MANAGING DIGITAL TRANSFORMATION

Per Andersson, Staffan Movin,
Magnus Mähring, Robin Teigland,
and Karl Wennberg (eds.)

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Karyn McGettigan, Language Editor

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Keywords: digital innovation, organizational transformation, digitalization trends, customers, business models, platforms, eco-systems, analytics, information technology, change management, Internet of Things

Managing Digital Transformation
ISBN: 978-91-86797-31-7

First edition

Art Direction and Design: Petra Lundin, Manifesto
Production: Manifesto, www.manifesto.se
Cover photo: Westend61/Getty Images

Distributed by:
Stockholm School of Economics Institute for Research (SIR)

Printed by: BrandFactory, Göteborg, 2018

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Stiftelsen Marknadstekniskt centrum, MTC
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STIFTELSEN MARKNADSTEKNISKT CENTRUM

In his central role at the Wallenberg Foundations,
Peter Wallenberg Jr has furthered a broad range of important research and research-led education initiatives at the Stockholm School of Economics (SSE) and its Institute for Research (SIR). This indispensable work has also helped create a fertile ground for research on digital innovation and transformation: a phenomenon currently experienced, shaped, and managed in and between organisations and throughout society.

This is the topic of this book, which we dedicate to him.

Contents

Acknowledgements

Every year since 1992, the Stockholm School of Economics Institute for Research (SIR) has published an Annual Research Anthology, and this year SIR is publishing the book in cooperation with MTC (Stiftelsen Marknadstekniskt Centrum). The purpose of the SIR Annual Research publication is to enable managers and practitioners better understand and address strategically important challenges by showcasing SSE research on a selected topic of importance for both business and society.

This year's book, *Managing Digital Transformation,* features authors from academic areas across SSE together with representatives outside the institution. The book's eighteen chapters show the strength and breadth of SSE's research within the area of digitalization and reflect the importance that SSE places upon closely linking research to practice and on investigating the leadership challenges and their implications in order to support value creation in society.

Participating in the many ongoing research projects at SSE and the multitude of aspects of digital transformation addressed in the various chapters has been very rewarding for the editors. We would like to thank all the authors for their hard work and cooperation throughout the project. In finalising this book, we have relied upon the expert work of Karyn McGettigan for language editing, Petra Lundin for layout and graphic design, and Marie Wahlström for digital access to the book. We are, indeed, most grateful for their excellent and diligent work.

The Director of SIR, Johan Söderholm, and the Chair of SIR, Professor Richard Wahlund, have provided important support, for which we are deeply grateful. We would also like to thank Vinnova for its financial support for the research project *Progressive Digital Development: Pre-Requisites for Success* of which this book is part. Hopefully, the book will become a reference for future research and funding areas.

Finally, we would like to thank all the companies and organisations for sharing their challenges and engaging in dialogue and research collaborations with us so that we can produce more solid and relevant research to help better our society.

The authors and the editorial team would like to express their gratitude to the following for generously contributing to this valuable research:

• European Union's Horizon 2020 research and innovation programme: Grant Number 688670
• Forte: Grant Number 2014-1502
• Hakon Swenson Foundation
• IIS: The Internet Foundation in Sweden
• Infina Foundation
• IoT Sverige: Internet of Things Sweden
• Jan Wallander and Tom Hedelius Foundation
• Marianne and Marcus Wallenberg Foundation
• Peter Wallenberg foundation
• SMHI: Sveriges meteorologiska och hydrologiska institut,
• Sveriges Riksbank
• Tore Browaldh Foundation
• Torsten Söderberg Foundation
• Vinnova

And to the Swedish retailers, executives and other research participants, and all others who kindly helped make this book a reality.

Stockholm, January 2018
Per Andersson, Staffan Movin, Magnus Mähring, Robin Teigland, Karl Wennberg

Introduction

One of the hottest research topics lately is digitalization. Many research projects are focusing upon different perspectives. Gone are the days when digitalization or business implications of ICT were just about increasing efficiency. Instead, the ripple effect of digital development can now be felt wider and deeper than ever before. The way in which business is conducted and how it creates value, as well as how corporations can become more efficient and sustainable, are all implications of digitalization. Adapting to new demands and taking advantage of the plethora of possibilities, however, is not always easy.

Managing digitalization and the transformation of business always involves new challenges. The novelty and complexity of the digital age has led to an increased academic interest in the area of digital transformation and a call from companies that seek support in this process.

We take a look at digitalization from the perspective of business research. This creates a better understanding of the challenges that today's businesses are facing. We believe this anthology will serve as a tool to help businesses better understand the force that is digitalization and support these corporations in their digital transformation.

The idea behind this anthology grew as Marknadstekniskt Centrum was taking part in several interesting research projects. Companies were asking MTC to facilitate contact with scholars and supply them with academic insight. Vinnova came on board, by supporting the project *Progressiv digital utveckling förutsättningar för framgång (Progressive Digital Development: Pre-Requisites for Success)* of which this book is a part: its aim to stimulate business to become more progressive in digital change. At last, this book and the website www.digitalchange.com have become a reality.

This joint venture between Marknadstekniskt Centrum and The Stockholm School of Economics Institute for Research follows the SIR tradition of publishing an annual yearbook to showcase its vital research contributions. The book begins with an overview of digitalization, then moves to understanding the new digital customer, and ends by exploring re-organisational effects, business models, and ecosystems. We hope this year's anthology will be useful for managers by facilitating their digitalization processes.

PART 1: DIGITALIZATION – DIFFERENT PERSPECTIVES

The role of digital technology in business and society is rapidly shifting from being a driver of marginal efficiency to an enabler of fundamental innovation and disruption in many industrial sectors, such as media, information and communication industries, and many more. The economic, societal, and business implications of digitalization are contested and raise serious questions about the wider impact of digital transformation. Digitalization affects all private and public operations, as well as the internal and external workings of any operation. Digitalization is the major driving force behind sweeping large-scale transformations in a multitude of industries. Part 1 includes various perspectives on digitalization and digital transformation.

PART 2: THE NEW DIGITAL CUSTOMER

Digitalization has resulted in more user-centric business and user-centric systems. The changing behaviour of the digital consumer/customer is discussed here as it connects to new forms of customer involvement and engagement, as well as analysis models of what creates customer value in this digital context.

PART 3: THE RE-ORGANISATION IN ORDER TO CONNECT WITH THE DIGITAL CUSTOMER

How can companies connect with digitalized consumers and non-digitalized customers? This is a central issue in managing digital transformation, as it draws attention to the emerging intra-organisational, marketing, and customer interaction challenges associated with digitalization: for both the consumer and the supplier. Another aspect of this is the internal handling of new forms of organizational ambidexterity; that is to say, companies and organizations engaged in digitalization processes often require an internal re-organisation in order to handle the demands that digitalization brings, and to explore new digital opportunities while promoting their existing business and operations.

PART 4: BUSINESS MODELS AND ECOSYSTEMS

How do companies change, adapt, and innovate their business models? Given that digitalization leads to a convergence of previously unconnected or loosely connected markets, the digitalizing company and organisation is analysed in its systemic and dynamic context. This part draws attention to business models

and business model innovation. Incumbent firms need to adapt and change business models while competing with digital start-ups based upon new scalable business models, accessible ventures, and rapid processes of intermediating. These chapters discuss completely new co-operative business models: processes that need to be developed as companies shift from products to digitally based services.

The Ecosystem places digitalizing organisations and companies into their broader and systemic context. This includes discussions on digital disruption, industrial convergence processes, and shifting patterns of competition and cooperation. Digital technologies cause markets to converge in many new and sometimes unexpected ways. The result is the emergence of new roles and market positions of technical platforms.

