



# Intelligent Automation in FinTech

*An exploratory study of how Norwegian providers of financial technology utilize intelligent automation in light of PSD2*

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# Abstract

By performing a literature review and conducting semi-structured interviews with six business leaders on robotic process automation and artificial intelligence in the Norwegian financial services industry, this thesis analyzes how providers of financial technology utilize intelligent automation in light of the revised Payment Service Directive (PSD2).

As the financial services industry experiences considerable upheaval based on digitalization and new regulations, incumbents and startups apply digital technologies to increase their competitiveness. Our findings indicate that by utilizing intelligent automation—the combination of robotic process automation and artificial intelligence—FinTech firms could improve all the components of their business model; value creation, value delivery, and value capture.

While robotic process automation entails the use of bots to handle repetitive, high-volume, and rule-based tasks, artificial intelligence enhances the user's ability to solve business problems by simulating human cognition using various algorithms, e.g., machine learning, natural language processing, and computer vision. Although robotic process automation often is deployed as a “patching tool” to deal with outdated legacy systems, our study reveals that it can yield extraordinary results. Rapidly altering how businesses operate, artificial intelligence is a cutting-edge technology applied in services like robo-advisors and virtual assistants. Our research shows that the combination of these technologies has the potential to disrupt the financial services industry in ways not thought of yet.

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## List of Abbreviations

AI	Artificial Intelligence
AISP	Account Information Service Provider
API	Application Programming Interface
GAFA	Google, Apple, Facebook, and Amazon
IA	Intelligent Automation
PISP	Payment Initiation Service Provider
PSD	Payment Service Directive
PSD2	Revised Payment Service Directive
RPA	Robotic Process Automation
TPP	Third-Party Provider

# 1 Introduction

According to Schwab (2016), we are in the middle of an industrial revolution characterized by technologies that blur the lines between the physical, digital, and biological spheres, in which three distinct drivers are separating it from the previous industrial revolution; velocity, scope, and systems impact. Furthermore, today’s industrial revolution, which is the fourth of its kind, has no historical precedent, and it is evolving at an exponential rate. Given the speed at which disruption is taking place, the emergence of global platforms, new business models, and new technologies are forcing companies to rethink the way they do business (Marr, 2018a).

Garelli (2016) states that the average life-span of corporations listed in Standard & Poor’s 500 has fallen from 61 years in 1950 to less than 18 years in 2016. Following that development, Desmet, Duncan, Scanlan, and Singer (2015) believe that 75 percent of the S&P 500 incumbents will become extinct by 2027, which is an indication of once-successful businesses lacking agility and the ability to reinvent themselves before others do. In other words, no firm is too big to fail—not even today’s ‘Four Horsemen of Tech’, i.e., Google, Amazon, Facebook, and Apple (Hower, 2017). Consequently, Jørgensen and Pedersen (2018, p. 48) argue that business leaders need to challenge the status quo and innovate continuously, or risk becoming victims of ‘death by a thousand cuts’<sup>1</sup> (Hernæs, 2015; Tynan, 2017). Kjerpeseth (2017) is convinced that the businesses that cease to exist in the future will do so because of this approach rather than because of an ‘Uber moment’.<sup>2</sup>

Individually or combined, Schwab (2016) argues that emerging technologies are forcing firms to reexamine the way they create, deliver, and capture value from business opportunities. Demonstrably, this is particularly relevant for providers of financial services in light of PSD2—the EU’s revised Payment Service Directive—as it opens up the banks’ infrastructure, increasing competition in what was previously known as an industry with extremely high barriers (Skinner, 2014). By imposing banks to give third parties access to their customer data and payment infrastructure, PSD2 entails the end of the banks’ information monopoly (Jensen, 2019).

With the emergence of technologies like the Internet, banking has gone from somewhere you go to something you do (King, 2012). Therefore, large, traditional banks are not just competing against other banks anymore; even brand-new digitally-enabled services are

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<sup>1</sup>A Chinese failure metaphor stemming from the accumulation of many insignificant problems (The Economist, 2012).

<sup>2</sup>A term that refers to how business model innovation disrupts an industry through the unification of new technology and social change (Flinders, 2017).



challenging them—everything from consumer loan banks, online brokers, and foreign tech companies (Cognizant, 2018). As an example of what kind of threats banks are up against now, the biggest bank in Norway, DNB, regards Amazon as its most prominent competitor in the future. Furthermore, they fear becoming an anonymous account provider and that their banking services are going to be performed by third-party providers such as FinTech firms (Lorentzen, 2019). Hence, companies in the financial services industry have two options moving forward; either cooperate with each other because they must or because they want to. Instead of conducting business as usual, i.e., competing with local players as they have done since the dawn of time, collaboration by sharing knowledge and technology may yield added value and increase competitiveness against non-traditional financial institutions.

King (2018) argues that the next banking experience is “everywhere, never at a bank”. According to Marous (2018a), this will depend on the industry’s ability to leverage on the power of digital technology, customer insight, and advanced analytics to provide services that help customers manage their finances and daily lives. Having worked in a bank and seen the potential that new technologies have for a financial institution first-hand, we believe that robotic process automation (RPA) and artificial intelligence (AI) will be instrumental in achieving the banking experience of the future.

## 1.1 Research Question

As the financial services industry is experiencing considerable upheaval based on digitalization and increased competition from new players as a result of PSD2, we want to analyze how Norwegian providers of financial technology utilize new technologies and cooperate with competitors to increase their competitiveness. We assume that digital native companies are familiar with automation and also experiment more with emerging technologies than traditional banks, and thus, we are curious to see if FinTech startups and incumbent banks share knowledge or technology to improve their business models and customer experiences. Specifically, we are interested in how and to what extent Norwegian providers of financial technology utilize the combination of RPA and AI—a concept called ‘Intelligent Automation’ (Schatsky & Mahidhar, 2014; Williams & Allen, 2017).

By reviewing the contemporary literature and conducting semi-structured interviews with business leaders and experts on robotic process automation and artificial intelligence in Norway, the objective of this master thesis is to answer the following research question:

*In light of PSD2, how are Norwegian providers of financial technology utilizing intelligent automation?*

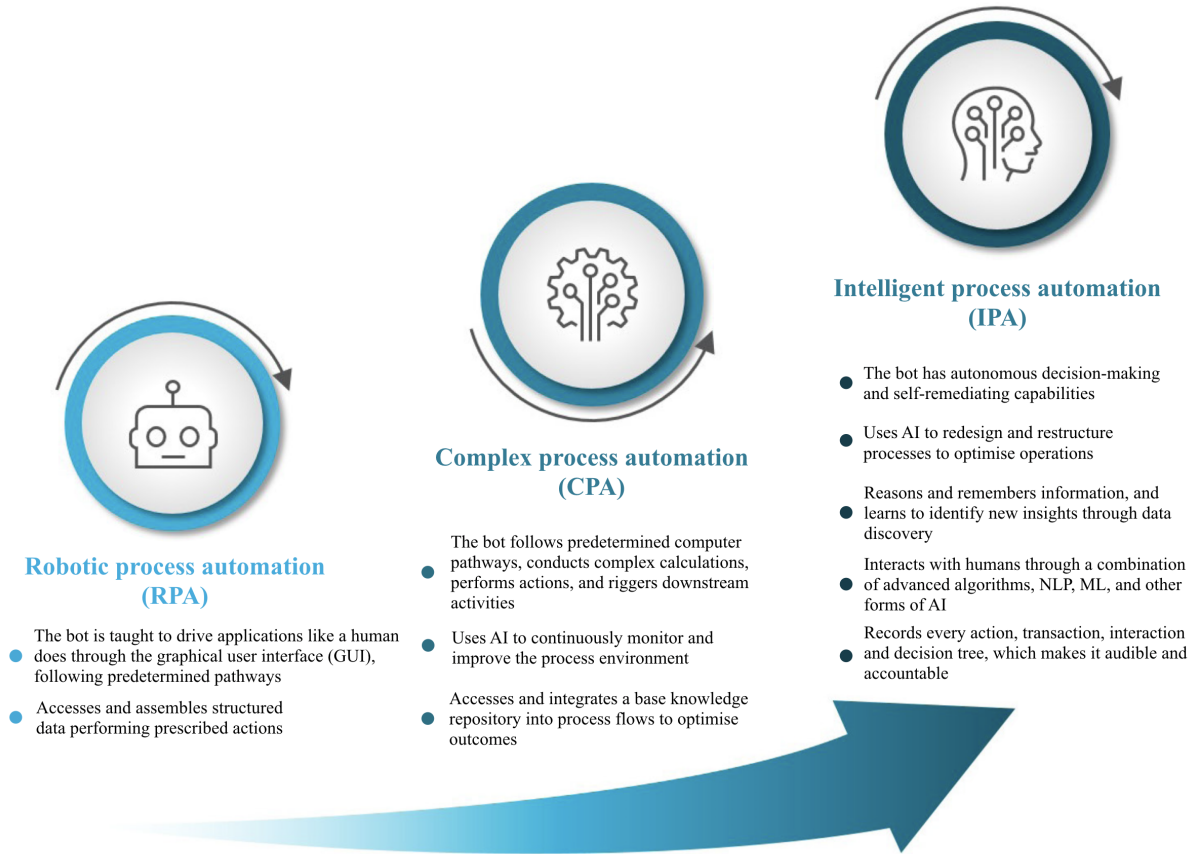
## 2 Background

### 2.1 Intelligent Automation

According to IBM (2018), intelligent automation allows business and technology to function together for a common goal instead of working against one another. It consists of robotic process automation and artificial intelligence, which are applied cohesively with business process management to achieve strategic business objectives (Capgemini, 2018, p. 3). Whereas robotic process automation entails the use of software robots to handle repetitive, high-volume, and rule-based tasks, artificial intelligence enhances the user's ability to solve business problems by simulating human cognition using different algorithms, e.g., machine learning, natural language processing, and computer vision (Bain & Company, 2018; Bughin et al., 2017; Gerbert, Hecker, Steinhäuser, & Ruwolt, 2017). Lastly, business process management is a process redesign approach to improve the efficiency and quality of processes (Wyatt, 2019).

IBM (2018) argues that intelligent automation is revolutionizing almost every aspect of banking and financial services through innovations like chatbots and virtual assistants as they change the way customers interact with financial institutions. Moreover, they anticipate that it will continue to disrupt the financial services industry in ways not thought of yet considering that the range of business problems it has the potential to solve is expanding. Technologies for AI subdisciplines like machine learning (ML), natural language processing (NLP), and computer vision (CV) are becoming increasingly available as open source, cloud-based services, or low-cost products, making them accessible and usable also for non-specialists (Schatsky & Mahidhar, 2014). The rapid development in these areas is heralding a new era of productivity and innovation, in which the applications set new standards of efficiency, quality, speed, and functionality.

According to Berruti, Ross, and Weinberg (2017), AI's subdisciplines have different applications. Machine learning mimics human judgment by using algorithms to identify patterns in structured and unstructured data, whereas natural language generation mimics human speech using software engines that create seamless interactions between humans and technology, translating observations from data into prose. Combining these technologies make it possible to develop cognitive agents, i.e., virtual workers such as chatbots and virtual assistants, capable of executing tasks, communicating, learning from data sets and making decisions based on logic. Adding these algorithms to the RPA software would enhance its capabilities, as illustrated in Figure 2.1 (Williams & Allen, 2017).



**Figure 2.1:** Intelligent automation continuum

According to Mithas, Tafti, and Mitchell (2013), digital technologies enable innovation in customer experiences, business processes, and business models. Furthermore, Westerman, Bonnet, and McAfee (2014) argue that companies that systematically explore digital technology will increase their innovation capacity and competitiveness. While Blue Prism—an industry-leading provider of automation technology—uses the term ‘Intelligent Automation’ for its digital technology, competitors like WorkFusion, Automation Anywhere, and UiPath describe their services as smart process automation, cognitive automation, and intelligent process automation, respectively. Nevertheless, these solutions share two particular features: RPA and AI, of which the common denominator is automation with an intelligent component (Stegink, 2019).

Before discussing how providers of financial technology utilize digital technologies such as intelligent automation, the following subsections elucidate the underlying technologies behind equation 2.1:

$$RPA + AI = IA \quad (2.1)$$

### 2.1.1 Robotic Process Automation

According to Morgan Stanley (2017), robotic process automation (RPA) is a technology that uses software robots ('bots') to emulate the actions of humans within digital systems to execute business processes. By utilizing the computer's user interface to capture and manipulate applications, these bots interpret and communicate with other systems to conduct repetitive, rule-based tasks like data collection and entry faster and more accurately than their human counterparts (UiPath, n.d.).

RPA software manages workflows using drag-and-drop features in a visual way that do not require any coding expertise. Furthermore, it does not require an overhaul of organizations IT systems—it is non-intrusive and leverages their existing infrastructure without disrupting the underlying systems. By logging into applications, moving files and folders, copying and pasting data, filling in forms, and extracting structured and semi-structured data from documents, RPA compliments humans so that humans can focus more on unstructured and creative tasks (Lacity & Willcocks, 2016).

According to Sopra Steria (n.d.), RPA provides profitable business cases and is a natural part of digital transformation as it reduces costs and implementation time, releases more resources for value-adding work, increases quality by removing human errors, and improves audit and regulatory through traceable logging. Besides, it provides a 24/7 operating schedule and is easily scalable (Jain, n.d.).

J.P. Morgan is using bots to handle internal IT operations such as resetting passwords for the employees. In 2017, they estimated that the bots would process 1.7 million IT access request, which is the equivalent of 40 full-time employees (Berruti et al., 2017). Although this example is not exclusive to banks or financial institutions, it illustrates how automation can solve easy tasks and generate cost-savings—especially when the organization is of this magnitude. Brooke (2017), however, argues that 75 percent of the current banking operations can be automated using RPA, in which one bot has the potential to replace up to eight employees.

Schatsky and Mahidhar (2014) explain how a large hedge fund applied computational linguistics technology to extract and aggregate the content from its research notes, thereby discovering that a significant amount of the notes diverged from the analyst ratings. Consequently, after reviewing and redesigning its processes, they ended up with an improved system that automates and monitors the future research notes' quality efficiently. Similarly, Credit Suisse automated the analysis of vast amounts of data to automatically

produce reports that assess company expectations, in which the objective is to help bankers, analysts, and investors to make long-term investment decisions. Compared with reports written manually by analysts, this technology improves both the quality and consistency of the report, in addition to increasing the volume threefold. AI-enabled algorithmic trading has even led to fully automated hedge funds (Metz, 2016).

In another example, Australia and New Zealand Banking Group reduced costs by over 30 percent in some of their functions as a result of deploying RPA at scale (Berruti et al., 2017). By automating over 40 processes, they enabled employees to focus on other tasks that are more rewarding and value-adding. Furthermore, KPMG (2016) states that RPA is beneficial in meeting regulatory requirements<sup>3</sup> because it can factor in thousands of validation and due diligence rules when analyzing forms.

Deployed successfully throughout an organization, Morgan Stanley (2017) argues that the return on investment from cost savings could be anywhere between 10 to 25 percent—a number that can increase up to 50 percent should RPA develop cognitive abilities. However, for an organization to reap automation’s full benefits, it should examine the entire value chain—not only automate processes but re-engineer them. By creating a simple workflow, one could translate the processes into machine operations afterward.

Some RPA software already makes use of technology such as optical character recognition (OCR) to adapt to changing websites, thereby reducing the need for human intervention (Ostdick, 2016). Combining RPA with even more intelligent solutions, however, could make the software able to deal with unexpected errors and exceptions in business processes, adapting based on previous actions, and learning from experiences. By adding an intelligent component to the equation, the software can improve its performance and make complex decisions with little human intervention or manual programming. AI—including cognitive capabilities such as adaptive learning, pattern identification, and speech recognition—is such an advanced technology compatible with RPA that could elevate its features and permit digital transformation on another level (Ocean Report, 2019).

