1. INTRODUCTION

The ongoing digital revolution has created a data tsunami that grows every day. It has been estimated that the amount of data stored in our computers and on servers in the cloud almost doubles every year. No area of business is safe from the current turbulence; the boundaries between business areas are breaking down and value chains are changing. In every field, almost without exception, change centers on two things: the effective use of information and the deep understanding of customers, both of which have become crucial success factors for business.

Our motivation to write this book arose from our strong belief in data. We believe that a great amount of potential value is hidden in both large and small data warehouses, and if this value can be extracted, refined, and applied, it is possible both to boost the performance of current functions and to find completely new business models. Our story runs from the source of data through to its refinement and to the possibilities of knowledge-based management. We also talk about data protection. Our focus is on analytics and how to apply it, i.e. the bridge from strategy to action, to follow-up, and to continuous improvement.

The story in this book describes what is happening today: the ongoing digitalization that is breaking down traditional field boundaries and business models while creating the exciting new possibilities and opportunities that arise from utilizing information. Additional depth comes from interviews that unravel the meaning of digitalization and at the same time show us examples of the operational environment and everyday life of analytics. Together, the story and the interviews complement each other to give a complete picture of what all this means for today's businesses.

Our background is mainly in commerce, which can be seen in several practical examples in this book. The interviews, in which some of Finland's top ambassadors of the digital revolution and knowledge utilization share their views and experiences of the change, extend the picture to different business areas.

The structure of this book allows the reader to cherry-pick, i.e. to read only the parts he or she finds interesting and worth reading. We offer additional, updated information with the help of the AR application by Houston Analytics. You can download the application from App Store or Google Play and access the updated information directly: When you look at a picture marked with the H+AR logo through the application, it will link you to the expanded or updated information. Some of the contents may require an Internet connection.

Analytics and the possibilities for utilizing information are developing so rapidly that you need to "run to stay still". This means you should begin "data gymnastics" today – for example, you could put this book on your bedside table for tonight's read. We would like to thank those business leaders and experts whom we interviewed for this book: Maarit Aarni-Sirviö, Sami Finne, Nina Inkala, Pekka Linnonmaa, Pekka Lundmark, Miika Malinen, Sinikka Markkula, Mika Pantzar, Tapio Pesonen, Hartti Suomela, and Tuukka Ylälahti for their interesting views, Colin Shearer, the father of data mining, and the team at Houston Analytics for sparring with each other and working with the glossaries and several pictures.

Tuulikki Markkula, Antti Syväniemi

2.

2. DIGITAL REVOLUTION

The world has never been more complex. Globalization, the exponential growth of information brought on by digitalization, and the revolution and evolution of industry clusters and business models challenge everyone's perceptions and decision-making abilities. The tsunami of change impacts all businesses: in the old days it was enough to manage costs, revenues, and production, but now the key to success is leadership in know-how, knowledge, and intangible assets such as brand and reputation. Digitalization disrupts and changes value chains, and elevates networking to a source of competitive advantage. Traditional companies are challenged the most: their weak spot is both implementing new models of operation in the organization and, especially, giving up old operational models. It is all about strategy and a shared vision. The importance of commitment and support from top management and of having "champions" that are completely devoted to driving the change cannot be emphasized enough.

Digital data disrupts ecosystems

Traditionally, "strategy" is the top management's method of defining the action that is necessary to achieve future goals and ambitions, i.e. vision. Clear, consistent, and easily communicated vision is the prerequisite for the company's success. Without a vision, the company floats like a boat on an open sea without a destination or navigation charts. It is customary to make an evaluation of the current situation based on the company's figures and skills as well as carrying out an analysis of competitors and markets to back up the strategy. Depending on the business field, the economic and market outlook and the customers' purchasing power have different levels of importance.

The strategy process and models may vary, but there are some common features: the process usually begins with the company's current strengths. Development and the actions of competitors are predicted within the company's ecosystem. Scenarios are more or less based on continuity models, which, either on purpose or due to wishful thinking, ignore the possibilities for disruption. Although Blue Ocean strategies are greatly admired, they are rare.

A former Finnish President, Juho Kusti Paasikivi, said: *"the beginning of all wisdom is the acknowledgement of facts"* – and this is definitely the cornerstone of a successful strategy. The evolving global digital economy changes branches, ecosystems, and business models. The digital upheaval – disruption – affects all areas: customers find new, better, and cheaper products and services available outside the traditional market segments. Good examples are the taxi service Uber, the private accommodation service Airbnb, the music streaming service Spotify, and the Finnish companies Enevo and Cabforce which, respectively, optimize the emptying of rubbish bins and reserve taxi rides. The one thing these new business models have in common is that they answer customers' needs using technology and they do not respect the boundaries of business fields. With digitalization, the power of customers has massively increased. We have moved from industrial engineering to a customer economy.