Staffan Movin, Stiftelsen Marknadstekniskt Centrum

Future Outlook on Digitalization

ROBIN TEIGLAND, CLAIRE INGRAM BOGUSZ, AND ANNA FELLÄNDER

Introduction

Since the year 2000, digitalization's influence on products, services, processes, and business models is the primary reason that just over half of the names of the companies on the Fortune 500 list have disappeared.[1] Technology-based companies are increasingly taking centre stage, thus, replacing traditional asset heavy companies with their asset light operations. For example, in terms of market capitalisation Microsoft was the only technology company among the top five publicly traded firms in 2000: GE, Citibank, Walmart, Exxon and Microsoft. By 2016, however, all five were technology companies: Apple, Alphabet, Microsoft, Amazon, and Facebook.[2] Turning to the S&P 500, the percentage of tangible assets in these companies' valuation from 1975 to 2015 fell from 83% of the total value to 13% with the value of intangible assets, rising from 17% to 87%.[3]

In addition to technology companies taking centre stage in terms of market valuation, digitalization is also influencing value creation activities on different levels. Digitalization is dissolving the boundaries of the firm on the more basic process level, as some firms move the nexus of their value-creating activities, such as branding and innovation, to informal networks outside the firm. Secondly, some firms are moving away from traditional value-chain, pipeline-based business models on the business model level, to multi-sided platform business models that enable transactions among strangers in what has been labelled the *Platform Economy*. We are seeing digitalization's potential to transform entire industries on an even higher level – that of industry. Furthermore,

1 https://www.weforum.org/agenda/2016/01/digital-disruption-has-only-just-begun/

2 http://www.visualcapitalist.com/chart-largest-companies-market-cap-15-years/

3 http://www.oceantomo.com/blog/2015/03-05-ocean-tomo-2015-intangible-asset-market-value/

there are indications "under the surface" that there are even more significant forces at work: forces that challenge our basic assumptions of an industrialised society and work, as we know it today; and that these forces may be taking us rapidly from the third into the fourth industrial revolution, as discussed at the World Economic Forum in January 2016.[4]

The purpose of this chapter is to provide a broad overview of digitalization to date as well as provide some thoughts on how digitalization might influence the future of value creation in society. This research is intended for a broad audience: from practitioners to policymakers, as well as those interested in learning about digitalization's influence upon society. We focus first upon crowdsourcing activities: one of the initial areas significantly influenced by digitalization; we then turn to the Platform Economy, and the related Sharing Economy: discussing how these new business models are challenging our traditional strategy tenets. We then raise our level of discussion and turn to industry evolution and digitalization's influence upon the transformation of industries, with a focus upon one industry in particular: the financial services industry and the FinTech phenomenon, as well the recent trend of fusing the physical with the digital. We then branch out to some emerging technologies that are currently receiving the most attention: IoT data analytics, artificial intelligence (AI), blockchains, 3D printing, and virtual and augmented reality. We discuss how digitalization may impact the future of the labour force. Lastly, we end the chapter with some recommendations for both managers in general, as well as policymakers in Sweden.

Digitalization of Processes: Dissolving Firm Boundaries through Crowdsourcing

One of the first hallmarks of the current digitalization era has been the emergence of crowdsourcing that describes how the collective resources of a large group of people can be used to help solve problems. While crowdsourcing has existed throughout history, the internet along with digitalization has greatly facilitated the means with which crowdsourcing can emerge: ranging from a group of strangers self-organising on the internet (for example, open source software) to user-generated content supported by hierarchical organisations (such as a firm). Taking this into consideration, crowdsourcing can be defined

4 http://marketrealist.com/2016/01/fourth-industrial-revolution-need-know/

as "a collaboration model enabled by people-centric web technologies to solve individual, organisational, and societal problems using a dynamically formed crowd of interested people who respond to an open call for participation" (Pederssen et al., 2013). As such, crowdsourcing has also led to the development of the term *Collaborative Economy*.

User-generated content lies at the heart of organisations such as Wikipedia and Facebook, in which users create content without any expectations for reimbursement; six of the ten most popular content sites in the world are primarily user-generated (Brynjolfsson & McAfee, 2014). A recent study of US millennials (those born between 1977 and 1995) revealed that they spend 18 hours a day consuming media, and 30% of this time is with user-generated content as compared to 33% on all traditional media combined (TV, print, radio).[5] Furthermore, the same study found that millennials trust UGC 40% more and find it more memorable than traditional media.

As a result of these changes, businesses have realised over the past ten years that they no longer can rely upon traditional media for their marketing and branding efforts and are, thus, enabling customers to play a much more active role in their business decisions: such as marketing and product development. They have increasingly shifted from static websites to interactive platforms using a variety of social media applications that enable user-generated content (UGC). Many are calling this a paradigm shift since these platforms have led to a move from "one-to-many" (kinds of) communication between the business and the customer to "many-to-many" interactive dialogues among the business and its customers. Burberry's Art of the Trench website is one of the first examples of this. Launched in 2009, it enabled users to upload and comment upon pictures of people wearing Burberry products. Within one year, Burberry's ecommerce sales rose by 50%.[6]

In addition, numerous firms have developed user innovation communities specifically to help in the development and testing of new services and products. For example, companies such as Dell and Starbucks host electronic social environments in which globally distributed customers can share their knowledge and expertise with the community and the organisation through their comments upon existing products and services, while proposing new innovations.[7]

5 http://corp.crowdtap.com/socialinfluence

6 http://blog.hubspot.com/marketing/examples-of-user-generated-content

7 http://blog.hubspot.com/marketing/examples-of-user-generated-content

Another well-known example is Threadless: a company founded in 2000 that enables anyone to design t-shirts and a variety of other small products that are then produced and sold through the Threadless platform if selected by the crowd. Under this business model, customers now conduct many of the traditional in-house value-creating activities: such as idea generation, product design, marketing, and sales. Due to their customer voting system that ensures all t-shirts produced are sold, Threadless has significantly reduced its unsold inventory compared to traditional clothing manufacturers.[8] As a result, the company's profit margin was estimated to be 30%, which is remarkably high for a company in a commodity industry.[9]

User innovation communities can lead to beneficial results, such as faster innovation times; more successful new product launches, and increased customer satisfaction. However, they also present considerable challenges to managers. For example, a study of Dell IdeaStorm identified four key challenges in its first 18 months managing the community: understanding the ideas posted, identifying the best ideas, balancing the needs of transparency with the community against disclosure to competitors, and sustaining the community (Di Gangi et al., 2010).

While this model of "flipping the firm" is receiving considerable attention from researchers and managers alike, one of the most widely cited companies is Quirky, which declared bankruptcy due to its inability to sustain profitability. As a result, several people question whether the crowd is capable of selecting which products the market wants.

Digitalization of Business Models: Strategy Tenets Challenged

Moving beyond crowdsourcing and user-generated content, the development of multi-sided or matchmaking platforms that enable peer-to-peer transactions has spread from industry to industry: that is to say, individual-to-individual rather than firm-to-individual transactions. Transactions can be mediated either by firms, such as Uber, that run their own platforms or by groups of private individuals who use existing social networking sites, such as Facebook; they can even be mediated by those who design their own apps using open source software to self-organise their peer-to-peer activity in the cloud

8 http://www.fastcompany.com/1714561/company-community-threadless-puts-everyone-charge

9 http://www.inc.com/magazine/20080601/the-customer-is-the-company_pagen_2.html

with the help of blockchain-enabled smart contracts. These platforms may locally connect acquaintances on a face-to-face basis or they may digitally connect strangers from all over the world: for example, Airbnb and Upwork. In particular, firms that have multi-sided and technology-based platforms at the core of their respective business model have redefined the global business landscape throughout recent decades. This has been increasingly the case within the past ten years.[10] Companies such as Amazon, Alibaba, Apple, eBay, Facebook, Salesforce, Upwork, and Google have all emerged basing their business models and operations upon platforms that provide the infrastructure and rules for interactions between users, and they differ substantially from traditional offerings in terms of their value chain.

One interesting observation when comparing a traditional company with a platform company delivering similar products or services within an industry reveals a remarkable reduction in the total number of employees per firm. For example, Marriott, which was founded in 1927, had around 200,000 employees and a market capitalisation of USD 32 billion in 2017 while Airbnb, which was founded in 2008 and now offers more rooms than Marriott, had only 5,000 employees and a market capitalisation of USD 31 billion. A second example is Walmart, which was founded in 1962: with approximately 2.3 million employees, it has a market capitalisation of USD 200 billion compared to Alibaba, which was founded in 1999, and has around 36,000 employees and a market capitalisation of USD 240 billion.

In the traditional strategy literature, value is accumulated from left to right as value-adding activities occur in sequential processes; inputs are delivered to a transformation process, which then become outputs. These activities are generally conducted in-house by the firm's employees with costs being incurred throughout the value chain and revenues generated only on the downstream side. Since the firm owns many of the resources, employs individuals with the necessary skills, and provides the management, organisation, and physical infrastructure necessary for the process, it incurs considerable fixed costs. A firm strives to achieve supply-side economies of scale in order to then create competitive advantage, through increasing production volume and sales to reduce the unit cost, thereby, creating entry barriers. However, the firm reaches diminishing returns at some point, as acquiring

10 https://hbr.org/2006/10/strategies-for-two-sided-markets

new customers becomes more difficult and more expensive since fewer people find the value proposition of the firm appealing (Eisenmann et al., 2016).