Uncritical use of bots can lead to a patchwork of short-term solutions that smooth the underlying issues associated with IT infrastructure and processes (PwC Norway, n.d.-b). Before implementing RPA, it is therefore essential to assess the use of RPA compared to upgrading systems and streamlining work processes. As illustrated in Figure 2.2, RPA cannot be applied to every task (van der Aalst, Bichler, & Heinzl, 2018).

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<sup>3</sup>Financial institutions are subject to strict regulations involving KYC (Know Your Customer), AML (Anti-Money Laundering), and FATCA (Foreign Account Tax Compliance Act).

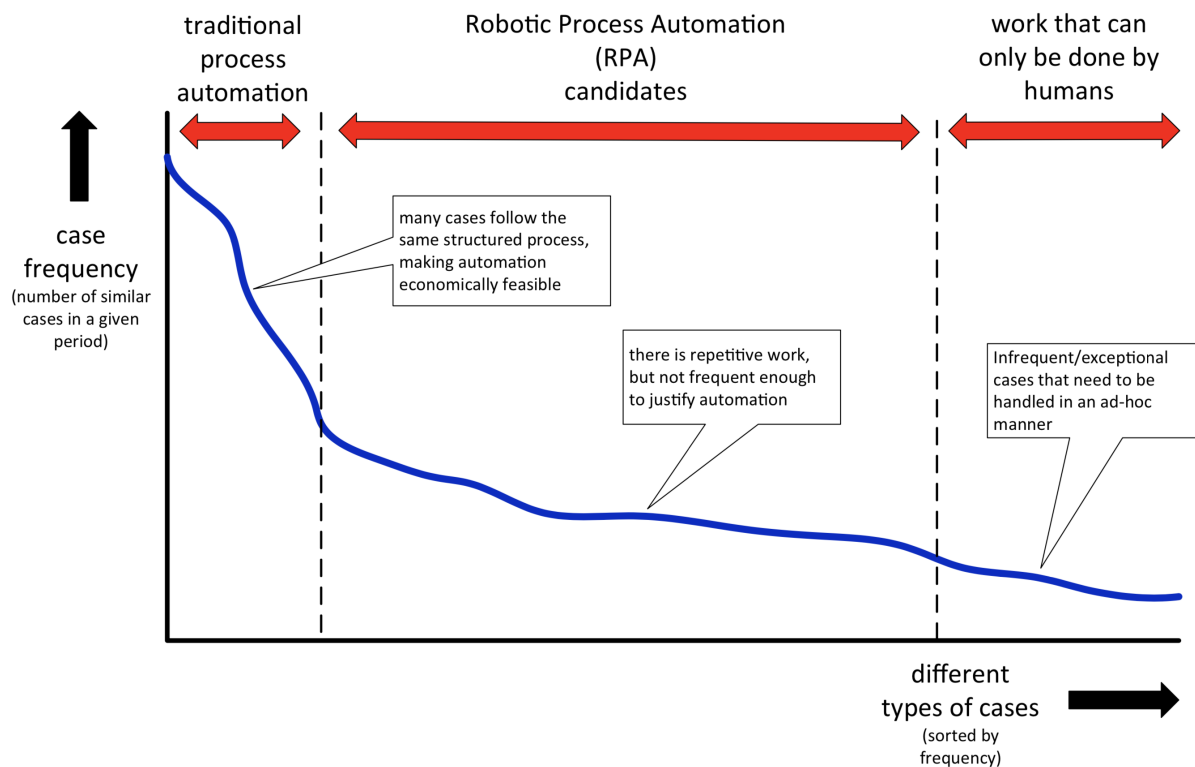


Figure 2.2: Positioning RPA

### 2.1.2 Artificial Intelligence

In ‘Computing Machinery and Intelligence’, a seminal paper on the topic of artificial intelligence published by Alan Turing in 1950, he proposed the question, “Can machines think?” (Turing, 1950). As the paper crystallizes ideas about the possibility of machines to behave intelligently—including a description of the imitation game known as the Turing Test<sup>4</sup>—it is considered the turning point in the history of AI (Buchanan, 2005).

A few years later, at a conference organized by John McCarthy in 1956, ten participants from various fields gathered to discuss the topic of artificial intelligence, by which they believed a couple of months would be enough to solve its theoretical challenges (Anyoha, 2017). The project is famously known as the ‘Dartmouth Summer Research Project on Artificial Intelligence’ and is often cited as the beginning of AI as an academic discipline. Even though the project included famous researchers like Marvin Minsky, it did not turn out as expected; instead, the next 50 years of AI research was characterized by fits and starts. Since then, there have been two so-called ‘AI winters’, i.e., the challenges were so significant that both interest and funding for the discipline almost ceased (UBS, 2016).

<sup>4</sup>A machine passes the test and can be said to be ‘intelligent’ if our interactions with it are indistinguishable from those with a human (Kunze, 2018).

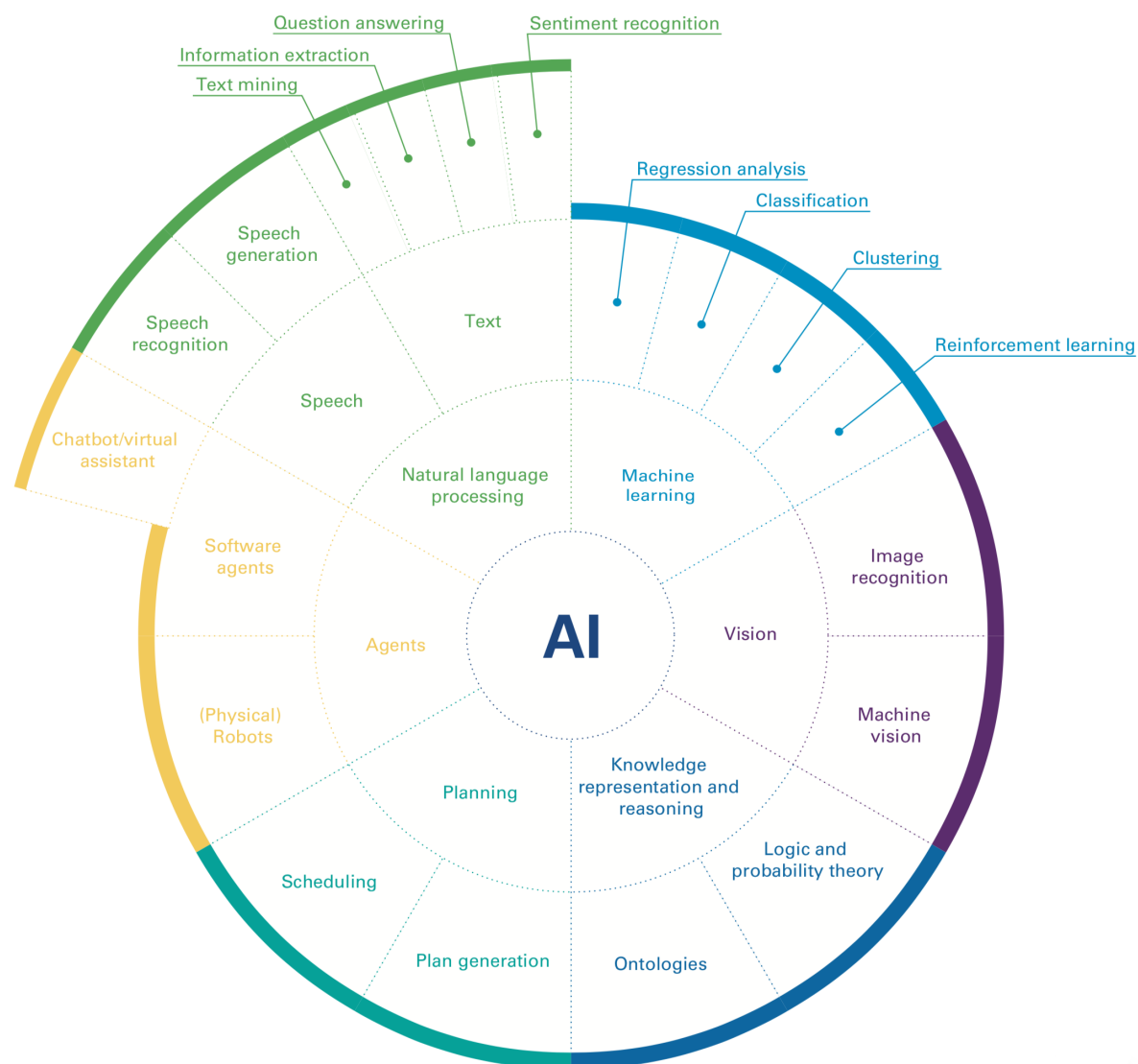
Since 1996, the number of papers on artificial intelligence produced each year has increased by more than 900 percent (Shoham, Perrault, Brynjolfsson, & Clark, 2017, p. 9). Consequently, they argue that the field of AI has “leaped to the forefront of global discourse”—and it is still evolving rapidly. According to UBS (2016), the recent interest and innovations in artificial intelligence is based on developments in several areas; the availability and accessibility of vast amounts of digitized data (of which much is unstructured), exponential increase in computer processing power (Moore’s law<sup>5</sup>), declining price of data storage solutions (i.e., computing capacity accessible through the cloud, in hyper-scalable data centers), and improved machine learning algorithms for the analysis of data (Huber-Straßer et al., 2018).

Due to technological achievements in processor efficiency and memory, rapidly-increasing volumes of available digitized data and advances in algorithms, AI is being sharpened and consequently enabling further development at entirely new levels. Therefore, Huber-Straßer et al. (2018) argue that AI has the potential of becoming the most important technological innovation of our generation. Over the past few years, notable advances in computer vision have made machines able to recognize what they see, such as objects, faces, and even the emotions traced in those faces. Similarly, advances in voice recognition make machines capable of listening, i.e., to recognize who is speaking to them and understand the nuances in the way words are said. Moreover, advances in natural language capabilities mean that machines are learning, rapidly, to understand the content of what they read or what is said to them—and learning how to use human languages and dialects to respond (UBS, 2016). Huber-Straßer et al. (2018) describe this ability to *learn* as the most crucial aspect of AI, in addition to its ability to sense, comprehend, and act.

As illustrated in Figure 2.3, AI has several subdisciplines (Huber-Straßer et al., 2018). Machine learning, which is considered the most widespread, includes algorithms that enable computers to learn and develop behavior based on empirical data. Without explicitly being told what to find, these algorithms are capable of searching for traces in large amounts of data, such as finding customers who have the same preferences (PwC Norway, n.d.-a). Other prevalent types of AI include natural language processing, computer vision, and cognitive agents (e.g., chatbots and virtual assistants).

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<sup>5</sup>Moore’s law states that computers’ processing power will double every two years (Intel, n.d.).



**Figure 2.3:** Overview of AI subdisciplines

According to Arpteg (2018), there are two main types of artificial intelligence (AI): general AI and narrow AI. Nonetheless, due to a low degree of consensus amongst AI's most prominent researchers as to when general AI may be achieved (average estimate being 80 years from now), the following will focus on narrow AI (also known as 'special purpose' or 'weak AI'), which includes applications built with a specific purpose in mind (Vincent, 2018).

AI represents a fundamental change in how IT systems are built; it is not merely an add-on. Machines are becoming more sophisticated in terms of learning and decision-making, meaning that the process of automating similar tasks becomes easier as the future unfolds. This is IPsoft's Amelia an example of—an AI platform that provides



wealth management, mortgage processing, credit card processing, account management, and payment processing. Performing as a digital colleague in a variety of banking areas, Amelia automates knowledge work, while being able to speak to customers in more than 20 languages (IPsoft, n.d.). Artificial intelligence also makes it possible to analyze and process millions of transactions to detect and combat fraud, in addition to providing secure, instant person-to-person payments.

In addition to an intense interest in academia, tech giants like IBM, Microsoft, and Google have announced that AI will shape their futures. In April 2016, Google announced that they would “move from mobile first to an AI first world” (Pichai, 2016). Later that year, Satya Nadella, CEO at Microsoft, said that they are infusing AI into everything they deliver across their computing platforms and experiences (Microsoft, 2016).

UBS (2016) is also optimistic on behalf of this technology, believing that it will enhance human capabilities and thus empowering workers to concentrate on creative, value-added services instead of routine work which will likely lead to more enjoyment and increased quality of life. The UBS report predicts that thinking machines have the potential of generating insights and making considered decisions. As an example, IBM is already building cognitive AI that will impact “every decision made” (Ulanoff, 2016).

Moreover, AI can help banks provide more personalized, on-demand services by understanding their customers’ need. According to UBS (2016), banks using AI can give their customers better and more robust financial and wealth management tools. AI algorithms can understand spending patterns by using deep learning and anomaly detection, and because most humans are creatures of habit, this implicates that whenever there is a transaction unlike the rest (e.g., by amount, geolocation or even the browser’s language when accessing the bank), it may trigger an alert. Not only does this provide clients peace of mind, but it also saves the bank losses related to both finance and reputation.

Furthermore, UBS (2016) argues that AI will provide both safer banks by improving the means for combatting cyberattacks. As an example, Danske Bank has launched a cognitive program together with IBM using Predictive Insights, in which the idea is to stay ahead of breakdowns and avoid incidents.<sup>6</sup> By analyzing performance data and learning the normal behavior of a system, the bank hopes to be able to identify IT issues in advance (Danske Bank, 2019).

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<sup>6</sup>Predictive Insights is “a proactive fault management system that can identify and predict faults and performance degradations in the physical and logical infrastructure” (IBM Developer, 2018).

There are several challenges related to implementing AI in financial services as the algorithms are only as good as the data they were trained on (Crawford, 2016). One of them, according to Bygstad (2017, pp. 181-182), is that many organizations in finance are dealing with the ‘IT silo problem’, i.e., having vast amounts of data on their clients but stored in different silos thanks to legacy systems. These systems are often not ready to be accessed by new digital solutions and interface with digital architectures. Therefore, legacy systems may become the Achilles’ heel that thwarts digital success (Puryear, Berez, & Padmanabhan, 2016).

Another challenge concerns the quality of unstructured data. For an AI to understand patterns and retrieve insights from channels such as customer emails, phone calls, and social media, the information that used to be stored in paper archives have to be interconnected and digitized, and consequently searchable and actionable.<sup>7</sup> Furthermore, the data has to be transparent, as transparency in decision-making is likely to be an issue if banks want their AI systems to be trusted. As an example, clients may want to know why their loan application gets denied and the reasoning behind that decision. If it is not possible to reverse engineer it, they will not trust it. This is known as the ‘black box’ problem (Bloomberg, 2018).

### 2.1.3 Implementation

The Capgemini report finds that there are several factors preventing organizations from moving beyond proof-of-concept to actually deploying intelligent automation, e.g., challenges related to business, technology infrastructure, and people. As an example, 43 percent of the surveyed organizations say that they are struggling with establishing a compelling business case for automation, and 41 percent are struggling to persuade leadership to commit to a cohesive strategy (Capgemini, 2018, p. 17). Additionally, talent with the technical know-how of RPA and AI technologies is required to deploy and scale-up successfully, of which 48 percent say they lack the resources to implement it effectively. Finally, 46 percent of the organizations underline that the lack of a sufficient data management strategy hampers progress because AI-based automation algorithms require the right data in enough volumes.

