting the Customer Relationship block to be changed by the Internet of Things. (Arnold, Kiel, & Voigt, 2016) Channels are also affected by the ability to update or upsell services over the air rather than by introducing a completely new product. In the previously described case of pHin it is clearly visible how the company selling pool chemicals can create a long-lasting relationship with its customer and deliver “just-in-time” chemicals through Internet of Things gadget.

Other example covers how companies can easily update and change the user interface when they decide to place it in the cloud, rather than physically on the device itself. When new technology comes or new feature is available the company just pushes the update to the controlling application through cloud to enable user the latest and best experience. For example: “Home audio equipment maker Sonos, a smart, connected products pioneer, takes advantage of cloud-based capability to “reinvent home audio for the digital age,” putting a premium on convenience, variety of music, and ease of use. The company’s wireless systems place both the music source and the user interface in the cloud, enabling Sonos to simplify its products’ physical design: The portable device, which is controlled from a smartphone, contains only the amplifier and speaker. With this offering, Sonos attempted to disrupt the home audio market.” (Porter & Heppelmann, 2014)

Revenue Streams – Next block can be also affected by the IoT revolution as the connectivity helps rethink the product offering. This fact can be seen on the Exhibit 9, where in the value capture part, new way of path to profit is highlighted. It goes from selling the product or device into enabling recurring revenues. And it is not only very appealing for companies as the value-added services, subscriptions or apps can exceed the initial purchase price, but also for the potential investors as Renee DiResta, a Principal at O’Reilly AlphaTech Ventures, noted: “Things that generate recurring revenue are actually more appealing to venture capitalists. Otherwise, the business model is banking on the hope that prospective customers will be loyal and be compelled enough to come back to buy the second product.” (Hui, 2014)

Other way to obtain additional revenue stream is by offering the data further to new set of customers as discussed before. Other example is providing more insight on how can our customer make better use of his investment by monitoring his machine performance and for a recurring fee give him insight on how to be more productive. Other already mentioned example of pHin shows how sales of chemicals can be transformed into steady service income. Next example of how IoT changes pricing models can be seen in home security. As the homes are getting smarter with connected smoke detectors, cameras capturing suspicious activity or other sensors sensing for

example weather damage, forward thinking security companies are now offering tiered services. Starting with cheap tier for basic services and higher tiers provides for example incident response, recommendation services or threat prevention based on collected historical data. Just as a pay-as-you-go cloud computing model, where customers only pay for tiers of services they consume. (Kavis, 2016)

Key Partnerships – There is a big challenge for many industries and manufacturing companies that are thinking about making their product smart. It requires a huge investment into specialized skills, technologies and infrastructure that has not been present in recent business model. Many of these skills are scarce and in high demand, but crucial if the company wants to build a long lasting, perfectly secured smart products. (Porter & Heppelmann, 2014) The obvious problems with partnership is that companies must understand, that the partner might acquire a big chunk of value added to the product. To achieve long lasting business relationship, it is crucial to understand how others in the ecosystem make money. (Hui, 2014) It is also important to note that creating such relationship between product manufacturer and IT company like Microsoft, that provides the needed infrastructure and platform also involves important information and data sharing, which can be serious concerns about privacy and security. (Dijkman, 2015) However, given the interest in Internet of Things and the challenges in this space, the importance of business models and partnerships cannot be over emphasized. (Agrawal, 2017)

As an example, Rolls-Royce created partnership with Microsoft to remotely monitor more than 13,000 airplane engines that are in operation worldwide. With Azure IoT suite, Rolls-Royce can monitor the terabytes of data created on every flight to give airlines suggestions on airplane fuel efficiency, predict needed maintenance and most importantly prevent any damage that could occur. Another big advantage for the airlines that are paying for provided insight is, that even one percent saving on fuel cost would save \$250,000 per aircraft per year. (Microsoft, 2016)

Key activities and Resources – Key resources and activities were partially covered in previous building blocks. It involves the creation of software and data collection capabilities by developing software and platform, investing into human resources that are crucial for possessing specific IT, development, data analytics, software know-how, market competence and understanding of customers. (Arnold, Kiel, & Voigt, 2016) Porter notes that: “Smart, connected products create major new human resource requirements and challenges. The most urgent of these is the need to recruit new skill sets, many of which are in high demand. Engineering departments, traditionally staffed with mechanical engineers, must add talent in software development, systems engineering, product clouds, big data analytics, and other areas.” (Porter & Heppelmann, 2014) These resources, often very expensive and hard to acquire can be outsourced by the strategic partnerships that cover another very important aspect such as solution security and data privacy.

Cost Structure – With new value proposition and revenue streams new costs naturally incur. Mainly in terms of rising expenditures for skilled IT human resources, software and platform

development. (Arnold, Kiel, & Voigt, 2016) Some of those costs can be transferred to partners but it does not come without a tradeoff. Outsourcing can create new costs, as suppliers and partners demand a larger share of the value created. Companies that rely on partners also compromise their ability to differentiate going forward, and their ability to build and retain the in-house expertise required to set overall product design strategy, manage innovation, and choose vendors well. (Porter & Heppelmann, 2014) Porter also warns about over equipping the devices with IoT capabilities: “Smart, connected products dramatically expand the range of potential product capabilities and features. Companies may be tempted to add as many new features as possible, especially given the often-low marginal cost of adding more sensors and new software applications, and the largely fixed costs of the product cloud and other infrastructure. But just because a company can offer many new capabilities does not mean that their value to customers exceeds their cost. And when companies get into a features and capabilities arms race, they end up blurring strategic differences and creating zero-sum competition.” (Porter & Heppelmann, 2014)

7 Methodology

As the achievement of this thesis goal requires deep understanding of Microsoft OEM business, expert interview with managers from Microsoft were conducted. During 30-60 minute interviews managers were introduced to our current Business Model Canvas, then presented with IoT facts to better understand the topic, and in the end asked which Building Blocks need to change and how. For this method to be successfully implemented, and replicable for further usage, following steps were made:

Firstly, Microsoft Corporation was described in greater detail along with the explanation how OEM team fits in the main strategy and what is its primary focus.

Secondly, Business Model Canvas based on Osterwalder (Osterwalder & Pigneur, 2010) was created for OEM team, and all building blocks carefully explained. This was done based on author's experience and internal and external Microsoft documentation along with the help from Microsoft colleges from Germany and Czech Republic.

After creation of Business Model Canvas most pressing problems and opportunities were described in presentation for questioned managers. The presentation was not specific about changes to the business model to keep answers during interviews not influenced by author's opinions. It is understandable, that most of those topics are already known by the OEM team, however, this step ensured that managers had at least some basic layer of understanding of the Internet of Things. The main topics that were presented during interviews:

- Why IoT is an important opportunity
- How Microsoft pushes the cloud services and Microsoft Azure
- Emerging competitive landscape
- Role of Windows devices in the Internet of Things
- Microsoft offerings of IoT related products for partners
- Where are IoT devices used, including real cases

Semi-structured interviews were held with 13 managers from Microsoft OEM team where they were shown the current business model and quickly introduced to the concept of Internet of Things and challenges identified in the theoretical and practical part. Based on these facts, and prior knowledge they had 10 points available to assign to Building Blocks based on their importance for further development. Each could be awarded by 1-10 points and not all of them must have been scored. Only hard condition was to distribute all 10 points.

Semi structured interview had similar structure but were flexible in terms of Building Blocks chosen as most important to change. The interviews were used to rate the Building Blocks based on urgency to innovate them, and for identification of changes that have to be made inside those blocks.

To analyze the interviews and connect the findings to current business model following steps were conducted:

- 1) Full transcripts of interviews were made and rewritten into the selective protocols, that are attached in the appendix of the thesis. Only relevant parts of interviews are presented as they were used for purposes of coding.
- 2) Descriptive coding based on the theory suggested in book “The coding manual for qualitative researchers.” (Saldana, 2013) was done and example of codes can be seen in the Appendix 3. More than 180 codes were created.
- 3) Codes were further divided into categories based on common meaning or common theme following the Mayring’s Qualitative Content Analysis. (Mayring, 2000) Final 22 categories can be seen in Appendix 2.
- 4) Categories were assigned to Building Blocks which were ranked based on how much points they were assigned by interviewees. Categories that could not be assigned were described separately.

Author further discusses the changes identified in the business model in relation to studied literature and empirical part of this thesis. Recommendations were made based on thesis and interviews findings, and first steps towards Internet of Things were suggested.

In Table 1 interviewees are shown along with length of interviews and their roles. To keep anonymity, names were changed and no further information will be provided.

Interview	Name	Role	Interview time
1	Peter	Solution Sales Specialist	34:24
2	Armand	Local OEM Manager	40:05
3	Pavel	Windows Category Manager	38:46
4	Jan	Windows Product Manager	32:58
5	Steven	Account Technical Specialist	52:34
6	Honza	Windows Category Manager	48:29
7	Zuzka	Local Channel Executive	39:54
8	Steffen	Local OEM Lead	49:15
9	Denisa	OEM Account manager	32:46
10	Yveta	OEM Lead	49:05
11	Zdenek	OEM Controller	38:27

12	Petr	Windows BG Lead	45:49
13	Jan H.	Technical Evangelist Manager	39:23

Table 1: Interviewed subjects from Microsoft. Source: Author

However, the roles assigned to those names will be kept real, as it is essential to understand the viewpoint of interviewed person.

8 The Microsoft Corporation

To fully understand what is the role of OEM team and Windows devices in the Internet of Things revolution it is essential to have full perspective on the development and structure of Microsoft corporation along with its divisions.

8.1 Description and history of the company

Microsoft was founded in April 1975 by the college dropout programmers Bill Gates and Paul Allen, who became acquainted with high-level programming at high school. The very first business contract was the creation of a programming language for the Altair 8800, based on BASIC programming language. At the outset, Microsoft was primarily focused on developing operating systems. The first product of this type was Microsoft Disk Operating System (MS-DOS), which was created for IBM's personal computer (PC). The first version of the Windows operating system was introduced in 1985 as a MS-DOS graphics extension, however, the first truly mass-expanded version was Windows 95. (Kapoun, 2009)

At present, Microsoft is one of the largest software companies in the world with a market value of more than \$500 billion (Reuters, 2017) and employing more than 114,000 people worldwide. The current value of the brand is estimated at \$75,2 billion, making it the fourth most valuable brand in the world. (Forbes, 2017) The company's revenues for the fiscal year 2016 exceeded \$91,96 billion and net income was \$16,8 billion. (Financial Times , 2017) It is important to mention that Microsoft's fiscal year begins in July and ends in June.

Microsoft products are basically divided into three main groups, which are Productivity Tools, Intelligent Cloud, which includes IoT Services, and Personal Computers including Windows IoT. Basic product overview can be seen in Exhibit 10 below.

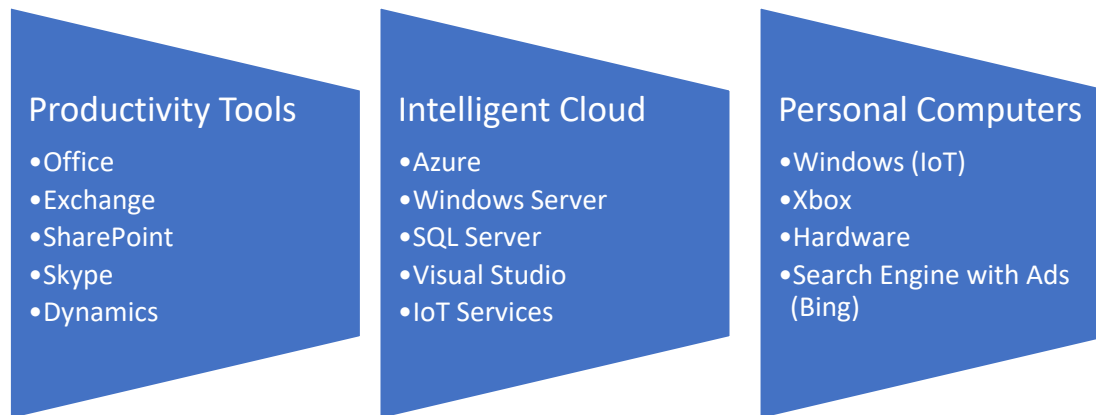


Exhibit 10 – Product overview. Source: Author

8.2 Structure and company hierarchy

Microsoft is geographically divided into 14 areas. One of them is the Central and Eastern European region, which is not entirely appropriate from a purely geographic point of view, as several Central Asian countries also belong into this cluster. There are 34 countries in the region, including the Czech Republic. The Czech subsidiary was merged with Slovak in the year 2016 and offices are in Prague and Bratislava. At the bigger, Prague office established in 1992, over 300 employees work. The Branch is divided into nine departments, including Marketing & Operations, EPG, Public Sector, SMS&P, CDS (which is further divided into Retail and OEM), Services, Development Experience, Finance and Human Resources. This structure is consistent around the world, so the same structure can be found in Czech Republic as well as for example Germany.

Responsibility for overall sales and subsequent activation of Windows operating system falls under the marketing and organization department, specifically under the Windows Business Group. However, the Windows Group team is responsible for selling and activating Windows licenses for end-users through retail channels under Consumer Devices Sales team (CDS). To successfully meet the sales and activation goals of the Windows operating system, most teams across the CDS are required to work together. An essential factor is the work of the Original Equipment Manufacturer (OEM) team, that ensure that an optimal portfolio of Windows devices made by our OEM partners will be present on local market. The devices are further sold through our distribution or retail partners either in stores or through online shops. In addition, there is a close collaboration with the PR & Communications team from Marketing & Operations department, which is in charge of communication with the media and social networking.

8.3 Vision and company goals

Microsoft's mission is to Inspire every person and organization on the planet to achieve more.

The company wants to achieve this through the provision of cloud tools that enable fully mobile work. This means transforming the standard model of selling software licenses for OEM product to providing it as a service. So far, the customer pays once for the software that can be used for unlimited period, but with limited time of support from the manufacturer. The new subscription model is based on regular monthly payments, that provide the customer with the software only during the payment period, but with continuous support from the company. It is always up to the customer to have up-to-date software that is fully secure against potential cyber-attacks while providing the ability to use the latest features.

Although the effort to change this business model is particularly noticeable for corporate clients, it is also visible in Office 365 subscription, including tools such as Word, Excel, PowerPoint, Outlook, OneNote, Access, and Publisher. As part of the monthly payment, the customer will also receive one-terabyte capacity in OneDrive Cloud Storage. Office licenses sales are driven by the sales of computers; therefore, the number of Windows enabled devices is ranked among the key performance indicators of the entire branch. The target for the first half of the fiscal year 2018 (July 2017 - December 2017) was set at 380,000 activated devices with the Windows operating system on the Czech and Slovak markets.

9 Current OEM Business Model

Based on gained knowledge from more than three years of experience inside the OEM team, and insights from coworkers and internal information, the current business model based on the Osterwalder Business Modes Canvas was created. All 9 building blocks are described in this section and the BMC will be later used during interviews as a starting point for the discussion about Internet of Things future influence. Canvas will focus mainly on devices and therefore Windows operating system. It is not the only product that is sold by OEM. Others are for example: Microsoft Office (not Office 365) and Windows Server, however, for simplification and purpose of this thesis, business canvas, that can be seen on Exhibit 11, is only considering devices running Windows OS.








Key Partners  <p>OEM Partners:</p> <ul style="list-style-type: none"> • Multinationals • Local <p>Distributors:</p> <ul style="list-style-type: none"> • And large retail/eTail partners <p>Other teams inside Microsoft are crucial partners</p>	Key Activities  <p>Partner Support:</p> <ul style="list-style-type: none"> • Finance/Insight <p>Data Analysis</p> <p>SW sales activities</p> <p>Networking</p>	Value Proposition  <p>Empowering every person and every organization to achieve more through:</p> <ul style="list-style-type: none"> • Reliable and always up to date software that works on any device and with every tool that one needs. While keeping the system secure and data private. 	Customer Relationships  <p>Updates based on user feedback</p> <p>Customer Support:</p> <ul style="list-style-type: none"> • Directly or through partners <p>Customer oriented content marketing</p>	Customer Segments  <p>End Users:</p> <ul style="list-style-type: none"> • Basically everyone that can afford computer. <p>Small and Medium Businesses:</p> <ul style="list-style-type: none"> • Not managed by other Microsoft teams.
Cost Structure  <p>Salary</p> <p>Marketing activities (Funds to partners)</p> <p>Channel Education</p>		Revenue Streams  <p>OEM licences: Licences sold to OEM partners</p> <p>Licences sold directly: Through MS Store</p>		

Exhibit 11 – Current Business Model. Source: Author

Customer Segment – Customer segment for Windows devices is very broad as billions of people worldwide are using computers of various form-factors. Any of those end users, that can afford personal computer could be Microsoft's customers. Windows being the operating system with largest market share with more than 85% (Statista, 2017) is not only serving end users but also companies or public organizations.

Other teams apart from OEM are working with company customers. They are selling the Windows licenses directly to the bigger customers (50 + computers) and therefore, such sales are not counted under the OEM team revenue. Four teams selling into companies can be identified in Microsoft –

SMS&P taking care of small and mid-size companies, where small company is considered one with more than 250 computers, EPG taking care of large corporate accounts – examples from Czech Republic are: ČEZ, RWE, O2, Agrofert and many others. Next team is called Public and takes care of accounts from public sector, namely ministries, government, cities, towns and others. Last team, EDU, is also selling computers to public organizations – schools, however, school business is unique and therefore a dedicated team of professionals is needed.

What is left is a potential customer for OEM team – company with less than 50 personal computers that is usually buying software along with hardware through e-shops and retailers and are not big enough for Microsoft to be managed. The way how such companies are purchasing computers is basically the same as the other customer segment – end users. Someone from IT department usually orders computers through e-shop like Alza in case, that some employee needs one or new colleague is onboarded.