These basic assumptions in strategy are now being challenged with multi-sided platforms (Eisenmann et al., 2016). Since the platform serves two groups of users, not only are costs incurred on both the left and the right side; revenues are also generated on the left and the right side of a value activity system. Moreover, with platform-based businesses, the firm merely plays an intermediary role matching those that own resources with those looking for them. Firms are relatively asset light and do not own the resources being transacted, nor employ the individuals to perform the resource transaction process; they merely provide the infrastructure and the rules of transaction for the two. What is new is that successful platform-based businesses experience increases returns to scale due to network effects. Network effects are based upon Metcalfe's law, which states: "The value of a telecommunications network is proportional to the square of the number of connected users of the system".[11] Platforms strive to gain users to build critical mass such that it can more efficiently match supply with demand and raise the likelihood that users on both sides of the platform have their demands fully satisfied. As more people use the platform, the value of the platform to each user rises. To create a competitive advantage, firms strive to leverage network effects in order to create demand-side economies of scale (Parker et al., 2016). In contrast to traditional manufacturing and service firms, platform-based firms' experience improved margins, as the number of users grow since users will pay more for access to a bigger network (Eisenmann et al., 2016).

As the platform-based business model continues to penetrate industries, one aspect that is becoming increasingly prevalent is the "winner takes all" effect. More specifically, platform leaders are able to drive out weaker rivals and create a barrier to entry due to their ability to leverage higher margins through investing more in R&D and, thus, lowering their prices. This leads to mature two-sided network industries usually being dominated by a handful of large platforms with some extreme situations in which a single company emerges as the winner, taking almost all of the market (Eisenmann et al., 2016).

These new market dynamics are not unique to B2C markets. Indeed, B2B industries are also seeing a rise in the number of firms focusing upon building

11 https://en.wikipedia.org/wiki/Metcalfe%27s_law

platforms to support their traditional business models, as well as striving to achieve the "winner takes all" effect. For example, with the goal of becoming a top 10 software company by 2020, GE has invested more than USD 1 billion in creating a market around the industrial internet through the development of its Predix platform, based upon open source software and the blockchain.[12] GE entered a partnership with Apple in October 2017, and unveiled a new software development kit (SDK) to enable developers to create their own industrial IoT apps using predictive data and analytics based upon the Predix platform.[13]

In connection with the rise of platforms, the use of the notion "Sharing Economy" has also become prevalent and is defined to include the renting, bartering, loaning, gifting, and swapping of assets that are typically underutilised: either because they are lying unused or because they have not yet been monetised (Felländer et al., 2015). Sharing Economy companies are based upon two-sided networks with the premise that a consumer's underused or spare fixed assets can be shared: a business model that is predicted to grow from $26 billion globally in 2015 to $335 billion by 2025.[14] Some Sharing Economy companies have achieved substantial valuations in a very short period due to the promise of network effects and increasing returns to scale, as users pay more for access to a bigger network and margins improve as the user bases grow: for example, AirBnB with $31 bln[15]. However, a debate is ongoing as to whether this is truly sharing or merely a new form of capitalism: this phenomenon known as "crowd-based capitalism", as some researchers, such as Professor Arun Sundararajan, have labelled it.

Digitalization and Industry Evolution

"Creative destruction" is a term coined by economist Joseph Schumpeter in 1942 (Schumpeter, 1942); it refers to the process whereby the creation of a new industry or method of doing things destroys the industry or process that preceded it. Creative destruction is obviously evident in some industries: for example, the replacement of records with tapes, CDs, DVDs, and then by

12 http://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/how-b2b-digital-leaders-drive-five-times-more-revenue-growth-than-their-peers

13 https://www.apple.com/newsroom/2017/10/apple-and-ge-partner-to-bring-predix-industrial-apps-to-iphone-and-ipad/

14 http://www.pwc.co.uk/issues/megatrends/collisions/sharingeconomy/the-sharing-economy-sizing-the-revenue-opportunity.jhtml

15 https://www.cnbc.com/2017/03/09/airbnb-closes-1-billion-round-31-billion-valuation-profitable.html

streaming. However, it is not clear how this process will play out across industries as digitalization progresses. Under the Sharing Economy umbrella, although incumbents in the hotel and taxi industries have, indeed, been forced to innovate in order to survive due to new entrants and platform business models, neither the industries nor their processes have been "destroyed" by the advent of sharing. Rather, traditional goods and services have been augmented through an interconnected array of digital services, such as social networks, location services, online payments, and rating systems. Such novel elements bring greater benefit to consumers, which often leads to the destruction of old practices, yet this will not necessarily lead to the destruction of old products and services.

Research investigating industry transformation by Anita McGahan (2000) at the University of Toronto indicates that industries evolve along four trajectories: radical, progressive, creative, and intermediating. These trajectories are determined by the degree to which the industry's underlying core activities and core assets are threatened, as they become less relevant in the marketplace due to new and alternative solutions. Core activities are the recurring value-creating activities that attract and retain suppliers and buyers in the industry, while core assets are the durable tangible and intangible resources that enable these efficient core activities.

This research also suggests that the traditional model of industry life cycle is only relevant for industries experiencing progressive or creative change and not for radical or intermediating change. An alternate model was suggested instead, in which an emerging industry that start-ups developed offers alternative value-creation solutions and grows in volume to supersede the sales' volume by industry incumbents with traditional activities. Competitive advantage in the industry then becomes increasingly based upon the ability to provide products and services that are evaluated based upon the new criteria as new industry standards are created (McGahan, 2000).

A study of the transformation of US industries from 1980 to 1999 by McGahan revealed that the 43% of industries were characterised by progressive change, 32% by intermediating change, 19% by radical change, and 6% by creative change. As digitalization pervades industry after industry, it will be worth revisiting these figures to see how industries have transformed on a global scale.

FINTECH AND THE TRANSFORMATION OF THE FINANCIAL SERVICES INDUSTRY?

One industry that is rapidly transforming is the financial services industry: due to the emergence of the FinTech sector enabled by the mobile internet, cloud computing, the smart phone, changing consumer behaviour, and a mistrust in the established banks along with declining internet technology start-up costs. While there are many definitions of FinTech companies, one of the most frequently used is "those that offer technologies for banking and corporate finance, capital markets, financial data analytics, payments, and personal financial management" (Skan et al., 2014). The FinTech sector attracted investments of USD 36 billion globally in 2016.[16]

A look into the transformation of this industry reveals that FinTech start-ups are specialising in individual services and products traditionally provided by the larger banks as opposed to competing with established banks in multiple products. As the entrances of these FinTech companies press margins and take market share from industry incumbents, a McKinsey study predicted in September 2015 that the profitability of the established private banks may fall up to 60%.

The book, *The Rise and Development of FinTech: Accounts of Disruption from Sweden and Beyond,* published in 2018 by Routledge Publishers, offers an in-depth discussion of the transformation of this industry. One area discussed is crowdfunding, which falls under the label of the sharing economy previously discussed in this chapter. Crowdfunding, or the accumulation of small investments in individual projects from a large number of individuals (the "crowd") via or with the help of the Internet and social networks (De Buysere et al., 2012), is enabling new forms of investment for private individuals, entrepreneurs, SMEs, and even large organisations. There are four established categories of crowdfunding: donation-based or philanthropic, reward-based, equity-based, and lending or debt-based (often referred to as P2P lending), with some claiming that the particular form of real-estate crowdfunding should be recognised as a category. P2P lending currently dominates the other crowdfunding forms, in terms of money transacted, and while it was predicted to account for approximately USD 25 billion of the total USD 34

16 https://letstalkpayments.com/global-fintech-funding-36-bn-2016/

billion globally raised through crowdfunding in 2015, reports claim that P2P lending topped USD 150 billion in 2015 in China alone.[17]

One of the greatest challenges in taking an idea to the marketplace is the ability to raise funds. Several researchers are now suggesting that crowdfunding is democratising the process of innovation through providing access to necessary capital to those individuals outside of traditional investor networks, such as through gender discrimination, or located in remote areas. For example, the company Laser Unicorns raised more than USD 600,000 from almost 18,000 individuals across the globe for the production of its movie, *Kung Fury,* despite being located in Umeå, a town in the north of Sweden.