According to KPMG Norway (2018a), it is vital to think about how an organization can disrupt itself without stepping into its own business, and that unless intelligent automation projects are done right, the results may disappoint and frustrate the leaders. It may require strategic thinking and comprehensive testing to determine what is suitable for scaling

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<sup>7</sup>Digitization is the process of encoding (i.e., converting) analog information to a digital format (Osmundsen, Iden, & Bygstad, 2018).

across multiple areas, and it may be necessary to make some big decisions regarding the workforce; perhaps employees need to be retrained or terminated. In intelligent automation projects, change management may be equally challenging as the technology itself.

Moreover, Henrik Hjelseth Hansen, Manager at KPMG Norway (2018a), argues that organizations have to understand that intelligent automation is changing business and that it builds on the ability of business operations to use new machines and data sources. Such a transformation requires long-term planning with a series of concrete steps, the first of which is to prioritize projects that can be scaled to a certain size within a year or two. It is crucial that senior management is on board with the priorities and actively supports the program, thereby making it imperative to formulate a comprehensive plan for solid business cases to clarify how to balance the promises of which capabilities to be developed reasonably.

According to his colleague, Ida Aspaas Karlsen, there is a shift away from a model where people are supported by technology to one where humans back technology, i.e., a ‘digital first’ model. Furthermore, she argues that businesses need to understand that investment decisions in intelligent automation should be managed strategically at senior level and that they are more about business transformation and business model than about IT (KPMG Norway, 2018b).

A recent survey—in which the purpose was to explore why companies adopt intelligent automation and what it takes to scale such solutions—shows that most senior executives acknowledge that their business has not yet advanced beyond simple robotic process automation, which is often used to compensate for obsolete technology or outdated business processes (KPMG Norway, 2018b). These findings match their experiences from working with customers, i.e., they mostly observe piece-wise, minor initiatives within payroll, invoice processing, and customer service that can provide incremental improvements—help cut costs and streamline the organization enough to give some breathing space. However, with that kind of focus and such an approach to the issues, Karlsen claims that they will not be able to position themselves to transform business operations and operating models in a way that is necessary to become competitive in the face of ‘digital first’ businesses. As artificial intelligence gains momentum in industries and organizations worldwide, such companies will have a distinct competitive advantage.

### 2.1.4 Outlook

As the financial services industry is in the midst of an unprecedented digital transformation, organizations are increasingly automating tasks to improve efficiency and reduce costs. Although the economics of such measures appears enticing, Marous (2018b) argues that intelligent automation's real value may actually be as a driver of revenue generation and customer satisfaction enhancement.

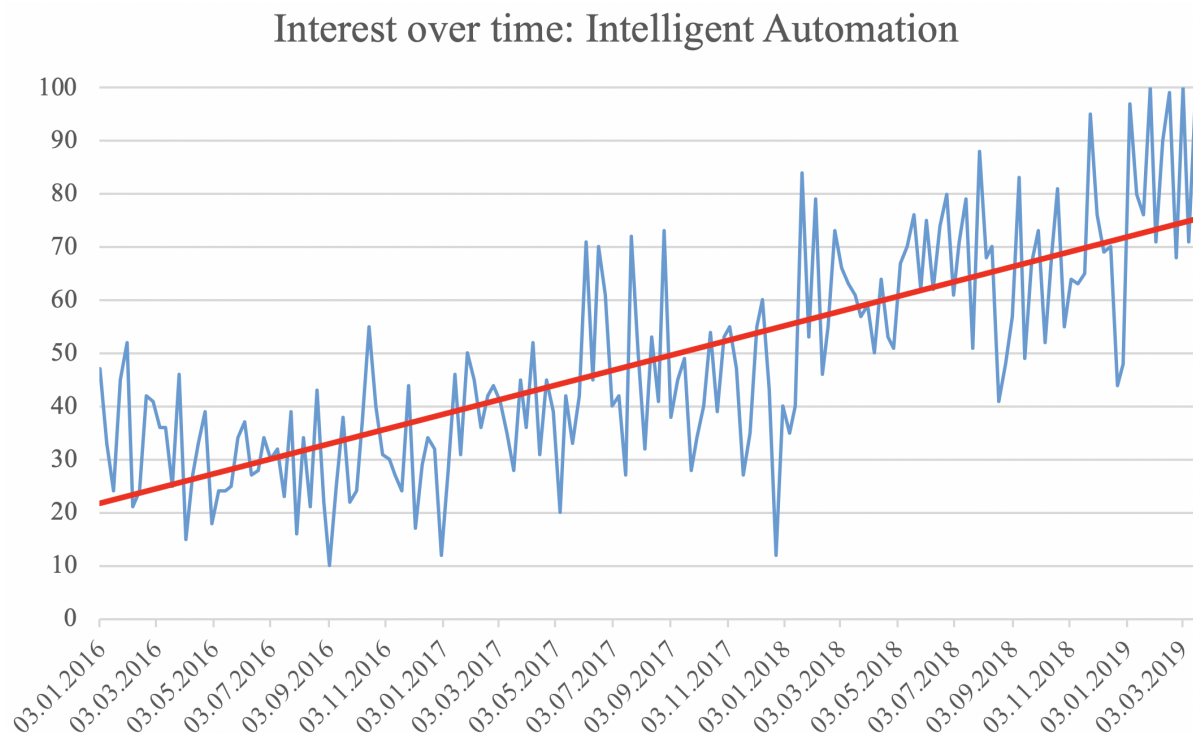
Manyika (2017) argues that we are experiencing a new wave of opportunities related to robotics as firms deploying automation technologies can realize substantial performance gains and that for the financial services of tomorrow, success will likely come to those who systematically embrace these technologies. Besides improving the customer experience and ultimately increase revenues, one of intelligent automation's main advantages is its scalability capabilities; "once an algorithm has been trained for a set of operations, it can be replicated in countless locations and perform to the same high standards" (Brooke, 2017).

As with every industrial revolution, some are afraid of losing their jobs due to new technologies. According to Manyika (2017), automation combined with AI will have a significant impact across bank functions in the next few years as estimates indicate that 10-25 percent of which will be replaced by machines, thereby freeing up workers to focus on higher-value tasks. Nonetheless, these technologies will only replace a portion of today's jobs or processes as the most severe impact will be on tasks; replacing simple tasks and reshaping work as we know it today. To exemplify, this happened a few decades ago with the introduction of ATMs in the United States, when tellers initially believed that their jobs would be replaced. Although the number of ATMs quadrupled between 1980 and 2010, the opposite, however, happened—tellers became sales representatives instead. Hence, even though ATMs reduced the need for one specific task, technology provided opportunities for banks to tailor the customer service experience and deliver value in different ways (Gold, 2016).

According to Roy (2018), intelligent automation could add USD 512 billion to the global revenues of financial institutions by 2020 as leaders within the financial services industry focus on automation in terms of generating revenue rather than merely saving costs. In addition to an increase in topline growth of 2-5 percent, financial institutions have seen significant improvements in customer satisfaction as well. Consequently, in the next few years, financial institutions are likely to invest more in automation and AI than human employees (InData Labs, 2015). Besides potential cost reductions and increased revenue,

this trend is also motivated by customers' preferences as millennials and the upcoming generations "prefer to interact with technology at a time that is convenient for them."

Capgemini (2018) found that 45 percent of financial services firms believe that Google, Apple, Facebook, and Amazon will be their competitors in the next few years. However, despite the growing threat from non-traditional players, adoption of intelligent automation has been slow as only 10 percent have implemented it to scale. Nevertheless, as illustrated in Figure 2.4, intelligent automation is a trending topic (Google Trends, n.d.).<sup>8</sup>



**Figure 2.4:** Google searches for intelligent automation

There are many bank processes to which these technologies can be applied, and specialized solutions seem to be the new approach by both banks and vendors; not the traditional 'hammer and nail' in which one solution was supposed to fit all. According to Ocean Report (2019), RPA vendors are targeting revenue gains from an expanding automation technology market, and as the prices of deployment are declining, the adoption is expected to intensify.

Moreover, banks are focusing on redesigning processes in favor of automating them either partly or entirely, in which better workflow, i.e., managing handoffs between man and

<sup>8</sup>As of January 1, 2016, Google implemented an improved system for data collection; ergo, we decided to use worldwide search results from that date up to March 26, 2019 (the day we conducted this research). The chart's numbers represent search interest relative to the highest point for the given region and time, in which a value of 100 is the peak popularity for the term.

machine more effectively, is of particular interest. Digitalization and innovations in automation and AI are creating productivity opportunities and consequently reshaping employment and the future of work. Instead of looking at individual technologies and how they can be applied within organizations, intelligent automation is about transforming processes—across the front, middle and back offices—to meet new digital customer expectations. By re-engineering and automating processes, organizations can increase efficiency and reliability while reducing costs, errors, and risks (EY, n.d.). The promise is that with data-driven intelligence, RPA tools can adapt and handle non-standard cases by observing human problem resolving capabilities (van der Aalst et al., 2018).

According to Accenture (2016a), intelligent automation has the potential of fundamentally changing traditional ways of operating—for both businesses and individuals as it provides capabilities such as scale, speed, and the ability to cut through complexity. Furthermore, the rapid developments in these technologies are changing the rules of what is possible, as the human workforce and their new digital tools work together to solve tasks differently, and as a result, new job titles like chief digital officer (CDO), AI researchers, data scientists, robot developers, and so forth have emerged (Tumbas, Berente, & Brocke, 2017). Nevertheless, there will still be a crucially need for complementary humans to interpret the data that machines provide (Danske Bank, 2019).

Robotics and artificial intelligence provide interaction and insight in real-time so that people can focus on value-adding tasks instead of repetitive ones, and as the newest recruits in banking and finance, they are reinventing what is possible in these sectors (Accenture, 2016b). Using intelligent machines, banks and financial institutions can empower their workforce and reap benefits in different ways; faster insight-based decisions, higher efficiency, highly-tailored customer service, new ways of working, and capture of new revenue. Increased efficiency, e.g., happens when repetitive tasks are automated (like assessing loan applications), thus freeing workers to focus on more value-adding tasks such as developing new products.

Despite the challenges that arise in most industries these days, KPMG Norway (2018a) argues that a strategic approach to artificial intelligence, focusing on creating new business and new business models, can provide improvements of five to ten times over existing models. Few companies are at this level now, but the KPMG survey shows that many have ambitions to get there and that financial services will experience considerable upheavals in the business models over the next five years. Furthermore, the survey shows that intelligent automation's potential is extraordinary and that it is capable of creating long-term differentiation compared to its competitors—as long as there are higher ambitions and a comprehensive strategy behind.

## 2.2 FinTech

The intersection between technology and finance have given the starting point to a new tech industry—FinTech. It is an umbrella term referring to technology used in the financial services industry; providing increased access to the financial system, lowering costs, improving risk management, diversification of risk, and increasing competition and collaboration (World Economic Forum, 2016). According to ICT Norway (n.d.), this industry is undergoing considerable upheaval based on digitalization.

The Financial Stability Board (2019) defines FinTech as “technology-enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on the provision of financial services.” Still, Oxford Dictionaries (n.d.) defines it merely as “computer programs and other technology used to support or enable banking and financial services.” FinTech firms, however, could be described as “providers of financial technology reshaping the financial services industry, offering customer-centric services capable of combining speed and flexibility, backed by forward-looking strategies, and cutting-edge business models” (Nicoletti, 2017, p. 3). Atle Sivertsen, CEO at NCE Finance Innovation, says that FinTech has many use cases applicable also in other industries like insurance and property and that some argue that because tech companies are the ones that often develop the products and services for the financial services industry, it should be named ‘TechFin’ instead (LØRN.TECH, 2018c). However, regardless of how the term is defined, David Baum, CEO at FinStart Nordic, argues that the overall objective is to make excellent services with advanced technologies and new business models (LØRN.TECH, 2018d).

Apple, primarily known as a tech company innovating products such as the iPhone and MacBook, has developed financial technology for many years already, in which the most recent example is Apple Card. When Tim Cook, CEO at Apple, launched it on March 25, 2019, he even described it as the most prominent card innovation in 50 years (Armstrong, 2019). By partnering with Goldman Sachs and Mastercard, Apple created a product that offers generous rewards, zero fees, sign up in the app, privacy and security built-in, in addition to a money management tool (Apple, 2019). Designing it in a way that provides transparency and making it easier for customers to understand their spending, Apple wants to help their customers lead a healthier financial life (Finextra, 2019). By removing hidden fees and opaque statements, and improving consumer privacy and consumer control, Evans (2019) argues that Apple is setting a new bar for the financial services industry with Apple Card.

### 2.2.1 Emergence

The emergence of FinTech companies (from now on referred to as ‘FinTechs’) is due in particular to PSD2, which requires banks to give other players access to account information and the possibility of carrying out transactions if the customer so wishes. This directive makes it easier for new players to establish themselves as providers of financial services and thereby threaten traditional financial institutions’ revenues and customer bases (Frost, 2017).

According to (King, 2018, pp. 15-17), the banking experience has changed multiple times over the last 40 years, as access to banks’ services has moved from the branch as the only channel, to becoming multi-channel and finally omnichannel. However, during this period, traditional banks have kept loyal to their business model instead of rethinking how they can create, deliver, and capture value from business opportunities. In the meantime, non-conventional companies realized that by taking financial services’ core utility and purpose and optimizing the design for the mobile world, it was possible to create solutions that would integrate into customer’s lives more naturally and scale better than retrofitting branch banking.

Since the arrival of the commercial internet in the 1990s, there has been an overwhelming drift towards low-friction and low-latency engagement, in which the customers expect real-time, instant gratification. By rethinking how banking could be embedded better in customer’s lives, tech companies like Ant Financial’s AliPay and Tencent’s WeChat from China have become “streets ahead of their Western rivals in terms of technology, user-friendliness, number of users and ubiquity” (Fraser, 2018).

A recent KPMG report shows that it has become demanding for banking customers to deal with all the different solutions and players in the financial services industry and that 60 percent of millennials believe that large banks are not designed to provide services to their generation. According to Clint Sookermany, Partner at KPMG Norway and Head of KPMG Digital, incumbent banks have been too busy fighting for protectionism and an outdated system, whereas IT companies have grown into giants providing the best user experiences. Nevertheless, he is convinced that banks have realized the seriousness now (Moe, 2018a).

As a consequence of limitations related to innovative processes within existing structures, SpareBank 1 SR-Bank ended up creating a spin-off company called FinStart Nordic that will challenge the inherent conservative banking culture. Admitting being clueless to what



financial technology will entail in just a couple of years, they are looking for brand new technology, new ways to operate banks and completely new types of ecosystems that can take advantage of FinTech (Finance Innovation, n.d.). SpareBank 1 SR-Bank's CFO states that this NOK 300 million investment is a measure to prepare them from increased competition in the future, as large multinational companies are threatening the profitable areas of the traditional banks (Fosse, 2017). By creating FinStart Nordic, they plan to develop new services at a faster pace and work more systematically with innovation, to follow customer expectations of banking services and assert themselves in the competition with other financial players (Lycke, 2017).

According to ICT Norway (n.d.), the Norwegian FinTech industry is young and proliferating, with FinTechs providing services in the areas of security, authentication, payments, savings, personal finance, and more (described later in section 2.5 Business Models). FinTech startups differ from other startups because of a strict license requirement to operate lawfully, of which the process of getting such a license is time-consuming and bureaucratic. However, as of later in 2019, impatient entrepreneurs finally get to test innovative solutions with the blessing of the Financial Supervisory Authority of Norway, even before they have applied for a license. According to Freihow (2019), this regulatory change may result in more successful Norwegian FinTechs at the end of this year.