Value Proposition – This building block is crucial for any business and should express what problems of customers is the company serving and what additional value does it bring to them. The mission of Microsoft was used as the building stone – Empower every person and organization on the planet to achieve more.

We are helping our customers to achieve more through always safe and reliable software – Windows. With hundred million of Windows devices being connected to the internet it must be secure and always up-to date to keep up with new threads for users. Big part of Windows users is relying on their computer for daily work or keeping connected to the internet for personal purposes. In both cases, the privacy along with security is the number one priority for Microsoft. Therefore, Microsoft is supporting its operating system for more than 10 years after the date of general availability of the product, to make sure that everyone is able to upgrade to new version of Windows before the support lasts.

Next part of the Value Proposition is the fact, that no matter what PC hardware is the customer using, the Windows experience is always the same. Therefore, customer can quickly become familiar with the new computer or has the availability to seamlessly switch between personal and working computer. Another crucial part of the Value Proposition is, that Microsoft works closely with software developers to ensure that every new version of Windows will be supported by them. That prevents situation of incompatibility between the new operating system and applications on which are customers dependent on.

What Microsoft OEM team especially offers to customers is the wide variety of devices developed by our partners and running Windows. The device should suit anyone and bring new capabilities that help to fulfill the mission and empowers users and companies. Latest trends set by Microsoft are the availability to control computer through touch inputs or make notes directly on the computer with pen. To fully understand what form-factors of personal computer Microsoft distinguishes, a comprehensive overview was made and can be seen on Exhibit 12 below. Most of

the form-factors are self-explanatory, however, the 2-in-1 category which is also the fastest growing one should be explained into more details. 2-in-1 stands for notebook that can be transformed into tablet. Those devices are usually touch enabled and come with active stylus for handwriting capabilities. Detachable 2-in-1 means that display can be detached from the base and used as a separate device. On the other hand, convertible 2-in-1s have special hinge, connecting computer and display enabling the display to be rotated by 360 degrees and the whole device can be used as a tablet but cannot be separated.

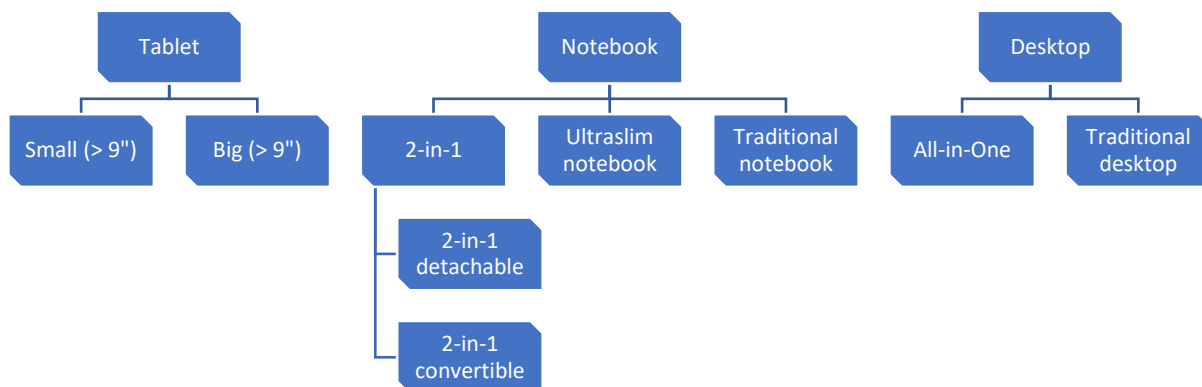


Exhibit 12 – Form-factors. Source: Author

Channels – To deliver all the value to customers Microsoft uses two different types of channels – direct and indirect. Indirect channel plays bigger role as Microsoft is highly dependent on its partners. Therefore, most of the computers running Windows are sold through our retail partners or online shops that offer devices from various manufacturers. Only about 2,5% of Windows operating systems are sold through direct channel (Online Microsoft Store) and the rest through partners that are further divided into different levels. Simple scheme was created to fully explain what kind of partners does Microsoft work with on the retail level. Those retail partners are mostly not purchasing devices from Microsoft or device manufacturers. Instead, they are purchasing through distribution companies connected directly to OEM partners and Microsoft. The scheme of Microsoft retail partners through which value is delivered to customer segments can be seen on Exhibit 13. The retail partners are further divided into three different levels based on the market share and therefore support from Microsoft. Retailers in level one are covering almost half of the market and all managed partners (levels 1-3) are selling to almost 90% of our customer segments.

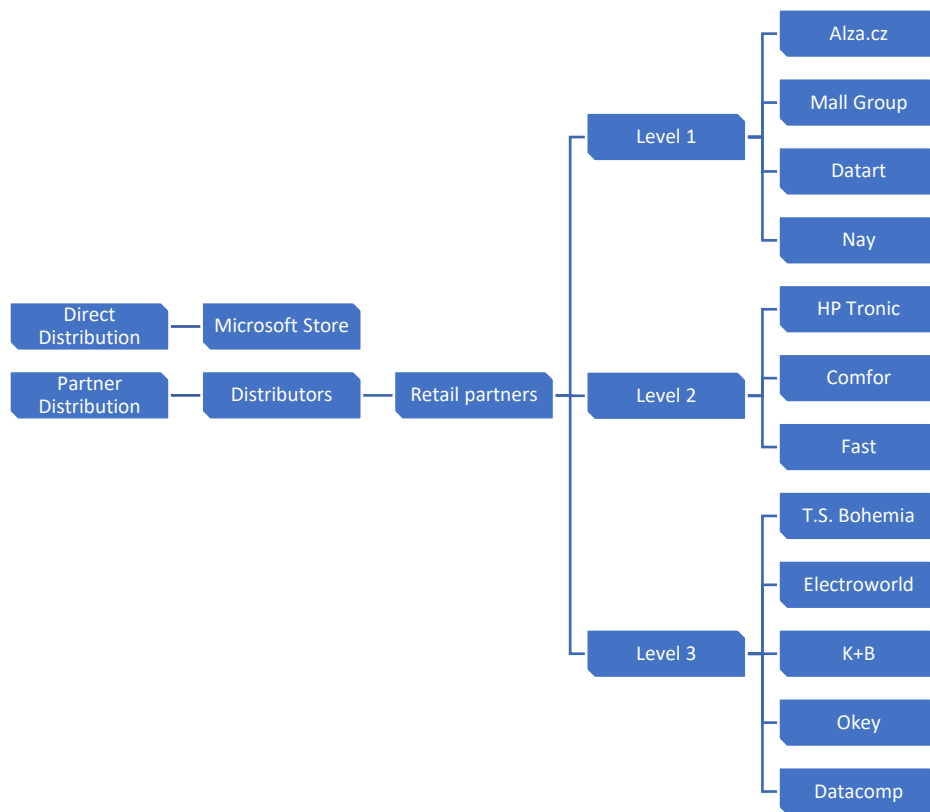


Exhibit 13 – Partner scheme. Source: Internal Microsoft data presented by author.

Customer Relationships – Microsoft seems to be listening to its customers like never before. It has created a special community for Windows enthusiasts called Windows Insider. Based on the feedback from customers and their features suggestions, Windows Development team is making new versions of Windows more suitable for everyone. It is very hard to make all the Windows users happy at the same time, however, Microsoft has learned that it is no longer enough to just push new Windows features without caring too much about how useful it is for the end user.

Microsoft is also taking care of its customers through built in tips and tricks suggestions and troubleshooting options inside the operating system. If that is not sufficient, user can reach out to Microsoft by posting his/her questions to one of Windows online forums or call the call center with any problem that cannot be solved easily. If the problem is hardware related and Microsoft is not able to help, user is redirected to the manufacturer (OEM) of the computer to get resolution. Also partners that are reselling hardware are supposed to provide customer with any after sales service or reclamation complaints.

Revenue stream – Revenue for OEM team consists of multiple parts however, for purposes of this thesis only revenue from sold Windows licenses will be considered (not counting Office or Windows Server licenses). The revenue is dependent on the type and hardware specification of the device and may vary greatly. Microsoft is charging OEMs for example 0 dollars for small tablets

(see Exhibit 12) and \$65 for classic Windows license on a notebook. Another version sold by OEM is the Windows Pro version that is sold to OEMs for \$115 and contains additional security and business features such as Domain Join, BitLocker or Azure Active Directory.

Approximately 97,5% of all Windows sold by OEM team is to OEM partners (device manufacturers) and only 2.5% is sold directly through the Microsoft Store. This proportion used to be bigger in the past as users had to buy new licenses through the store if they wanted to upgrade their Windows to newer version. This situation has changed with the newest Windows 10 as it was offered as a free upgrade to Windows 7 and 8.1 customers. Therefore, the sales of licenses through Microsoft store has almost diminished.

Key Partners – As the name of the Microsoft OEM team suggests one of the key partners are OEMs, device manufacturers. Those companies are further divided into two main groups: Multinational manufacturers (MNA) represented by Lenovo, HP, Dell etc. and Local OEMs that are based in Czech Republic and are mainly producing locally. They also might have a close connection to device manufacturer in China, building computers under the local manufacturer brand. One example of such a partner is UMAX from Czech Republic or TrekStor in Germany.

To better understand what is the market structure like in Czech Republic Exhibit 14 was made that shows the percentage sales of each of the MNA and other local OEMs during the last 6 months of previous year. Microsoft on the Exhibit below means the devices manufactured directly by Microsoft corporation – Surface line of hardware that is a specific high end device line designed specifically to showcase all the modern capabilities of Windows. It also serves as role model for other MNA however, at the same time it is a competition for partners developing hardware.

As seen on the Exhibit 14 Czech market is dominated by Lenovo with more than 37% and followed by HP with 19% those two players are constantly highest selling OEM partners in the Czech Republic but they are varying between 1st and 2nd place. Named partners can be seen under the All Other OEMs in the table below and have only about 7% of the market. There is only one stable seller of Local OEM devices that is offering notebook and tablet portfolio – UMAX, however, other companies that might be also distributors at the same time are building classic desktop computers and gaming desktops, that are gaining on popularity in recent years.

Share of OEM Partners on Device Sales

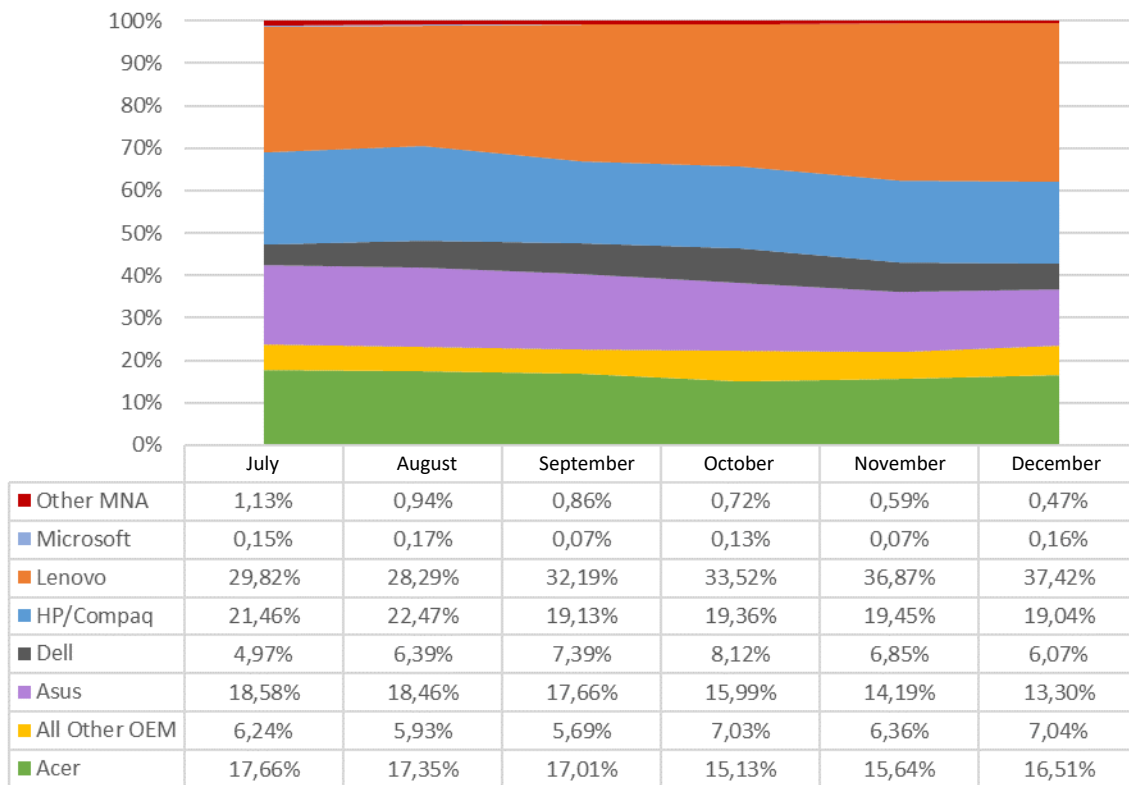


Exhibit 14 – OEM partner market share. Source: Internal data, interpreted by author

Among other key partners, distributors and retailers play an important role. Distributors are companies that are directly connected to OEM partners and are purchasing devices in big quantities and reselling them to retailers. The role of retailers was already covered in Channels building block and will not be discussed again.

Other team inside Microsoft must be also considered as important partners as they help to make the whole business model better by developing Windows product, promoting it and supporting local subsidiaries with funds that are used to support local partners including OEMs, Distributors, Retailers or ISVs (Independent Software Vendors).

Key Resources – One of the essential resources is Windows operating system itself and it is a merit of OEM business. The development is not made directly by the OEM team; however, we are closely cooperating with the team of developers coding it.

Other important resource is the staff. It is crucial to have the right people at the right position. It is especially challenging to find people that would be suitable for the role inside OEM team as it must be mixture of technician with great business and interpersonal skills. Some of the roles do

not need deep technical knowledge, however, everyone in the team should be able to describe all the products that we offer and be a trusted advisor to our partners and customers.

Investments and funds from Microsoft are also crucial as some of the revenue is reinvested into marketing campaigns and support to partners. That further helps to achieve set goals of subsidiary and whole company.

Other important are data and know how that Microsoft gets from the market. Those data help OEM team to better understand the state of market. That helps forecast what type of devices should our partners bring to the local market, without cannibalizing each other too much. Know how also includes news about Microsoft products that help the team members prepare our partners for the upcoming changes and implement it flawlessly. Data that OEM team is working with do not come only from inside the Microsoft, but also from information agencies such as IDC, Gartner or GFK.

Key Activities – Supporting the partners is one of the essential activities. It is important for OEM team to be a trusted and reliable partner to everyone we work with: retail partners, OEMs or teams within Microsoft. The support consists of funds, data analytics, news briefing, presentation of new features and trends to partners and their customers. But also, presenting new devices to other teams inside Microsoft, so they can have hands on experience with the newest pieces developed by our OEMs.

OEM team is responsible for bringing, together with our partners a portfolio of devices that will capture maximum of the market share. In the premium segment, we are mainly competing with Apple computers and OEM partners have the devices for this purpose - Dell for example is offering a premium laptop XPS 12 that is a direct competitor to Apple MacBook Pro. However, not only MNAs have such an expensive laptop, but also local partners have something to offer. Example might be recently released Porsche design 2-in-1 laptop that was manufactured with one of our global OEM partners. Some OEM partners have portfolio that competes not only in premium segment but also in cheap tablets segment or as a direct competitor to Chromebooks.

Other important role of OEM team is the networking capabilities. OEM team should work like a connector between its partners, distributors and retailers to drive the market forwards together. Microsoft is often hosting events for its customers and partners to meet with them personally, provide them with hot news from Microsoft products and the market or to simply connect partners that have the potential to cooperate better.

As the OEM is one of the main cash cows for Microsoft worldwide since the first days, the most important and number one activity is to maximize the software sales through our partner channels. This goes hand in hand with other activities. The number one priority is to grow businesses of our partners with the device portfolio that maximizes the PC market.

Cost Structure – Costs such as premises are mostly held by the whole corporation, and OEM team is affected only indirectly. The main direct costs for the OEM team are: marketing, sales funds provided to partners and personnel costs.

Other important costs are costs of channel education. We are working closely with device manufacturers and other partners to educate the market on the new trends in IT industry. It is crucial for whole IT market that people without understanding of technology know how much technology advanced in recent years and how much time they can save by using the newest hardware. Super-fast SSD discs, touch and pen capabilities or lightweight devices with long battery life, that what helps people to be productive everywhere. That perfectly fits into our value proposition, however, it is not an easy, nor cheap process and we invest heavily to market education through channels like events, online activities, point of sale marketing etc.

There are also other minor costs that occur from time to time. For example: ordering samples from manufacturers that we do not work with, travel expenses connected to fairs and device shows or co-partnership on partner activities and events.

10 Why IoT is important for OEM

This part of thesis will be used as a base of knowledge about IoT and Microsoft offerings related to devices in this trend. It will be presented to the managers interviewed in upcoming part and used as an overview of this problematic. Not everyone will be provided with all the information before interviews as many managers are already aware of the Internet of Things and have deep knowledge of this topic. First part is about understanding why IoT is important for Microsoft and OEM team, the second one is about the story that Microsoft can tell about IoT, how it stands against competitors and what kind of devices are used in IoT.

10.1 Current state and development

To understand why is Internet of Things important for Microsoft business in general we must zoom out and see bigger image of how Microsoft does business. Not so long ago the PC market was blooming and innovations in personal computing were very fast and substantial. That is unfortunately no longer the truth and Microsoft is slowly losing traction with Windows business as the whole PC market is falling. However, the lack of substantial innovation is not the only problem the PC market has, another big hit for PC was the financial crisis back in 2008. That was reflected in the European market a bit later, however, still substantially as new personal computers are considered luxury rather than necessity.