Other areas developing rapidly within FinTech include the robotisation of personal wealth management as well as the penetration of cryptocurrencies and blockchain technologies for new payment and reconciliation solutions. The 2008 white paper "Bitcoin: A Peer-to-Peer Electronic Cash System" was published on the internet under the pseudonym of Satoshi Nakamoto.[18] A few months later, in early 2009, the project was launched on an open-source project repository. These initial developments have spawned more than 900 cryptocurrencies today although only around a handful have a market capitalisation of more than USD 10 mln.[19] A cryptocurrency is a digital, decentralised, peer-to-peer currency that uses cryptography to validate and secure transactions. The largest and most well known cryptocurrency is Bitcoin: with a market cap of almost USD 100 billion during October 2017. Since Bitcoin does not have a central clearing house, there is no central authority in charge of the money supply, nor are there any financial institutions involved in the transactions, Bitcoin differs from traditional fiat currencies: that is to say, nation-state currencies, such as the USD and SEK. The members of the Bitcoin network perform these tasks themselves: by verifying and validating every transaction that occurs between network members in order to avoid the risk of double spending. Today there are more daily transactions with Bitcoin than there are through Paypal.

At the core of Bitcoin is the blockchain protocol, which in essence is a shared public ledger of all verified transactions. During 2015, a number of large multinationals, such as Goldman Sachs, JP Morgan, IBM, and Samsung,

17 http://www.crowdfundinsider.com/2016/01/79612-report-china-p2p-lending-topped-150-billion-in-2015/

18 https://bitcoin.org/bitcoin.pdf

19 http://www.cryptocoincharts.info/coins/info

began to pay increasing attention to the bitcoin blockchain and other emerging blockchain protocols, such as ethereum, hyperledger, and R3Corda. This was due to the potential of a number of uses for the blockchain and their ability to incorporate IoT, smart contracts, and machine-to-machine micropayments within financial services and supply chains. These are just some of the examples of the many FinTech companies founded in recent years; we will be able to see in time whether these start-ups are capable of gaining enough momentum to transform the industry.

STRATEGIES FUSING THE DIGITAL WITH THE PHYSICAL

Another area of industry transformation relates to an increasing number of companies implementing strategies that fuse the digital with the physical. In order to create a sustainable competitive advantage with a digital strategy, an increasing body of research is arguing that companies that are able to fuse their physical and digital operations, such that customers can easily move between the two, will be more successful at creating a sustainable competitive advantage.[20] While many argue that online operations will displace physical operations in numerous industries, research is finding that the two worlds are complementary, and the combination of the two is the real transformation that is occurring. For example, as part of Burberry's fusion strategy to attract millennials, the company developed digitally immersive physical experiences, such as in-store digital screens that turned into catwalks: a strategy that tripled the firm's stock from 2006 to 2014.[21]

Not only are physical firms fusing with digital; digital firms, such as the two early pioneers of online trading: E*Trade and TD Ameritrade, are also integrating physical offerings with their digital ones. More recently, Amazon has made major efforts into the physical retail space in the USA: including the purchase of Whole Foods Grocery Chain for USD 13.7 billion, a partnership with Kohls – the retail department store chain to provide return locations, the opening of bookstores, the establishment of lockers and pick-up spots in retail stores and on college campuses, and a Treasure Truck in six cities that sell certain items at a discount.[22] Amazon's efforts have revealed that having a

20 http://www.gartner.com/imagesrv/books/digital-edge/TheDigitalEdge.pdf, http://www.bain.com/publications/articles/leading-a-digical-transformation.aspx

21 https://hbr.org/2014/09/digital-physical-mashups

22 https://www.cnbc.com/2017/09/19/amazon-is-firing-on-all-cylinders-to-grow-its-retail-presence.html

physical presence fuels online sales. For example, Amazon sold about $500,000 worth of Whole Foods-branded products online in the first week after making them available following the purchase of the chain.[23]

Other examples include Local Motors, which focuses upon motorised vehicles, and First Build, focusing on household appliances. Both of these companies have created micro-factories or physical workspaces that enable the "crowd" to participate in the development and production of products, thus, bridging the divide between virtual community and physical participation.

Investigating the level of transformation within 20 industries, the aforementioned research found that industries, such as the airlines, automobile and insurance industries, will be those that have the greatest level of innovation in fusing the physical with the digital within the next five years.[24] Developments in areas such as the Internet of Things, 3D printing, and virtual and augmented reality will likely hasten this transformation in many industries.

Emerging Technologies

Some of the greatest areas of uncertainty about the future relate to the development of emerging technologies: such as the IoT data analytics, artificial intelligence (AI), blockchains, 3D printing, and virtual and augmented reality. We provide a brief overview of each of these below.

IOT DATA ANALYTICS

Both technology evangelists and consumer goods manufacturers have hailed the rise of the Internet of Things (IoT), wherein everyday devices and products contain tiny computers and will communicate directly with machines and with one another. Things can be programmed not only to alert the user to certain events; they will also communicate with each other and even to coordinate and make micro-payments directly among themselves without human involvement. The name "Internet of Things" is perhaps somewhat inaccurate. A more accurate label might be "The Internet of Small Computers on Things", which is another way of saying that the things themselves cannot be endowed with the capacity to connect to the Internet. Rather, manufacturers have started to install small computer processers on devices and these computers both connect to the internet and control the device. This idea is

23 https://www.cnbc.com/2017/09/19/amazon-is-firing-on-all-cylinders-to-grow-its-retail-presence.html

24 https://hbr.org/2014/09/digital-physical-mashups

not new; however, advances in both computer hardware and internet connectivity have occurred over the last decade, including increasingly smaller computer parts and an increasing number of processes being hosted in the cloud. Thus, the Internet of Things has become a realistic possibility.

To date, health and fitness has seen the most activity with established brands; Nike, Adidas, and Apple have taken advantage of the emerging technologies in wearables. However, this is one area that is expected to further spawn growth and transformation across all industries. From 2003 to 2012, the number of connected devices grew from 500 million to 12.5 billion; this is expected to grow to 50 billion by 2020. Furthermore, the machine-to-machine (M2M) market, in which machines communicate and perform functions with no human intervention, is expected to reach €40 billion by the end of 2017.

One driver of this rapid growth is the falling costs of sensors; a sensor that cost €50 in 2009 fell to €15 in 2013. Another is the development of cloud computing that enables data analytics. As businesses and their users are producing an increasing amount of data, some cloud providers are providing the hardware and algorithms to mine these data for in-house operational and customer insights, such as the ability to predict and influence customers online and offline (McAfee, 2012). The need for computing power required for big data analytics continues to rapidly grow as the amount of data created each day doubles every 40 months or so (McAfee, 2012). However, the cloud enables any business, regardless of the size or financial resources, to achieve the IT productivity of the largest enterprises with extensive IT budgets. Thus, there are opportunities in every sector, as IoT will be employed to lower costs and improve productivity and safety.[25]

ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) refers to a "broad set of methods, algorithms and technologies that make software 'smart' in a way that may seem human-like to an outside observer".[26] Artificial intelligence is often confused or used simultaneously with other terms: such as machine learning, deep learning, neural networks, and cognitive computing. One way of describing the differences

25 https://www.bcgperspectives.com/Images/The%20Mobile%20Internet%20Economy%20in%20Europe%20Dec%202014_tcm80-178364.pdf

26 https://www.computerworld.com/article/3040563/enterprise-applications/5-things-you-need-to-know-about-ai-cognitive-neural-and-deep-oh-my.html

among these is that they are similar to Russian Dolls in which deep learning is a subset of neural networks, which is a subset of machine learning, which is a subset of artificial intelligence.[27] Arthur Samuel at IBM first defined machine learning in 1959 as a "field of study that gives computers the ability to learn without being explicitly programmed".[28] Thus, machine learning distinguishes itself from more general AI as it has the ability to learn or modify itself without human intervention when it is exposed to more data. Neural networks are a one kind of machine learning technique that is based upon the way in which neurons work in the brain. Deep learning, or deep neural networks, is a relatively new field within machine learning that has become popular of late due to the availability of large amounts of data combined with major advances in processing power. Deep learning is based upon a "family of algorithms that implement deep networks with unsupervised learning"[29]; it includes a large system of neurons arranged in several hidden layers. Finally, the term cognitive computing is a bit controversial since it is unclear as to whether it is a true category of AI or just a buzzword; however, the primary idea is that the application of AI focuses upon "reasoning and understanding at a higher level, often in a manner that is analogous to human cognition -- or at least inspired by human cognition," with the purpose of making high-level decisions in complex situations.[30]

AI is not new, yet the technology has been rapidly maturing due to greater access to more data through maturing technologies, such as IoT and improved access to processing power: for example, through the cloud. The vast amount of data in decentralised networks is making the algorithms smarter. Thus, AI using large datasets can create enormous gains for firms: such as customer loyalty and trust, lower costs, improved quality, and increased agility. Personalised offers and recommendations can be scaled and large efficiencies can be created across the value chain. We are entering a new era where every organisation must be able to handle data to create customer and operational value.