Globally, the FinTech sector attracted investments worth more than USD 39 billion in 2018 (up 120 percent from 2017), and 16 new FinTech unicorns<sup>9</sup> saw the light of day (Irrera, 2019). Much of the growth is taking place in China, where the size of the market, the absence of frantic western competitors and less focus on privacy have led to massive adoption and growth of Chinese digital services. Payment solutions are so seamlessly integrated into these services that the user almost does not notice being charged. CDO at Sbanken, Christoffer Hernæs, has described this as the best user experience, i.e., “no user experience at all, it just happens” (LØRN.TECH, 2018b).

### 2.2.2 Opportunities

Berit Svendsen, Head of International Expansion at Vipps, believes that Norway has to build international successes within FinTech to be competitive against the tech giants abroad, and to achieve that goal, we have to think big because the payment service industry is all about scaling (Finans Norge, 2019b). Henrik Lie-Nielsen, a serial entrepreneur from Bergen, says that Norwegian technology should be able to take positions abroad because of our relatively digitized financial industry (LØRN.TECH, 2018a).

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<sup>9</sup>Startup companies valued at more than USD 1 billion.

Lie-Nielsen is a visionary and has big ambitions on behalf of his companies: “We are trying to solve a problem in the Norwegian market and finding a solution that has potential also abroad. That way, the Norwegian FinTech environment can compete for infrastructure globally” (Trumpy, 2017b). Furthermore, he argues that Norwegian companies cannot compete just against their “nearest neighbors” and that they should not define the local market as their primary market. He believes that companies need to cooperate to an even greater extent, which is one of the reasons he helped establish NCE Finance Innovation. The FinTech cluster’s chairman, Jan Erik Kjerpeseth, says that their ambition is to create international successes. “Our point of view is that we are one of the world’s most digitalized nations, but that we are not able to export any of that technology. We must make an effort to achieve that.” (Hermansen, 2017).

NCE Finance Innovation is located in Bergen, a city that employs 6,000 people within banking and finance, in addition to having a leading technology environment. Kjerpeseth believes that we can reap exceptional benefits by working more across different industries and taking advantage of each other’s knowledge (Trumpy, 2017a). The purpose of NCE Finance Innovation is to help establish companies that can develop new products or services in financial technology. Lie-Nielsen believes that the highest potential lies in developing services or technologies that can be deployed internationally later.

Kjerpeseth, which is also CEO at Sparebanken Vest and one of the promoters of this cluster, says that financial actors have had good experiences with opening up the IT infrastructure and connecting to external suppliers to develop and launch new technology. He argues that it is more effective than if everyone tried to do everything themselves. Nordea agrees in this point of view, saying that partnerships with FinTechs are essential because it enables them to better serve their customer by offering them new relevant and valuable solutions faster than if they had to develop it on their own (Nordea, 2017).

According to Nets, Sbanken’s integration with the Norwegian State Educational Loan Fund, in which Sbanken allows its customers to access their student debt balance, is an example of open banking that goes beyond PSD2 (Finans Norge, 2019a). Furthermore, they argue that trust, openness, and transparency in the Norwegian financial market are competitive advantages and that our unique payment infrastructure separates us from countries outside of the Nordics. As many Norwegians have second houses abroad, Norwegian banks could go even further with PSD2 and cooperate with banks from countries like Spain or France. Thus, by gathering even more relevant financial information, they can take a more active role and provide customers with increased financial insight. Surveys show that 60-70 percent of customers are willing to share information across banks (i.e., banks as third parties), whereas only 22 percent trust new players similarly.

### 2.2.3 Challenges

The industry convergence<sup>10</sup> in finance and technology does not only create challenges in terms of business models and forms of cooperation; it also poses serious security threats. As more financial information goes digital, cyberattacks become more attractive, making data privacy a primary concern. Furthermore, with new entrants, the value chain becomes longer and more complex, and consequently, the responsibility for collective security gets distributed among more players, says Bente Hoff, Head of the National Cyber Security Center at the Norwegian National Security Authority (DN, 2019).

As we move from physical banks to neobanks (digital banks that exist without branches), banks lose some of their trust-building capabilities. That could prove as a big challenge for financial services as trust is critical to win and retain the customer relationship. “The exchange of trust is reduced to an algorithm or an onboarding-routine” (Kjellefold, 2018). He suggests that “banks must become more human if they want to survive the digital shift.” Furthermore, he argues that “trust will be banks most profitable currency in the digital future, and human connection the path to get there.”

According to Sivertsen, the average person has 1.9 customer relationship, meaning that people no longer necessarily stay loyal to the bank that they grew up with (LØRN.TECH, 2018c). If that trend continues, companies need to work even harder to attract their customers’ attention and provide the best experience. Consequently, he argues that for the first time in 180 years, banks and insurance companies have to redefine what they do, which is especially relevant for financial institutions in light of PSD and PSD2—regulations in which the objectives are to increase competition in the financial services industry.

As new regulations like PSD2 increase competition and improve collaboration between financial institutions, Dintrans, Anand, Ponnuveetil, Dash, and Ray (2017) expect to see the development of standardized revenue-sharing mechanisms within partner ecosystems as lines blur between entities within the ecosystem. They expect that the industry narrative will shift from banks *versus* FinTech firms to banks *and* FinTech firms. Furthermore, they believe that better integration and more effective service offerings will increase customer experiences and that ultimately the banking business model of the future will be a driven by the larger pie resulting from an improved financial services industry.

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<sup>10</sup>According to Digital21 (2018, p. 21), it is becoming clear that interaction between entities in different industries is increasing, and that this development allows businesses to enter new markets and offer new services or solutions, or deliver the same as others have—but in a completely new way.

## 2.3 Payment Service Directives

In this section, we describe the main objectives of PSD and its impact and issues; leading to the PSD2. The revised Payment Service Directive updates and complements its predecessor, which we examine in connection to the financial services industry.

### 2.3.1 PSD

The intensified globalization leads to an increase in cross-border payments. Thus, the establishment of a proper system for such payments within the EU market became vital for a suitable operational Single Market<sup>11</sup> (Council of the European Union, 2007). The directive on payment services (PSD) in the internal market was implemented in December 2007, in which the main goal was to enable free movement of goods and services within the Single Market.

PSD is the legislative foundation for a unified payment system within the EU, in which one of the objectives was to make cross-border payments as easy, efficient, and secure as national payments (European Commission, 2018). The directive defines information requirements, obligations, and rights, for both payment providers and users.

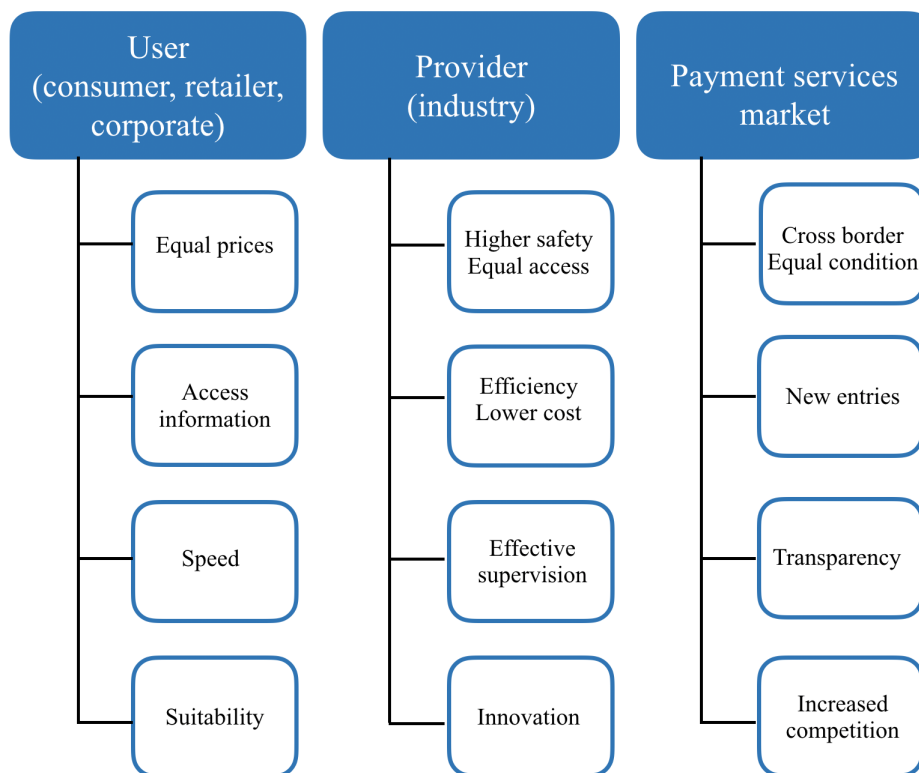
Another critical objective of PSD was to facilitate innovation by lowering the entry barriers for new payment providers, and by introducing a new category of financial institutions, PSD aimed to increase the competition in payment systems (Council of the European Union, 2007). The introduction of ‘Payment Institutions’ reduced the payment service monopoly belonging to traditional financial institutions, such as incumbent banks and central banks.

According to a study prepared by London Economics and *iff* in association with PaySys, one of the major concerns was that most of the innovative force came from the established payment providers. Another concern was that PSD only applied for two-legged transactions<sup>12</sup> (with a few exemptions). The main beneficiaries observable two years after the implementation of PSD are illustrated in Figure 2.5.

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<sup>11</sup>Refers to the EU as “one territory without any internal borders or other regulatory obstacles to the free movement of goods and services” (European Commission, 2018).

<sup>12</sup> When “both the payer’s and the payee’s payment service provider (e.g., the banks of the payer and the payee, the issuer of the card and merchant’s acquirer) are located in the European Union” (European Commission, 2013).



**Figure 2.5:** Main beneficiaries of PSD

A significant issue with PSD was that it did not regulate third-party-providers (TPPs) as payment institutions; they were still dependent on the incumbent bank's infrastructure. Because TPPs accessed payment systems indirectly by having one or several accounts with the banks, this affected both the execution time and costs for the TPPs, and for these reasons, the TPPs called for a way to gain direct access to the payment systems. Consequently, the European Commission (2018) proposed to revise PSD in 2013.

### 2.3.2 PSD2

PSD2, the revised Payment Services Directive, updates and complements the PSD—taking a broader approach in the definition of ‘payment services’, including one-legged transactions<sup>13</sup>, seeking to reduce the confusion and interpretation problems by updating and refining definitions and exemptions from PSD (European Central Bank, 2018). PSD2 also increases the safety and security of payments by introducing enhanced rules regarding strong customer authentication (SCA) for payment service providers, including banks. Moreover, the new directive aims to lower charges and surcharges for card payments, both online and in shops (European Commission, 2018).

<sup>13</sup>Indicates that only one of the payment service providers is located within the EU (European Commission, 2018).

By extending the scope to TPPs, PSD2 aims to increase the innovation and the entry of new market players by leveling the market field. The TPPs consist of two main types of service providers: i) Payment Initiation Service Providers (PISPs), and ii) Account Information Service Providers (AISPs).

With the customer's consent, PSD2 grants companies licensed as PISPs and AISPs limited account access. To remove complicating barriers for TPPs and level the playing field for new market entrants, access to the value chain of incumbent banks is vital. According to Christoffer Hernæs, CDO at Sbanken, the most crucial part about PSD2 is to understand the strategic competition regarding payments, and the value of customer data and the open interface (LØRN.TECH, 2018b). Consequently, PSD2 lays the ground for open banking.

## 2.4 Open Banking

EVERY (n.d.-a) describes 'open banking' as a concept that "enables people, businesses and things to give, take and multiply value creation for the bank by sharing assets like data, algorithms, and transactions with business ecosystems." The financial industry is invaded by agile companies providing financial technologies and large technology companies, e.g., Apple and Facebook. By leveraging data regarding customers' preferences, behavior, and history, they can offer new, personalized, and engaging services.

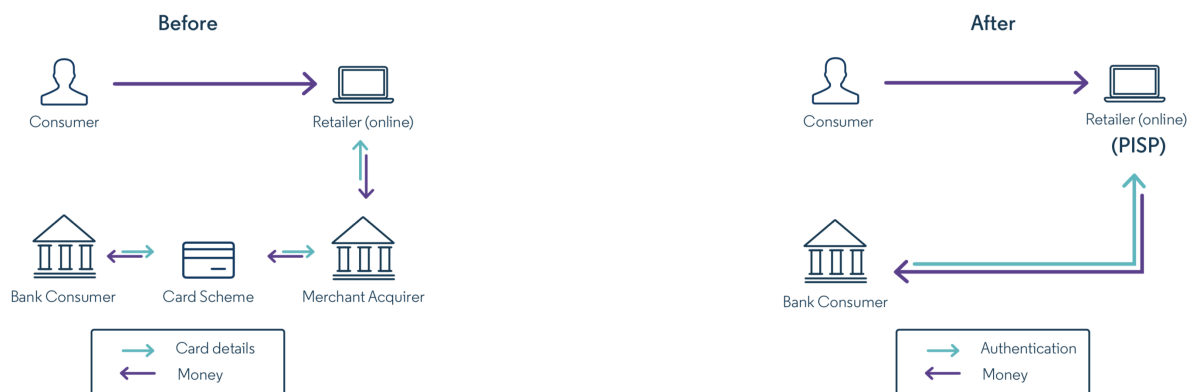
In this section, we discuss the new third-party providers; the preferred technological solution for realizing open banking; and, the implications of open banking for the market entrants.

### **Third-Party Providers**

A vital aspect of open banking is the opportunity for third-party providers (TPPs) to build new services on top of the banks' data and infrastructure, and fundamentally change the competitive situation (EVERY, n.d.-b). The traditional banks are no longer just competing against each other, but also against TPPs. These new competitors are in a unique position to exploit the data and infrastructure and use them to provide new financial services with added customer value. PSD2 divides TPPs into two different groups based on the financial services they provide; the former mentioned PISPs and AISPs.

### Payment Initiation Service Providers

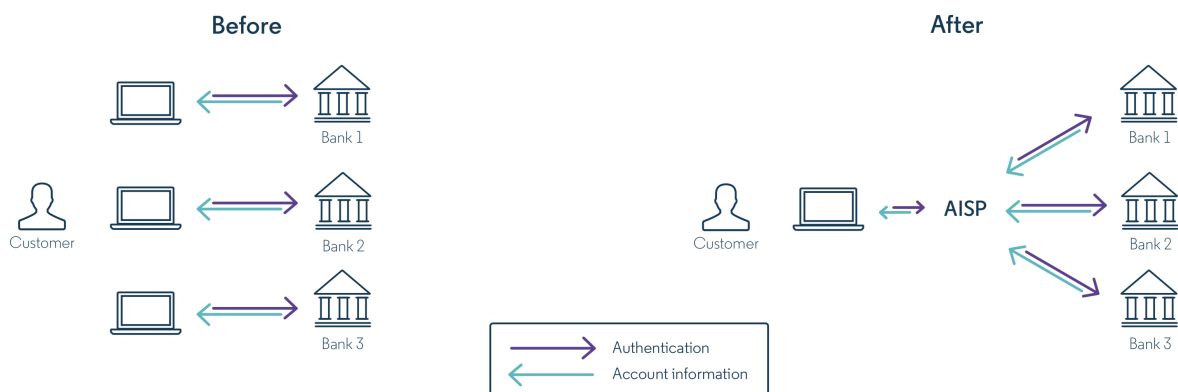
A PISP can initiate a payment on behalf of the consumer, involving fewer parties and not revealing any card details from the customer (EVRY, n.d.-b). The Norwegian FinTech company Vipps is such an example of a PISP because of the ‘bridge’ they build between the retailer’s website and the online platform of the consumer’s bank to initiate payments (Accenture, 2015).