Another force turning the PC market down is, that many cheaper devices can substitute PCs for consuming content while being cheaper. For example, Android tablets that are very popular, can almost fully substitute a much more expensive PC that would serve the same purpose and would

be much heavier and less convenient. It is not just about tablets that are influencing the PC market. Another major hit was seen with the development of smartphone markets that also, to certain extend, can substitute personal computer. Important milestone was met this April, when more people accessed internet on Android than Windows. (Fingas, 2017) What effect have those changes on the overall PC market can be seen on the Exhibit 15 along with the rise and slow fall of the tablets.

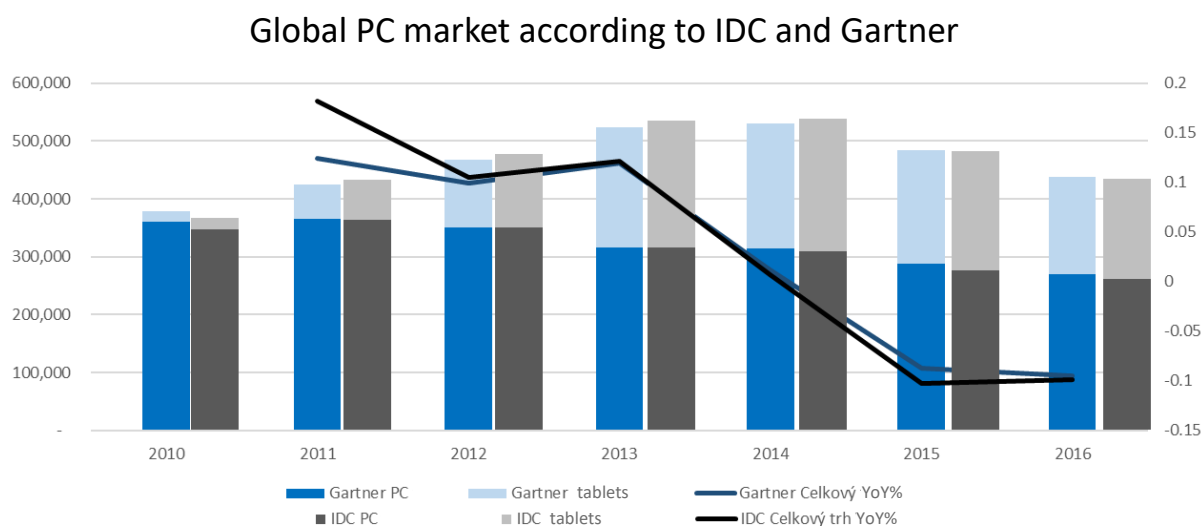


Exhibit 15: Global PC Market. Source: IDC and Gartner data interpreted by author, 2017.

Another important factor, why Internet of Things is perceived as a great opportunity for OEM and Microsoft in general is, that the whole Microsoft business is shifting into cloud. Instead of Office as the product whole company is pushing sellers to sell Office 365, which is sold as a service with monthly reoccurring fee for the customer. It makes sense, considering that sales of Office were driven by the sales of Windows computers. As computer market is falling, sales of other products bundled with computers are moving in the same direction. Furthermore, sellers that used to push Windows Servers and other licenses for on premise solutions are now pushed by the company to move their customers into Microsoft Azure cloud. The reason is the longer-term relationship with customer, reoccurring revenue and much higher margin. It also has benefits for the customer such as: unlimited scalability of the servers, privacy and security guaranteed by Microsoft and costs based only on actual usage.

Whole Microsoft is shifting into the cloud but OEM team is perceived to be a cash cow that is lacking behind this strategy. Therefore, IoT is foreseen as an opportunity, how the OEM can transform its business from providing only hardware with Windows. First steps towards this

approach were already taken by the headquarters and there are new offerings of special Windows IoT licenses that are ready to be used in specific Internet of Things scenarios. However, the strategic view on how the OEM fits into overall Internet of Things Microsoft strategy is still missing. So far, role of IoT devices is still seen as only another opportunity to sell licenses rather than integrating them into business cloud scenarios.

10.2 Windows 10 IoT offering

Microsoft developed three Windows products that are called Windows IoT Enterprise, IoT Mobile and IoT Core. The main differences can be seen on the Exhibit 16. Windows 10 Enterprise is like classical Windows 10 with additional embedded features on top.

10.2.1 Windows IoT Editions

Windows IoT Enterprise works on devices that are based on classic PCs integrated into one-purpose machines and cost between \$30-125, depending on hardware specifications. The Embedded features enable the machine to run one application and in case of any failure the program will start automatically without access to the classical Windows desktop. This version of Windows is on the market since the Windows XP and used to be named Windows XP Embedded. We are using it on daily basis without even noticing it. It is due to the specific features that hide the Microsoft and Windows branding, the classic desktop interface and the fact, that the computer

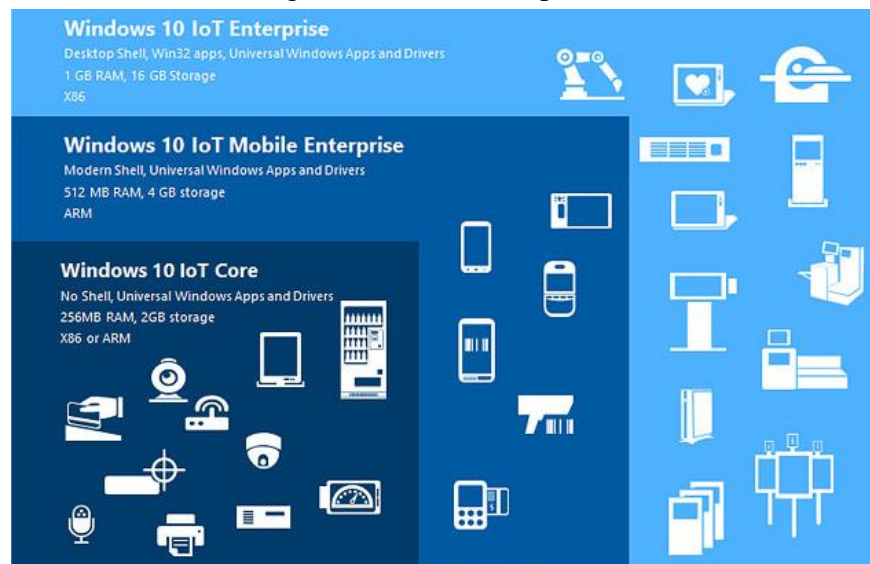


Exhibit 16 – Windows 10 IoT editions. Source: Internal Microsoft document

is even running operating system. Examples of such devices are: ATMs (still running Windows XP since 2001), self-serving kiosks but even some devices in hospital, industry computers or cinema projectors. However, as those devices have lifespan of about 15 years and they are manufactured by a very specific company for niche markets Microsoft is no longer heaving those embedded OEMs as partners. Therefore, the sales process of Embedded licenses is done through

worldwide distributors. This means for example, that there are many companies in Czech Republic that are developing those specific devices, however, Czech Microsoft has no incentive to talk to them as revenue from Embedded devices is not attributed to locally.

Windows IoT Mobile Enterprise is an embedded system for mobile devices. It was developed from Windows CE. Similarly, as Windows XP Embedded, it features all the embedded capabilities. It can make a specific purpose device running Windows in the background without its user even noticing it. It is used on handheld devices in manufacturing, logistics or for example small mobile payment terminals. This system was also used in Pocket PCs and first tablets, however, it was later replaced with newer Windows Phone. Today, Windows 10 IoT Enterprise Mobile looks just like the consumer Windows Phone, but has the features of original handheld embedded system.

Windows IoT Core is the only from the trio build solely for the Internet of Things purposes. It is made to be running on the smallest computers that can be integrated into almost any device and does not need powerful hardware to operate. It still has the same security features as the other two more hardware demanding Windows versions. The Windows IoT core can be running only one specific application and does not involve the classic Windows desktop. The Application must be written as Universal Windows Platform application. This application can run on any Windows device ranging from Arduino microcomputer, through classical laptop all the way to Xbox or Augmented reality glasses HoloLens. As the Windows IoT core is a new product it is still in the testing phase and not many use cases can be seen in the market. However, the situation slowly changes as more projects from “amateur makers” and even big companies are being developed. From OEM business perspective those devices are not interesting yet, as the Windows IoT Core is for free even for commercial use.

10.2.2 Current Windows IoT guidance

Windows IoT can run on almost any device apart from the simplest devices – sensors. Types of devices and scenarios featuring them will be explained later, to illustrate how Windows devices can be integrated into Internet of Things solutions.

Current Microsoft approach is a bit confusing and does not fully integrate into the overall Internet of Things Microsoft strategy which focuses mostly on the data analysis in the cloud. There were 3 device types identified, suggested by the headquarters as the top priority for the Internet of Things: Digital Signage, POS and Thin Clients.

As already discussed in this thesis, those devices are not the most important part of the Internet of Things revolution. The reason why Microsoft pushes them as the priority is because it supports the current Microsoft OEM business, as those devices run on the Windows IoT Enterprise license. Therefore, the license is the main revenue stream as it always used to be the case for OEM team. This approach pushes subsidiaries to focus on making partners create such devices, however, does

not provide them with guidance on how to transform them into the Internet of Things scenarios. Devices themselves cannot be considered as IoT without the connection and data analysis on the backend.

The new devices running Windows IoT Core are not providing any revenue from the license sales so there is not a big incentive to push this operating system to OEM partners to come up with new kind of devices for the Internet of Things. The only way, how such device can generate revenue is to create a solution that involves analytics of collected data, rather than only license. This approach would correspond with the overall Microsoft shift towards services.

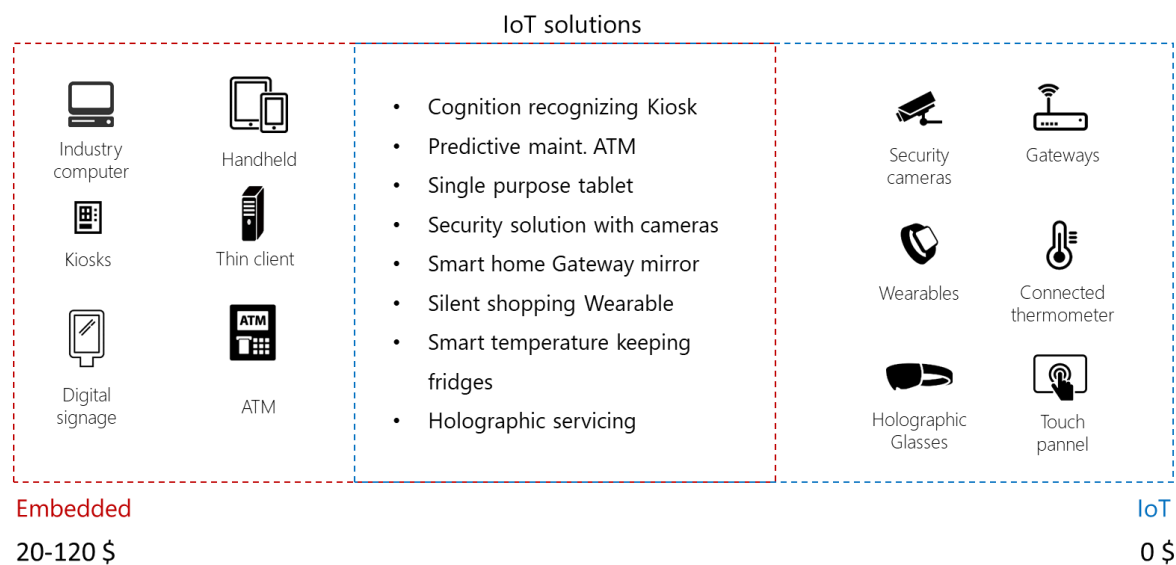


Exhibit 17 – Embedded IoT vs. IoT Core. Source: Author

This situation is pictured on the Exhibit 17 where on left side are devices that bring revenue to the OEM through classic licensing business. On the right side are devices that bring no license revenue, but might have much higher potential in the connected world. In the middle, there are examples of how can both of those device type become an IoT solution, that will be paid as a service by providing additional features. Wearable itself is not IoT if it is not connected to the internet and data are not being used effectively. The same thing applies on the kiosk example with only difference, it is running on license that brings revenue to OEM team. So far, there is no incentive to sell Azure services for OEM as it is not part of metrics set for the team. Interestingly, most of the kiosks could run on low cost hardware and Windows IoT Core, which would mean huge savings for the partner and potentially their customer and there would be more space to come up with additional services. However, for OEM team it is more beneficial to sell Windows IoT Enterprise edition without thinking about how to turn it into the IoT solution.

To better understand, what kind of devices can be used in Internet of Things scenarios and illustrate how the services connected to the device can bring additional value to the user. 3 specific business

verticals were chosen and basic use cases were described. However, Internet of Things means unlimited possibilities of what devices can be used and for what purposes.

10.3 Strategic business verticals and used devices

IoT can be seen to be used in many different business verticals. The basic use case that can be fitted to almost any kind of business is remote monitoring. Things connected to the internet are remotely monitored through set of sensors. These data are further used to predict possible failure – overheating, malfunction, unexpected behavior etc. and take predefined action if the problem occurs. This basic service can have a great impact on saving of resources as well as reducing costs. Most usually, business verticals are divided into following parts: Manufacturing, Utilities, Smart Cities, Healthcare, Smart Cars, Transportation, Retail, Smart House. Vertical that is especially important for Czech Republic and CEE countries is Agriculture.

As the variety of business verticals is broad this thesis will only focus on top 3 verticals that were identified as most important by the Microsoft headquarters. These vertical are also interesting in terms of used devices that can run operating system thus potentially interesting for Microsoft OEM partners. However, in all the cases there are at least some kinds of OS capable devices used. Gateways for example, are used in most of the IoT scenarios across all verticals. The selected verticals are: Manufacturing, Healthcare and Retail. These verticals will be shortly described on case studies alongside with identification of devices that can be used.

10.3.1 Smart Manufacturing

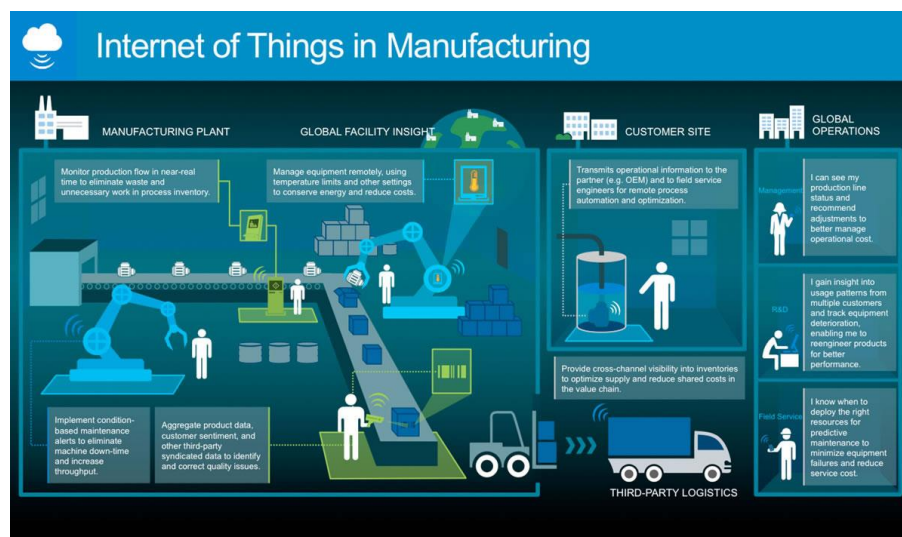


Exhibit 18 - Internet of Things in manufacturing – the Microsoft view. Source: SlideShare presentation (Luz, 2014)

On Exhibit 18 the Microsoft view on smart manufacturing can be seen. The process is divided into three different locations: Manufacturing Plant, Customer Site and Global Operations, based on where IoT is being used.

Manufacturing Plant – In the plant itself sensors are collecting data from whole machinery, checking its temperature, state and productivity efficiency. The plant worker is checking production flow and controls data on site for ability to react in case of an urgent situation. Everything is displayed on a touch enabled kiosk where also gateway is hidden. Machinery has also implemented condition-based maintenance alerts to eliminate downtime and increase throughput. At the end of the production line another worker is scanning bar-codes to be able to further identify unit and connect it to the end-customer.

Customer Site – The factory itself does not only generate data, but is also sending it back to the manufacturer of machinery. This OEM did not only sell its machines to the plant but is also offering additional services for monthly fee. The OEM partnered up with software provider that connected the OEMs machines to the internet and cloud so they offered a complete solution to the plant rather than plain devices.

Global Operations – OEM is further analyzing data obtained from their customers and transforming them into additional insight. Based on the data collected and analyzed OEM can give recommendations to the plants on how to increase manufacturing productivity as increasing it will result in better management of operational costs. Meanwhile, OEM R&D department is working with big data from all their machines in plants and based on its deterioration reengineering the product for better performance. OEM is also using the data about machines to predict the maintenance need to minimize equipment failures and minimize servicing costs as technician is sent to the site only when maintenance is really needed. The service technician does not have to be expert on particular machine as he is using augmented reality headset in order to transmit what he sees on site to the technical support that will guide him remotely through the whole servicing process.

OS capable devices in use: Smart Gateway, Smart Kiosk showing data dashboard, Handheld device for scanning barcodes, Car tracking gateway during the logistic, Smart Signage showing insight to the Global Operations, R&D designing terminal for engineering, Field service Handheld tablet and Headset for Augmented reality.

10.3.2 Smart Healthcare

Healthcare is another space where Internet of Things is predicted to boom. It has many potential benefits as in health more than anywhere it is crucial to have precise data available as soon as possible. Few seconds can mean difference between life and death. The healthcare segment is also divided to three different parts: IoT for patients, for doctors and for patients on the go.