27 https://deeplearning4j.org/ai-machinelearning-deeplearning

28 https://www.ibm.com/developerworks/community/blogs/jfp/entry/What_Is_Machine_Learning?lang=en

29 https://www.ibm.com/developerworks/library/cc-beginner-guide-machine-learning-ai-cognitive/index.html

30 https://www.computerworld.com/article/3040563/enterprise-applications/5-things-you-need-to-know-about-ai-cognitive-neural-and-deep-oh-my.html

However, come critical issues that must be addressed come with the opportunities of using algorithms on data. Without the proper oversight, data and AI usage can have unintended consequences: such as machine bias and discrimination, misuse of data, and sensitive data breaches. For example, ethical considerations lie in the bias of the programmer when programming how an autonomous driving vehicle should act in a crash situation. Furthermore, many now argue that data are the new gold, and there is an increasing competitive divide between leaders and laggards using AI on large data sets, thus, leading to monopoly situations occurring faster than ever before.

A study conducted by MIT[31] in partnership with BCG provides insights into AI maturity levels among organisations and what they need to do in order to develop an AI strategy. The results reveal low risk awareness and knowledge gaps in organisations. Many believe in the future of AI, yet few have a concrete strategy for how to get there or to govern it. Executives underestimate the security, and the organisational and technological capability gaps. The study also shows that very few organisations have strong data governance practices.

BLOCKCHAINS AND SMART CONTRACTS

One of the most promising areas of emerging technologies is in the use of blockchain-based technologies to automate processes. The best known use of the blockchain is probably as the underlying infrastructure that supports the cryptocurrency Bitcoin. However, the technology has also been widely used to build other automated networks. Another well-known network is the Ethereum ecosystem, which provides a platform for the creation of new automated systems, and a marketplace for the release of Decentralised Apps or DApps. These DApps require the network currency Ether to operate.

Blockchain technology generally works by transmitting a transaction to a network of computers that verifies when the transaction fulfils all the requirements for transaction execution: for instance, that the initiator of the transaction owns the asset being transferred, or that the sender has fulfilled the requirements for the assets to be released from escrow. The computers do the verification; then they receive tokens in exchange for verifying the transaction,

31 *MIT Sloan Management Review,* September 2017. The study found that more than 3,000 executives, managers, and analysts across industries. Complemented with 30 in-depth interviews with technology experts and executives.

encrypting it, and releasing into a network-maintained ledger. This process is known as mining; and in most blockchain systems, the tokens have come to have monetary value as currencies in their own right, as has happened with Bitcoin. Once the transaction has been transmitted and verified, the miners receive their reward and transmit the individual transaction to the network; it is typically not possible to reverse or alter the transaction. This is because no single computer in the network controls the ledger of transactions; changes can only be made when more than 50%[32] of those in the network agree to the change.

Blockchain automation holds a number of potential applications, beyond just the creation of new currencies. These include self-executing smart contracts, and organisations with automated vote verification and collection. To automate land registration,[33] Swedish Läntmateriet (The Swedish National Land Survey) has already experimented with smart contracts, and Axel Johnson to automate supply chains.[34] Blockchains are also being experimented with for use in standardised international transaction systems,[35] and for online trading of securities and other commodities.[36]

As a way of obtaining entrepreneurial finance, creators of new blockchain-based firms are even using smart contracts and existing cryptocurrencies. ICOs or initial coin offerings do so when these new firms sell tokens in their new system in exchange for an existing cryptocurrency: typically, Ether. The largest ICO to date, Filecoin, raised $205.8 million for tokens that allow individuals to share unused space on their computers—and sell it for Filecoin tokens.[37]

3D PRINTING

3D printing or additional manufacturing can be disruptive as it will transform industries through shifting competitive advantage and changing organisational structures, as it accelerates product-development cycles, thus, enabling

32 Some researchers argue that the threshold is really 30%.

33 https://www.lantmateriet.se/contentassets/6874bc3048ab42d6955e0f5dd9a84dcf/blockkedjan-framtidens-huskop.pdf

34 https://digital.di.se/artikel/axel-johnson-gruppen-vill-ta-blockkedjan-till-fruktdisken

35 Both for the transfer of funds and for smart contracts, see http://www.r3cev.com/blog/2016/4/4/introducing-r3-corda-a-distributed-ledger-designed-for-financial-services

36 https://www.coindesk.com/coinbase-integrates-gdax-exchange-with-algorithmic-trading-platform/

37 https://www.coindesk.com/257-million-filecoin-breaks-time-record-ico-funding/

new manufacturing strategies, shifts profits, and requires new capabilities.[38] 3D printing technology has existed since the 1980s, yet the range of consumer uses for 3D printing today is still quite limited to small plastic and metal objects such as toys, jewellery, and small household and electronics items. For example, Mattel has plans to sell 3D printer kits including the printer and app with design software for children for approximately USD 300.[39] However, 3D printing within industrial and other production areas is already printing parts in a variety of materials such as glass, titanium, and human cartilage; rapid prototyping and cheaper product molds are currently commonplace, thereby, removing economies of scale in many industries. As the technology continues to mature, companies now explore how 3D printing can transform product design. Not only can objects include moving parts; they can also be stronger or lighter than their traditional counterparts due to novel designs often based upon nature. For example, GE's 3D printed fuel injection nozzles for airplane engines are 25% lighter, saving approximately USD 1.4 million for each LEAP plane; its new single-prop Cessna plane engine is 85% 3D printed, thus, reducing the number of parts from 855 to 12.

The improvements above are incremental, however, compared to how 3D printing may radically transform manufacturing since it enables an idea to be instantaneously transformed into physical reality anywhere in the world. Today you can scan your foot with Volumental's technology in New Balance stores and receive your running shoes with perfectly fitting midsoles a few hours later. Local Motors prints cars in its USA micro-factories instead of manufacturing them in low-cost countries and shipping them over the ocean. Ivaldi will digitally send its designs to ports across the world and 3D print spare parts for the maritime industry. Amazon plans to 3D print objects in delivery trucks while on the way to your door.

According to a recent the International Data Corporation, global spending on 3D printing is predicted to grow from nearly $11 billion in 2015 to $26.7 billion in 2019 at a 27% compound annual growth rate (CAGR).[40] The McKinsey Global Institute has also estimated that 3D printing could have an annual economic impact of up to USD 550 billion by 2025. As 3D printing advances, traditional sources of competitive advantage, such as economies of

38 http://www.mckinsey.com/business-functions/operations/our-insights/3-d-printing-takes-shape

39 http://www.thingimaker.com/

40 http://www.idc.com/getdoc.jsp?containerId=prUS40960716

scale and low cost of labour, will decline in importance. As a result, manufacturing may be moved back to rich industrialised countries and increasingly performed by SMEs and entrepreneurs[41], encouraging disruption not only in the manufacturing industries; it will also be evident in logistics and transportation industries. For example, Local Motors has plans to manufacture its 3D printed cars in micro-factories in the US, cars that will be adapted to local driving conditions, energy sources, and regulations.

Additionally, manufacturing may move to local or online communities of individuals designing, printing, and selling a wide variety of objects. Sites such as Thingiverse, Blender, and Shapeways currently facilitate such activities while 3D Hubs platform claims that its more than 27,000 printers in 150 countries across the globe provide one billion people with access to a 3D printer within 10 miles of their home.