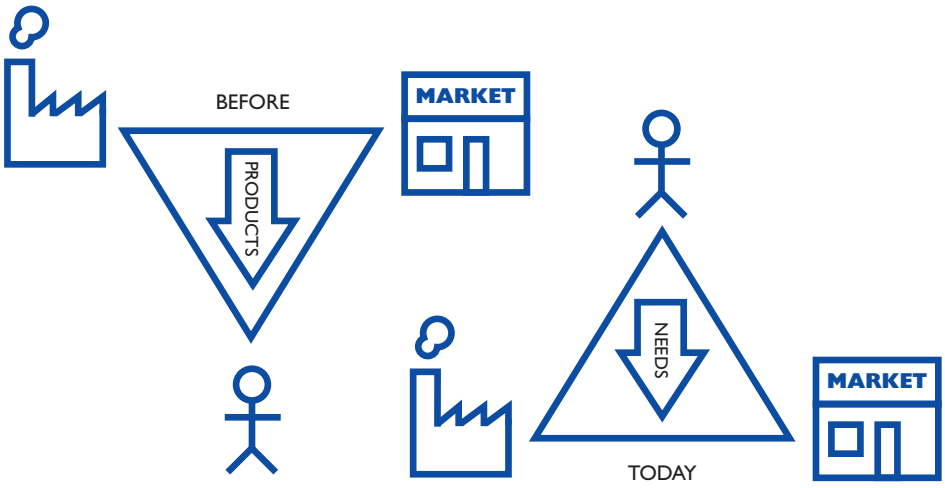


FIGURE 1. FROM INDUSTRIAL ENGINEERING TO A CUSTOMER ECONOMY: DIGITALIZATION INCREASES THE CUSTOMER'S POWER.

Digitalization and change affect all companies. Regardless of value chain or viewpoint, the business models and processes that have been established over the decades have lost their power through disruption. The key phenomena behind this change are the possibilities offered by intelligent technology, the fragmentation of consumption, the unlimited mobility of information that was revolutionized by the mobile Internet, and business model networking. As start-up entrepreneur Tuukka Ylälahti says in his interview, *"New business concepts arise more often from horizontal innovations instead of vertical ones and span different fields. Cabforce combined taxi and business travel, cost management, and the modes of payment instruments."*

The change has turned the strategy process 180 degrees around and inside out: a successful strategy begins with understanding the change in the market, and with trends, competitor and network analysis, and quiet signals, but also with the courage to look outside the company's own ecosystem and to see the nodes of irregularity. Strategic insights do not necessarily originate from top management, although that is still the place for the big picture, power, and responsibility, but the valuable signals can arise from different parts of

the organization – or from the customers. The ability to utilize collective intelligence can be a competitive advantage in rapidly changing situations.

The importance of the basic strategic questions of why, to whom, what, where, how, and when is not decreasing; quite the opposite. However, in a changing business environment it is even more important both to analyze your and your competitors' situation with the help of these basic questions and to see the forces of change and the possibilities outside your ecosystem, i.e. consider the question "what if". Nowadays, it is impossible to lead a company or its processes with a gut feeling; the strategic cornerstone must be steadfast.

Basic strategic questions for analyzing your business and competition

WHY answers the question why the company exists, what its business idea is, its mission. This is a very profound strategic question that clarifies the ultimate purpose of the existence of the business. It reveals where the company wants to be in the long run and defines its function and role in society. Mostly, the achievers of today do not only seek to create economic and functional value, but also to add emotional, cultural, and social value.

The success of the business is always dependent on customers, i.e. in every business the most crucial question is **TO WHOM.** Who are the company's customers whose needs you want to fulfill, whom you want to and should listen to – or what are the target groups of the company's services and products? It is possible to have several target groups that vary according to product group, product, area, brand, or even (marketing) channel.

The question **WHAT** is closely linked to the previous questions "why" and "to whom". What products and services are offered to customers? During the era of industrial engineering, the focus was specifically on products and on controlling the production chains. Today, both products and processes are easy to copy, thus making service a fixed part of the core of competitiveness. The Internet of Things (IoT) further emphasizes the strategic importance of the service point of view.

The question **WHERE** links the supply and customer demand together, i.e. where does the company find the customer? Through what channels are the products and services offered to the customer? Does the range of channels include physical stores, online stores, phone and field sales, catalogues, or some combination of these? Is the strategic outline only to sell through the company's own branch or to use a partner network? If so, what is required from the operators regarding location, concept, and extent? How do you manage the network of different channels and operators?

When analytics and versatile marketing automation tools are at the company's disposal, competitiveness is more often searched for and achieved with the question **HOW.** How can the customer be served and how can his or her purchase path be supported as an individual process that gives added value to the customer? How can the largest possible picture of the customer's needs, interests, and priorities be obtained?

WHAT IF is definitely the most difficult question, but it also has the most potential from the business point of view. Digitalization

radically changes the value chains but, on the other hand, seeing the change and internal disruption may in some cases be the only chance to build new success. The top management does not have a monopoly on viewpoints and understanding, so this is the one question that measures the management's ability to listen widely to both the organization and the signals of change from outside and to reflect them in the basic strategic questions.

Not only has digitalization knocked down field boundaries and geographical market areas, it has also dramatically changed the time perspective. The times when the strategy folder was dug out onto the table, dusted, and updated with the figures for the next five-year-period are inevitably history. Strategy must live in time: balancing between agility and target-oriented perseverance is characteristic to strategic work today. Significant changes in the competitive situation, economy, or technology do not follow strategic cycles but may rapidly demand powerful changes in the strategy.

In this time of dynamic strategy, everything is focused on knowledge and knowledge-based management. Knowledge is the link from market and competitive situation to strategy, from strategy to execution, and from execution to follow-up. Because strategy is equivalent to business choices, the best way to create a profitable strategy is to combine analyzed information with a strong business view.

Often the first challenge in knowledge-based management is in the structures of the company. When business and technology are too far away from each other, they do not speak the same language. Who will be the interpreter in the organization, i.e. take responsibility for producing information for the business?