The Patient – The patient will come to the hospital and check himself at the self-service kiosk that will recognize him based on his face and assign him a doctor. Otherwise, patient will choose his symptoms and a bot service will get more information to successfully match him with specialist in the hospital. In case it will not be possible, the kiosk will simply use its built-in camera to perform a video-call with a nurse. Patient will get a wearable device on his hand that will not only monitor his body functions but will also contain all his data that can be later accessed by the doctor. He will use this device to unlock his locker and sign in wherever he comes. Instead of a TV in the hospital room each patient will have his personal screen attached to the bed, it will not only serve as an entertainment system, but it will also show the schedules of upcoming procedures and services as ordering food or calling nurses. It will also have application for connection to the family like Skype. The patient will be able to get himself drugs that he needs by using his wearable on smart vending machine, that will provide him with exactly the medication that he is supposed to take.

The Doctor – Doctor will be always aware of any critical situation happening with their patient in real time. He will have smart wearable that will easily notify him in case he got an urgent case and will remind him of any upcoming events. He will have a tablet that will be able to read patients data by just touching his bed. There will be no need for paper as everything will be stored in cloud and always up-to date.

Patient on the go – A big increase in effectivity will be achieved when patients will be let out of hospital sooner. Once there will be precise devices to measure critical functions of body remotely there will be no need in staying in bed for longer period. All consultations will be made through online video calls where patients will go through their data with the doctor and will readjust their daily routine and drug usage accordingly.

OS capable devices in use: Gateways, Smart Kiosks, Wearable devices, Tablets and embedded computers, Smart vending machine, IP calls enable devices, NFC readers

10.3.3 Smart Retail

Retail is another sector where IoT is an important topic. That might be caused by rising demand for internet shopping that results in need for innovation of traditional retail model. This case will be demonstrated on example of Smart Retail scenario presented by Microsoft Czech Republic this year. It is a model of a small retail shop packed with technology, analysis and artificial intelligence. It will be again divided into three parts based on who is profiting from the Internet of Things: Shopper, Seller and Manager

The Shopper - Shopper will always get relevant information about devices that he is looking at. Digital signage above the device stand will recognize his face and based on his age, mood and gender it will give him a relevant content on how the device can be used. If he is a student the signage will offer him information about battery life and pen capabilities for easier note taking

while in school. It will also offer him with special student discount and additional warranty and financing options. If the customer is looking at the device longer, seller will come automatically without having to look for one. He can place the order directly at the stand and pay it in self-service kiosk with cash, card or mobile payment. There will also be special kiosks where he can get more information regarding his order or shipping status provided by AI bot that will communicate with him in natural manner.

The Seller – The seller will be still important in this scenario as he is able to showcase all the possible scenarios for the customer to successfully convince him into purchasing the product. The shopper will be notified about a customer spending time at a device that he is focusing on and will inform him about his approximate age, mood and current location. This will all happen through wearable device on seller's wrist, where the seller logged in before starting his shift. Thanks to this, the right seller with expertise in the product category will be always matched to the potential customer so that he could provide a very deep and helpful insight to the customer.

The Manager – The manager will have access to all the information from the store. He will be able to create heatmaps of most successful devices based on the data from cameras and clever signage from all around the store. In the long run, he will be able to offer the hottest places for various device types and sell these information to their B2B customers. With help of artificial intelligence, he will be also better informed about their customers as he will get data about ages, genders and so on, which can be later used for planning segmentation etc. Some other trends can be observed as most eye-catching technologies, the best performing sellers etc.

10.3.4 Smart Kiosk Example

For deeper understanding on how typical OEM licensed device can be turned into the service that also creates a consumption (revenue) from Microsoft Azure, real case from Microsoft Russia will be explained. It will be also used in interviews as an example how device that is now interesting from the OEM perspective can be turned into strategic base for future development in cooperation with ISV partner (Independent Software Vendor).

Standard digital kiosk can be seen in many places, for example it can help you order food in local McDonalds, tourists navigate through the city or shoppers through shopping malls. The usage is straight forward. The kiosk contains of big screen with or without touch capabilities and is equipped with small computer that is running operating system and application that was created for the customer (McDonalds, shopping mall etc.). It enables the end customers to interact with the content provided on the screen. Unfortunately, the interaction is usually only one way and data from the kiosk are not collected or used.

Russian Microsoft OEM partner Asbis partnered with startup ISV partner AddReality to come up with smart kiosks that could be used by Microsoft customer - a big pharmaceutical company in Russia. Because of the cooperation of OEM and ISV company they could offer a unique solution

and came up with a way, how to offer pharmacies the OEM devices free of charge. The device enable customers to choose from various medicaments, pay for them directly at the kiosk and pick them up few meters away at the cashier (just like cheeseburger in McDonald’s).

However, under the hood something more complex is happening. The camera integrated into the kiosk recognizes the person approaching it and thanks to Microsoft Cognitive services offers a relevant, high-margin medicament. It uses data like gender, age or mood of the user. Furthermore, the kiosk can be remotely monitored and content can be updated if necessary or when the offering of medicament changes. All the data about how the device is used are analyzed and used to increase user experience.

This situation is demonstrated on the Exhibit 19 along with approximate financial results of the deal are shown. And this is a perfect example how new OEM business could work by partnering up with other teams inside Microsoft and new ISV partners. Our current OEM accounts can come up with new ideas that can ultimately transform their and OEM team business from selling devices into offering services. If 10,000 devices were sold in this deal, approximately 650,000 dollars would be made in revenue and 10,000-15,000 dollars would be paid monthly for the additional features. However, OEM team is not encouraged to push their partners into the transformation, as Azure revenue is not yet part of the revenue goals.

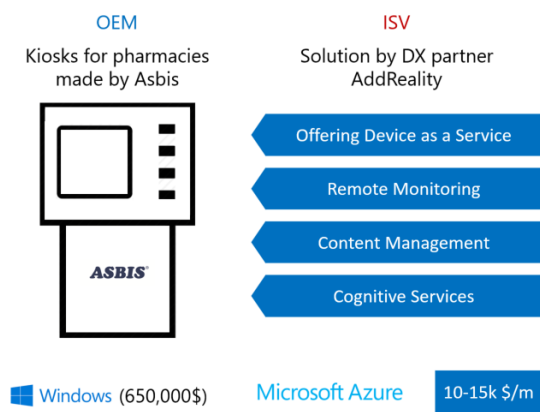


Exhibit 19 Asbis Digital Signage. Source: Author

10.4 Competitive landscape

To understand how Microsoft differs from competition, small comparison will be made with tier 1 competitors. Today the competitive landscape is very segmented as many companies enter the IoT trend, however, many of them fail to take off the ground. The top companies are compared based on what part of Internet of Things do they cover: devices, connection or data analysis. Following companies are compared: Amazon, Cisco, GE, IBM and Google. All of them are

considered being tier 1 competitors for Microsoft based on their size and IoT spending. There are many other companies that do IoT activities, for example Apple and their Apple Watch, however, it's main focus is only on hardware and end consumers, rather than businesses and IoT ecosystem.

At the Exhibit 20 simplified overview of tier 1 competitors was conducted. Each of those competitors will be further described along with their strengths and weaknesses.

	Microsoft	amazon	cisco	GE	IBM	Google
Devices	✓		✓	✓		✓
Connection	✓	✓	✓		✓	✓
Data Analysis	✓	✓			✓	✓

Exhibit 20 – Tier 1 competitors overview. Source: Author

10.4.1 Amazon

Strengths – Amazon is the strongest player in the cloud market with more than 30% (Richter, 2016) of market share. It has a big customer base, which is a big competitive advantage as the IoT discussion with those companies are based on existing relationship. Amazon is also very open to developers, selling most of its solution as a toolbox for them to build on. It is also investing heavily to acquire IoT related companies that complement their cloud offering. One of their biggest acquisition was 2lemetry that offers a solution for connected devices and was later implemented into the Amazon Web Services. (Lunden, 2015)

Weaknesses – One of its core strengths also proved to be its weakness. The 2lemetry system was connected to Amazon offering, but is not yet connected to other services offering for example the data analysis. To have such a capability their customers must purchase additional packages which brings high additional costs. That underlines their biggest disadvantage - high price of their offering. As the IoT AWS does not offer full range of needed services in one package the Amazon solution is much more expensive compared to Microsoft Azure IoT. Amazon is strong in sales to IT departments; however, it still must become better in offering IoT solution to business leaders. Unlike Microsoft, Amazon does not offer an operating system for the IoT devices, however, they are selling Amazon Echo which is a speaker with smart assistant Alexa.

10.4.2 Cisco

Strengths – Cisco is a very strong player in the devices and connection aspects of Internet of Things. Their main business is to sell networking hardware and telecommunication equipment. Most of their products are aimed to increase productivity on the workplace by enabling over the internet communication by offering IP phones, Wi-fi routers and conference rooms equipment. They have very strong position in communicating with the IT professionals and is also partnering with companies such as IBM to turn their hardware business into IoT solutions. (Kumbhar, 2016)

Weaknesses – Cisco is a hardware company and as such does not have a data analytics solution that would compete with Amazon or Microsoft. The data analytics heavy lifting is mainly done by partners, and therefore does not offer one end-to-end solution for its customers. This might be a big roadblock for Cisco to sell the IoT solution to companies as it becomes more complicated with additional vendors present in the negotiation.

10.4.3 GE

Strengths – GE is a dominant player in the industry hardware and is covering range of devices from strategic IoT vertical such as manufacturing, logistics or healthcare. It uses this advantage to generate additional revenue by tracking the devices, collecting data they generate and predict maintenance. GE created a platform called Predix, that is very well perceived by industrial players as it is offering all the mentioned capabilities along with business intelligence and other important offerings.

Weaknesses – As GE offers the Predix platform only for GE equipment it is very hard to scale the IoT business efficiently. The potential IoT customers are limited to those already using the GE machinery. However, the biggest disadvantage is that GE does not have its own cloud, therefore, it is heavily dependent on the cloud partner to enable the IoT scenarios. That makes them vulnerable in case of any changes or malfunctions of the cloud provider. Cisco is currently running Predix on Amazon Web Services, but announced that they will move their offering to Microsoft Azure during 2017. (Microsoft News Center, 2016)

10.4.4 IBM

Strengths – IBM has a long history of doing B2B business and therefore can leverage current customers and try to upsell them new Internet of Things scenarios. IBM has IoT as one of their top priorities and are investing heavily into this trend. They are doing very good job promoting their big data analytics platform named Watson. Their acquisitions of Star Analytics, StoredIQ and Vivisimo fits perfectly into their analytics and connection expertise.

Weaknesses – Their solution must be customized for every customer and fit specifically for their needs, that makes the implementations costly and time-consuming. Along with high initial costs, maintenance or upgrades require specialized team of consultants that do not come cheap from

IBM. Because IBM solutions are customized, not platform-based, adjusting solution once it is deployed can be a complex, lengthy process. Watson offerings look really appealing, however, it is very expensive and challenging to implement and needs IBM engineer as well.

10.4.5 Google

Strengths – Google is very strong player on the B2C market and well perceived by “geeks” and people working in online marketing. Those early adopters are very likely the target group for smart home products and therefore, perfect fit for Google’s Nest thermostat. Although Google seems to be offering all parts of the IoT ecosystem – Android devices, platform for their connection, and to some extent also data analysis, they have not proven yet that their offering is suitable for B2B scenarios.

Weakness – As it is strong among regular users it lacks behind in the B2B market big time. Google has a long tradition of selling ads to consumers but is failing to offer their solutions to other companies. Google also focuses rather on gadgets such as Nest, but lacks focus on industry or value to decision makers. Android devices have huge market share in cell phones, but they are not exactly known for their security, that is a big road block for enterprise use cases.

10.4.6 Microsoft

Microsoft perceives the Internet of Things as a huge opportunity to drive its most important business to date – the Microsoft Azure cloud platform. Azure revenue almost doubled from previous year and Microsoft CEO Satya Nadella sees a big opportunity of business digitalization which is driven by IoT and Artificial Intelligence: “Our customers are seeing greater value and opportunity as we partner with them through their digital transformation. Accelerating advancements in AI across our platforms and services will provide further opportunity to drive growth in the Microsoft Cloud.” (Microsoft, 2017)

Strengths – Microsoft offers a unique solution as it is offering real end-to-end solution. It is very strong player in the device market as Windows continues to dominate market for personal and industrial computers. It also has a very long history of productivity software offering ranging from Office, through Dynamics CRM to Power BI for big data analysis. From its market power, Microsoft has a long history of offering solutions to almost every vertical including government, industry, healthcare and many others important for the IoT. With this experience, Microsoft can offer an IoT solution that can be easily implemented in those areas along with legal and security requirements. Microsoft is shifting its business from selling software to offering services with the help of its partner ecosystem and therefore can reach to more customers easily. Microsoft Azure is perfectly scalable and is present with datacenters worldwide.

Weaknesses – Microsoft has long history of creating Windows, however, it is necessary to mention that most of the devices in IoT are not running an operating system. Sensors are simply

harvesting data, and eventually sending them to larger devices that can be running an OS. Microsoft is also known as the company locking people in their ecosystem, however, it is working hard to change this perception by opening to other device systems such as Linux, Android and iOS. Probably the most crucial weakness is that Microsoft is used to selling solutions to IT departments, but IoT is usually sold through management. It has to adapt its strategy and create new business connections with their customers.

11 Interview outcomes

Based on the interviews 130 points were distributed overall. 53 points were assigned to Key Partners building block and therefore, it is the most important to change in order to be prepared for the future of Internet of Things. As the second most important Key Activities were identified

Key Partners 53/130	Key Activities 26/130	Value Proposition 14/130	Customer Relationship 4,5/130	Customer Segments 4/130
	Key Resources 12,5/130		Channels 4/130	
Costs 3/130			Revenue Streams 9/130	

Exhibit 21 – Points distributed among Building Blocks. Source: Author

and assigned 26 points. Third was Value Proposition with 14 points and afterwards Key Resources with 12,5 points. From remaining 5 building blocks: Revenue Stream got 9 points and the remaining Customer Relationship, Channels, Customer segments and Costs all got below 5 points. The changes are mostly focused around partners and activities inside Microsoft, rather than changing the way we treat or segment customers. Value proposition is changing as advantages of Internet of Things are being leveraged. The point distribution can be seen on the Exhibit 21 where shades of blue highlight the importance of each building block – darker color means higher importance. More detailed table of how each of the interviewed assigned points can be seen in the Appendix 1 table.

After the coding of interview transcript about 180 codes were identified and further divided into 22 categories, that are connecting codes with similar meaning and theme. Examples of codes identified, along with the categories in which they were divided can be seen in Appendix 3. Those categories were based on meaning assigned to building blocks that are in the following part of thesis ordered by identified importance. This distribution is shown in Appendix 2. Categories and

themes are used to describe what is due to change in every building block. Those that could not be assigned are used to describe overall trends or facts mentioned during interviews. Quotes from the interviews that are supportive for better understanding or further underlining some of the categories are used.

For better illustration of the coding process, example of how a category was created can be seen on Exhibit 22. It consists of codes that were identified during interviews and together forms a theme “Partners have always been crucial for Microsoft”. This category consists only of 7 codes, however, others such as “Need to connect OEM partners to ISVs as they lack cloud know-how” was created from more than 30. All 22 themes, built from 30 pages of selective transcripts and 180

Partners have always been crucial for Microsoft	Partnership is crucial for Microsoft	Microsoft is selling through partners	Partners are essential for Microsoft	Microsoft is good at partnering since beginning	Partners always have been essential for Microsoft	Partners are the key once again	Partners are essential as always
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Exhibit 22 – Codes assigned to category. Source: Author (Appendix 3)

unique codes, were assigned to building blocks and used to derive insight described in next sub-chapters.

Facts	Key Partners	Key Activities
IoT is a system of one-purpose devices connected to the internet, collecting data which help make businesses more effective	Partners have always been crucial for Microsoft	Partner education, showing possibilities of value they can add with Internet of Things
OEM is a cash cow that does not fit into cloud strategy, but supports other teams in the shift.	New partners have to be found as our current might not be flexible	Creation of POC projects along with partners and internal teams is needed which solves business problems
No incentive for OEM to change as cloud services are not in the quota and other targets are high.	Together with other Microsoft teams offer end-to-end solution rather than just analysis or devices	New Opportunities for partner's business and not only financial
There is a need for change but nobody can address it as the information is overwhelming	There is a need for partner's mindset change from product to service offering.	Along with partners educate customers and show the real value of IoT
	We have to connect ISV partners with OEMs as they lack cloud know-how	

Exhibit 23 – Categories divided into building blocks. Source: Author (Appendix 2)

Example of division of themes along building blocks can be seen on Exhibit 23. Only three out of 10 building blocks (9 building blocks and “facts”) are shown for illustration of the procedure. The remaining part can be found in appendix.

Identified themes and codes, are further used for description of most important changes, that should be made in each building block. The order of the building blocks described below, mirrors the importance identified during interviews (Exhibit 21). However, it starts with basic facts about OEM and Internet of Things.

11.1 Trends and facts about OEM and IoT

Themes and categories that could not be assigned to building blocks were identified as either description of trend, understanding of Internet of Things, current role of OEM inside Microsoft or reasons why is OEM not transforming into service seller as much as the overall company.

Interviewed employees identify Internet of Things as system of interconnected, one-purpose devices that are sending data to the cloud. In next steps data are being analyzed and the outcomes are used to make processes in company more efficient, and overall productivity higher. As the most important parts for the future, analytics and cloud connection were mentioned, however, devices are taking important place in the trend as well.

One of the themes that came out during interview is that OEM is still considered as a cash cow fueling the growth of overall strategy. Even though, it is providing other teams with funds to create a strategy full of cloud services, the OEM team does not have a clear role in it yet. Its business is about selling hardware and boxes of software which is quite the opposite from services that are being pushed by 90% of customer-facing employees. “I feel that whole company is pushing towards cloud services and we are selling boxes of software instead”.