VIRTUAL AND AUGMENTED REALITY

2017 saw a revival in virtual and augmented reality with an increasing number of solutions coming onto the market and money being invested in these technologies. Within the past few years, Facebook bought Oculus Rift for USD 2 billion and Microsoft purchased Minecraft for USD 2.5 billion, and Magic Leap has raised USD 1.4 billion, with USD 800 million in a series C round: the largest series C round for an internet company at the time to date. With such money being invested in these technologies, it might come as no surprise that the market for VR/AR is expected to explode within the next few years to more than USD 600 billion in 2025 with some predicting that VR/AR technologies will replace the smartphone.

Although it is developing, virtual reality already enables various forms of immersive training as well as the ability for multi-national employees spread across the globe to simultaneously collaborate on project work or for children from distant schools to build Minecraft models that they then print out on their 3D printers. For example, Nvidia has plans to develop its software in order to enable immersive collaboration for manufacturing design. Many argue that augmented reality may have more potential than VR since it has extensive uses in e-commerce and mobile commerce, as well as for use in

41 http://www.economist.com/node/21552901

industrial areas: such as manufacturing, equipment operations, and material and inventory handling.[42]

Influence of Digitalization on the Labour Force

With its emerging technologies and new business models, digitalization has already begun to influence the labour force. For example, the number of freelancers in the world is rapidly increasing. One recent study in 2016 reported that the number of freelancers in the US had reached 35% of the workforce and that this number continues to rise.[43] Advances in artificial intelligence will more than likely enable temporary freelance platform-based organisations in ways we have difficulty imagining today. For example, a research group at Stanford University has developed Flash Organisations: a concept for AI-enabled temporary organisations. The group is currently working on its Foundry software with the purpose of enabling crowd workforces to flexibly assemble and reassemble themselves into collectives "that rival modern organisations in their prevalence, impact, and achievements"[44]. With the help of AI, the software builds a temporary organisation by recruiting freelancers from an online labour market – such as Upwork. Then, as project demands change over time, it continuously updates the organisation with new freelancers.

We now discuss two related areas: the immersive internet and automation, in addition to taking a look at the implications of a freelance workforce.

IMMERSIVE INTERNET

Virtual and augmented reality solutions along with virtual world solutions, such as OpenSimulator: the open source virtual world platform software, are encouraging the development of the "Immersive Internet": internet's next generation that enables individuals to immerse themselves into an internet with 3D sight and sound, and an increasing ability to transmit the sense of touch, thereby, offering an immersive working and networking space. Regardless of physical location, entrepreneurs may collaborate on value-creating activities in these environments, with one another as well as with other individuals from

42 http://ftalphaville.ft.com/2015/12/01/2146247/welcome-to-your-simulacrum-future-a-674bn-opportunity/

43 http://www.marketwired.com/press-release/new-study-finds-freelance-economy-grew-55-million-americans-this-year-35-total-us-workforce-2164446.htm

44 http://hci.stanford.edu/publications/2017/flashorgs/flash-orgs-chi-2017.pdf

both large and small firms, academia, hobbyists, and the public sector. This has already been clearly demonstrated by the OpenSimulator project: an open source virtual world platform project, in which the expression "meeting face-to-face" has lost its physical meaning, indicating instead a virtual meeting of avatars in a 3D online space.

Anyone with access to the internet will be able to learn just about anything and engage in a world of economic opportunities through the next generation of the internet; therefore, the number of freelancers across the globe will only continue to rise. Moreover, individuals who have previously been hindered from entering the workforce due to physical disabilities or peripheral locations will be able to learn and work through this immersive environment. One significant question this raises is how this "mobility" of labour and the "mobility" of physical goods due to 3D printing will impact the competitiveness of regions and nations.

We are finding indications of "open entrepreneurship" through the immersive internet, or the process of entrepreneurs openly engaging in social capital-building activities through the free contribution to the public of intellectual property and other resources, with the purpose of pursuing individual business-related interests while contributing to the pursuit of collective goals. While these entrepreneurs may give away for free their intellectual property, knowledge, time, and other resources, they do so in the pursuit of creating a social structure, which enables them to overcome the inherent difficulties in attracting the necessary human, financial, and other resources due to the uncertainties of their new venture and the liabilities of newness and small size. Through the immersive internet, entrepreneurs may more easily overcome these liabilities: factors that have traditionally disadvantaged small firms compared with large organisations, which have generally led to their failure. Furthermore, we are beginning to see signs that the immersive internet is leading to, or implicated in, a migration from an economic model characterised by centralised hierarchical firms controlling in-house resources to a model of decentralised social production by communities of globally distributed firms and workers. Such fundamental changes clearly bring into question how and to what degree well-established multi-national organisations and their brands will continue to dominate economic activity.

As 3D printing becomes integrated with the immersive internet, as well as becomes commonplace for household and industrial objects, we will not only

be able to design and experience objects in these virtual spaces; we will also be able to simultaneously produce these objects in our garage or workplace, thus, enabling an era of social manufacturing. Not only will the borders between industries be blurred; the entire value creation system may be revolutionised due to the convergence of the immersive internet with material, production, and other related technologies: from the sourcing of inputs and production in the supply chain through to distribution and end-user consumption.

AUTOMATION

In a 2014 study by Carl Benedikt Frey & Michael Osborne from Oxford (2014) on the future of employment, the authors predicted that 47% of total US employment is at risk due to computerisation. Today, robots already cut our lawns, vacuum our houses, write our sports articles, and make or lose our money in the stock market, while drones deliver small packages in some countries as well. Japan, the country that wants to be the world's leader in robots, now has two hotel – Henn-na Hotels, owned by the low-cost travel agency H.I.S. Co. in Nagasaki and in Tokyo – that are run almost entirely by robots. Robots help you check in, carry your luggage, provide concierge services, haul your trash away, and even provide entertainment as fish in the lobby's tank.[45] The only human tasks left are changing the sheets and taking care of said robots.

However, there are a number of tasks that computers will have difficulty in performing, and Carl Benedikt Frey & Michael Osborne developed in their 2014 Oxford study a list of nine task dimensions with computerisation bottlenecks, as they are primarily non-routine tasks. These tasks fall under three categories: perception and manipulation (finger and manual dexterity, cramped workspace, and awkward positions), creative intelligence (originality and fine arts), and social intelligence (social perceptiveness, negotiation, persuasion, and assisting and caring for others).

As a result, not all jobs will disappear. Indeed, it may be more beneficial to consider which tasks, as opposed to jobs, will AI and/or robotisation control. We can expect that some non-routine jobs will be augmented by computers performing routine tasks while new jobs will appear, especially within the high-paying sector. For example, five high-paying jobs that did not exist ten

45 http://www.japantimes.co.jp/news/2016/11/18/business/nagasakis-robot-staffed-henn-na-hotel-gets-guinness-nod/#.WDWBV7VwpME

years ago include data scientist, mobile applications developer, information security analyst, digital strategist, and green building and retrofit architect.[46]

However, we will see a middle-tier job squeeze as software applications and robots continue to replace routine tasks. This will force middle-skilled labour to compete for jobs in the lesser-skilled sector, which has the effect of reducing wages (Felländer et al., 2015). Furthermore, the falling cost of automation and robotisation will put downward pressure upon wages as the cost of substitution for traditional labour continues to fall. Such structural factors will hold back wage increases and employment in routine jobs: even in the current environment with a cyclical upswing in the US labour market.

Thus, as in previous technological paradigm shifts, it is predicted that there will be technological unemployment as technological advances outpace the rate at which we can find new uses for the displaced labour. Although this prediction implies certain negative effects in the short run, the long-run effect should be positive because history reveals that people tend to move higher up in the value chain over time as lost jobs are replaced by new ones. With the right training and circumstances, we can expect that self-employed individuals or freelancers can replace, to a certain extent, jobs that are lost due to digitalization and robotisation. The question is with which pace firms, entrepreneurs, and freelancers will be able to create opportunities and jobs in both highly-skilled and lesser-skilled sectors.

A FREELANCE WORKFORCE?

Another area that deserves consideration is to what degree society is prepared for a labour force that is composed of an increasing percentage of freelancers and entrepreneurs. Labour regulations to date have focused upon protecting the rights of workers vis-à-vis their full-time employers; however, such regulations about the rights of freelancers and self-employed entrepreneurs are often silent. Today's digital platforms do not guarantee an individual's well-being in the same way that a "traditional" employer does, and individuals who provide their services through online platform transactions generally bear a considerable amount of risk. For example, platforms such as Uber and Airbnb, do not define themselves as employers in the transportation and hotel sectors, respectively. Rather, they argue they are merely digital platforms that

46 http://www.payscale.com/career-news/2015/09/5-high-paying-jobs-that-didnt-exist-10-years-ago

match drivers with clients, and property owners with tourists. Hence, these companies claim they are not responsible for the social benefits and insurance of the drivers and property owners.