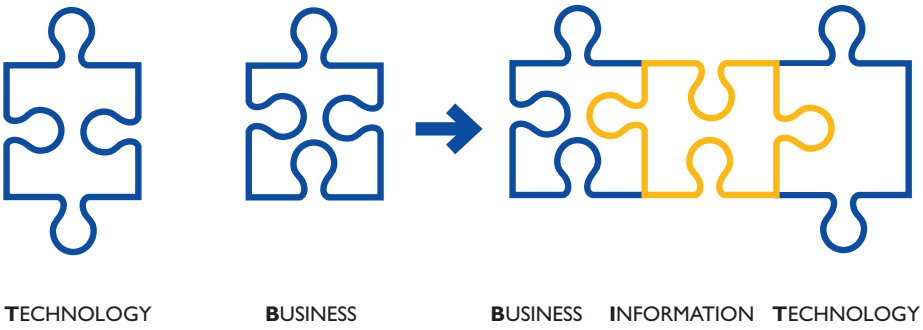


FIGURE 2. ORGANIZATIONS OFTEN LACK A PERSON OR A SECTION THAT WOULD TAKE CARE OF BOTH THE VALIDITY AND THE REFINING OF INFORMATION FOR BUSINESS USE.

One of the strategy's most significant challenges is connecting it to everyday work. Without this connection, the vision of everyday leadership and strategy will remain only theoretical for the management. In order for the strategy to succeed, it is crucial to determine how to measure it. What are the management's key indicators and, above all, the indicators at the operative level that are connected to them? In order to make the decisions mentioned above, you must understand and define the sources of fact-based knowledge as well as the information process with which the data is linked as an inseparable part of the organization's decision-making, execution, and follow-up. This raises questions about data storage and data management, along with Business Intelligence Structure, analytics, and reporting.

Interview: Start-up Entrepreneur Tuukka Ylälahti

Born to be global. Cabforce.com spread from Espoo to the world.

It was the end of the 1990s. Tuukka Ylälahti was financing his studies by driving a taxi. The growing Internet and mobile technology was strongly present in his

and his friends' lives, both through work and hobbies. Even the conversations in the bar often circled around technology inspired by the rise of Nokia: what possibilities technology will offer, and how it will change the world and society.

Behind the wheel of a taxi, Tuukka was annoyed by calls that came to nothing, when the customer walked off before the taxi arrived. When he was driving, Tuukka, inspired by sci-fi movies, sketched out a solution in which the driver and the customer could see each other on a computer screen. But the time had not yet arrived: cars did not have GPS and smartphones were only a dream.

Years passed by. Tuukka left Finland and graduated from university in Australia. After he returned home, he started working as a consultant. The usual annoyances of the taxi business from the customer's viewpoint became familiar to Tuukka: it was easy to book a flight or a hotel room but the easiness and quality of a taxi ride varied. Could there be a business solution to this where everyone would win?

Matters started to advance one step at a time: Google launched Google Maps with its interfaces in 2005 and Nokia introduced the N95 phone with GPS a couple of years later. Now at last it would be possible to solve the meeting problem in the taxi business! In 2008, Tuukka and his colleagues invented and created an application for S60 phones that shared location data.

The technology was there, but the market was not ready to change. The local taxi center was not interested in bringing location data to SMS orders. However, Tuukka did not give up. He developed his idea into a service concept that would bypass the traditional taxi call center, taxi meter, and payment terminal and would bring all the taxis in the market area into one centralized network service.

It had become clear during development that the breakthrough would not be achieved in the domestic market: the taxi field in Finland was too small and inflexible. To conquer the world, then! Tuukka's friends Andreas Hansson and Tommi Holmgren came aboard with the undertaking. They were specialized in business development, finances, and tourism.

- We founded Cabforce at the end of 2009. The aim was to bring taxis and their payment transactions into a network service in which the user experience

and pricing would always be the same, i.e. just like the operations model that had been standardized by the flight and hotel booking systems. At the same time we would introduce electronic receipts as a part of companies' travel expense management.

- The original idea was a model based on a peer-to-peer network, but very soon larger and fast-growing operators like Uber appeared on the market. In 2011, we changed our strategy: we moved from fast order transfer to pre-order services for traveling. In order for the customer to book a reliable taxi ride when booking flights and hotel, the service should be integrated as a part of travel agencies and airline companies. Developing a solution and bringing it to the sale channels took, in the end, over three years.

- Because we were an online service, we naturally did plenty of site analytics and calculated the effects of various marketing actions. For example, we followed the functionality of different search words and whether various actions resulted in customers. Within our marketing budget, we achieved the best effect through the channels of our partners such as the electronic newsletters and pre-departure communications of airline companies and travel agencies.

- When the concept was clear, we decided to look for strong international growth. With the help of Finnish export organization Finpro, we expanded to 20 cities at first, then to 40. The people who were responsible for Cabforce's partner network accumulated a notable number of traveling days, and this could be seen in the outcome. On the strength of convincing results, we were able to bring aboard two global giants of the travel business: Amadeus and Travelport. The road to a market of 10 to 20 billion euros was open, Tuukka says contentedly.

- It is great that the possibilities for start-ups have been noted in Finland. There is a huge number of proficient people here, and especially the young have a promising culture of action. The challenge is finding the capital; this is always the key question when you are competing for global market shares with marketing investments of hundreds of millions.

Cabforce found the answer to the growth challenges in the world at large. In January 2015, the operations moved to be under CarTrawler, which is known

for its rental car search engine. The approximately 20-member team still works in Finland but the world conquest continues. At the moment, Cabforce offers taxi reservation services in over 200 cities all over the world, and the expansion is speeding up.

- In my mind, new business concepts arise more often from horizontal innovations instead of vertical ones and span different fields. Cabforce combined taxi and business travel, cost management, and modes of payment instruments, Tuukka Ylälahti summarizes. He is already planning a new start-up.