The initiative to move OEM from selling boxes is missing so far as cloud services are not part of OEMs targets. Furthermore, nobody knows how to involve them to ensure that the team transforms together with rest of the company. “OEM team does not like cloud as they are not measured for it. So, it is about changing the mindset of whole company.” So far, the OEM team has the highest revenues with as little headcount as possible. That leads into high targets for everyone and therefore, only limited motivation to push something that is not in their quotas. Even though, they believe that it is essential for the future as “OEM will be the cash cow for another 2 or 3 years and then it will have to transform to service provider just like the rest of Microsoft.”

And the reason why the OEM team is not heaving cloud services in quotas is other, commonly described theme among interviewees. Even though, the company sees that there is need for change, as computer market is falling and new competitors are emerging. The term Internet of Things is still considered as a hype bubble and nobody really knows how big it will be, and where is the highest value for the OEM partners. Changing strategy of a cash cow, that would threaten the overall effectivity, for a trend that is yet not proved is considered as dangerous. Company therefore set 3 verticals for IoT devices: POS terminals, digital signage and thin clients. These devices still bring only revenue from licenses and therefore is safe bet for Microsoft. “We as company specified 3 vertical where to focus, and I think that IoT can be very broad and it is much bigger than those three verticals.”

The strategy clearly must be set by the company headquarters, until then there will not be a clear incentive for the whole OEM team to push towards selling and actively offering Internet of Things

services. “The problem is that nobody knows how to handle it, not even Redmond and that is horrible.”

11.2 Key Partners

Key Partners Building block got assigned almost half of the points that were to be distributed among all 9 building blocks. That illustrates, how important are going to be partners in the future. The categories are about connecting various types of partners, importance of partners in general, better cooperation with teams inside Microsoft and changes in the partner ecosystem we have today.

Partners have been always essential for the Microsoft business, and even today most of the business is made through partnership. As an example, 97,5% of all Windows licenses are sold on devices manufactured by our OEM partners. The Microsoft itself started as a partner business “That is how Microsoft started, when IBM needed some kind of operation system. And instead of selling it for few millions we sold it for 15 dollars per box through partners. We are good at partnering. “and partners are still considered to be crucial even for the business in the cloud and Internet of Things offerings. They can scale our offerings through their customer channel.

Hardware partners are used to do business in their own way and it might be very complicated for them to change the mindset from selling devices to offering services. Some have problems even when they are told that they can achieve significant savings by switching from classic boxes of Office into electronical codes, that can be distributed online. “Just yesterday a partner called in and asked for a box of office, now when we are selling most of the licenses electronically. Electronic would be much cheaper but he prefers to hold the box in the hand instead of having just a product key.” As the current partners are not flexible, a new set of partners will have to be found. Partners, that we never talked to but might have specialty in Internet of Things or set of customers that are looking for IoT scenarios. This happened, when Microsoft set tablet computers as new priority and we had to find partners that could produce them. “I do not believe that our partners can make it. We should look for new partners with Internet of Things capabilities” but not all partners can be replaced, and some of them will be able to transform into IoT friendly companies, but they will not be able to do it alone.

The most used code overall was the need off connecting our current OEM partners with Independent Software Vendors (ISVs). The typical hardware manufacturer lacks the capabilities to create a software solution that would make complete Internet of Things offering. However, those companies together could create synergy and together offer bigger value to the customer while creating new revenue streams and transforming their business from devices to service offering. “Other important thing is, that our partners will not be able to do it by themselves and will need to be connected to ISVs that other teams in Microsoft are working with.” This quote is leading us to another important theme from the interviews – OEM must start working together with other

Microsoft segments to bring real, end-to-end scenarios that cover everything from Windows based devices up to the cloud analysis.

“I would say that we are the only company that is offering the whole story: starting from the operating system for devices, connecting them to the cloud through our services, analyzing the collected data and then of course, making insight from them that helps our customers to decide on next steps and accelerate their business.” Today, rest of the Microsoft is pushing towards cloud services without caring about devices that are part of those scenarios. However, we should take advantage of the fact that we are the only company among our competitors that is offering real end-to-end scenario. As the services have highest margins it might not seem too important to focus on devices, but it ensures not only higher security, but also enable us to gasp most of the value customer can generate even in long term. “It is important to have the operating system, if the company is going to use Apple hardware all of the sudden they might also want Apple cloud and Apple software instead of Office. The company means a lot of revenue and just because the devices we could lose all of it. The platform is essential and it only works end-to-end.”

11.3 Key Activities

Key Activities scored as second highest among all building blocks. It consists of educating partners as well as customers, creation of proof of concept cases solving real business problems by IoT applications and showing partner how they can transform their business through Internet of Things.

The market education is needed on both sides: the customer and partner. Even though, Internet of Things is a big trend and everyone want some IoT scenario, most of them do not know what it means. Therefore, it is crucial to present our capabilities on case studies, showing how IoT solves real business problems for our customers together with hardware and software partners. “Everything starts with the problem that customer have, or the process that can be optimized. What is going to be hardest is to tell them what is possible and what can be solved with IoT and we need some lighthouse projects that we can echo and scale it among customers.” We need to have such proof of concept not only for partners, but also for customers. Otherwise, they will have no incentive to use for example smart devices based on our operating system. “Windows is not known for stability and I would not want to have Windows 10 running in my fridge. We have to show additional value to the user.”

OEM team also needs to push service offering not only by offering financial benefits to the partner. OEM also needs to show, how partners can deepen their relationships with customers by additional services like monitoring or servicing. “They can have multiple types of tiers for example in servicing. Tier one would be just in time servicing with breakage prediction and tier two could be servicing based on actual problems, that is new kind of revenue not only for our partners but also for us.”

As we want partners to push our Internet of Things offering, and educate their customers about what Internet of Things is, we need to give them as much arguments as we could. That can be done by making case studies showing real business results as well as showing partners all the advantages they can leverage: “They are going to do it only if they see some clear positive business outcome. It does not have to be direct profit, but other advantages, servicing options, additional security offering they can further upsell to their customers. It can really be direct or indirect profit, but it must be in their best interest.”

Activities are also closely interconnected with Key Partners building block, as we will have to reach out to look for new partners on the IoT market, work more with other teams inside Microsoft to interconnect ISVs with our OEM partners, and together with them come up with proof of concept scenarios, showing the Internet of Things capabilities.

11.4 Value Proposition

The Value proposition of Microsoft to customers must be clearly defined and easily understandable by our customers. OEM team will also bring value to the partners however, it was already described in the beforementioned Building Block. The Value Proposition should be targeted only to customers. They are defined as end users and small, medium companies not managed by other teams within Microsoft.

Most discussed theme in interviews was the security and privacy aspect that Microsoft offer on every level of Internet of Things. For some Microsoft customers, security is number one priority and as Microsoft has a long history of keeping devices secure and data private, Windows devices are only option for some accounts. “So far, everyone is talking just about cloud and it is easier for the seller to go with Linux devices and just sell the data services. But I think that if there is a chance, we should fight for Windows and mainly on the security story. And some customers are going to ask for secure devices. BMW for example is not going to give android tablets into their factories and that is great opportunity for selling end-to-end Microsoft solutions as we have the long-lasting support for Windows devices. No one can guarantee you security and updates on Linux and it would be a shame to not push Windows devices.”

However, the security is not important only for companies to keep their data private, but with growing number of connected devices, that are dependent on secure internet connection, any malfunction may have serious implications: “Security will be probably the number one concern in IoT scenarios. It might not seem like a big deal if someone hacks into your fridge, but when hackers will tackle autonomous cars it might be life-threatening. And Microsoft has long history of security and privacy and I would say that not a single system is as secure as Windows it has all the needed security features and can be updated remotely which is very important.”

11.5 Key Resources

Key Resources needed for the OEM transformation based on interviews are mostly: acquisition of new knowledge about the Internet of Things and heaving a champion inside OEM team, that will drive the whole idea and make sure that the team fits into Microsoft strategy.

The resource that we will have to leverage even more, is the platform that Microsoft is offering and help us connect OEM and ISV partners, while providing them with technologies that make Internet of Things possible. We have a unique network of partners with various expertise, which is important resource. Matching them together is one of the most crucial activities for OEM team. “This, I think is the only way that makes sense. Once again be the pillow for the partners, put them together, support them and help them while providing the software platform.” This links us back to the fact, that we should be able to provide the platform not only on the cloud level but device as well. “It might sound like an advertisement but who else is supposed to help partners than Microsoft that has the solution really from end to end? We have software, analytic services, servers, cloud. If there is supposed to be an integrator to connect companies and enable IoT, there is no one else that could do that on the market. We should not only provide the platform but we must connect the hardware and software partners. For example, software guy comes up with a solution and we connect him to a hardware guy and together they can make it happen and at the same time Microsoft should be a creative partner coming up with ideas from our customers to create new, out-of-the-box scenarios.”

The process of innovation of OEM business model also needs a dedicated person, that would be in charge of the activities and promoting OEM role within Microsoft. “Now we need to have someone who knows partners from not only OEM part, but also ISVs. Together with both of those partners we must help them connect with a customer that is heaving some business problem that Internet of Things can help solve. We would need at least one additional person to do this.” But the person cannot do all the work alone. It needs to gain the knowledge of IoT market and all the possibilities, and educate others in the team to shift mindset within OEM. “We need someone, who will drive the transformation and all those activities and it should be you in our case. But we also have to gain new knowledge, get to work with other teams in Microsoft and let them know that our partners are capable of doing IoT devices.”

11.6 Revenue Streams

Revenue Streams Building Block got 9 points out of 130, which is indicating only limited importance in the strategy of OEM team. Two common themes were identified: firstly, the revenue will be obtained from actual usage of services and secondly, the revenue will change because of other changes.

So far, the business of OEM is straight forward. Revenue is obtained through licenses, that are mainly sold through OEM partners and therefore, is tied with the number of computers sold in the market. The servicing model will result in change of this approach as revenue from services is linked to actual usage. Therefore, it is not enough to just sell a device. This is a trend that OEM team is not used to and will require a change in mindset of all employees. “I would love it to be classic licensing business, it is fast and clear, but it is going to be paid per usage. This is just like Office 365 and I see IoT as the driver that could change how we charge for our software. We could have some new freemium offering, heaving the monitoring for free but if you want to use other services we would charge extra.” Other implication of this change is in revenue planning for the OEM team and whole company “I think with IoT what is going to change is Revenue Stream, revenue is not going to come from selling boxes, but from offering services. The customer is going to pay for what he really uses and that is going to change planning for the entire company. Now it is: how much you sell, that much revenue you gain. From now on you have to sell it, implement it and the customer also have to use it to get revenue.”

Changes in revenue seems to be important according to interviewees, however, most of them believe, that the change will occur because of the activities, and shift of partners into service providing. The revenue stream is dependent on the company headquarters strategy. Currently it is not possible for OEM team to obtain revenue from service offering and that is linked to trends and facts about OEM team and Internet of Things. “I would give 0 points to revenue stream, that is the last detail and it will just happen”

11.7 Customer Relationship

Customer Relationship belongs into the last four channels with lowest score with less than 5 points along with Channels, Customer Segments and Costs. No major theme was assigned to this theme as the relationships will be affected by the Internet of Things in between partners offering solutions and their customer. This relationship can be deepened and new ways, how to effectively communicate between them will be created, however, this was already included in the Key Activities and Key Partners building blocks. “I would give the last point to the customer relationship as Internet of Things changes the way how we, or our partner connects with their customers. With IoT you can react to failures or problems in real time and offer non-stop servicing or tracking etc. and that is a big change from current approach.”

11.8 Channels

Channels also belong in the group of Building Blocks, that will not be affected in a significant way. Only theme identified in the interviews, was the shortening of partner channels by cutting out some parts. “If IoT is going to be big, there will be a change in distribution channels, some of the parts of distribution chain are going to disappear, like resellers or redistributors. OEMs are going to create more customized products and that will lead into shortening the distribution

channel” other statement from the interviews underlines this theme: “Channels will also be a subject of change as for customers it is interesting to buy services directly from partners providing the whole service rather than purchasing only devices at retailers and then looking for a company that would connect it to the internet.”

11.9 Customer Segments

Customer segments will mostly stay the same, however, the way how we see size of the customer will change with the Internet of Things scenarios. The overall idea of IoT is, that current customers should not change the way, how they use devices, but they will have more pleasurable experience doing so. They will enjoy better customization, and perhaps also experience lower cost as only actual consumption will be charged.

What will change, is the way how we seize customers and partners. So far, the only segmentation criterium was, how many computers the company uses. In this criteria company having 25 computers is considered small, as they can buy only 25 computers and 25 Office licenses. However, with Internet of Things and service offering this will change. The only thing that matter, is how much cloud computing can the company consume. “Now we have a big corporate account that are clustered based on number of employees but now it is all about consumption. Even small company can consume more azure than big company and it is only about the use case.” Some companies are so big, that they are simply resistant to change and will never give their data in the cloud.

Similar approach can be seen in seizing partners. Even smaller partners can be treated as big customers as their portfolio will include more cloud services and size of their customer will not be the main defining criterium. “Our small partners have like 30 customers and you never know if some of their customers can have a huge IoT solution.” And therefore, education of even smaller partners and showcase of what is possible with our IoT portfolio is important.

11.10 Cost Structure

As the Building Block with least changes identified was cost structure. Only theme connected to it were additional costs linked to the market education about Internet of Things. “For the activities, it is also very important to educate the market and show them that the IoT is not just another hype bubble, although it might be very hard and might cost us a great amount of resources.”

As well as the Revenue Streams, costs linked to the overall strategy change will occur, but it makes no sense to focus on them directly.

12 Discussion

As explored in the theoretical part and during interviews with Microsoft employees, Internet of Things is a very complex and hard to understand concept that is yet to prove its real value. However, the basic component understanding is in line and can be simplified into three basic parts: Devices, Connection and Data Analysis in the Cloud. It seems that every technological company believes that the Internet of Things is the next big trend which is going to create new value for new revenue possibilities when the general market for computers is declining. Microsoft has the unique opportunity because it can cover all the three layers of IoT with its offering.

However, it seems like the device part is being neglected in favor of the more profitable and higher margin cloud offering. Therefore, there is yet only limited strategy for the OEM team in the Internet of Things work, and there is no guidance on how to include the business unit generating most of the Microsoft profits in the cloud business where the rest of the company is heading to. The revenue from licenses is still creating most of the Microsoft revenue and therefore the OEM is only creating money that is further redistributed among other teams offering cloud services to their customers. The Internet of Things transforms the possible ways of how to upsell services to the devices as discussed in the theoretical part and the Microsoft OEM team must clearly change its strategy to stay relevant in the upcoming trend of digitalization. Even though the trend is marked as important and during interviews, it was described as the future for the OEM, there is only little incentive for current employees to push the Internet of Things forward as the company is struggling with incorporating the cloud and IoT quotas and targets into the team's metrics.

Partners were identified as the most important subject to focus on and that is in line with the theoretical findings. It is extremely hard for manufacturers producing devices or any other products to implement sensors and write software as they do not have the needed knowledge, highly skilled and expensive manpower and other resources to do so. Therefore, the strategy is to partner OEM partners with ISVs and to create case studies and solutions based on real problems which Internet of Things can solve. Current approach of the rest of Microsoft teams is also a future challenge as the sellers push mainly the cloud infrastructure and do not focus on the device level, because it is not in their targets and any Linux device will do.

However, this approach could be disastrous in the near future. If Microsoft scales its IoT scenarios built on insecure Linux devices rather than those running on Windows operating system, there is no control over the very first object that can be attacked by hackers. And if the whole solution fails, or some important data leak through unsecured devices it can have a very negative effect on the whole Microsoft IoT offering. This could be prevented by offering a real end to end solution where every part is supported by one trusted partner – Microsoft. Therefore, there is a need for cloud services sellers inside Microsoft to cooperate with the OEM team and to create a portfolio of fully secured and scalable Internet of Things scenarios together with ISV partners, which involve every bit of hardware and software needed. An employee within the OEM team is needed

to focus solely on transforming OEM partners, interconnecting them with current ISV partners and making sure that our hardware manufacturers are capable of providing all the devices needed for Internet of Things scenarios. Other important activity is seeking for new partners who are more flexible and can quickly fill the gap which cannot be filled by our current partnerships.

This new approach to the partner network, role of devices in the Internet of Things and needed resources can further help overcome identified possible roadblocks for the Internet of Things adoption. Apart from security it can help fight privacy issues. Microsoft has decades of experience of keeping data private for customers ranging from personal computers, huge manufacturing companies or public institutions, which creates trust that is needed for companies to be open for the Internet of Things scenarios. Lack of Standards is another very important problem in the Internet of Things world and as many new companies are entering the market and creating their own ecosystems, new security holes can be exploited. There is not a single 100% secure way how to connect Linux devices with Azure services, however, including devices running one of the Windows 10 IoT offers can mitigate this problem.

The analysis of interviews also brought new findings about the changes that are about to come. For example, Microsoft customers could no longer be divided based on the number of computers they use in the future. Even company with few PCs can use an Internet of Things solution that is creating a huge consumption of cloud services and thus generating much more revenue in long term, than company using hundreds of computers while not being connected to cloud at all.

As the interviewed employees were only from Microsoft, their opinion might have been biased based on their experience and limited knowledge of other Internet of Things providers. The overall lack of clear definition of the term Internet of Things and novelty of this topic also creates place for limitation of the research. To overcome these problems, employees were presented with unbiased facts about the Internet of Things which provided them with basic knowledge of this trend as well as offerings of competitors.

As this thesis can have direct business implementation, the possible follow-up on this research would be implementation of some of the changes inside the OEM team which would ensure that it is prepared for the future of connected devices. First step could be:

- 1) Appointment of the champion who would drive the Internet of Things thinking.
- 2) Promotion of the idea why devices are important in IoT within company.
- 3) Cooperate with flexible partners and seek for new ones on the market.
- 4) Come up with the first fully end-to-end scenario which could be used as a benchmark for Microsoft worldwide.