**Figure 2.6:** Flow of card details and money before and after PISP

### Account Information Service Providers

By gaining access to the account information from an Account Servicing Payment Service Provider (ASPSP)<sup>14</sup>, an AISP serves as an aggregator of data relating to the consumer’s accounts, as the consumer may hold accounts with one, or several different ASPSPs (Accenture, 2015). The aggregated data can be used to analyze the financial behavior of the consumer, and provide financial advice and information from several ASPSPs into one user interface.

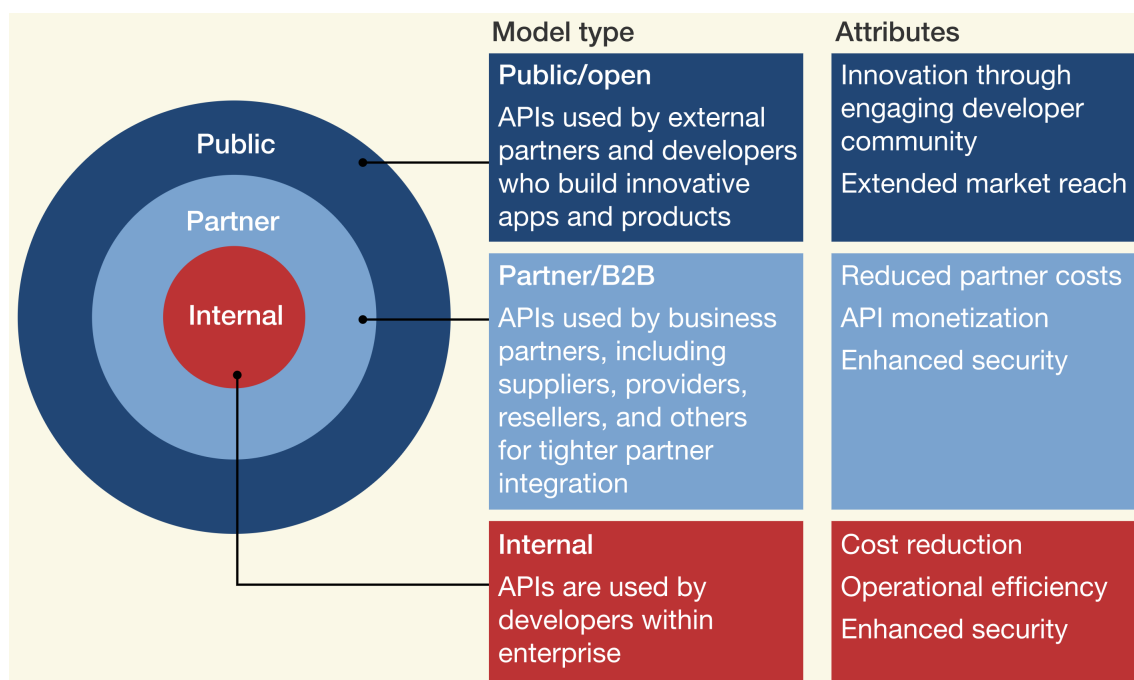


**Figure 2.7:** Flow of authentication and account information before and after AISP

<sup>14</sup>The traditional type of Payment Institution where a consumer holds one or several accounts, and from or to which the consumer issues payments (Accenture, 2015). Examples include Sbanken, DNB, and Monobank.

### Application Programming Interface

An application programming interface (API) is a standardized protocol allowing communication between computer programs that “specifies the connection mechanism, the data, and functionality that are made available and what rules other pieces of software need to follow to interact with this data and functionality” (Verhoeven, 2016). API only allows a predetermined communication between the computer programs. Figure 2.8 illustrates APIs’ different levels of openness (Brodsky & Liz Oakes, n.d.).



**Figure 2.8:** Levels of API openness

PSD2 does not explicitly regulate the technical solution for open banking but together with additional regulatory technical standards (RTS), open APIs are the optimal technical solution (Johnsen, 2018). The API should provide the same performance and availability as the ASPS online interface, and provide third-party providers payment initiation and account information without any obstacles (European Payment Council, 2018). By using the customer’s interface and their personalized security credentials, the TPP accesses the customer’s payment account. The solution can be described as a more sophisticated and secure version of ‘screen scraping’.

The alternative solution is to let TPPs use the same interface as the ASPS, typically the customers online bank interface. RTS will be applied from September 2019, and is essential for the technological standardization of open banking in Europe.



### 2.4.1 Implications

The definition of open banking states that it enables people and businesses to create, deliver, and capture value for the banks by sharing data. According to Botta, Digiacomio, Höll, and Oakes (2018), this implies disruption of the traditional banks' business model and consequently opportunities for the new payment service providers.

PSD2's main objectives are to increase the competition between payment providers and to improve the quality of financial services. As a result, brand-new competitors take form as digital-born banks as well as non-traditional financial institutions (EVERY, n.d.-a). This new reality of finance poses both challenges and new business opportunities.

To be compliant, most of the incumbent banks must update their IT systems. The time has come to deal with years of manual workarounds and custom patches on top of outdated legacy systems, and it may become expensive and time-consuming (EVERY, n.d.-a). Failing to do so may disable the established banks to keep up with the digital disruption caused by open banking. Old core systems do not slow down the new market entrants. They utilize new technologies, e.g., artificial intelligence, in combination with an established infrastructure to deliver new financial services with increased customer value.

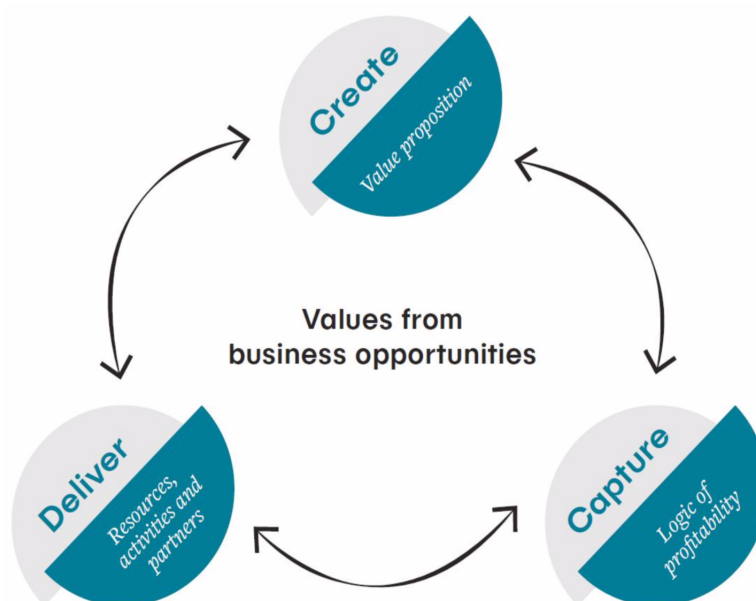
The increased number of competitors providing enhanced financial services almost certainly will result in a squeeze in pricing and margins. For account-to-account payment alternatives, new service providers in the European market may put USD 50 to USD 100 million of the incumbent banks' revenues at risk (Botta et al., 2018).

Technological progress has forever changed customer expectations due to seamless multichannel experiences from non-financial services such as Google Drive and Facebook. The customers demand personalized and engaging services, expecting banks to anticipate and understand their preferences and needs. The customers are also willing to share financial and non-financial data in exchange for personalized and engaging services (EVERY, n.d.-a).

Banks are accustomed to dealing with competition from other banks, economic downturns, and financial deregulations. However, with today's rapid digitalization, changes in consumer behavior, and emerging technologies, Angelshaug and Saebi (2017) argue that the next battle is going to be fought on the grounds of new and disruptive business models.

## 2.5 Business Models

According to Jørgensen and Pedersen (2018, p. 58), a business model tells the company's story by explaining how the company works. This section describes the business model of Norwegian incumbent banks using a theoretical framework, in which the objective is to create, deliver, and capture value from business opportunities.



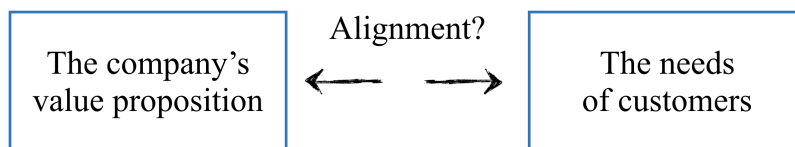
**Figure 2.9:** The business model

### 2.5.1 Value Creation

Value is created by offering a value proposition—arguably the first and most fundamental part of a business model because it refers to how the company helps the customer solve a problem at a given price (Jørgensen & Pedersen, 2018, p. 60). As it appears from Theodore Levitt's classic statement, there may be more than one value proposition for each problem: "People don't want to buy a quarter-inch drill, they want a quarter-inch hole" (Jørgensen & Pedersen, 2018, p. 34). In this case, the value proposition could be offered as a service or a product, i.e., the company can help solve the customer's problem by providing rental of qualified personnel with the equipment included, or selling the drill directly at a hardware store.

In these examples, the customer's level of competence and confidence may be crucial for his choice of the solution as the needs of customers and their preferences give rise to different value propositions to solve the same fundamental problems. Hence, it is

critical for ambitious companies to understand both the customer’s problem and how they can offer a proper solution. These elements must be aligned and match each other, as illustrated in Figure 2.10. If the needs of customers change, the company’s value proposition should also change not to lose market shares or market segments.



**Figure 2.10:** Value proposition

To achieve the overall objective in banking, i.e., to satisfy the customers’ financial needs, Wallace and Herrick (2009) divide banking into five parts: i) Savings and investments, ii) transaction and cash flow management, iii) borrowing, iv) protection, and v) advise.

### **Savings and Investments**

Banks provide a safe way to store savings, whereby customers are offered deposit-interest for making funds available for the banks. Online banks and traditional banks are market entrants, and only banks are permitted to accept ordinary deposits from the public (Norges Bank, 2018).

Investing is an alternative to deposit, by which the banks offer different types of, such as mutual funds, stocks, and bonds. By providing investment opportunities, banks facilitate capital allocation across the economy effectively and efficiently by connecting entities in need of money with entities who have money. Today, banks share the investment segment with other market entrants, mainly online broker companies such as Nordnet, Plus500, and others. These companies specialize in investment services and in providing a user-friendly trading platform (Nordnet, n.d.).

Also, new market entrants disrupt the investment segment by offering FinTech solutions, e.g., Huddle Stock—a digital platform pooling many small investors together so they can invest in investment strategists’ ideas (Lee, 2016). Traditionally, investment strategists pitch their ideas to hedge fund managers because the industry structure makes “the man in the street” too small to cover. Huddle Stock reconfigures the wealth management structure by providing a digital platform where small investors can participate in ideas formerly reserved hedge funds and institutional funds, and take advantage of large-scale benefits such as highly competent intellectuals previously only available for the financial elite in London and Wall Street (Lyche, 2017).

Another example is Harvest, a factor-fund using AI algorithms to optimize the fund's portfolio. The technology exploits well-known investment research in identifying the decisive factors for companies' financial performance using machine learning to collect and analyze vast amounts of data to select the optimal companies for the fund's portfolio (Sparebanken Vest, n.d.).

Crowdfunding, another type of investment service, uses technology to facilitate and ease the connection between investors and entities in need of money (Jenik, Lyman, & Nava, 2017). Crowdfunding pools groups of person-to-person (P2P) and person-to-business (P2B), and consists of funding and lending. Funding is an investment with a company share or reward given in return, whereas lending is a loan with a fixed return schedule and a fixed interest rate (McHugh, 2012). Crowdfunding companies targeting mass markets emerged from the financial crisis in 2007, while the confidence in the financial system decreased, especially in the banking industry in the US and England. In 2018, the crowdfunding market grew 118 percent as Norwegians invested NOK 205 million via crowdfunding platforms (Weldeghebriel, 2019).<sup>15</sup>

Crowdfunding taps directly into the financing market by providing alternative investment opportunities outside the traditional system (Jenik et al., 2017). In the beginning, stand-alone FinTech companies specializing in crowdfunding provided this kind of service, but eventually, banks like DNB realized the importance of participating in the alternative finance market. That is why they announced a collaboration with crowdfunding companies Dealflow and FundingPartner (Holm, 2018a, 2018b). In 2017, DNB launched Startskudd.no, and shortly after, other banks followed, e.g., SpareBank 1, which made its crowdfunding company, Spleis, independent the same year (Holm, 2017; Moe, 2018b).

### **Transaction and Cash Flow Management**

Money transactions are still an essential financial service performed by banks as they traditionally are considered the primary providers of the service. This can be partly explained by the required bank licenses, making it difficult for new market entrants to enter the market, and partly because of low customer trust towards third parties (EVRV, n.d.-b). In the last couple of years, this situation has changed, though, due to several reasons.

As described previously, one of PSD2's objectives is to facilitate innovation by letting new payment providers enter the market and challenge traditional business models. By offering innovative and smarter solutions, the advent of digital payment solutions is, therefore,

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<sup>15</sup>Excluding the international platforms Kickstarter, Indiegogo, and Sponsor.me.

transforming the payment space, forcing banks to respond to the end of their transactional and informational monopoly (Marschall, Korstvedt, & Krabbe, 2018).

In Norway, three banks launched three different mobile payment solutions during 2014 and 2015: mCash<sup>16</sup> (SpareBank 1), MobilePay (Nordea) and Vipps (DNB). After three years of intense competition in the Norwegian market, Vipps was the last one standing in 2018. Their victory was a result of their ability to grow fast and quickly, and their association with a well-known Norwegian bank, DNB, helped them in becoming the preferred mobile payment solution among consumers (Frimand-Anda, 2018b). Today, Vipps has approximately 3 million users, and they continuously add new features after starting as a digital friend payment method between private people (Vipps, n.d.-a). Now, their app includes an economic ecosystem with several features, such as payment of electronic invoices, person-to-business payment, scanning and payment of physical invoices, and displaying account balances from different collaborating banks (Vipps, n.d.-c).

Collaboration with competitors and other companies was essential for Vipps' success. In February 2017, 107 Norwegian banks agreed to cooperate on one mobile payment solution, thereby making Vipps a joint venture with DNB as the majority shareholder with 52 percent of the shares (Nysveen, 2017). Later, Vipps merged with BankID<sup>17</sup> and BankAxept<sup>18</sup> in July 2018, making them the most substantial market entrant for payments and identification in the Nordic (Frimand-Anda, 2018a). Furthermore, in December 2018, Vipps announced a strategic collaboration with Alipay, the world's largest mobile payment platform—a position they took over from PayPal in 2013 (Heggstuen, 2014). As of April 2019, AliPay has over 500 million active users, making the collaboration an important measure to prepare for the entry of other global FinTech giants.

According to Frimand-Anda (2018b), the development and joint venture of Vipps was a result of the potential competition from Google, Apple, Facebook, and Amazon. In Norway, Apple Pay became available from mid-2018 with Google Pay a few months later, and in March 2019, Apple announced its new product, Apple Card, with its P2P payment solution integrated with iMessage—a direct competitor to Vipps. Even though Vipps is well positioned today, they had to bet big; in 2017, DNB reported a total expenditure of NOK 600 million and Vipps ended up with a deficit of NOK 157 million for the fiscal year due to investments in technology (Hauklién, 2018; Hoemsnes & Eriksen, 2017).

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<sup>16</sup>mCASH's Norwegian branch was acquired by SpareBank 1 in October 2015 (Sagmoen & Wig, 2015).

<sup>17</sup>Electronic identification service fulfilling the Norwegian government's requirements for identification verification and legally binding digital signature (BankID, n.d.).

<sup>18</sup>The national payment system in Norway (BankAxept, n.d.).