Information is democratized and moved to real time

Digitalization becomes a part of a company's core business through several routes: digital channels are opened alongside traditional channels in both service and business. A company may discover a whole new digital business area. When the customer interface becomes digital, the company may boost the processes of both the service business and industrial business. This means the exponential growth of knowledge and, above all, a change in the management and decision processes.

What the French Revolution did to social structures, the digital revolution will do to information: it becomes democratized. Traditionally, information has been a tool for power – a privilege of the few. In refining information, the main emphasis has been on reporting and analyzing internal historical data, and, at best, describing trends. We are in the middle of a great change that will make information available to everyone to assist them in everyday life and to support decision-making.

The customer has been the first to widely utilize real-time information. Often, the customer uses the same or even more versatile information than the service provider. The customer may continue quite a long way on the information path before the first contact with a physical service provider,

despite ending up in the physical store. What the customers are doing now, the companies are doing at speed.

These days, for the company's need for information, it is no longer enough that the management looks in the rear-view mirror for monthly sales, costs, and profit. Information is needed and produced in every level of the organization, here and now. The need is more acute, though, the closer you are to the customer interface or critical decision-making points. A cold, hard fact is that we are living in a real-time economy where customer's patience is measured in seconds; in an economy where the efficiency of the processes and the size of losses are often directly proportional to the speed and correctness of the directional information.

Therefore, one of the most important value chains in a company's success runs from data to information, knowledge, and understanding. It is not the amount of information that counts but the company's ability to apply it to practice. Besides the quantity of information, it is essential to talk about its quality: relevance, correctness, and versatility are crucial factors in the

effectiveness of utilizing the information.

When the core of business is information, several other structures will change in the organization. Traditional IT changes from being the producer of reports to the enabler of information flows. The role of marketing will be emphasized and expanded because, in the area of online services, the customer will independently proceed even further along the path to purchasing. Thus, the most important utilizer of information in the traditional customer interface is marketing, whose role is to constantly have a finger on the customer's pulse (see chapter 9).

The second revolution will happen in the traditional industry that real time is invading because of the irreversible revolution of the Industrial Internet. This development from transaction-based business models to service business means that analytics will be a fixed part of process optimization: predictive analytics as well as fleet analytics, which depends on a wide knowledge of the field, have come to stay. The development forces the traditionally inflexible IT to learn flexibility and to work in real time. Easier said than done, but if the company wants to stay alive, there are no options.

The revolution of the Industrial Internet

The current popular term 'Internet of Things' (IoT) means the Internet of objects and things or the Industrial Internet, depending on the context. The central idea is that machines and devices can communicate in a network and collect data from their functions and environment. This can be used to refine functions and processes with the help of analytics to improve the value of the service to the customer. The IoT has been referred to as the second business revolution, at least as important as the Industrial Revolution in its time. Besides industrial processes, logistics, energy efficiency, health care, and personal smart devices, for example, can also be seen as areas of application – the imagination has no limits.

Digitalization gives the decision-making points of devices or processes an identity and an IP address. Thus they connect themselves to the network and are able to transmit data about their functions. Their sensors untiringly collect the necessary measurement data: temperature, humidity, speed, location, vibration, oxygen level – almost anything. This produces a vast mass of information – Big Data – that can be analyzed, refined, and fed back for the directing and optimizing of processes. Several types of technology – measuring equipment, routers, data storage devices, and analytics tools – are needed for the two-way intelligence chain but, above all, the ability to perceive both processes and totally new kinds of business models.

Development can be achieved either by developing whole new creative technologies or by copying and applying the existing technology effectively and innovatively. The latter method will bring visible results more quickly, as can be expected. In the IoT, the technology and tools that are used are no longer new technology, but the timing of the IoT avalanche at this exact moment can be explained by the collapse of the prices of the core components, i.e. the technology, for example micromechanical sensors and data storage. Thus the benefits that come from applying the existing technology are quickly available.

Besides efficiency, another phenomenon brought along by the IoT is the changing of business models. More and more often, companies are moving from traditional production and transaction-based business to a business model that offers a wider range of services. The length of customer relationships grows due to the closer co-operation, and so does the share of the services in the revenue. So far, the IoT has been seen only in industry but, as the price of technology falls, we may expect the Internet of Things to roll into our homes in the near future. Intelligent everyday life is taking its first steps in Internet-based energy management, security systems, and fitness trackers, but soon sensors that monitor efficiency and functional ability will be found in both the washing machine and the refrigerator.

The ongoing revolution of the Industrial Internet will not be painless or automatic, even for veterans of automation, and change needs perseverance

and strong leadership. The following interview of Pekka Lundmark, the CEO of Konecranes, demonstrates extremely well the changes and prospects of the Industrial Internet.

Interview: CEO Pekka Lundmark, Konecranes Oyj

The Industrial Internet will concern all industry

The Industrial Internet has been a passion for Pekka Lundmark, the CEO of Konecranes, for several years. He sees the Industrial Internet as a great advantage: for a small country, Finland has a great number of industrial enterprises that are leaders in their field and have expanded into the service business. The new kinds of services of the Industrial Internet give the field a completely new boost.

- The Industrial Internet revolutionizes traditional industries and enables a rise in productivity. On the other hand, the development may bring notable changes to current value chains. An operator from outside the field can grab a large part of the whole chain's value. A good example is the Finnish company Enevo that developed sensors for waste containers. In the traditional method of emptying and route planning, you can increase your productivity by a few percent. Now they optimize the routes of the waste trucks by using sensors that measure the fill-level of waste containers and achieve savings from 50 to 80%. So Enevo has grabbed the lion's share of the value chain without any new trucks or waste containers. A waste container is not really a very complex device, but digitalizing it has squeezed a considerable amount of extra capacity out of the value chain. The same can be achieved in any other industrial process, Lundmark asserts.