13 Conclusion

The main goal of this thesis has been met and main changes in the current business model identified along with strategies for each of them. The most important implications of the Internet of Things will be visible in the way how the OEM team works with the partners and other teams within Microsoft. Current hardware partners will have to adapt to the new way of thinking and together with help of independent software vendors create solutions based on the Microsoft platform. These solutions will be helping their customers to achieve more while exploring new revenue possibilities along with better services that could be upsold along with the current hardware portfolio.

However, such changes have to be supported by the company headquarters, because, so far, no one is sure about the next guidance in term of revenue attributions from cloud projects which also includes the Internet of Things offerings. Therefore, there is only limited initiative for OEM team members to push services forwards and implement changes suggested in this thesis as it would disturb them from achieving very high revenue targets based mainly on classical software sales. A new headcount is needed to drive the Internet of Things as a strategic project that would be in charge of new partner acquisition, connection of current ISV and OEM partners as well as creation of proof of concept scenarios which would clearly demonstrate that there is a role for the OEM team in the future of cloud services.

To successfully achieve goal of this thesis, careful review of literature about the Internet of Things, Business Models and Business Model Innovations was made. In the practical part, Microsoft Corporation was introduced along with the role of the OEM team. Then, current IoT activities and offerings were described by analysis of internal secondary data. Findings were compared to rapidly evolving competition in the IoT sphere. To analyze, what changes must be made in the current OEM Business Model, interviews with managers from Microsoft were made. Selective transcripts were analyzed and turned into 180 codes, that were divided into themes, used to identify most important changes to be made in business model building blocks. Theoretical part served as the knowledge base for interviews, analysis and final results discussion.

Findings of this thesis were presented to OEM managers in Microsoft Germany and the Czech Republic, as well as discussed with the OEM team in Central and Eastern Europe. As a result, new role was created in the Czech Republic – Champion for Internet of Things and Windows devices, connecting the conservative device business with strategic opportunities in the cloud. Other markets are waiting for first successes of this pilot project to make sure, that the investment into such position makes sense, even without the Microsoft headquarters direct support, which might or might not come.

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15 Appendix

Interview Transcripts:

Interview – Peter

Hi, I would like to describe you the aim of my thesis, I am not sure if you know how Business Canvas works.

Nope

(Explain BMC)

The thesis is about how Internet of Things and digitalization can change these building blocks that you can see on the canvas. It can be any block, for example new partners, different customer segments with different channels etc. I am exploring how IoT can change our business model and I would like to apply this approach to other companies. And the number one question for you, what does Internet of Things mean for you? How do you understand it?

I think it is connection between devices that interact with each other followed by the data analysis. That should be used for optimization of processes.

You have seen my presentation. Do you think that OEM team has a role in IoT?

I don't see it yet. I don't think that OEM team is the one that is supposed to sell the services like Azure Hub and others but they are the key for Microsoft. The role of OEM should be the role of evangelization of operating system and solutions rather than selling the cloud services. I have met with manufacturer of microscopes and tried to tell them why they should use Embedded, IoT and shown them how to work with that. We should still think about hardware even though Microsoft is focusing on the analytics and data.

Do you think that revenue from licenses in the future will be different? Is it sustainable to sell only licenses?

I see OEM as an island inside Microsoft and we will need merging for example with SMB team that is working with partners and distributors and our business models are going to merge. I don't know why OEM can't sell services including IoT as a package solution that is going to be sold as a service rather than separate products. So, widening of the portfolio we offer. Now, I see OEM as a team that is selling boxes of Office, OS, devices but I feel that we are lacking behind the whole company that is more focused on services. We are just a cash cow for the company and we are doing our business to enable other teams to do service business. And this will have to

change. What is important about switching from boxes to cloud is that in boxes you have revenue in the time of purchase, however, in cloud it is paid monthly as a service.

This is probably where IoT is going considering the IoT Core licenses with zero revenue but promise of future Azure services upsell.

Yes, I totally agree. However, there might be another trap. You might sell a service but also make sure that they will use it afterwards and it helps their business.

Now the exercise, when you look at the business model what do you think is important to focus on in the future, if we are talking about the Internet of Things. You will get ten points and you can distribute them among those building blocks. You can give all the points to one or distribute it.

It depends on how it is going to evolve. I see the role of the OEM in selling the hardware. You still must consume on a platform as you can offer more services such as office on all the devices. It can be two main streams, for the company pushing services, it will be interesting on all hardware without pushing Windows everywhere. I am not sure, but partnership is crucial for Microsoft you must have great relationship with manufacturing partners but also with ISVs that are selling solutions to their customers.

You also were talking about the activities and revenue streams. You said that right now it is about selling boxes. Do you think that it is going to shift?

Yes, for sure I have already seen activities for next year that through ESP program you as OEM will be able to sell other services apart from Windows. Why would not people buy it? It is system as a service without maintenance rather than buying licenses and caring about service and upgrades. I see a problem in sales person inside Microsoft. They have their goals and quotas but they don't care much about the welfare of partner. The partner might prefer selling services rather than boxes, it needs a mind shift. I see partners as brokers of services. That is also the change of the channels as instead of boxes you are offering directly the whole service.

Do you think that some additional resources are needed? New people on the team?

I think that our team is already working slowly with the partners. But people in the team are conservative and they do not want to change the way they work. It will be hard to do the mind shift of the partners. We need to find some pilot projects, 2 or 3 partners to do the proof of concept to show that it works and can be done.

So, you think that it is about work with partners?

The OEM business is not going back to growth, it can be flat in long term but it is never going up, so new revenue streams are also very important. Maybe we are going to change category and instead of laptops we will sell for example 3in1s but PC market is dead.

Now we have specified the building blocks and we divide points, how would you do it?

It is all about work with partners, they are those that are going to sell the solution. I would give them 5 points. Now, I am thinking about the revenue stream, but they are probably going to change even as a result to other changes we are talking about. I would however, give them 2 points as there must be a change. Then we talked about the activities and we must give partners ideas about what are the possibilities of IoT and what kind of problems can they solve. The activity from our side is crucial and we must find the pilot projects and scale them among other, slower adapting partners.

You also mentioned channels.

Channels will also be a subject of change as for customers it is interesting to buy services directly from partners providing the whole service rather than purchasing only devices at retailers and then looking for a company that would connect it to the internet. Overall, I think that whole IoT is about changing the classic device sales into working with software partners along with OEMs to connect them and come up with specific solutions for real customers. It is still a huge topic but it is very hard to grasp Stepan is trying to tap into that but it is still in very early stage and partners at the end don't see our added value, they are doing it themselves, for example Jablotron is doing the whole security systems on their own. You come as Microsoft and tell them that the Azure IoT is the best way. You must tell them, how they can benefit from business in Azure, all the security certificates, storage of data in the cloud operating system on all devices always up to date. It has to be pushed by partners with solution. It is like you are buying a car and person from Bosch is telling you to buy the car because one part of the engine is made by Bosch and is the best on the market. You as customer simply don't care. You are buying a car and you have the relationship with the dealer you are sure that it is reliable. It is about selling the whole story. You must find 10 big companies and show them how Windows fit into the story. In the microscope company, they were amazed by the Azure offering. Right now, they are using AWS as their tech dealer Mainstream offered them Amazon services. We must give some incentive to our partner to offer their customer Azure and Windows solutions, create an alliance and always have arguments why Azure is better than other solutions and push this story through partners. We are just a small part of the story and to be honest, for the customer there is not much difference between offering of Microsoft and Amazon it is mostly about the overall relationship.

Ok, thanks you very much Peter.

Interview – Arnie

Hi Arnie, could you tell me what do you understand by the term Internet of Things.

I think it is everything connected to the internet. There are devices gathering the data all around us and when you collect the data and analyze them – that is what I call the Internet of Things.

What devices do you have in mind?

Well I think it is mostly about sensors, collecting the information, however, there are also bigger devices, I mean anything can run with a small computer inside and connect to the internet. The sensors itself can't do it, so there is probably also some kind of more complicated device needed. An I am very excited about the whole trend. I believe that it is going to be big. But I would really love to know more about it.

Showing the presentation for IoT.

What kind of partners are doing those IoT devices, Sheznen?

There are also MNAs creating gateways, but we are not supporting that very much. We do not care about the devices in scenarios yet.

Me, explaining the current business model. Now when you saw the presentation and our current business model, what building blocks should change, which are the most important if we want to keep up with Microsoft and digitalize?

I think it must be done through OEMs. It is not about just selling the licenses to them, we have to focus on educating them about what kind of devices are needed for Internet of Things and together with them and other Microsoft partners develop or import devices for those scenarios. And they are going to do that only when they can see a clear business advantage for them. They are not going to do it just because they like us, we have to show them a clear proposition. Explaining them, what kind of services can they sell along with their devices to transform also their business from selling devices to offering services.

So, do you think that we must give them a clear business reason?

Yes, logically they are going to do it only if they see some clear positive business outcome. It does not have to be direct profit, but other advantages, servicing options, additional security offering they can further offer to their customers. It can really be direct or indirect profit but it must be in their best interest.

So, is it about partnership?

I would give it 7 points. But then we have to educate the market, show that Microsoft have the solution that can help them and is better than competitors it can be known as secure, easy to implement or affordable. It does not need to be cheap or the cheapest. Just like we did with the EET offering. I think we have to work with the developers, that is an important starting point.

Do you think that partners have capabilities to make Internet of Things devices?

I think that we must use our current partner network and connect it to ISV partners that other teams in Microsoft are working with. Together they can offer the whole package, just like Apple, they are selling device, that just works. This is what we should offer, complete solution that is plug and play with all the security features. Just the whole, complete offering. We also have to have strategy not just come with something and toss it on market. We should know how our offering fits into the strategy.

Yeah, Microsoft does not really excel at this

I completely agree we must think in long term, not just announce it and then cancel it. Principle is clear everything is shifting towards selling services. We have to change the mindset of the whole company and OEM team. And that probably goes into the Key Resource and I would give it 2 points.

So far everyone in Microsoft is talking about partnerships in IoT...

Yes, if we want to do something in IoT is we must do it now and leverage that we have all the expertise in every part of it here in Microsoft. Windows, Azure, Security, Privacy, data analysis, everything. We have to create real world case studies as proof of concept and then scale it among our customers and through our partners.

Perfect, thank you, but you have still one point left.

That should go into the Activities, that's the market education and creation of partnerships among OEMs and ISVs. I hope that I have helped you at least a little bit.

Yes, perfect, thank you very much.

Interview – Pavel

I do not have to present you the Business Model Canvas considering that you helped me put it together and you are quite familiar with IoT concept.

Yes, I have seen it already. And I have seen your presentation so I think that I understand the basic concept of what Internet of Things is.

So why do you think it is important?

I feel that whole company is pushing towards cloud services and we are selling boxes of software instead.

And could you tell me what is your personal understanding of IoT?

I think of it as a system that enables to collect data and interconnect devices to work together. They have sensors, that collect data and by collecting data you can use them for better monitoring the user, observe how the product is used and make the customer experience more pleasurable. They can for example know that people are using the OEMs product in different ways than he thought and with that gained knowledge you can make the product more personalized for example.

And if you look at Microsoft and OEM, what do you think is the role in IoT?

OEM partners? Well, that probable depends on the partner and their abilities. Do you think MNAs or Local?

Both

Well for the classic MNA partners it can be about monitoring how their devices are used. And the OEMs in general can leverage from the Internet of Things capabilities. It is not a new and sci-fi like concept it is straight forward. I can't see a reason why company would not go for it.

Do you think it is about the connected services? Can they develop them in-house?

I would not say so. IoT is a broad term. They are probably not going to do the analytics or the connection in house. I think it does not make sense for a hardware company. But using the analytics they can gain new abilities and explore new business models with hard data from the devices, not just assumptions about it.

Thanks, that is great. Now we should go onto the Business Model. You know the current state and you have ten points, can you highlight the building blocks that we have to focus on to be relevant in Internet of Things?

I think with IoT what is going to change is Revenue Stream, Revenue is not going to come from selling boxes but from offering services. The customer is going to pay for what he really uses and that is going to change planning for the entire company. Now it is how much you sell, that much revenue you gain. From now on you must sell it, implement it and the customer also have to use it to get revenue. Should I give it points now?

We can talk about it and then you can distribute the points.

Okay, I think the customer side is not going to change much, the customer itself should not see a negative effect of this shift. It has to have only positives for the customer otherwise he is not going to go for services instead of boxes. But that means the change in the Value proposition. He is going to have more personalized product.

So, is it going to make our offering better?

Yes, that is right. And new things are going to be created in the value proposition. I cannot think of any right now, but it has to become better. For the typical end user, I can't think of any changes in the customer relationship. But for companies, the services connected to IoT will make another ways of connecting with customer possible. As I already said, the customer is paying for what he used, and that is another way how to connect to the customer which affectively can change the channels a bit.

And what about the left side of BM?

I am looking at it right now, I would not say that those partners are going to be replaced however, they will have to change their mindset from their business today to services business. Now they create chipset and just sell it but in IoT they will have to partner up with someone that knows how to deal with the gathered data.

And do you think that we should develop some new activities or resources to help our partners do such transition?

It might sound like an advertisement but who else is supposed to help them than Microsoft that has the solution really from end to end? We have software, analytic services, servers, cloud. If there is supposed to be an integrator to connect companies and enable IoT, there is no one else that could do that on Czech market. We have to not only provide the platform but we have to connect the hardware and software partners. For example, software guy comes up with a solution and we connect him to a hardware guy and together they can make it happen and at the same time Microsoft should be a creative partner coming up with ideas from our customers to create new out-of-the-box scenarios.

So, this is connected to activities, now we are doing network in between partners, but now it is also connecting them to new kind of partners like ISVs. Now, you have those 10 points, could you distribute it among the building blocks?

Could you elaborate on Channel changes?

If IoT is going to be big, there will be a change in distribution channels, some of the parts of distribution chain are going to disappear like resellers or redistributors. OEMs are going to create more customized products and that will lead into shortening the distribution channel. I can imagine that some of our distributors will be against this shit as it might be cannibalizing their

business. Of course, we know that the structure is complex and some distributors are also OEMs however, I believe that we will see some changes in the Channels.

Thank you Pavel. I think that we covered everything you highlighted as important. Thank you very much for your time.

Interview – Steven

Hello Steven, are you familiar with the Business Model Canvas?

Hi Jan, not much.

Explaining the current business model. Ok Steven let's start off with simple question – How do you understand the term Internet of Things?

Ok, IoT is a new way of revenue for partners, they have to change their mindset and think about how they can connect to the internet and collect the data. It's about building services and create deeper relationship with their customer.

And if you think about IoT in general, no relationship to business model

IoT means everything to me, every device can be IoT, everything.

Fair enough, now tell me, what do you think is the role of OEM in IoT

Everything starts with the device and the OEMs have the most important part because they can deliver exactly the device their customer wants. They can produce the device and add services on top of that.

Thanks, now you have the business model – you have 9 building blocks and 10 points, tell me, which are the most important parts to change?

Let's start even before the business model, they must change the thinking and mindset. If you speak with OEMs what they are doing now is – How can I sell my device? And that's it. And to get an idea what IoT really means they have to change their mindset. From the business model perspective for them it is going to be the same but they can add more value and parts on top. It starts with thinking: How I can provide solutions to my customer, to have a better relationship. It's starting by purchasing the device, but then they should offer additional services. In general, they have employees, some experience with development and now they must say okay, when an enterprise partner comes into plan what do they want? They usually have an idea, they need a specific device and they have to move with the partner and also offer consulting services, they need ISVs because they cannot simply hire developer. That is too expensive and unrelated to their business. You can add ISV for the development and what is interesting, is that OEMs have

no experience with the Azure service. When opportunity comes, they cannot do it alone. Great example is Liebherr, they are strong in the refrigerator and mining business and what they can do is say okay, we have this project and what we can do is build a special device for use case that will be explored but it is only a part of the solution on top you have consulting services including the ISVs and System Integrators who are responsible for Azure part. Then you can leverage this. This means huge transition towards service offering.

Now when you successfully finish the project, you can say, we have all those devices on the field. You can see what is happening with devices that you sold and that is after sales, the service business. They can have multiple types of tiers for example in servicing. Tier one would be just in time servicing with breakage prediction and tier two could be servicing based on actual problems, that is new kind of revenue not only for our partners but also for us.

So, this is mostly how the business changes for the partner, now you can see the OEM business model. Can we go back to our business model?

I was already talking about the activities, revenue streams and key partners. And as OEM team, we need dedicated resources to drive this idea. Because it is completely new way how to look at the business. Now we need to have someone who knows partners from not only from OEM part but also the ISVs. Together with both of those partner types we must help them connect with a customer that is heaving some business problem that Internet of Things can solve. We would need at least one additional person to do this. The main pain point for OEM team is that they have no idea how to do that, how to make revenue from Azure count into their quotas. And they are not going to see the revenue in short term, it is very long term process and takes a while after implementation. I am working for few months on DHL project and it takes a lot of time, it is a big company they must pitch it internally and that takes months at least. When you go to large companies they have mainly their own IT infrastructure, datacenters and so on. That is hard to tell them: ok, that is what we can offer and we need you right now to consume Azure, and that will not happen. The OEM department needs a clear strategy on how to move forward, especially for the named accounts because no one has an idea. Or they might have an idea but they do not know how to move forward.

Awesome, now if you look at the business model and you get 10 points and you should distribute them among those 9 building blocks based on how important are they for OEM team in IoT world, how would you do it?

What is the most important to change is the key partner block. I would give them 5 points for the reasons we already discussed. Than I would give something to key activities as they must be changed as well let's say three points.