By losing their information monopoly, banks are afraid of being reduced to a provider of infrastructure for new innovative payment solutions (Weldeghebriel, 2018). For this reason, Vipps is a vital service for the future of Norwegian banks in the transaction segment—having a robust national position with its 3 million users and over 100 national banks backing and developing the service, resulting in a substantial competitive countermeasure providing new value propositions to stay relevant in their customers' everyday banking life. While Vipps is a financial service developed by a banking community, Apple Card, on the other hand, is created by a technology company.<sup>19</sup> Nonetheless, they are both examples of FinTech, although their business models differ intrinsically.

Cash flow management services enable customers to plan their disposable income and outgoing cash flows, going beyond the monthly bank statement. Traditional banks typically have a function in their online bank that categorizes income and expenditure so the customer can quickly review cash flows within each category, e.g., DNB's 'Min økonomi' (DNB, n.d.-c). A significant problem with this approach, however, is the siloed overview caused by the service only using financial information from the issuing bank. By taking advantage of the payment directives, new market entrants can thus specialize in providing more holistic, hence better, cash flow management services. American Mint and Swedish Tink are examples of such companies collecting financial data from various banks and cards into one user interface—providing customers with enhanced customer experiences and a more holistic cash flow management service. The technological platform used by Tink is already in place in Norway and can be used by companies to provide similar services (Eidem, 2019a).

Joint account information is already made possible in several established Norwegian banks, such as Sbanken, Sparebanken Sogn og Fjordane, and Sparebanken Vest. Furthermore, Sbanken's collaboration with the Norwegian State Educational Loan Fund illustrates an awareness of the possibilities that PSD2 and open banking have in the cash flow management segment, and that established banks already have the systems ready to open up and share necessary information with third parties (Sbanken, n.d.).

### **Borrowing**

One of the bank's core services is to provide long-term and short-term loans to their customers, and for private people, this usually takes the form of credit and mortgages. According to Nilsen (2018), the consumer loan market in Norway is lucrative; thus, new banks who specialize in consumer loans have emerged. The combination of high margins and growth in credit demand has led companies like Norwegian Air Shuttle (originally

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<sup>19</sup>In partnership with Goldman Sachs as the issuing bank (Apple, n.d.).

an airline) and Komplet (originally an online electronics store) to establish digital-only bank services, but the dynamics in the credit market has not shifted noticeably until the last years.

For credit card loans, the situation is different. Because of PSD2, new market entrants combine technology and the opportunities given by the directive to provide new credit card services. Examples include credit card services alerting customers before the annual withdrawal for subscriptions, and personalized reward offers. By using artificial intelligence, they can also provide enhanced cash flow management, e.g., alert customers when their monthly budget is about to exceed (Queen, 2018). All of these examples are applicable for debit cards and account information as well but are most typical for the new credit card service providers, e.g., JAJA, which is a virtual card “making credit simpler, fairer and easier for everyone” (Finextra, 2018). Conclusively, significant changes in the borrowing segment occur in the credit card segment as legislation facilitates new market entrants to provide innovative offerings using new technologies.

### **Protection**

Protection is a financial service based on an old and generic business model, in which the fundamental idea is to pool people together and divide the financial risk if a customer is a victim of an unfortunate event leading to economic loss, e.g., working disability or house fire (Weldeghebriel, 2016). Traditionally, providers of protection services are strong monetary institutions, and the banks are used to compete, cooperate, and merge with companies specializing in these services, e.g., If and Gjensidige. According to DNB (n.d.-b), the merger between DNB Forsikring and SpareBank 1 Skadeforsikring will be finalized later this year—an agreement that enables them to develop innovative and customer friendly solutions on another level, delivering better and more customized protection services (DNB, n.d.-a).

According to Catlin, Lorenz, Münstermann, Olesen, and Ricciardi (2017), new tech-savvy competitors within ‘InsurTech’<sup>20</sup> enter the insurance sector, “bringing the full force of their innovative, disruptive, opportunity-laden power” (Catlin et al., 2017). In Norway, pay-as-you-go models and in-product insurance challenge the aforementioned traditional protection model (Borgen & Vykundanathan, 2017). Tribe, which is the first Norwegian person-to-person insurance company, initiated a technology collaboration with AXA, one of the world’s largest insurers in September 2018. They provide a price-matching system based on digitized and automated processes—matching the customer’s current insurance agreements and offers a five percent better price within a minute (Tribe, n.d.).

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<sup>20</sup>The insurance industry’s equivalent to FinTech.

The technological development also enables added customer value by automating formerly manual processes, helping protection companies to predict and calculate risk. Furthermore, insurance companies have automated large parts of the damage claim process utilizing chatbots and other types of artificial intelligence. The improvements in predicting and pricing can be seen in conjunction with the vast amount of customer data available, such as Big Data and the Internet of Things. Tesla, which collects extensive amounts of data from its car fleet, is in an advantageous position to provide customized insurance services, such as InsureMyTesla—a motor vehicle insurance service provided by the car manufacturer (Lambert, 2019).

In Norway, insurance companies work proactively to prepare for future changes. By improving processes, terms, and products, the established companies are getting ready for disruption and international competitors. The customers are used to products and services continually becoming simpler to understand, better and cheaper, and the expectations are also applicable for the products delivered by Norwegian insurance companies. In conclusion, new market entrants disrupt the traditional business model as enormous amounts of data combined with advances in AI (including ML) challenge the incumbents, whose old business model is ripe for change (Borgen & Vykundanathan, 2017).

### **Advise**

Banks are used to assessing their customers' financial needs and “advise them the products and services that best match their financial objectives” (Wallace & Herrick, 2009). Today, this service is accessible in different ways; some banks still have physical branches to visit, whereas neobanks are only available via telephone and digital correspondence such as chat and email. Regardless, in most cases, the advisors have access to the necessary internal systems and adequate customer information.

Robo-advisors is a new breed in asset management, programmed to provide financial advice to customers without human interaction (Deutsche Bank Research, 2019). Hence, in 2017, Sbanken acquired 39.9 percent of the shares in Quantfolio AS<sup>21</sup> to strengthen their savings area by providing their customers with automated savings advice, which are individually tailored, using a user-friendly and intuitive robot service (NTB info, 2017). In addition to managing wealth—by which Deloitte predicts robo-advisors will manage USD 2,000 million globally by 2020—virtual assistants can also help customers solve common inquiries to tell customers where to go to enter the correct page in the online bank (Jordheim, 2018).

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<sup>21</sup>Quantfolio is a Norwegian FinTech company that democratizes wealth creation by providing automated and sophisticated AI advice through machine learning algorithms (Quantfolio, n.d.).



The development within cash flow management mentioned above also represents a new type of advice. By aggregating financial information from different financial institutions, new market entrants can help monitor and help customers in their everyday banking life, e.g., suggesting a money transfer from a consumer account into a saving account before the vacation starts, or accept better deals offered from alternative providers based on paid invoices. Payr has such an app combining a payment service with financial advice by letting customers scan and pay their invoices inside the app, and providing better and personalized deals if possible (Edseth, 2019).

Banks are working proactively in providing new forms of communication with its customers, taking advantage of technologies like artificial intelligence in an attempt to provide better financial advice and to stay relevant in their customers' everyday banking life. Virtual assistants such as Alexa and Siri represent new ways of utilizing AI and APIs for banks to communicate with its customers (Eidem, 2019b). Furthermore, exemplified by a DNB experiment in November 2018, their chatbot was able to solve half of the customers' inquiries, thereby reducing expected waiting time and decreasing the threshold for customers to initiate contact with customer support (Strzelecki, 2018).

### 2.5.2 Value Delivery

This part of the business model has to do with how companies deliver the value proposition to its customers reliably and satisfyingly, over time, which depends on the composition of the company's resources, activities, and partners (Jørgensen & Pedersen, 2018, p. 62). Different companies can deliver the same value proposition in different ways, i.e., a rental company may offer their services only online, while another only offers them in-store. It is easy to understand why value delivery is an integral part of the company's story; the composition of resources, activities, and partners affects the strategical, tactical, and operational level of the business. Because the value delivery affects all sides, it is expedient to concentrate on the important ones.

Key resources, which can be physical, intellectual, human, or financial. are the company's most essential input when delivering the promised value proposition. The key resources enable the company to perform activities that enable them to deliver value over time, and the company must organize itself in a way that empowers them to utilize the resources and activities fully (Jørgensen & Pedersen, 2018, p. 62). Usually, a company cannot possess all the key resources and perform all of the necessary activities by itself, making partnerships essential to optimize the operations. Because resources, activities, and partnerships are costly, the offered value must exceed the company's cost.

### Key Resources

Banks used to be a physical location where customers could meet bank employees and agree on terms and prices for banking services and perform financial errands. Thus, retail banking used to have several branches in the local parts of their operational area. In 1990, there were more than 1,200 consumer bank branches in Norway—twice as many as in 2017 (Finans Norge, n.d.). When DNB announced the closure of 59 branches in 2016, the main reason was an increase in consumer behavior, i.e., self-service via online banking. More local market entrants like Sparebanken Vest also started to close offices a few years ago, preparing for the digitalization of consumer banking (Flatekvål, 2016). The expenditure on branches and the shift in consumer habits made the banks prepare for a digital relationship with its customers instead of focusing solely on a physical presence. As digitalization is the leading disruptive force in banking, technological hardware is increasingly becoming a more critical physical resource.

As a consequence of digitalization, many of the traditional banking activities previously performed by human employees have become automated or replaced. When closing many of their branches in 2017, DNB simultaneously announced that they had to terminate 600 (out of 1,500) branch employees. By focusing on business process optimization and automation, more traditional activities are likely to come to an end. Driven by rapid changes and innovation, human resources are still vital as the disappearance of routine low-value tasks enables reallocation of humans from paper pushing back-office activities to high-value front office activities such as social interaction with customers, or working on proactive projects to further improve the business (AVO Consulting, n.d.). Palermo (2017) argues that in this age of ‘Digital 2.0’, there will be an increase in bot-human relationships.<sup>22</sup> However, DNB Group’s 2017 annual report emphasizes the importance of competent employees in the following statement: “Employees who learn faster than our competitors will be one of the Group’s biggest competitive advantages” (DNB, 2018).

Financials are essential when innovating, developing, and delivering customer value. As mentioned, DNB’s NOK 600 million investment in Vipps in 2017 illustrates the need for money to keep up with the ongoing disruption as innovation and development happen in both value creation and value delivery. Furthermore, there have been significant investments in back-office functions as preparations for the future of banking, such as RPA to increase efficiency and accuracy while reducing risk and costs (Horowitz, 2018). Moreover, Norwegian banks have “developed significant equity buffers, particularly since 2011, when stricter capital requirements were introduced” (Nordic Credit Rating, 2018).

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<sup>22</sup>Digital 2.0 is about “apps anywhere, anytime, on any interface, and with any method of interaction” (Heller, 2018).

The last category of key resources is intellectual, which includes all technological software—an essential resource in the present and future value delivery, considering the digital transformation happening in the banking industry.

### **Key Activities**

Traditionally, banks have provided both the infrastructure and the professional activities needed to deliver value in the banking industry. By taking advantage of technology and business process management, banks' activities are being automated, thereby becoming more productive, and in some cases more intelligent as technology takes over traditional key activities like financial advisory and processing back-office tasks.

From providing products and services, banks have turned their focus to user experiences (Bjerke, 2017a). The digital disruption forces banks to perform new activities to keep up with the evolution, and DNB considers itself to be a technology company with a banking license. By deploying minimum value products and adopting agile working progresses, they tend to act more like a technology company by focusing on the customers' need and problems, and discard old, but outdated, success products (Bjerke, 2017b).

The banks are in between two eras—transforming from the conventional 'brick-and-mortar' business to a more modern organization, embracing digitalization and new technologies. Although Sbanken, the first digital-only bank in Norway, still considers itself the leading digital bank, they have significantly increased their development capacity by employing, e.g., students as part-time developers (Sbanken, 2019). At the same time, customer support is still an essential activity because of the need for guidance in the online bank and further information regarding products and features. Being digital-only, however, has not proven to be a disadvantage in terms of customer satisfaction, as they have won the prize for having the best customer support 18 years in a row (Sbanken, n.d.).

### **Key Partnerships**

New market entrants, in addition to the industry convergence, has led incumbent banks to enter new partnerships. Vipps' story illustrates how Norwegian banks initiated partnerships to establish a national mobile payment service to strengthen their position against future international threats. Furthermore, the collaboration between the Norwegian State Educational Loan Fund and Sbanken is another example of how traditional institutions collaborate to enhance their value proposition. By displaying student debt balances via Sbanken, the purpose of the partnership was to show the ability of public services working with private market entrants and provide the customers with a more holistic financial overview (Erichsen, 2018).

The banks also initiate partnerships with FinTech startups for different reasons. The incumbents have the infrastructure, customer relationships, and compliance, but they are not capable of providing all the financial services their customers want (EVERY, n.d.-a). FinTechs are agile, specialized, and have fewer compliance hindrances—thus potentially great partners for the incumbent banks. These partnerships could include sharing knowledge, joint ventures, or benefit from each other's strengths and resources. As an example, DNB initiated a collaboration with Lucidtech to develop their invoice scanner because they realized that another market entrant had the solution needed to achieve the desired scanner service in their new mobile bank. For Lucidtech, this partnership exposes their technology to two million mobile bank users (Henriksen, 2019).

### 2.5.3 Value Capture

Jørgensen and Pedersen (2018, p. 59) describe the logic of profitability as how the company makes money through a given revenue model and a given cost structure. Hence, a company is profitable if the revenues from its operations exceed the associated costs. Consequently, it is evident that a company must have a specific idea about how they are going to earn and spend money to finance their operations.

Traditionally, customers bought (ownership over) items, e.g., CDs as customers wanted to be able to listen to a particular set of songs when convenient. Hence, it made sense from a business perspective to sell the music experience as a physical product to capture value. Today, however, the same customer may stream music using Spotify instead, gaining access to approximately 40 million songs (Spotify, 2018). In this case, Spotify's revenue streams are from subscriptions and advertisement, illustrating how changes in the offered value proposition (service versus product) may impact the revenue model.

Commercial banks, on the other hand, have two distinct revenue streams: income from interests and income from fees (Mitchell, 2019). The interest revenues come from loans, e.g., house loans, car loans, consumer loans, and credit card loans, whereas income from fees may occur for products and services like debit and credit cards, home loan establishment, payment processing, and brokerage. According to Mitchell (2019), value capture in the banking industry is still awaiting disruption as even new FinTech startups like Vipps capture their value from business opportunities by charging fees, e.g., for person-to-business transactions and person-to-person transactions if the amount exceeds NOK 5,000 (Vipps, n.d.-b). Although the recent engagement in crowdfunding platforms may result in new revenue streams for the incumbents (Startskudd, n.d.), revenues from interest and fees are still the most common method of capturing value amongst banks.

## 3 Methodology

### 3.1 Research Philosophy and Approach

The objective of this master this is to analyze how Norwegian providers of financial technology utilize intelligent automation in light of PSD2. By reviewing the contemporary literature and conducting interviews with experts, our ambition is to acquire new insight into an industry that is experiencing considerable upheaval based on digitalization and new regulations. Following these arguments, we applied an inductive approach (Saunders, Lewis, & Thornhill, 2016, p. 147).

According to Saunders et al. (2016, p. 145), an inductive approach is when the research starts by “collecting data to explore a phenomenon, and you generate or build theory.” Intelligent automation and PSD2 are both new subjects to the financial industry services, and we seek to explore how providers of financial technology interpret the challenges and opportunities derived from the two phenomena. By analyzing data, our research also aimed to identify themes and patterns to create an introductory overview of intelligent automation in the Norwegian financial services industry.