Furthermore, individuals often have no control over when and from whom they receive work assignments. In addition, as the number of global freelance labour platforms increases, freelancers may be affiliated with more than one platform, thus, complicating the situation even more. For example, an individual might work full or part-time in Stockholm for Uber while simultaneously developing software for an organisation in China or Australia through the Upwork platform.

In most countries, because freelancers such as Uber drivers and other local sourcing platforms are not considered to be legal employees, they are not able to organise to obtain the collective bargaining privileges and protections that those belonging to most labour unions have. Thus, although some people argue that the Platform Economy offers flexibility and supplemental income not available from traditional jobs, others argue that it signals a return to the piecemeal labour system that exploited workers.

Moving forward, traditional unions will not capture the entire labour force. Thus, labour market regulations must be adapted: not only to ensure the traditional safety net for individuals, and to provide regulatory and tax incentives to incentivise self-employment as well. One such organisation, the Freelancers Union in the US, has emerged to serve the needs of this labour force. However, as aforementioned, the line between employee and freelancer is not always clear, and the Platform Economy is increasingly generating more ambiguous situations. For example, what happens if individuals barter or are paid in kind, rather than in money? Can residents of a community volunteer for a housing association in exchange for reduced rent? If so, what do they need to declare for tax purposes, given that the association may not employ them? For that matter, does the association employ them?

Recommendations for the Future

What will the world look like in in the future? On the one-hand, it is most likely that the penetration of the mobile Internet along with an internet-savvy workforce will continue. Global mobile internet penetration is predicted to reach 71% by 2019 while usage per device is to triple and will most likely

exceed the use of desktop and mobile browsers combined.[47] By 2020, on the other hand, the world will have its first generation of individuals who will have grown up in an entirely digital world, and 50% of the global workforce will be millennials.[48]

When it comes to firms, a study by McKinsey & Company suggests that the average rate of digital penetration across all industries is only approximately 37% and, as penetration increases, industries will continue to see downward pressure upon revenue and profit growth.[49] Increased price competition will result as the number of digital platforms grows and other technological advances decrease entry barriers and contribute to transparency. New entrants, so-called *born globals* and *micro-multinationals*, are accessing the global market right from their inception, which means that previously protected local providers will find themselves facing global competition (Felländer et al., 2015). Traditional middlemen, which generated higher transaction costs and higher fixed costs of holding capital or labour, will be eliminated; the more perfect matching of supply and demand through digital platforms will further decrease transaction costs. Thus, although demand may grow in many economies, companies will find it increasingly difficult to increase their margins.

As a result, the pace of change is predicted to only increase. Research has shown that the average lifespan of a company on the S&P 500 index has declined from 61 years in 1958 to 25 years in 1980 to 18 years in 2012, and is forecast to further shrink to 14 years by 2026.[50] At the current churn rate, 75% of the S&P 500 firms are predicted to be replaced by 2027.[51] This "creative destruction", wherein some jobs, firms, and industries are transformed or destroyed only to make way for others, has been depicted by some as thrilling and promising, while others are more concerned. There is a lot that remains to be seen; however, as we move into this era, which may be the beginning of the fourth industrial revolution, characterised by the mass adoption of expo-

47 https://www.internetsociety.org//globalinternetreport/2015/assets/download/IS_web.pdf.

48 https://www.pwc.com/m1/en/services/consulting/documents/millennials-at-work.pdf

49 http://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/the-case-for-digital-reinvention#0

50 https://www.innosight.com/insight/creative-destruction-whips-through-corporate-america-an-innosight-executive-briefing-on-corporate-strategy/

51 https://www.innosight.com/insight/creative-destruction-whips-through-corporate-america-an-innosight-executive-briefing-on-corporate-strategy/

nential technologies,[52] many argue that even more significant disruptive changes in economy, business, society, and individually are yet to come[53].

We now present some more general recommendations for managers on how to tackle the challenges of digitalization. In addition, we discuss some policy considerations for Sweden and its policymakers on measures to ensure that Sweden can benefit from digitalization in the future.

RECOMMENDATIONS FOR MANAGERS

One study by the MIT Sloan Center for Information Systems Research found that the winners in this new era will be those companies that fully embrace digitalization. Those companies that had 50% or more of their revenues generated within digital ecosystems and understood their end customer better than the average competitor exhibited 32% higher revenue growth and a 27% higher profit margins within their industry than the average (Weill & Woerner, 2015).

Digitalization is expected to even increase its pace; thus, it is impossible to predict what industries will look like in ten to twenty years time as the majority of what will happen in the future is beyond our comprehension – we do not even know what we do not know about the future. One of the reasons that companies are unable to survive in the long run is that they get blindsided by changes in their industry: that is to say, they were unable to scan the periphery of their industry for weak signals that later led to significant changes in their industry, thus, rendering them obsolete.

However, scenario analysis is one strategic analysis tool that is becoming increasingly useful in enabling companies to prepare for the future, especially in response to the rapid pace of digitalization; it should be noted that scenario analysis is not a forecasting tool that projects historical trend data into the future, nor is it a vision for how a company would like the future to be. Rather, it is a tool to enable managers to produce scenarios of how the future of around ten to fifteen years out could potentially be dependent upon how a number of uncertainties develop. Since scenarios promote creative thinking and challenge conventional wisdom, they enable managers to make better decisions if they are developed correctly. Companies that have been successful using scenario

52 https://www.weforum.org/agenda/2016/01/digital-disruption-has-only-just-begun/

53 http://www3.weforum.org/docs/Media/KSC_4IR.pdf

analysis are Shell, GE, IBM, and UPS, thus, enabling them to retain their position as market leaders even as their industries transform.

While there are many scenario analysis tools, one of the most commonly used is a 2x2 scenario matrix that enables managers to consider the question: "What if this were to happen…?".[54] The scenario matrix is created by choosing two mutually exclusive, critical uncertainties for the axes, which may significantly change the medium to long-term future in relation to a key strategic issue for the company. For example, a key strategic issue is whether to open a new factory in another country, to develop a completely new product line, or to invest in a new technology or competitor. One way to determine this is to think about the question: "What one question would you ask a real psychic?"

The two critical uncertainties can be uncovered by performing a PESTEL (political, economic, social, technological, environmental, and legal) analysis in which these trends are analysed based upon the degree to which they are uncertain and influential for the key issue. For example, one critical uncertainty may be related to governmental regulations ranging from strict to relaxed governmental regulations, while another might be related to the adoption of a new technology from high to low.

Four scenarios are then developed: one for each of the matrix boxes (figure 15.1). These scenarios are in narrative form and describe potential futures in which the company needs to consider how they will perform. Conclusions can then be drawn related to the strategic issue, thus, providing the company with input into how it can build robust strategies and enable it to be agile and sustain its competitive advantage regardless of which scenario unfolds. Leading indicators are then determined to scan for early warning signals for the various scenarios.

Scenario analysis can be used in a more large manner in which all employees and stakeholders are involved in a lengthy process that could last several months, which enables the company to develop its vision; it may even be used in a small-scale manner among a group of a handful of individuals in their decision processes.

54 A Note on Scenario Planning, Harvard Business School.

- Test 4–5 most Critical Uncertainties in pairs in scenario framework
  - Must be very low correlation between pair of uncertainties
- Develop characteristics and narrative for each scenario

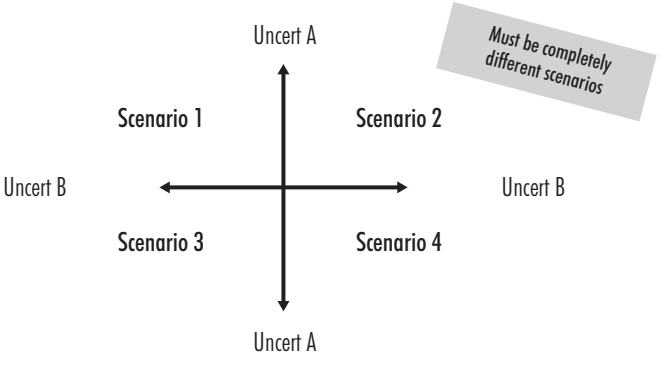

Figure 15.1. The 2x2 scenario matrix

POLICY CONSIDERATIONS FOR SWEDEN

While digital disruption has only just begun, the characteristics of the Swedish economy suggest that Sweden is in a relatively good position to benefit from digitalization. These characteristics include the following: a highly skilled workforce in information technology, natural sciences and engineering, user interface and design, communication services, high levels of internet and smart phone penetration, a global outlook, a focus upon entrepreneurship and thriving entrepreneurial ecosystems in many medium to large cities, a leader in the area of FinTech, a stable and advanced welfare state, and Sweden's ideological concern for sustainability (Berkes et al, 2000).