You were also talking about new resources

That is right, you need new resources. That is hard to count I only have few points left. Change it, make key activities 1 point, key resources 2 points and.... Change in revenue are going to happen eventually as you shift from boxes to services but they are going to happen. Resources are contacts and connection to SI and ISVs, Activities are coming with ideas on products, and then you must explore what kind of new revenue you and partner can have together to have better relationship, new value to customers and that should be the right way.

Interview – Honza

Hi Honza, let's start with a simple question. What do you think about IoT?

Well I definitely think that it has a huge potential but it's still waiting for someone to come with great technology that will work with IoT. I know that Microsoft has an offering that is, however, not perfect. My worry is that there is too many information and it is very hard to work with it. But it has a huge potential.

And what is IoT for you?

For me IoT is every smart thing. I mean things we call smart but are not, refrigerators, cars, planes. Things that help us but we are at the beginning of their development. Why are not washing machines cleverer? Why are they not functioning based on what is inside them? But this is more a consumer side. The second part is B2B, where it definitely helps in manufacturing, healthcare and what I see the use cases can be in field in huge companies, you know logistic operation, smart cities, light in the city. Collecting information based on which we can decide on something.

So basically, devices connected to the internet.

I don't even know if we can call it devices. But something connected to the internet and it analyzes the data and gives us some report based on which we can decide what to do next.

The second easy question for you: Do you think that OEM has a role in Internet of Things?

I think there is a role for OEM but the companies including Microsoft are not flexible. So, I think that there will be new companies that will pop up and penetrate the market. Maybe the old companies are going to roll them over eventually because of the capital etc. We must find new partners just like in tablet case.

I have prepared the simplified OEM Business model canvas. Are you familiar with this concept?

No

Me explaining the concept and how it looks for OEM like now.

Microsoft is all built on partners ever since it was founded. However, sometimes we do steps against them. Like the Surface, Xbox etc. But I think it is really hard to change partner's mindset and make them manufacture new kind of devices. This might be the case in the USA or China but here they function only as a business unit and are reselling devices they get from higher level of their company. I know only of TrekStor that is doing some IoT devices. That is a great exception, exception that I am afraid, will fail. I think, that we should look also outside of our current partners. I do not believe that our partner can make it. We should look for some new partners with those capabilities. Some partner can come and find a hole in a market or we should look for a company that already produces connected solution just like Jablotron, it came from 0 to billions of CZK and it was not because they were reselling, but developing devices. It is all about finding new partners.

Perfect, now look at the current business model. What do you think is most important to change in the business model to stay relevant in Internet of Things era?

That is a hard question.

It indeed is, but I am not looking for ultimate truth but only for your opinion.

For me, the easiest thing for Microsoft is to get ecosystem of partners around us offering hardware and come up with software proposition. Windows might turn into services but we still need partners to work on it. Not every device has operating system. Everything is running for example DOS. For us getting partners from market is essential. Get to know what they offer, they might have big devices or sensors. Then, partner up with other partners like ISVs that would use the hardware. I do not see it as a product for end customers. This I think is the only doable way. Be the pillow for the partners, put them together, support them and help them, while providing the software platform. It must make sense for the partners, otherwise it does not make sense.

We are good at pushing something that does not make sense!

Yeah, we have already tried it and it did not end up well. Even the people internally are not motivated to do bullshit. Even though, they could be fired for not doing it they will not push it. One thing is to implement sensors but it must make sense. I need the sensor to help me make something more effective or easier.

So, it must solve some issue for customer?

Sure, and that is how Microsoft started, when IBM needed operating system. And instead of selling it for few millions we sold it for 15 dollars per box through partners. We are good at partnering.

And do you think that we as OEM can do the IOT partnerships?

Well, that is hard to say. It is a brand-new business. I am not sure if we have the proposition. I am not sure if the software solution is what our customers/partners really need. I cannot imagine what kind of software solution do we have... We need clear proposition for lot of use cases. There I think, we could miss the train again and should work on it. And we also need new set of partners that we have never worked with. Everyone wants to partner with us in PC market but in IoT not that much, we need a special offering. Our solution must simplify someone's life. We have to change, again, we are still changing.

It is very new for OEM...

I would love it to be classic licensing business, it is fast and clear, but it is going to be paid per usage. This is just like Office 365 and I see IoT as the driver that could change how we charge for our software. We could have some new freemium offering, heaving the monitoring for free but if you want to use other services we would charge extra.

Last thing I need to do... Now you have 10 points and I need you to distribute them among the building blocks based on how they are important for Internet of Things.

I will do it the other way around, I will cross out what is not important. Customer segments out, Revenue streams as well, it will happen by itself as well as costs. Relationship cross out. Channels also not, that will change eventually after what we are going to do. Now 4 blocks left. What is Value Proposition?

That is what we offer to the customers, the added value. For OEM, it's the software and what it represents.

Ok, all those 4 are important and we can't underestimate them. I would give 3 points to Key Activities, then we must have very strong value proposition, so also 3 points. Next points we should give to the partners, so OEM partners 3 and resources are going to be 1 point, that is the person that will have to push it. Firstly, analyzing market, then proposition and then to go with it to partners. We do not have to care about how are we going to sell it yet, we should care about what and how to create it. This is how would I do it.

Interview – Steffen

Hi Steffen, at start I have few warm up questions for you. First one: How would you explain the term IoT.

Well that is a good question and I think that you get different answer every time. But for me it's mostly about the intelligence in the cloud, collecting data from different sources, sensors devices, whatever and really delivering results and bringing all the data together and do something with it. Or to optimize how devices work together or predictive maintenance and that is how I look at it but I think it's more about the intelligence but you still need the devices.

So, you still believe that there is room for our OEM partners.

Yes, but by definition, it is really about the cloud connecting everything.

We have already talked about the business model canvas and OEM business model before. Now the question is: What do you think is important to change in the future of Internet of Things?

That is a tough question. I think it is all about Value Proposition that you have here. I think it's about delivering the value proposition to the breath channel. I am not worried about the customer relationship and the channels are ok. It's about value proposition, the activities and probably what is missing here is the creation of solutions which would fit in the left part. It is about bringing everything together, heaving requirement from the customers, have the key partners also the ISV part that have to be mentioned.

What you see is our current business model and you are already talking about what's going to happen in the future.

Everything starts with the problem that customer have, or the process that can be optimized and what is going to be hardest is to tell them what is possible, what can be solved with IoT and we need some lighthouse projects that we can echo and scale. It is not actually about one of these parts, but everything starts with the problem and everything else have to work to solve this problem. Most of the customers try to solve the problem like the last 20 years but that is going to change with the IoT, that is my point of view. We must show the customer what is possible. Now, we have a big corporate account that are clustered based on number of employees but now it is all about consumption. Even small company can consume more azure than big company and it is only about the use case.

That is important.

Yeah, but it is not about the specific device, but you have specific problem and we have the abilities to solve it with our partners. Number one is to tell customers how differently they can solve their problems.

Now I am going to make it even harder for you. You will get 10 points and I want you to distribute them among those building blocks based on how important they are for the IoT future.

You are not making it easy for me, I have to think before I shoot... The revenue streams will change, but I do not know... Give 2 points to the revenue streams than the cost structure will also change and I would give them 2 as well. The OEM partner landscape will change dramatically and I would give them 4 points.

You are run out of points

I see I have only 2 points. Customer relationship is going to be the same, channels and customers as well. The value proposition will change but I don't think that the value proposition will change slow it is already there so I would give it one point. Then I would give the resources... Give the last point to the resources. I do not know if the activities are going to change because you already have it there. What do you think?

There is not a single right answer it is about understanding each of the building block. But most of the people did not talk about the cost structure, could you elaborate?

So, I think that we should change the marketing and probably sales approach. I do not know it is going to change from cost structure but probably from the activities, so I probably got it wrong. The other thing is where do you see the ecosystem evolving and I do not think that the OEM partners we have today are the ones that are going to be big in IoT. And then, you must change the key activities. We must find new partners that already have connection to ISVs or are ISVs themselves.

Thank you, Steffen it was really helpful.

Perfect Jan, see you soon!

Interview – Denisa

First of all, what does internet of things mean to you?

I imagine it as a simplified operating system on which you can program solutions for example for factories, ATMs, and so on. And then it is connected to internet.

Now, what you think is the role of OEM in the Internet of Things?

I think, that we should promote it more among partners, some might know about some applications and how to do it. Everyone can have an idea and we should seek for it. They have their own customers with different needs.

That sound reasonable, let me show you our current business model so we can discuss how we should change it for IoT.

I think that we should reach out to our partner and show them what is possible with our IoT offerings, show them specific cases. There is so many information out there and we must find them some new and exciting solutions. We must inspire them and educate the market. This might be the most helpful activity. It is kind of marketing, but it does not help just to push marketing. My partners are doing all sort of things and have many kinds of customers.

But do you think that if I for example made a call for them and shown them what is possible with IoT would it inspire them?

I think so, yes. And looking at the Business Model it is all about the activity that we do, try to give them info in clever way so they can work with it further and perhaps have it in mind if some customer asks about IoT solution. And they can have a new business from it as they will be offering services instead of just software. We do not care much about small partners and I think that we should give them deeper information about those trends. They are really interested but we just do not have the capacity to treat them all equally. I have partners with about 50 employees which is small for Microsoft standards.

This is great. I would never think that those partners might be interested.

Yeah, they have like 30 customers and you never know if some of the customers can have a huge IoT solution.

Now, you will get 10 points and you should distribute them into the 9 building blocks based on how they are going to be important in the IoT.

We need to get more knowledge – that would be the Key resources, make webinars, meeting, schoolings etc. We could go to partners together and you can tell them in 10 minutes what IoT is. That would be something new and exciting for them and we do not need more people, just invest some time into our smaller partners. The most important is to work on the partners as they are in contact with the end customers. Our IoT is mainly focused on B2B so we should find our partners that are serving companies in verticals that are interesting for us, healthcare, manufacturing and show it on real cases.

And do you know what customers do your partners have?

Well it is a mixture but it might be schools, manufacturing companies or even hospitals. I do not have a list of their customers but I could get a few most interesting ones in case we could do a presentation for them. The partner could connect us to their customers but we must gain trust first. However, it is business also for them and we could even connect them to the ISV partners and they could come up with new business together and connect each other to different set of customers. And that eventually means new revenue stream for us, however we do not have it in the quotas yet so theoretically, I should not give them that information because it is not helping my targets. But I am doing it anyways because it will be important eventually, and it can really help the partner.

And are partners always looking for newest solutions?

No, just yesterday a partner called in and asked for a box of office, now when we are selling most of the licenses electronically. Electronic would be much cheaper but he prefers to hold the box in the hand instead of having just a product key.

Ok, let's get on the number distribution.

Let's make it fast. I have already talked about it before. 6 points would go to the activities which are about working with the partners but I do not think that partners themselves are going to change much. Then, it is important to gain new resources, so it will be two. And last two point would go to the customers as we would have to reach to new ones through our partners and try to show them use cases for their verticals.

Perfect, thanks Denisa!

Interview – Jan S.

Hi, Honza, what does IoT mean to you?

Small smart, one purpose devices for many applications. It might be connected to cloud and is collecting data. Apart from sensors it can be almost any device that runs on electricity. It is an interesting trend for devices, however, not all of them are running OS. But it brings new use cases for them. And then it is great opportunity for cloud analytics that collects the data.

And do you think that some devices with Windows have role in IoT?

Yes, one of the cases are ATMs that are running Windows XP so far, but it is great opportunity to connect them to the internet. Then, we have a lot of partners creating handheld devices, that are still running the legacy Windows CE. We used to have Microsoft Band and now we have TrekStor wearable. OEM team could really help, because they have partnerships with local OEMs and MNAs and one of the examples of IoT are augmented reality glasses. In consumers, IoT are going to be the glasses, not the smart coffee maker. EET is also a good example as it is single purpose device connected to the internet and data are being used.

Now you have the business model, what should we focus on?

Definitely on the market awareness, so we have to educate it as we are starting on the green field.

And educating end customers?

No, partners. We must give them a solution and show them what we are offering in the IoT space. We must motivate them to care about IoT and we must support them by funds for example. And IoT world is about data so it can also bring them and us potentially new revenue

stream. And that is what is going to be important for OEM, it would be new revenue stream even for us. And everything is heading into that direction.

Do you think that OEM must change?

It could work for few more years, we are a cash cow and have a lot of revenue from Office, Windows and servers that have still a great potential and they can still grow, but only servers, windows devices are going to be flat or go down eventually.

Do we have to get new skills?

Well, OEM does not like cloud as they are not measured for it. So, it is about changing the mindset and not only internally but also to push it to partners and show them all the advantages cloud can offer. Partners must know what cloud offering they can leverage and involve into their offerings. But Windows is still very important and application ecosystem is crucial.

Now, let's get to the numbers. You will get 10 points to divide among the building blocks you see based on how important are they going to be in the future.

I would give 4 points to the partners, 2 for the activities, 2 to value proposition to show customers how they can get more value from Windows IoT and the story is mostly about security. Resources are going to be another 2 points as we need someone inside Microsoft who is going to visit partners and tell them what IoT offerings do we have.

Perfect, Honza, thank you very much!

Interview – Petr

What does IoT mean to you?

I imagine everything that connects to the internet and collects data. It can be equipped by sensors and sending the data to the internet. That is the viewpoint for the devices. But much more I think it is about the process further and that is the control of data, it is a hub controlling and collecting the data and making sense of them. When you have them then you should analyze them and see what you have and give it context. That is IoT for me, from the devices, to collecting data and making analysis. And it ultimately makes your processes more effective based on the insight. And it can be applied anywhere from consumers to manufacturing or healthcare. But it can also be a lot consumer, cars for example, anything that collects data. It is not only one part, it is the whole ecosystem. We as OEMs are focusing on the devices on our platform but rest of the company cares about processing and analyzing the data and connecting it to the rest of the Microsoft products.

Do you think that it is important that the device is running Windows?

Well if it is just a sensor it does not make sense. If it is a bigger device that needs some capabilities and maybe is processing data, it is all about security. All the settings you can make on the Windows platform are on the top secure level. All the accessibility of the data and privacy on our platform is I guess the most important selling point.

This is exactly what I was presenting in Germany.

I would love to see the presentation. I do understand all the Windows licenses and I know a bit about the cloud side but I would love to see how it works together. But it is a mess so far, nobody knows how it is going to work in the future. I think it is important to say, that we have the real end-to-end solution and it is always better for the customer as everything is taken care of by Microsoft and I do not hesitate to say that we are a strong name in platform world as we can dedicate a person to big customer that is taking care of everything. If you sell Linux device, nobody cares about you and you are on your own. So far, everyone is talking just about cloud as it is easier to go with Linux devices and we are just working with data, but I think that if there is a chance we should fight for Windows and mainly because of the security story. And some customers are going to ask for secure devices. BMW, for example is not going to give android tablets into their factories and that is great opportunity for selling end-to-end Microsoft solutions as we have the long-lasting support for Windows devices. No one can guarantee you security and updates on Linux and it would be a shame to not push Windows devices. However, we should listen to our customers as they might need just simple solution that is maybe not even running operating system.

Yeah, and I feel that even our sales people do not know that we have some Windows devices for IoT.

And that is part of the transformation of the staff, in Microsoft it is going in waves and I think that we must balance the device and cloud offerings as the devices still have a great position in manufacturing, where it is still bigger than Linux and it is important to focus on whole offering. However, bigger margins are on analytics and it would be a shame to push just analytics instead of whole solution.

Thanks Petr this was meant to be short introduction now let's move on the business model that Microsoft OEM team has so far... Now the most important part is how the business model must change in the Internet of Things world.

Now, Internet of Things is cool and everyone is talking about it. Let's say that 90% of people in Microsoft that are customer facing care only about cloud and Azure. And they are offering many cloud services and IoT is big part of the offering. You should go and let them know that we have IoT solution for devices. You must get out of OEM and reach out to other teams. There are two stream for you inside Microsoft - reaching to OEM partners and telling them what is possible or connecting them to ISV partners. You must show them what IoT is. And the new OEM partners

can be ZEBRA etc. and you should also go to the IS partners that we are giving a lot of money to promote our solutions and they are mostly not pushing Windows devices but they should. Before we asked ISVs to work on Windows and now we are pushing them into cloud the business that Microsoft do is 95% about partners that is why Microsoft got that huge.

Now we should quantify it. You have 10 points and you should distribute them among the building blocks based on how they are important for the IoT future.

I think partners are important but if you want to get it going I would further divide it into two sections 4 point are going to be internal team selling Azure, 4 will be ISVs and solution partners. Other important thing is going to be taking care of the IoT from the OEM side but I believe that people are there so it is not going to change much but there should be someone driving it. And the last 2 points must go into the support, financial wise. It does not have to be huge but we should push the partners into offering the IoT solutions just to create lighthouse solutions to scale them further. It is not going to change how OEM works it is all about heaving little people with highest margin possible. And you should take those resources and transform OEM to team that is in line with the overall Microsoft strategy. The problem is that nobody knows how to handle it, not even Redmond and that is horrible. Our goal is to show the real end to end solution but we do not have enough support to push it.

And what so you think about the competitors are they pushing it?

Well everyone is talking about the data analysis or just devices. But I think that we are the only company that can offer real end-to-end solution from operating system all the way to the cloud. We have the brand, the security all the way to the cloud. And other value that we can add is the Office and mainly the products that we have as Power BI that connects to all our other services and effectively makes sense of the data and helps the customer make their everyday business better. Windows is part of the puzzle and we can build on that, the rest is just going to grow but the first layer is essential and in our case, it is the Windows and it is a pity not to leverage that just because there is no person driving it. It is important to have the operating system, if the company is going to use Apple hardware, all the sudden they might also want Apple cloud and Apple software instead of Office. The company means a lot of revenue and just because of the devices we could lose all of it. The platform is essential and it only works end-to-end.