"The businesses that control data flows and can offer analysis-based conclusions as a superior service have the best business opportunities."

A digital strategy and the Industrial Internet became the cornerstone of Konecranes' strategy in 2012. This also meant updating the vision: in the future, Konecranes will no longer be a crane and maintenance contract merchant, but the customer's partner in the increase of their safety and productivity.

When it comes to factories, lifting, and cranes, safety is enormously important. In several factories, lifting, poor maintenance of the cranes, and incorrect use of the equipment are the most common reasons for accidents. These can be prevented by correct maintenance and surveillance. At the moment, we have 450,000 cranes in our maintenance deals altogether, and 8,000 of those are "online", i.e. cranes for which we can monitor their safety and condition in our control rooms in real time. Technically, we could have used several IoT applications for a long time now, but the cost of the execution has been too high for wide-range use.

Technology is rapidly developing and getting cheaper. New-generation sensors can read amazing things: acceleration, pressure, temperatures, particles in the air – almost anything. The price of sensors and data transfer, as well as data mining and crunching, has dropped, thus decreasing the costs of the whole value chain. Online operation models have suddenly become a mass market.

It is possible for Finland to become Silicon Valley

In Finland, some companies are well on the way in Industrial Internet services; Konecranes is the world's number one in its own field. On the other hand, several companies have unfortunately not started at all.

- Finland has every possibility of becoming a sort of Silicon Valley. We have good start-ups, the necessary technology for the Industrial Internet, and now investors are interested in start-ups in the field. An ecosystem that works well can be found around Aalto University in Otaniemi, Espoo, for example. The importance of the IoT has been realized in other countries as well: several things are happening in, for example, Germany, Sweden, and Singapore. In Germany, one of the country's top projects is Industrie 4.0 that relates to the next stage

of digitalization and includes automation of the manufacturing process, robotics, and 3D printing, among other things. So, you have to be alert at all times and move forward with speed. In Konecranes, one step was opening the first fully automated container field in Indonesia.

- As a working environment and workplace, future industry will be very different from what many people are traditionally used to. Many still have the impression that manufacturing cranes means welding iron, something dirty and hot, and nothing to do with digitalization. The challenge of the industry and its training sector is how can we market the field to the young as an attractive choice of work and career.

Wake up, governments!

Konecranes has been a pioneer of digitalization: cranes switched to digital steering 20 years ago. Nevertheless, proceeding on the IoT path has been unbelievably painful. But when the avalanche begins, nothing can stop it.

- For decisions of this gravity, the involvement of the top management is crucial. Boards should push the change forward, but unfortunately there are sometimes more people slowing down than enabling the change. If there is no digitalist in the board, it is almost impossible to make the IoT take off because in the Industrial Internet it is very difficult to present a business case in which you can ensure profit in the next quarter. But you must dare to make bold decisions.

- Another challenge is the middle management. In an industrial enterprise, the middle management is usually occupied by professionals who have worked in the company for 30 years. Young, accomplished, enthusiastic, and talented people get tired of trying to introduce development ideas to the top levels of the hierarchy which do not understand or want to understand the change that is going on. Progress is shot down from the inside.

Lundmark thinks the best way to proceed on the IoT path is often to start a project outside the actual organization with a small group of excited and talented young people in the middle. If the organization's middle management shows

genuine enthusiasm and skills, they can also be given leadership of the project. The aim of the project is to produce a prototype that can be brought into the real customer environment in a relatively short time. The important thing is the ability to experiment quickly with the prototypes and see what works and what does not – and quickly dismiss the ones that do not and move forward. When Konecranes organized a competition for the programming teams, it showed that this also worked in practice. In the competition, the teams could use the cranes' interfaces and had 48 hours to do anything they wanted.

The results were amazing: one team, for example, made a crane steering system for a smartwatch. The clock speed of development in traditional industry has to meet the speed of start-ups. It is often a very different speed and world than we are used to in quarterly economics. If we cannot change the speed, the bottleneck of development will be slowness. The model where you first develop a business strategy and an action plan for several years ahead and then develop it for years does not work anymore.

Real-time information is power

At the moment, services make up 42% of Konecranes' turnover and equipment makes up 58%. The service stock of cranes is increasing by 5–10% a year, but the increase in digital services is 50%. Thus the situation in the near future will be that most of the equipment will be in the range of online services. Digitalism is also the key to better customer service and sales management. A global CRM system that includes 50,000 sales cases shows how the sales are going in real time – not only for offers but also for leads and prospects. The focus can be, for example, country-, customer segment-, seller- or product-based. Real-time information means competitive advantage and huge possibilities.

- I believe that the Industrial Internet will prove to be the next industrial revolution. It may well be that now there is some hype which will lead to some sort of disappointment. But in 10 to 15 years the IoT will definitely be a revolution. It will transform all fields of industry. This also includes saving the

world: material efficiency and clean energy. Thus digitalization will be one solution to the pollution problem. Now we must act and move forward.

The era of cloud services

Cloud computing services have made it onto the strategy agenda of every data administration. It is about a change of paradigm: Are our machine rooms out of date? What risks are there in cloud computing and, on the other hand, what can we achieve?