Conversely, “if your research starts with theory, often developed from your reading of the academic literature, and you design a research strategy to test the theory, you are using a deductive approach” (Saunders et al., 2016, p. 145). In a deductive approach, a theory is developed and becomes rigorously tested. This approach is criticized for not permitting alternative explanations of what is happening (Saunders et al., 2016, p. 147).

Because our analysis is concerned with exploring a new situation in a contextual manner, we have chosen an inductive approach. By starting with data collection and then develop theory, this approach permits a better understanding of the nature of the problem. Besides, the absence of a highly structured research design may reveal alternative explanations between relationships discovered in our analysis (Gioia, Corley, & Hamilton, 2013, p. 16).

Since we investigated the utilization of a technological concept that is relatively new, complex, and unstructured, we chose to apply a qualitative method with a collection of non-numerical data (Langley, 1999; Langley & Abdallah, 2011, p. 106). Hence, we obtained primary sources of data through semi-structured interviews. Secondary sources of data, however, included an extensive literature review of articles, books, and web resources.

## 3.2 Research Design

We sought to understand and clarify a new phenomenon in the FinTech environment by asking questions during interviews and performing a literature review. For these reasons, an exploratory research design was considered particularly fitting for our research question (Johannessen, Christoffersen, & Tufte, 2011, p. 62).

According to Eisenhardt (1989, p. 534), a case study is “a research strategy which focuses on understanding the dynamics present within single settings”, typically combining different data collection methods. Since intelligent automation is a relatively new phenomenon, a case study was therefore considered the best research strategy as it enabled us to conduct an in-depth inquiry into the phenomenon and its dynamics within its real-life setting (Yin, 2003, p. 2).

## 3.3 Data Collection

### 3.3.1 Interviews

The objective of this master thesis is to analyze how Norwegian providers of financial technology utilize new technologies—and the combination of these—in light of a regulatory directive. As this concept is complex and unstructured, we wanted the opportunity to probe answers to gain insights and untangle complexity. Furthermore, we wanted to understand the rationale behind the interviewee’s thoughts and opinions. For these reasons, we obtained primary data by conducting semi-structured interviews.

### 3.3.2 Sampling

Our sample consists of six participants from different segments within the Norwegian FinTech environment, by which the selected number is a result of relevant participants willing to participate within our time limit for this project. Johannessen et al. (2011, p. 108) argue that time and economic resources are limited in school projects, thus smaller samples are acceptable. All the subjects in our target group are operating within the FinTech environment, so the number of samples seemed reasonable, and our process for sampling started by doing web searches to discover relevant stakeholders. Through non-probability purposive sampling, we established a suitable basis group of potential interviewees, and we sought to “collect data to describe and explain the key themes that can be observed” (Saunders et al., 2016, p. 301).

The next step was to send invitations via email with an attached information letter (see appendix A1 ), explaining our overall objective and research question. Within the FinTech environment, we strived for a sampling sufficient for the analysis of the utilization of RPA, AI, and IA, and the analysis of both incumbents and new FinTech startups. A broad spectrum of participants was interviewed, from CEOs to non-C-suites. Table 3.1 illustrates our interviewees, in chronological order.

#	Title	Sector	How
1	CEO	Financial Services	Phone call
2	CEO	FinTech	Phone call
3	Leader Customer Insight & Analysis	Banking	Office
4	RPA Developer & Solution Architect	Banking	Office
5	Head of Data Science	Financial Services	Phone call
6	Manager	Management Consulting	Phone call

**Table 3.1:** Interviewees

### 3.3.3 Preparation and Execution

We created a semi-structured interview guide (see appendix A2) with the main topics for our research, whereby the questions were chosen based on comprehensive literature research of the topic ‘Intelligent Automation’. Because we aimed to obtain a deeper understanding of the utilization of intelligent automation for FinTech companies, the interviews can be considered in-depth interviews, using the semi-structured guide to keep us within our scope and discover new exciting topics.

We aimed to conduct the interviews face-to-face whenever possible (conditioned by their proximity to Bergen). When necessary, electronic communication tools were used to do long-distance interviews, preferably via Skype or similar applications so we could establish a more personal connection via audio and video. The interviews were estimated to last a little less than an hour.

For the accepting participants, we scheduled a time to conduct the interviews in addition to sending a follow-up email confirming the appointment. The email contained the declaration of consent, which we asked them to sign and return to us (see appendix A3 Declaration of Consent) beforehand. By signing the declaration, the interviewee consented to the audio recording and that we will delete the recordings by the end of the project. The declaration also emphasized that signing it does not constitute any form of binding obligations towards us and that they could withdraw from participation at any time. The project was registered at the Norwegian Centre for Research Data (NSD), meaning that the information in the declaration of consent was subject to predefined formalities.

Before the interviews, we supplemented our level of knowledge with literature research and background information regarding the segment, the organization, and the interviewee. This research was conducted to avoid unnecessary misinterpretation between the interviewee and us and enabled us to ask better follow-up questions with high relevance to our interviewee.

During each interview, one researcher focused on taking notes, while the other focused on interviewing. This distinct task distribution was done to ensure adequate quality of the notes taken and for the questions asked. We considered this to be expedient due to our lack of experience conducting interviews.

## 3.4 Data Preparation

After the interviews, we transcribed the audio recordings as quickly as possible “in order to avoid a build-up of audio-recordings and associated transcription work” (Saunders et al., 2016, p. 572). Transcribing was also done to reduce the risk of data loss.

If the quality of a recording was low, and we were not able to transcript the entire sentence, we excluded it from our analysis as this type of data cleaning was considered vital for further analysis. By only keeping full sentences and reasoning, we could understand the context, which was important because our findings build on the statements put in context.

### 3.4.1 Data Analysis

Due to the inductive approach and the contemporary phenomenon that we were researching, the data collection unveiled prominent themes, enabling us to create a higher level of structure. For these reasons, we chose ‘Thematic Analysis’ as our analytical approach, which is considered to be expedient, due to the vast amount of terminology and the different definition of terms, as discussed in the previous section.

We conducted all the coding manually, initially by reading all the transcribed interviews by ourselves. When reading, each of us noted summarizing descriptions for each section in the side margin. After that, we made a joint list of all the observations and further processed and trimmed the list until we had a set of relevant codes and a definition for each code. Then, we started to search for patterns and relations between the codes and assembled the related ones into groups.



## 3.5 Research Quality

High research quality reduces the possibility of getting the wrong answer when conducting research experiments (Grennes, 2012). To judge the research quality of this study, we have considered its dependability, credibility, transferability, and bias.

When assessing the dependability of a study, one usually asks the question of whether a researcher following the described procedures, conducting the same study will arrive at the same results (Saunders et al., 2016, p. 202). Our findings in this case study only reflect the reality of the time it was conducted. If someone performs the same research in the future, they may, therefore, arrive at entirely different conclusions, especially considered how the situation may be subject to change because of technological development. The nature of semi-structured interviews also makes it unrealistic for other researchers to replicate the procedures and arrive at the same results (Saunders et al., 2016, pp. 398-399). To overcome issues regarding the dependability, we have thoroughly discussed our methodological choices and procedures to describe our rigorous design.

Credibility is about “ensuring that the representations of the research participants’ socially constructed realities actually match what the participants intended” (Saunders et al., 2016, p. 206). To ensure credibility, we questioned and probed if an answer could be subject for misinterpretation during the interview, and we did extensive research of the interviewee and the company in advance of each interview.

Transferability is a question whether the findings of the study can be applied to another setting in which the reader is interested in researching (Saunders et al., 2016, p. 206). Because our research analyzes a specific technological concept in a particular industry, the study does not tend to be transferable to other settings beyond the scope of our research.

Bias can take two forms in a semi-structured interview approach: interviewer bias and interviewee bias. To reduce the amount of interviewer bias, we did extensive preparations in advance of the interviews. We performed literature research and made a plan regarding tasks during the interview and a list of potential follow-up questions. To reduce the interviewee bias, we focused on providing the interviewees with as much information possible regarding participation and our research topic. By establishing trust, we reduced the interviewee bias (Saunders et al., 2016, p. 408). Furthermore, we focused on asking open questions.

## 3.6 Ethical Considerations

Our research design involves humans and personal data. Therefore, it was essential to take ethical considerations into account by protecting the rights, dignity, and welfare of those who participated (Johannessen et al., 2011, pp. 93-94). Moreover, we aimed to be open, truthful, and promote accuracy in our research. Hence, before conducting the interviews, our project was registered at NSD, which provided us with guidelines in terms of the data collection.

Furthermore, participation in our project was voluntarily, and the interview invitation stated our motivation, topics we were interested in discussing, and that we were aiming to protect privacy and anonymity. Furthermore, we also informed that in the interest of the subject, the participants' position and industry could have a significant impact on our research and would be included in an overview. We found that these considerations made it possible for the participants to make fully informed decisions, giving them the possibility to decline. Moreover, it was crucial to obtain research objectivity and not misrepresent the data collected in the analysis stage. Consequently, we endeavored to keep a high degree of integrity (Saunders et al., 2016, p. 250).

## 3.7 Weaknesses

Analyzing the utilization of new technologies as students in economics and business administration, with no in-depth background in computer science, posed as a weakness to this study. Therefore, we were reliant on our expert interviewees—that their opinions were well-informed and based on a solid background in the field. Another issue to emphasize includes the exploration of a new research subject with a limited selection of academic papers. Hence, we had to use our best judgment to ensure that our secondary sources were of high quality.

Additionally, the infant nature of the concept posed linguistic risks, as there may be differences in terminology. Lastly, since this thesis is in English, the interviews had to be translated. Accordingly, there is a possibility that the interviewees' opinions have been misinterpreted or mistranslated.

## 4 Analysis

Based on the coding of the interviews, as described in the previous section, our analysis and findings are divided into three main topics: regulation, business, and technology.

### 4.1 Regulation

#### Catalyzing Collaboration

All of our interviewees mentioned regulation as one of the main drivers behind the recent changes in the financial services industry and that incumbents must collaborate with FinTech startups to deliver the services required by today's customers. The incumbent banks cannot create everything themselves because of two reasons: i) banks are severely regulated compared to FinTechs, and ii) FinTechs are 'born digital native.'

Furthermore, regulations affecting traditional financial institutions are comprehensive. This fact was pointed out as a significant challenge for the incumbents and as an exceptional opportunity for new FinTechs as conventional banks have many operations to comply with, e.g., risk assessments and reporting to the national authorities, whereas the new market entrants can be more specialized and agile.

*I don't think FinTech companies have to deal with the same 'red tape' as we do. As a bank subject to strict regulations, we must focus on compliance continuously. They probably don't have to report to the Financial Supervisory Authority to the same extent as us.*

– Interviewee #3

*We can be much more specialized compared to the large banks because they must consider risk, compliance, credit... while trying to be innovative at the same time. They have agendas pulling in all directions, thereby ending up with less innovation.*

– Interviewee #5

The new FinTechs are born digital native, specialized, and have an organizational structure that allows them to make swift decisions and consequently adapt to their shifting business surroundings. The contradictions to the incumbents make a good match; the incumbents are often big, established companies with business prowess, while FinTech startups are known to be proficient in computer science and more light-weighted, thereby able to maneuver in the financial landscape more easily. All of the interviewees emphasized the importance of collaboration between the different market entrants, especially considering the potential threat that Google, Apple, Facebook, and Amazon (GAFA) pose.

*Cooperate when you can and compete when you must.* – Interviewee #2

Two of the interviewees, of which one of them provides services within crowdfunding while the other one is a PISP, said that the potential implications of PSD2 are limited. The former argued that their kind of financial services is not within the scope of the revised directive, and thus not a critical driver for their business. Nonetheless, they will utilize the possibilities enabled by PSD2 in their future business but considered the directive as a potential support function to their business. Also, the interviewee indicated that PSD2 constitutes a cultural change for the incumbent banks as the directive imposes opening of the banks' infrastructure.

*The culture used to be “every bank for itself”, and now they suddenly have to cooperate. Although we entered the market independently and unaffected by PSD2, I still believe that the directive was an indirect driver for our bank collaboration.*

– Interviewee #1

The interviewee from the PISP argued that PSD2 is not enough to make the incumbents fully cooperative, claiming that the banks only deliver the minimum standard. He explained that PSD2 does not facilitate enough sharing of what they consider to be relevant financial information for their business as a PISP. In his opinion, PSD2 indeed leads to the sharing of account information; thus facilitating innovation for PISPs and AISPs, but that his company's future business development is depending on extensive financial information that is outside the scope of PSD2.

*PSD2 is not sufficient. You may get a subset of your accounts. . . Of course, some may develop ‘flashy’ solutions for that purpose, but it's not enough, at least not for our company.*

– Interviewee #5

In Norway, PSD2 will go into full effect in September 2019 (Andersen, 2019). For the incumbents, the transition to become PSD2 compliant has been a technological journey, given the vast amount of financial resources they have invested in consultants and technical expertise as the new directive requires a substantial technological upgrade in their systems.

*Everything becomes easier for the customer, but there's a lot of work behind the scenes to put it together.*

– Interviewee #3

*It interferes with a lot, and we had to hire external consultants to help us because this is not something you want to be great at, but you have to be compliant.*

– Interviewee #4

Although the implementation of PSD2 increases the competition in the financial services industry, our interviewees working in FinTech startups seem to be disappointed that there has not been any “FinTech takeover” in Norway yet—at least not as expected.

*Currently, I'm disappointed... I really thought Google, Apple, and Facebook would have conquered the Norwegian payment market by now, but I'm not sure if that's possible anymore. Vipps, being one of the most popular brands in Norway, is well-positioned against them today.* – Interviewee #5

## 4.2 Technology

### Awareness

Only half of our selection of interviewees were familiar with the concept of intelligent automation before we explained it to them. Although all of them were familiar with RPA and AI, only three had heard of the combination, and they did not have a clear definition of the concept. However, they agreed that it consists of RPA and some form of intelligent component and that an exact definition is not essential. Interviewee #6 was surprised when we told him about the preliminary findings regarding the degree of knowledge about IA in our selection, and he affirmed the lack of a universal definition of it.

*I think everyone has their own definition.* – Interviewee #6

After explaining IA in general terms, we asked if they had any ongoing or scheduled IA projects. All of the participants referred to ongoing projects within AI or RPA, but only three worked on current IA projects. One of them explained that his company uses Blue Prism and how the software allows them to add intelligence into their RPA software via a panel. Using Blue Prism's service, it is possible to plug intelligent elements into the bots to add cognitive capabilities that can perform interpretations and assessments. The interviewee was in no doubt that IA will increase in popularity, but he was not sure how it would evolve in the future.

*First, they delivered automated robots, and now they want to make them intelligent. I'm convinced that intelligent automation will be increasingly popular in the future.* – Interviewee #4

Another participant explained that the company had an ongoing project with virtual assistants, but that he did not know how it would proceed as the project owner was another department.

Interviewee #6, on the other hand, talked enthusiastically about intelligent automation’s potential and some of its use cases. Since he is working in management consulting, one of his responsibilities is to help clients automate “boring” tasks. Therefore, he was thrilled when his employer recently addressed their frustration related to the re-invoicing of customers.

*We have just implemented an intelligent bot that scans and records invoices for our accounting department, in which the scanning technology is from a Norwegian startup company’s machine learning module.* – Interviewee #6

The participants with no ongoing IA projects favored the idea of implementing it in the future but did not have any specific examples of plausible applications. Their belief in intelligent automation’s current and future potential seem to coincide with Amara’s law: “We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run” (Ratcliffe, 2018).<sup>23</sup> Johansen (2017, p. 78) argues that this perspective can help leaders develop their understanding of timing, which is especially relevant for artificial intelligence regarding when disruption will occur (Frey, 2019, p. 329).