That was a deep discussion and thank you very much for it Peter.

Interview – Zuzka

Zuzko, first of all, what IoT means for you

I am influenced by the fact that I am working on IoT with my partners on daily basis. And we as company have specified 3 basic verticals where to focus. But I also think that IoT can be very

broad ranging from the smart homes to the autonomous car and it is much bigger than our 3 verticals. The first think I think of, are the smart home solutions.

What role do we have as OEM in IoT?

Well, we are working on it extensively I would say, we have specified the desired verticals but we have to broaden them and create bigger portfolio. And together with ISVs we must offer an end-to-end solution, it is about cooperation with partners and connecting them together like the OEMs and ISVs.

I will briefly introduce our current Business Model Canvas and then we will discuss how it changes with the IoT.

And it is changing slowly, the partners are forced to think about cloud offering, for example now with EET they were forced to create whole solution rather than selling just a device, so we partnered them up with ISV that was creating system for restaurant running on Windows and together they offered great IoT solution. The metrics are changing as well, so far not so drastically when we are talking about IoT but it is going to happen soon. It already happened for example with tablets and it is going to happen again with IoT. So far, the only goal we have related to that is the number of deals designs we come up together with our partner which was for example the case of EET.

Now you will get 10 points and distribute them among building blocks that you think are going to be most important in the IoT era.

I think we must focus on the end customer and communicate what is the additional value we offer to them. So, it is about educating the market to some extent. But everything is kind of important. I would give the points everywhere. The revenue is changing a bit as you are adding a stream but the same goes to the activities as we must work with the partners. We should communicate to partners and shift the cooperation to other directions sitting with OEMs and their customers or ISVs and connecting them together, coming up with new designs. The whole market needs to know what Microsoft is offering for the Internet of Things. And there must be a strong connection to partners. Also partner support is important and other than financial. We must focus on supporting the partners instead of making their life complicated with all the tools that we have that only suit to bigger ones.

Thank you Zuzka for helpful insight and see you soon!

Interview – Zdenek

Hi Zdenek, first of all, tell me what does Internet of Things means to you

What do I imagine under the IoT? I think it is Internet in things, seriously though. Consumer electronics is going to be connected into internet and it will be controlled remotely. It starts with customer and goes further to other businesses.

Perfect and if you think about it, do you think that OEM is going to have a role in IoT?

Well the OEM is about manufacturing products, and if you want IoT, the device manufacturers are not ready to do it. They do not have the capacity and they should seek for partnership with the software companies. And that is what OEM should do, connect the dots.

And do you think that Windows plays any role in it?

If we want to be in the IoT, Windows should be involved. I think it is a very good opportunity. And we have the special Windows editions for that right?

Yes, we do.

Perfect, you see, I am coming with strategies that are already developed. And we can offer this to companies without software experience. But I think it can be for 0 revenue, right?

Yes

But it still makes sense, because you charge 0 for license but you can charge for further services. It helps you to build the ecosystem and eventually, it will mean the new revenue stream. You do not have to charge on the start as it might be more profitable in the long run and that is where Microsoft is heading. Windows will change to a service that will be paid per use. The gained experience from free licenses can be monetized and we could upsell other services like the data analysis etc. But we do not have the quotas and targets yet, so the OEM team is not pushing it that much. But there must be a need from the customer it has to solve some specific problems otherwise there is no incentive for buyer to get smart products.

Yes, and what my thesis is about is the way how Internet of Things changes the OEM business model. What do we have to focus on in the future?

Well, Microsoft is all about partners and we must know whether to sell the IoT through our current partner system or we want to create a new ecosystem that would include new IoT vendors. I think that we should look for new partners that would be able to sell the Internet of Things products rather than using existing ones as they are more experienced and able to create deeper relationships and synergies. Then we should create scenarios that show why to use Windows rather than other products. Windows is not known for stability and I would not want to have Windows in my fridge. We must show additional value to the user.

I like your point of view as it is very customer centric normally we are working a lot with the IoT scenarios and not thinking about the end users.

Companies might be the step one but you can create a solution with partner but he must have someone to sell to. I would start by identifying the client and then find a solution with partners. And the value proposition is very important. I am a very loyal Windows user but I would not get a Windows 10 fridge or car. I would need to know why should I use it and what is the benefit for it. Cars also started with mechanical everything but now everything is digitalized and IoT is the same thing we should take it step by step. People and companies must get used to it, it is not going to happen overnight. People will refuse to have smart stuff because once it breaks you will not be able to repair it and that is the same approach as with digitalization of cars. If you provide value and people will gain trust they will not be able to live without it.

That is why Microsoft focuses a lot on B2B as you can easily show the value proposition, for example by saying that they could save 50% of water by using IoT solution.

Sure, and that is how it should be done if one farmer is satisfied with the solution and he can show the advantages to others than you are able to sell it to other farmers in the market. It must work otherwise you will not sell it anywhere.

Now you will have 10 points and divide them among those 9 building blocks based on how important are they for the future.

0 to revenue stream that is the last detail and it will just happen. Partners are at least 3 selling it through current channels or creating new ecosystem of partners. Then I would give 2 points to both, the value proposition and customer relationship to make sure the solution work. Then 1 point to the channels and I think that resources are covered and the rest I would put into the key activities as we must build the traction and create new use cases for the customers.

Interview – Yveta

Hi Yveta, first of all thanks for the interview. My first question is: What do you imagine under the term Internet of Things?

Well, for me it means any device that is connected to the internet and the data are being analyzed afterwards and used to make processes in the company more efficient. But I really think that most of the value is hidden in the data analysis in the cloud.

So, do you think that there is some place for the OEM team?

Of course, there is. That is why you are supposed to tackle this challenge. I believe that to be successful in the long term we need to offer the whole end-to-end solution rather than just analysis. This can be done by any company.

Ok, what do we have and competitors don't?

I would say that we are the only company that is offering the whole story starting from the operating system for the devices then connecting them to the cloud through our services and analyzing the collected data. Then of course, making insight from the analyzed data that is helping our customers decide on next steps and accelerate their business. And we as OEM should support the whole ecosystem by offering, together with our partners, devices that are running Windows IoT and are fully secured and ready for Internet of Things scenarios.

Do you think that security is important?

Security will be probably the number one concern in IoT scenarios it might not seem like a big deal if someone hacks into your fridge, but when hackers will tackle autonomous cars it might be life-threatening. And Microsoft has long history of security and privacy and I would say that not a single system is as secure as Windows. It has all the needed security features and can be updated remotely which is very important.

Thank you, now let's get to the business model. You already know it as I was discussing it with you beforehand. Now let's talk about what is important to change in the future of Internet of Things.

We will have to change quite a lot, we must work on the new proposition for customers but also to our partners and both of those sides must understand what kind of value is being unlocked by modern technologies. We will also have to change key activities as the way we work with partners will change rapidly. We will have to come up with some pilot projects that will show what IoT is capable of. Today's problem is that most companies, no matter if partners or customers, know that they want to have some IoT scenarios because it's cool but have no idea what it really means. And we should have some real use cases that will demonstrate the benefits of Internet of Things. Other important thing is that our partners won't be able to do it by themselves and will need to be connected to ISVs that other teams in Microsoft are working with.

And do you think that we can do it with current partners or we will have to find new ones?

I think that some of our partners can adapt and offer devices for the Internet of Things, however, we should also look for new players on the market. The IoT is very different than the classic hardware business. But our partners must understand that it could bring them new revenue possibilities as they could charge their customers for additional services and not be dependent on the initial sales revenue only.

Perfect, now we should quantify it a bit. You have 10 points and you should distribute them among the 9 building blocks you see based on how important are they going to be for the future.

Let me see. The most important one from my point of view are going to be the partners. The current ones must change their mindset as well as we have do. And of course, some new vendors should found and onboarded as partners. I would give it at least 3 points out of ten. The next thing we should focus on are the key activities. Instead of supporting partners mainly by funds we will have to connect them to ISV partners and together come up with IoT solutions that would be based on our operating system. And we will also have to educate the market about what is Internet of Things capable of and not only partners, but also potential customers. I will give it 2 points. Another 2 points must go to the Key resources as we need someone who will drive the transformation and all those activities and it should be you in our case. But we also should gain new knowledge and get to work with other teams in Microsoft and let them know that our partners are capable of doing IoT scenarios.

Now you have only 3 points left.

2 points should go to the value proposition and I already talked about it a lot. Partners and customers must understand what benefits does it really bring, otherwise there is no change to make it a success. And I would give the last point to the customer relationship as Internet of Things changes the way how we or our partner connects with their customers. With IoT you can react to failures or problems in real time and offer non-stop servicing or tracking etc. And that is a big change from current approach.

Thank you Yveta for your interview!

Interview – Honza H.

Honza, what does IoT mean to you?

Internet of Things means smart device that communicates outside, sends data and can be controlled remotely and I can interact with it over the internet network.

Do you think that Windows plays some role in the IoT?

Windows... Should I be honest?

Of course

Microsoft came with IoT a little bit late because there is a lot of Linux devices and boards that are written on directly and don't have an OS. But in wide spectrum of IoT devices like ATMs and machines Microsoft is still a leader and Microsoft has taken a cool name and changed the Windows Embedded into Windows IoT. I think is a lot of hype and nobody really knows what IoT is.

My thesis is about how IoT can change business models of companies. And now I want to know how the model should change to be up to date in the future of Internet of Things.

I think that you should push Azure and cloud more. It is not about pushing the devices, but whole solutions that make sense. Pushing device that can't really help anyone does not help, you should have the scenarios supported by the rest of Microsoft. We must show partners what are the needs and together come up with solutions that are scalable across different customers.

And do you think that OEM needs some new resources, like new employees or knowledge?

I do not think that it is needed but you should cooperate with other segments that do IoT business. You cannot push it through small retail partners. You do not have to say that it is IoT, perhaps it would be better to just promote it as a solution for the problem, nobody knows what IoT really is. You must useful scenarios for people to use it.

Do you think that we should push it to customers or offer it through partners?

I think it is important to involve partners just like we do in DX. The partners should talk about solutions they made with us and show them to their customers. In the end, it is the partner's business. That they do something scalable. It is a new revenue stream possibility. And I would say that OEM will be the cash cow for another 2 or 3 years and then it will have to transform to service provider just like the rest of Microsoft.

Let's go to the quantification. You have 10 points and you should distribute them based on how important are they going to be in the future.

I think that new know how is needed, I would give it .5 points. Partner support in activities is also crucial and I would give it at least two pints. Customer relationship is going to be half a point. 5 points would go for partners as they are the key and the other two would go to the Value proposition as it is important to show how IoT can help and move a bit from just theory. For the activities, it is also very important to educate the market and show them that the IoT is not just another hype bubble, although it might be very hard and might cost us a great amount of resources.

That's 10 points, thank you Honza for your insight.

Coding and point distribution

	KP	KA	KR	C	VP	CR	CH	CS	R	SUM
Peter	5	2					1		2	10
Armand	7	1	2							10
Pavel	3	2			1		2		2	10
Jan	4	2	2		2					10
Steven	5		1	2					2	10
Honza	3	3	1		3					10
Zuzka	2	1		1	2	1		2	1	10
Steffen	5	1	2						2	10
Denisa		6	2					2		10
Yveta	3	2	2		2	1				10
Zdenek	3	2			2	2	1			10
Petr	8	2								10
Jan H.	5	2	0,5		2	0,5				10
SUM	53	26	12,5	3	14	4,5	4	4	9	130

Appendix 1 – Point distribution among Building Blocks per interview. Source: Author

Facts	Key Partners	Key Activities	Value Proposition	Key Resources	Customers Segments	Costs	Revenue Streams	Channels
IoT is understood as system of one purpose devices connected to the internet, collecting data which help make business more effective	Partners have always been crucial for Microsoft	Partner education, showing possibilities of value they can add with Internet of Things	Microsoft have very strong end-to-end security and privacy story	New know-how has to be acquired and champion appointed	Changing our mindset about how we seize customers - Instead of number of PCs, Cloud scenarios	The market education is going to be expensive	Revenue will happen as a result of changes	Channels might be shortened as a result of partner-customer relationship
OEM is a cash cow that does not fit into cloud strategy but supports other team in the shift.	New partners have to be found as our current might not be flexible	Creation of POC projects along with partners and internal teams is needed which solves business problems		Microsoft Value for partners should be in interconnecting partners while providing platform	Customers should not feel a significant change		Revenue stream will change from products to services and will be based on usage	
No incentive to change for OEM as cloud services are not in the quota and other targets are high	Together with other Microsoft teams offer end-to-end solution rather than just analysis or devices	New Opportunities for partners business and only financial						
There is a need for change but nobody can address it as the information is overwhelming	There is a need for partner's mindset change from product to service offering.	Along with partners educate customers and show the real value of IoT						
	We have to connect ISV partners with OEMs as they lack cloud know-how							

Appendix 2 – Categories divided into Building Blocks. Source: Author

	as system of one that does not fit into purpose devices cloud strategy but connected to the support other team is not in the inter- data which help make business more effective	No incentive to change for OEM for change but at cloud services nobody can address it as the value they can get from information is high	Partner education - showing possibilities of value they can get from information of Things	Partners have always been critical for Microsoft	There is a need for partners' mindset change - from product to service offering, financial	New opportunities for partners to change - not only financial	New patterns for have to be found - current might not be flexible	Together with teams offer end-to-end solution rather than just devices or business problems	Creation of POC projects along with partners and internal teams is needed	New know-how has to be acquired and champion appointed	Microsoft have very strong end-to-end security story OEMs as they lack cloud know-how	We have to connect 150+ partners with OEMs as they lack cloud know-how	Changing our mindset about customers - instead of POC and cloud services	Along with partners educate customers and show the real value of IoT	The market for partners education is going to be expensive	Microsoft's Value should be in result of changes partner while interconnecting partner while creating platform	Revenue will happen as a result of changes services and will be based on usage	Channel's might be shortened as a result of partner-relationship
Connection IIIII	OEM should not sell services for IoT is completely new business for OEM	Windows market is shrinking	Education of partners	Partnership is critical for Microsoft	change of mindset for partners!	Advantages for partner in service and relationship	There is need for new OEM partners just like in the cloud case	Better cooperation with rest of Microsoft	creation of pilot projects III	We have to acquire knowledge and promote it	Longer support than Linux and IoT more secure	Connection of OEM and EV	change of internal mindset in OEM	Educating customers	Education of the whole market will definitely be more efficient offering costs	We have to know what additional revenue will just occur	Selling services rather than products	Shortening channels - removing parts not like it
Analysing IIIII	OEM is primary about hardware the quota	OEM needs a clear strategy showing possibilities	educating partners, selling through partners	Microsoft is selling through partners	Not just selling devices	New revenue possibility for partner and way how to moveable business	Some partners are resistant to any change	Whole Microsoft sales is pushing cloud (QUOTE)	We have to solve real life problems for someone to push the story to customers	Security of Windows devices	Making services intrusive does not make business sense	Internal mindset shift will be needed	Showing clear benefits to customers and partners	New revenue stream not only for partners but also OEM to train	Revenue streams are going to disappear partners might not like it	Not only initial sales but also usage	customer have to use services to generate revenue	
optimization of processes II	OEM is lacking behind Revenue from Azure will be ascribed to OEM	Nobody knows how to get OEM on the internet of how to connect Things wave	Education of partners about devices to scenarios	Partners are essential for Microsoft	Revenue from boxes to services will be better for partners	Partner support does not have to be financial only	finding new IoT vendors with scenarios	Cooperating better within Microsoft to end scenario	Partnering to deal with problems	There is a need for someone pushing this new thinking inside OEM	Advantages of Mc whole story - Security, privacy	They lack Azure exp	OEM selling towards services of the internet of Things	Working with partner and eventually show eventually		usage		
Data collection IIIII	How does OEM fit into the strategy? IoT - huge revenue	Nobody knows how Azure could be part of OEM IoT - huge amount of knowledge about what is IoT	Education of partner - mainly partners as they do not know what is IoT	Microsoft is good at partnering since beginning	Changing revenue from boxes to services	Partners can have better and deeper customer relationships with their customers	New partners with IoT capabilities and partnerships	Selling whole solutions	Pushing problem solutions rather than just device	We have to get more relevant know how	QUOTE about stability	Partners are unable to create services themselves	It is necessary to change the way how we see company size	Nobody really knows what IoT is about and think that it is just type bubble	Microsoft is connector and integrator	Revenue will eventually generate revenue	customer have to use services to generate revenue	
Interconnection	OEM selling only what is in quotas	Targets are high and there is no room to push something not in quotas	Making sure OEM fits into the breath of channel	Partners have been essential for Microsoft	Changing mindset of partners	Business incentive to partners II	partner landscape will dramatically	We have to offer the full story	Heavy real POC examples is crucial	Resources needed are more than over before - can, hospitals	Security is important more than over before - can, hospitals	We have to change the marketing and the partner for sales approach	We need clear proposition for the customer and the partner for internet of Things			Revenue has to be in quotas and will be based on usage		
Hints correct steps II	OEM is a cash cow like cloud as it is not bringing revenue, change in mindset is needed	OEM team has to believe in the idea what offering their business	Partners are the key once again	So far OEMs create devices and should add services	Partners should push solutions as need for new benefits for their businesses	There will be a partnership	Selling whole package rather than parts	We have to solve real world business problems to prove the concept	New OEM employee should drive the IoT and correct OEMs and DVS	The whole ecosystem is crucial and we are bringing security on every matter and it depends on the matter about what is possible.								
Devices IIII	We have strong position built over time	Partners' metrics are missing so far	Education of partners through direct meeting and POC presentation	Partners are essential as always	partner offering devices + services	Transforming businesses of partners II	Old partners are not as flexible therefore we have to find new ones	find the balance between offering devices and cloud capabilities		have security on the device level		consumption knows						

Appendix 3 – Examples of codes divided into categories. Source: Author