Sweden, however, is still likely to feel the adverse effects of increased digitalization and automation. Recent studies predict that 36–60 per cent of the current jobs in Sweden – primarily routine jobs – will be lost during the next 20 years as algorithms and robots are employed to perform an increasing number of tasks (Fölster, 2014). This is partly because its largest sectors of employment are currently transportation, construction, and metal manufacturing. However, although 10 per cent of Swedish jobs disappeared between 2006 and 2011 due to automation, the employment rate has remained relatively unchanged. The reason for the stable employment rate is threefold: 1) digitalization and

increased revenues have increased the demand for labour, such as computer specialists and engineers; 2) higher disposable incomes of highly-skilled individuals have increased the demand for local service sector jobs; and 3) labour market reforms, particularly those targeted toward youth labour, have had a positive impact on employment.

Regarding wages: lower labour mobility and lower wage flexibility cause more wage rigidity in Sweden compared to the US. Nevertheless, the aforementioned underlying forces do lead to the same wage pressures; commentators and academics are concerned about the fast pace of digitalization and automation and their potential impact on the labour market, especially since wages in the Swedish manufacturing industry are relatively high.

As digitalization proceeds, the questions arising are of deep importance for governments and public sector bodies at all levels. The regulatory framework must be adapted to significantly address the protection of consumers and employees while simultaneously enabling the creation of new jobs. How should taxation and legal systems be designed: to promote innovation as opposed to hinder it? How should resources be invested in virtual trans-national clusters of economic activity, such that this investment benefits local taxpayers and citizens? These tasks will require a balancing act; some policy suggestions are noted below. Many of these were developed in connection with a report we published on the Sharing Economy in 2015 (Felländer et al., 2015).

Facilitate a flexible labour market. The labour market may need to be more flexible, thus, creating incentives both for mobility and for self-employment. However, such flexibility is difficult to balance with a safety net for vulnerable individuals. The Swedish welfare model, which is characterised by risk sharing among individuals and security for the individual, has benefited the economy. In our view, it is even more crucial to aim for social cohesion in the future. Nevertheless, the model must be adapted to the newly emergent labour market.

Provide a workforce with skills that meet the future needs of the Swedish economy. Sweden boasts a strong skill base and a traditionally high share of graduates in natural sciences and engineering, which bodes well for the future of digitalization in the country. However, there are increasing concerns about the quality of education and the ability to provide a workforce with skills that meet the needs of Sweden's future economy. Swedish students rank in the

middle of the OECD countries in science education, and the pay-offs of higher education in Sweden lag behind those of many peer countries (Ketels, 2009).

Attract foreign skill. Sweden does not rank high in attracting foreign skill, which Ketels (2009) argues is increasingly necessary in the global economy. Diversity tends to spur creativity that, in turn, leads to a dynamic and innovative climate characterised by higher productivity. In addition, Sweden's regulatory scheme and administrative practices are viewed as bureaucratic, and Sweden has one of the highest levels of taxation in the world, especially for individuals.

Reassess the tax base. Taxation remains a significant and unresolved issue. The cost of labour will increase in the future as digitalization spurs a knowledge-intensive service sector. Thus, increasing taxes on labour might not be the best approach. Other tax bases must be explored instead. Some international discussions on this issue include the consideration of both wealth and property taxes. Furthermore, as we move more toward a platform economy, who is responsible for reporting the sale and pay the sales or income tax? What about exchanges in which money does not change hands: for example, a farming cooperative where individuals receive produce from the farm in exchange for labour or an Uber-like exchange where the number of hours spent driving others can be exchanged for rides from other participants? Similarly, when new currencies are created, should they be treated as goods, services or currencies for the purposes of VAT? Such debates have already begun to emerge with regard to Bitcoin: a cryptocurrency.[55]

Conclusion

The purpose of this chapter, which was intended for a broad audience, has been to provide a broad overview of digitalization and its many influences upon firms and society. There are many areas to explore – and only more will emerge as digitalization continues to penetrate industries and new technologies emerge and converge with others. Digitalization and technological developments combined with political and societal changes continue to change the world, as we know it; therefore, it is important to view these changes in the "longue durée". We may seem to be moving forward, but many also profess that our technological and societal advances have led us to the edge of the cliff

55 http://www.coindesk.com/europe-inches-towards-decision-bitcoin-vat/

of the anthropocene era: the period during which human activity has globally impacted the planet. Paul Dukes writes that we entered this era in 1763, when the available data indicate the beginning of a growth in the atmospheric concentrations of several greenhouse gases (Dukes, 2011). Digitalization, however, offers promise in reducing the pressure of growth upon pollution and large cities across the globe. A McKinsey study recently reported that this trend of large city growth has been broken in countries such as the US and India, as smaller cities and rural areas are gaining popularity across age groups. Yet, how it is unclear how we further develop to secure the future of the planet for generations to come; building roads tends to increase traffic, rather than relieve it. Recent research in entrepreneurship has recognised the basic human paradox of seeking to simultaneously fulfil both individual and collective interests. The question remains: How will future developments impact this dialectical nature of human beings: Will it encourage us to act more collectively or perhaps more in our own self-interest?

References

Berkes, F., Folke, C., & Colding, J. (Eds.). (2000). *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. Cambridge University Press.

Brynjolfsson, E., & McAfee, A. (2014). The digitization of just about everything. In *The Second Machine Age: Work, Progress, And Prosperity in a Time of Brilliant Technologies*, pp. 57–70.

De Buysere, K., Gajda, O., Kleverlaan, R., Marom, D., & Klaes, M. (2012). A framework for European crowdfunding. *European Crowdfunding Network*.

Di Gangi, P. M., Wasko, M. M., & Hooker, R. E. (2010). Getting customers' ideas to work for you: Learning from Dell, How to succeed with online user innovation communities. *MIS Quarterly Executive, 9*(4).

Dukes, P. (2011). *Minutes to Midnight: History and the Anthropocene Era from 1763*. Anthem Press.

Eisenmann, T., Parker, G., & Van Alstyne, M. W. (2006). Strategies for two-sided markets. *Harvard Business Review, 84*(10), 92.

Felländer, A., Ingram, C., & Teigland, R. (2015). *Sharing Economy: Embracing Change with Caution*. Näringspolitiskt Forum Rapport (No. 11).

Fölster, S. (2015). *De Nya Jobben i Automatiseringens Tidevarv*. Stiftelsen för Strategisk Forskning.

Ketels, C. (2009). *Clusters, Cluster Policy, and Swedish Competitiveness in the Global Economy*. Stockholm: Globalisation Council.

McAfee, A., Brynjolfsson, E., & Davenport, T. H. (2012). Big data: the management revolution. *Harvard Business Review, 90*(10), 60–68.

McGahan, A. (2000). How industries change, *Harvard Business Review,* October.

Parker, G. G., Van Alstyne, M. W., & Choudary, S. P. (2016). *Platform Revolution: How Networked Markets are Transforming the Economy--And How to Make Them Work for You*. WW Norton & Company.

Pedersen, J., Kocsis, D., Tripathi, A., Tarrell, A., Weerakoon, A., Tahmasbi, N., & de Vreede, G. J. (2013). Conceptual foundations of crowdsourcing: A review of IS research. In *System Sciences (HICSS), 2013 46th Hawaii International Conference on* (pp. 579–588). IEEE.

Schumpeter, J. (1934). *Capitalism, Socialism, and Democracy,* New York: Harper & Row.

Skan, J., Lumb, R., Masood, S., & Conway, S. K. (2014). The boom in global fintech investment: A new growth opportunity for London, *Accenture,* p 15.

Weill, P., & Woerner, S. L. (2015). Thriving in an increasingly digital ecosystem. *MIT Sloan Management Review, 56*(4), 27.