Traditionally 'cloud computing services' has meant the IT department calculating and saving resources. With the development of technology, the phenomenon has grown to stand for a much larger entity, including in fact everything that is needed to create the company's own virtual machine room or to put together entire business solutions by combining already-existing services.

Previously, providing the service and saving resources that the data administration needed were two activities carried out in completely separate rooms. This so-called on-premise model makes it more challenging to try new systems, burdens the investment budget, and at worst stresses the company's balance. So, the traditional model brings problems, especially for companies whose information technology needs are very seasonal.

When talking about cloud computing services, it is important to know the terms IaaS, PaaS, and SaaS because they describe the state of the services. The traditional IaaS (Infrastructure-as-a-Service) model offers servers and data storage to the user for quick use. It is the most inexpensive option but also the most limited. The PaaS and SaaS models include more extensive service. In the PaaS (Platform-as-a-Service) model, the operating systems, middleware, and runtime are already installed. In the SaaS (Software-as-a-Service) model, the required application is also installed. These service models are a natural extension of IT outsourcing, which aims to minimize the flaws of the on-premise model and emphasize service orientation.

Compared to the on-premise model, the use of cloud computing services has undeniable advantages. Cost benefits can be achieved in various ways. The use of cloud resources does not require advance investments: the user pays only for which he or she uses. Thus the flat costs are eliminated. Cloud service providers have several options for services and data storage technology, and the user can optimize the best solution for using them. For example, large runs that require a lot of calculating capacity can be carried out by momentarily harnessing several servers. Services that are unnecessary can be switched off – also on the invoice – on a minute level in the best case.

The use of cloud computing services is also justified when it comes to speed. In the traditional on-premise model, the acquisition of new resources and focusing the old resources are time-consuming processes that cause friction and costs. The immediate availability of cloud computing services speeds up work and thus brings growth in both effectiveness and productivity, and the business can better meet the customer's needs. Harnessing new server resources into a workable state is no longer a matter of days but of minutes.

The discussion about cloud computing services brings up the question of the service's risks: would a machine room of one's own nearby be more risk-free, after all, than the service provider's cloud? In cloud computing, the server rooms are often abroad, sometimes even outside Europe. The location may bring challenges; especially if it is a question of sensitive customer data, it is wise to recognize the risks associated with the location. Though fault tolerance is minimized, it is possible to lose the data permanently in the event that a considerable malfunction occurs in the server room or if the room and the servers are destroyed.

Cloud computing should not be an end itself. There are several combinations available (see table). Depending on the situation, the best model can be the use of the company's own servers or a combined solution, i.e. a hybrid cloud. In organizations where the data systems have high requirements for information security, a hybrid cloud may be the best way to execute the data system unity.

The choices of a cloud and a hybrid cloud

- Public cloud
- Virtual private cloud
- Private cloud
- Private dc + cloud
- Private cloud + public cloud

Cloud computing services offer extra power for analytics. The horizontal scalability of services minimizes the challenges in calculation or in data storage. For example, in large online stores and in industry, huge volumes of information are received daily. If the company wants to effectively analyze this volume of information, it can be achieved automatically by decentralization in which a large number of servers are momentarily harnessed to process the data in question. The largest cloud services also have programming and machine-learning interfaces for proactive analytics; the utilization of those gives a quick start in executing the use cases in analytics.

Cloud computing is not just about transferring the services of the company's own machine room to a cloud. With cloud computing, the company can execute whole new solutions that support business and that would not necessarily have been possible to execute with the company's own servers. A cloud computing execution that has arisen from the company's own needs can thus bring both cost savings and a leap into the new era of information.

The ease of implementing new applications is a factor that spurs on the use of cloud computing services. The traditional way of using the new system, installing it in the company's own machine room, easily takes several months even when successful, but a cloud service via the Internet can be put into operation in a few minutes. This offers organizations a whole new way of implementing new innovative tools and enhancing operations, when those

responsible for business can implement new tools independently without technology-based projects.

An example of a solution that is easy to implement is Armstrong One, which combines omnichannel marketing automation and real-time analytics. Traditionally, the implementation of advanced automatics would take the organization several months and demand a considerable investment that would preclude benefits. The same applies to omnichannel marketing automation. Armstrong One is a cloud service that includes 24 ready-made customer journeys. The implementation of the service takes two weeks, during which the necessary data and marketing content is plugged in and the marketing users are trained. Then the use of the service may begin. The price is determined by the number of customer journeys that are used (three, six, or 24) and the number of customer units added to the system.

Cognition changes both IT and knowledge-based management

Analytics has made huge leaps of progress in the last few years: utilizing Big Data, analytical databases, intelligent algorithms, and tools that are easier to use has increased the commercial benefit gained from data. However, in several areas the human is still superior to computers in many aspects. Our abilities of versatile observation, perception of contexts, and creative thought exceed the skills of computers. The situation is changing, however: IBM, among others, has been developing cognitive data conditioning for years. The result of this is Watson, an artificial intelligence that has cognitive intelligence, i.e. the ability to think. It learns, deduces, understands normal language, and communicates with people more naturally than traditionally programmed systems.

Cognitive systems can link contents with the right context, find the essentials from even more diverse data unities, identify and create new reasoning models based on the data, and find answers to complex questions. Thus, cognitive AI

may speed up and improve decision-making, bring out new viewpoints, and generally work as a human "assistant".

At the moment, cognitive systems are communicated with mainly through terminal equipment; the difference with traditional systems is the operational mode. Whereas traditional systems are directed using either menus or code language, cognitive systems can be directed using written or spoken normal language. More and more mobile applications are being developed for business use. They enable freer utilization of cognitive technology through smart phones, eyeglasses, or clothes, for example.

Another significant step of development, for which there are already the first case studies, is the change in AI's learning processes. At the moment, the learning processes that include cognition are mainly processes that are designed and practiced by humans and in which a human teaches the machine. In analytics, such models have already been taught to the machines for a long time. Now a machine can learn more generally by following a human's actions, e.g. by observing a surgeon at work, and performing the same procedure based on what it has learned. IBM's Watson works successfully all over the world, helping doctors and supporting business decisions from production planning to pricing and investment decisions.

Spontaneous learning has also been experimented with in several ways. Progress has had its own problems: for example, Microsoft had to stop the use of a chatbot based on AI after Twitter users tricked it into saying racist and other offensive comments. Similarly, the Sophia robot by Hanson Robotics received international attention after painting horrible pictures of the future of humanity in a television interview by CNBC International.

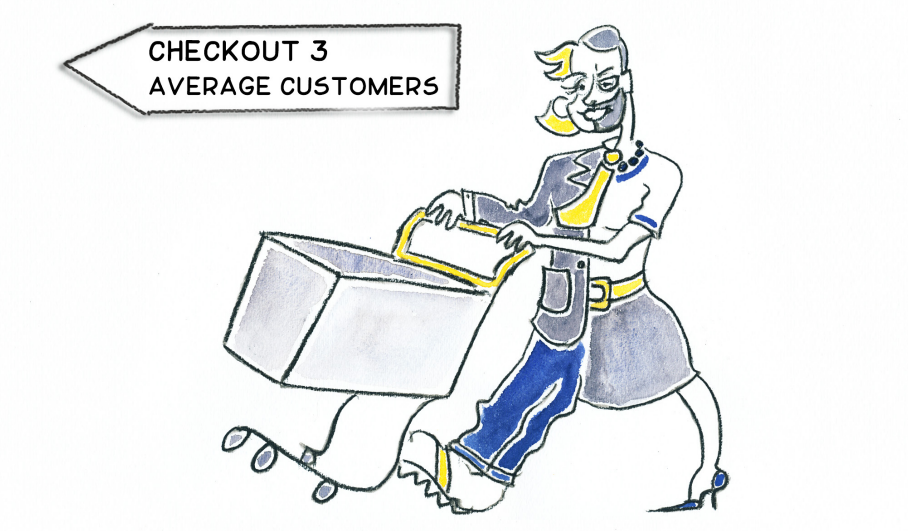
The amount of versatile written and spoken data is growing exponentially in digital economics along with mobilization and the growth of social networks. Working this data into information increases the need for cognitive data conditioning. As the trends in question still create a constant demand for even more personalized customer dialogue, cognitive processes will also take over control in this area. On the other hand, the progress challenges political

systems to create even clearer rules for the transparency of data economics – the starting point is people's right to their own information. Thus the precondition for progress both in companies and in the public sector is to earn and keep the consumer's/citizen's trust.

Cognitive data conditioning already offers incredible possibilities for the near future. The line between traditional "human work" and data conditioning carried by computers will move. The possibilities of added value that decisions based on unprecedented data volumes and real-time learning will bring are limitless. Among other things, this will mean implementation of the IoT in households. We have one of the most significant strides of the computer age in front of us, and we cannot afford to ignore its possibilities.

The way to a customer economy

There is no such thing as "an average customer" anymore. The product–price–time–channel combination that is optimal for one customer is not optimal for another. This goes for both consumer business and B2B business. In a world of fragmented consumption and high specialization, the importance



of customer understanding has grown. General mass information is not enough to gain superior competitive advantage; rather, the company needs a versatile 360-degree-view of the customer. This combines internal and external information as the cornerstone of the business.

The transfer from industrial engineering to a customer economy has increased the value of customer information in the management's briefcase. In spite of this, customership and customer (service) goals are usually only mentioned in passing; customership and the indicators related to it are still considered to be marketing nonsense that can be left to the marketing department. This attitude is dangerous at a time when nodes of information have proved to be the real engines of success. Good examples of this are Amazon and Google.

The companies that use Balanced Scorecard, also known as BSC, have fortunately taken at least baby steps to bring the customer view into the meeting rooms: alongside the view of the economy, internal processes, learning, and growth there is the customer view with its indicators that guide action. But is there a view to indicate the goals of customership? Good indicators ensure the

Scorecard's customer indicators in daily consumer goods trade

- The development in customer volumes (all channels) + prediction
- The development in online visits + prediction
- Sales conversion rate both online and in physical stores (if possible) + prediction
- Sales/customer development + prediction
- The ratio of new/lost customers + prediction
- The development of NPS + prediction

company stays awake, monitors the situation, clarifies and analyzes the reasons behind the numbers, and makes corrective moves if needed.

In order to lead customerships, you must monitor and measure their value. It is easier to start with traditional indicators – sales, customer volumes, and their development – and to continue with sales per customer or per household and their development. Omnichanneling makes a difference to customer analyzing. Today, one of the more important, if not the most important, sources of customer understanding is the Internet. As many as two-thirds of the purchase paths that end up in a physical store come into being on the Internet. Thus, monitoring and analyzing the online process is more important and crucial from a marketing point of view.

Often, in a physical retail store, customer indicators are used and customer value is measured only after the first purchase. Online, the effectiveness of the channels is measured at an earlier stage of the purchase path, most often with with page hits and clicks. In online stores, the primary indicators obviously include conversion rate (customers that bought online/visited the online store). Conversion rate can also be measured in physical stores. Especially in special stores, this indicator works quite well, so hopefully its use will spread more widely. The operators use customer churn, i.e. the percentage of customer loss. Another good indicator can be the ratio of new to lost customers, which suits consumer business, for example.

Measuring should not only be staring in the rear-view mirror but, above all, perceiving the view in the future. Predictive analytics offers good tools for this, but unfortunately the usage of predictive tools is very low, apart from large online stores. The indicators and predictive models should also interest people other than those in the marketing department. Especially if the business is omnichannel, the customer view should be at the top of the management's list of interests.

All excitement has its perils. If an information management model is rushed into the organization, the outcome is indicator explosion: the number of Key Performance Indicators multiplies, causing the goal of "what we measure is

what we'll do" to disintegrate when the big picture becomes blurred. Thus, it is not data and the indicators that solve the management problem but the business view and the ability to simplify matters.

The biggest challenge is the corporate culture revolution

Implementing a strategy not only means the implementation of traditional economics but also the implementation of customership models, market models, analysis models, and prediction models in processes and everyday decision-making. To build a continuous information nervous system that supports strategy implementation and runs through the entire organization requires an understanding of individuals and organization processes, time, and, above all, a clear vision. Yet, cloud computing services with their unlimited capacities and several agile tools often offer at least a temporary fast track to happiness.

When the first step is taken towards the strategy that works in real time, i.e. when the technological challenges of the information flow are overcome at some level, an even more crucial challenge lies ahead: a corporate culture revolution. Transferring from industrial economics to the real-time information-guided era of the customer and the Industrial Internet often means heavy storms in the company's processes, ways of organizing, and need for know-how. When information flows into all the processes, it radically changes the working methods in every organization.

The keys to a successful corporate culture revolution lie in the previously introduced questions of why, what, to whom, where, how, and when. If the central factors, i.e. why the change is being made and what the aim of the change is, are not successfully introduced to the organization, the prerequisites for successful implementation of the strategy will not be in place. This happens because the question of "when" cannot be taken through the action processes

without the commitment of everyone in the organization.

When implementing a new strategy, the most common pitfall is to underestimate the time that is needed for the change. To complete the change, the top management and the board have to be foursquare behind it, which in itself is not always self-evident. The board and the management are, on the other hand, able to work on the strategy and fully appropriate it during the process. The seed of change in the corporate culture is not planted in the organization through mere PowerPoint presentations. It is extremely hard to learn new technologies, information systems, and processes alongside your normal, busy everyday work. It is not enough to get the project-leading sections and forerunners aboard but it is rather a question of a culture change in the whole organization, and the results can only be enjoyed when everyone is playing the same tune.

No field is safe when the digital revolution breaks into new business areas. You cannot manage with the old business lessons anymore, and it is challenging to follow through change within the pressure of quarterly economics. But there

is no other choice; our ability to utilize and acquire the action models of the digital economy is what resolves the future of both companies and Finland. As Maarit Aarni-Sirviö, the general director of the Directors' Institute of Finland, says in the following interview, *"In the digital revolution, you cannot cope with business lessons from the 1990s."*

Interview: General Director Maarit Aarni-Sirviö, Directors' Institute of Finland

It is crucial for our competitiveness and our whole future that companies and Finland as a country are able to utilize digital and mobile technologies. The change will be so enormous, it will be difficult to understand. In Finland the challenge is even greater than in Estonia where there are no old structures or stiff regulations, reflects Maarit Aarni-Sirviö, a professional board member and the General Director of the Directors' Institute of Finland.

- Over the last few decades, manufacturing has been relocated to low-cost countries. For example, several professional board members in Britain have an assistant in India, and they communicate through digital channels. But we must also see the digital revolution as an opportunity: we have high education, good infrastructure, and our start-up culture is flourishing.

- Unfortunately, companies do not see the importance of the ongoing change with regard to their own business but rely on old models for too long. They are afraid that the new business model will adversely affect the current, profitable business. The company's board members have an enormous responsibility to be awake, to see into the future. They must understand the company's value chain and the possible effects that various megatrends, such as digitalization, aging of the population, urbanization, and increased awareness of the environment will have on the business. In the digital revolution, you cannot cope with business lessons from the 1990s. Boards must have real diversity and the ability to discuss future prospects and encourage the adoption of new operations models.

According to Maarit Aarni-Sirviö, a company simply cannot afford any odysseys back into the time of quarterly economics. On the other hand, companies have trimmed down their organization so that it is no longer possible to channel resources into the development that digitalization requires. But companies must at least start now because the ongoing revolution will affect all fields and there is a danger of missing the train if companies hesitate. Aarni-Sirviö recommends a project model that would be clearly separated from the business activities or proceeding through controlled acquisitions.

- The company should carry out the project outside of the usual profit and loss account so that the development costs do not eat into the profit margin of the basic business and give out the wrong signals. It is extremely important to plan how to communicate both inside the organization and to interest groups on the outside. In this way, the company can avoid unnecessary speculation and excess.

- In some presentations, the board's attitude to the digital revolution has been described as an ostrich with its head buried in the sand. Unfortunately, the description is apt for several boards, but fortunately the situation is changing. The Directors' Institute of Finland do their part in supporting the increase of their members' know-how in this area, the importance of which will inevitably increase even more quickly in the near future, guarantees Maarit Aarni-Sirviö.

Theses of Maarit Aarni-Sirviö

- Every board must have the digital revolution on their agenda.
- Change is inevitable: internal disruption is better than external disruption.
- Have the courage to take risks and to learn from failures.
- Development of a new *modus operandi* and business models requires a project that is differentiated from other business.