### Quick Fix?

The startups and the incumbents differed significantly in their utilization of robotic process automation. As the startups in our selection argued that they have few if any legacy systems, there is necessarily no need to implement RPA, whereas all the incumbents confirmed that they had ongoing projects involving this technology. Interviewee #5 in one of the startups considers RPA as “patching old legacy systems”, explaining that his company is a digital native that uses APIs to connect their different systems. Furthermore, he argued that being digitally native implies highly effective processes and a productive workforce performing value-adding tasks.

*There are no good reasons to use RPA unless you have severe amounts of technical debt. RPA is a good indication that your IT infrastructure is terrible and that something is seriously wrong.* – Interviewee #5

Interviewee #1 of another startup agreed, saying that it is unfortunate to spend time on automating processes in a startup phase because changes happen so quickly—including everything from simple tasks to organizational structure.

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<sup>23</sup>Coined by Roy Amara, a prominent futurist and former president at the Institute for the Future (Cox, 2017). According to Aldelhof (2019), Amara’s law applies to AI.

*I fear that if we standardize too much too soon, we may stop innovating and improving. It's not typical for startups to use RPA.* – Interviewee #1

Interviewee #6 explained how automation is the next step of optimizing the business after the processes are centralized and standardized. Although the business case for automation may be more appealing for incumbents, he argued that all companies could benefit from automation unless they are only a handful of people.

The incumbents, on the other hand, often need fast and reliable solutions to deal with their legacy systems. As explained by interviewee #6, RPA is not merely such a tool; it also has the potential to yield excellent financial results. In his previous job, which was in a neobank, they used to send notifications to customers by post when a direct debit agreement was established. Many of these customers were already registered with an email address in the bank's database, and consequently, the company was able to automatically notify these customers via email by making minor adjustments in some of the parameters. The team identified and automated the process, and sent a change request to their IT department within one day, resulting in a total cost of ownership of roughly NOK 13,000. Approximately three years later, he estimated the savings to be NOK 5.1 million—equal to a return on investment close to 39,000 percent.

Interviewee #4 explained how his company utilizes RPA to automate essential but repetitive tasks, in addition to its benefits in terms of 'time to market'. Besides reliability in solving necessary tasks and enabling reallocation of people to more value-adding tasks, he mentioned the need for smoothing the workloads to prevent new hirings when the workload peaks. The need for predictable processing is essential when releasing new products as it directly affects the customer experience. Bots do not require extensive training or rest to process fast and accurate, making them an ideal resource to scale.

*The robots are always 'stand by' and ready to be turned on or off as we see fit. That predictability and scalability are great advantages compared to human workers.* – Interviewee #4

RPA reduces time to market because the employees can focus on value-adding tasks like marketing and selling instead of rigging new back-office processes. The participants pointed out that the long-term goal is to automate such processes fully with the proper IT systems, but that the importance of being perceived as innovative and first to market required swift and temporary solutions. Furthermore, automation enables rapid innovation as fewer changes in the minimum viable product may involve simple re-coding of the bot instead of retraining people.

## 4.3 Business

### Industry Convergence

To have a mutual understanding of the term ‘FinTech’ during the interviews, we asked the participants to define it, of which only one participant had a different definition compared to the consensus. In his opinion, the term is reserved exclusively for startup companies that use new technology to develop and sell financial products or services to traditional banks. However, he agreed that startups both supplement and improve the incumbents with this financial technology.

Only one participant expressed an aversion towards the term ‘FinTech’, explaining that it may limit the mind to believe that the technological solutions must be financial. In his opinion, FinTech entails a variety of technological solutions from different customer experiences used in the financial industry. Nonetheless, an essential aspect of FinTech is the accompanying increase in industry convergence.

*I’m regularly in contact with companies that have developed promising solutions with remarkable potential in many different industries, not just in the FinTech industry.*

– Interviewee #2

In general, their answers revealed a lack of a standard definition of the term, but they concurred that it involves technological solutions enabling innovation and development of financial services—leading to a convergence between technology and finance.

*FinTech is about using new technologies to develop products and services within the financial specter and facilitating collaboration and competition between incumbents and new market entrants.*

– Interviewee #1

Also, the industry convergence leads to structural changes internally. The cooperation between technologists and business people is essential to achieve a holistic digital transformation, thus leading to interdisciplinary teams. When working in such units, it is vital to be aware of different competencies in the workforce.

*The classical knowledge gap between technologists and economists causes a problem that often arises when they work together, i.e., they don’t know enough about each others domain. In other words; technologists don’t know enough about business, and economists don’t know enough about technology. However, I have observed that this knowledge gap is gradually closing.*

– Interviewee #4



## Customer Experience

The customer demands are influenced by solutions from different industries, e.g., streaming-services with user-friendly interfaces and recommendation systems. They are used to seamless interfaces across various electronic utilities and proactive services, which inspires them to make good choices. The challenge is to make private banking exciting, so the customers choose them, but at the same time being perceived as professionals.

*Customers are used to services appearing before them almost before they realize they want to use them. They want information that can give them ideas and inspiration, and it's important that the information is perceived as relevant by the customer.*

– Interviewee #4

Also, all the interviewees elaborated on the importance of access to enough data to be able to provide exceptional customer experiences. Both incumbents and startups focus on collection, structuring, and utilization of data. Interviewee #3 described how his company is currently working on machine learning projects involving data science and prediction modeling to deliver ‘next best products’<sup>24</sup> of which the projects’ success rely on sufficient amounts of structured data. One of the banks is also moving software and data storage into the cloud to prepare for future machine learning projects.

Interviewee #5 explained how AI (including neural networks) already is widespread and not necessarily complicated to deploy. According to him, 80 percent of the job is to collect and structure data and that all you need to utilize machine learning is a medium skilled engineer with tools like Keras, in addition to large amounts of data. He explained the importance of data collection in the following way:

*It's all about collecting data and half of the startups in the business are pursuing data revenues. One of our competitors has this approach, i.e., seizing market shares with less regard to financial revenue streams (that's their second most important priority).*

– Interviewee #5

Interviewee #1 explained how the company’s credit model is not currently taking advantage of AI nor IA, but that they collect and prepare data for future AI projects because their long-term goal is to implement AI in their credit model.

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<sup>24</sup>‘Next best product’, also known as ‘next best action’, is a type of predictive modeling based on customer data which helps organizations to understand and decide what the next best product or action is.

It appeared from the interviews that the focus on user experience and the collection of customer data is correlated. By delivering exceptional customer experiences, the customers will choose the preferred financial service provider over another, and thus increasing the amount of user data which can be used to augment the services.

*We don't want customers to choose our competitors. We want the opposite—that the customers choose us naturally because the website is intuitive; we have great products; everything is manageable from our platform.* – Interviewee #3

When we pointed out that data revenue is the main focus for various multinational enterprises and asked if the incumbents considered themselves to be FinTech companies, their answers differed. The oldest company (+100 years) undoubtedly defined itself as a FinTech company and argued that in addition to innovating their own business, they also deliver financial technology to others. He emphasized how technology affects their core business model and that they took a qualified decision to invest in internal IT development some time ago.

*We have observed a trend in which banks (this is the situation for one of our biggest competitors) have started to in-house their tech projects again, making them one step closer to becoming FinTech companies.* – Interviewee #4

Surprisingly, the other banker—working in a neobank—was more restrained in the description of his workplace.

*In general, banks are not FinTechs yet, but it is only a matter of time, and the neobanks are the closest to becoming FinTechs.* – Interviewee #3

### **Business Model Impact**

All of our interviewees elaborated how robotic process automation and artificial intelligence—and even the combination of these technologies—have the potential to affect both revenues and costs in their respective business model. All participants with ongoing or scheduled projects involving IA or RPA pointed out that the main driver for their projects is reduced costs. Nevertheless, when asked to describe the benefits of IA and RPA, the answers suggested several implications for the entire business model.

Many pointed out that reduced processing time also reduces the total costs, e.g., automation could reduce labor costs. Nonetheless, there are additional benefits from time reduction as it enables more instant responses to customers used to having everything appear before them within seconds. Hence, time reduction is capable of enhancing the

value proposition by faster deliveries, affecting how the value is delivered by automating processes, and consequently, the value from business opportunities gets captured via opportunity costs. Many of the benefits from RPA are also attainable with IA and AI, e.g., chatbots may reduce labor costs and deliver several responses simultaneously to the customers, and thus reducing the time needed to process inquiries.

Another benefit stemming from ongoing RPA or IA projects is that they enable reallocation of people to do more value-adding tasks involving innovation, development, and customer contact. Reallocation was pointed out as the main reason as to why these companies did not express distress for their employees to oppose RPA projects suddenly.

*Everything a computer can do is tedious, per definition, so I think there will be changes. In the future, most workers will probably perform other tasks and be more creative than today. I genuinely believe that utilizing RPA is exclusively positive for the workforce.*

– Interviewee #1

Another interviewee explained that the high level of education in Norway is another reason not to fear unemployment. He argued that the average employee in Norwegian businesses is resourceful and capable of seizing new opportunities internally when tasks disappear as a result of automation or similar technologies.

As mentioned above, reduced time to market may affect the revenue side of the business model. By having a meticulous system ready to perform new tasks, the accrued time from a concept is in the development phase until it is operational may be reduced. Interviewee #4 emphasized the importance of developing such scalable RPA systems as a competitive advantage in the future of innovation and development.

AI, however, can affect the business model differently as it has the potential to offer new solutions and generate other revenue streams. Conclusively, these three digital concepts affect the participants' business models in different ways. One of the interviewees explained that it is challenging to innovate an entire business model and that it is easier to innovate incrementally and then eventually move on to disruption.

*It often starts with a technological innovation that makes the impossible possible. To innovate an entire business model—not just improve on it—you have to rethink the story of how the company should work. Most businesses tend to focus on piecewise improvements and consequently deal with one component at a time.*

– Interviewee #2

### Change Management

All the interviewees emphasized the importance of change management when working on digital projects, underlining that it is a critical success factor in digital transformations by which the project owner never should neglect. When working on projects or founding startups, there are several aspects the executives have to consider in advance, during, and after implementation of new technologies.

To keep the involved parties motivated, the management team should express enthusiasm and confidence in the projects from the beginning. According to our interviewees, change does not necessarily have to start on the management level, but they must endorse the projects. This was highlighted especially relevant for the incumbent banks because of their size and organizational structure, often creating a gap between the executive members and the project owners and their team members. For new startups, this gap is naturally smaller or even non-existing. As described by Interviewee #5 his employees used to pitch potential projects directly to him as the CEO, but that this model occupied too much of this time and created bottlenecks when the business reached a certain size.

*Projects need leadership momentum from the very beginning to be successful, i.e., continuously execution to drive them forward.* – Interviewee #1

*At a certain company size, you have to restructure the despised “hierarchy”. However, that is imperative to avoid stagnating creativity.* – Interviewee #5

Also, the projects must yield tangible benefits for the business, as described by an interviewee:

*Easily put, it is imperative that the business case increases revenues, decreases costs, or eliminates risk.* – Interviewee #2

Furthermore, the management team has to consider long-term effects and maintain a holistic perspective when assessing the projects as they may not be beneficial for their current operations. However, they may constitute essential steps for future projects, e.g., moving software and data storage into the cloud for future machine learning projects. Also, it is necessary to digitalize all the initiatives through the entire value chain. Too many companies are satisfied with digitalizing just one aspect of the business, only to realize that the after work is spiking another place in the value chain because they do not consider how to scale or further develop the projects later on.

*A little while ago, I was at a conference where giant companies explained how they underestimated the digitalization of their business, leading to lots of follow-up work afterward. Digitalization is a serious business that requires skills and planning, and we must be willing to opt out and prioritize cases because there's no way we can be best at everything at once.* – Interviewee #2

The startups also mentioned scalability and the importance of digital, but in a different context; it is ipso facto the reason for their existence. Hence, for the FinTech startups, the primary purpose is to scale their value propositions by exploiting the advantages of being 'digital native'.

*Our most important objective as a FinTech startup is to facilitate future scaling and agile development of our business concept.* – Interviewee #5

Furthermore, our interviewees underlined the importance of having a workforce that understands the reasons behind their digital initiatives, i.e., the projects' purpose and the potential benefits that follow for them and the company as a whole. Digital transformations entail more than merely implementing new technologies; they also consist of the people driving the changes and the people who get affected by them. As common barriers include lack of support from top management and inadequate expertise, educating and involving the right people with a willingness to change throughout the company is vital for the corporate culture (Dell Technologies, 2016, p. 6). Conclusively, change management is a critical success factor in digital transformations.

*In addition to the need for a promising business case, there's one precondition that's essential for successful digital transformations: the ability and willingness to change. In a worst-case scenario, even a project with exceptional potential could end up with a utilization equal to zero because of a rotten corporate culture.* – Interviewee #2

*Right now, our employees are the most indispensable part of our digitalization measures.* – Interviewee #3

The FinTech startups have the benefit of being associated with digital transformation, and thus less need for changing the company culture to attract the desired talents as candidates seeking digitalization and new challenges often end up in digital native companies. Hence, the employees' attitudes become a natural part of the startups' company culture. The employees are often young and comfortable with rapid technological development.

### Collaboration Prerequisites

The interviewees also pointed out the importance of collaboration in digital transformations, and that the reasons for initiating such relationships often involve sharing either technology or knowledge. When entering into such agreements or when dealing with trade secrets and immaterial property, trust becomes paramount.

*The importance of trust in cooperations means everything. 10/10. I cannot stress this enough.*

– Interviewee #1

Incumbents and startups seem to differ in their approach to establish trust in relationships. Whereas incumbents tend to write up huge contracts when initiating collaborations to protect themselves and to be compliant, collaborating with startups can be loosely based on a handshake or oral agreements because the startups are less interested in spending time nor money on drafting complicated contracts. Startups seem to have an understanding that it is excellent if the partnership works; otherwise, they can easily dissolve it. This informality facilitates flexibility and efficiency.

*By cooperating, we can establish trust on a different level because you really get to know what the other party stands for and what their intentions truly are. However, I comprehend the big players' point of view, and that informality is challenging for them because they have internal and external rules to follow (bureaucracy).*

– Interviewee #1

Since one of our interviewees works in a startup company operating internationally, he had noticed a distinct difference between the Norwegian FinTech society and others—namely that the Norwegian investors tend to be more protective. He explained that an international investor with shares in different companies often would endorse cooperation between them and take a more active role to make it happen because of the potential synergy effects that could arise. In Norway, however, stakeholders may discover such possibilities subsequently because various investors deliberately keep the companies apart for business reasons, e.g., to avoid corporate cannibalism. However, the interviewee emphasized that the Norwegian FinTech community is thriving and that new market entrants generally seem willing to cooperate to a greater extent than in the past.

*In Sweden, for example, the attitude is, “I have an investment in a company that is similar to yours, so you should talk to each other!” In Norway, however, you might hear about such possible synergy opportunities or potentially advantageous alliances afterward.*

– Interviewee #5

In the prolonging of trust comes the motivation for initiating collaborations. When sharing knowledge or technology with rivals, both startups and incumbents are conscious as to what they offer and expect in return. Some alliances are formed ad hoc, e.g., to share data whose purpose is to train mutual algorithms on a more extensive data set, then to be deployed on their private data again. Interviewee #5 expressed a desire to share this kind of information—even with their direct competitors—as an anti-money laundering measure, but that not everyone is equally eager to contribute to such data pools although it may yield all parties added value as a result.

*Nobody shares data voluntarily, at least not without getting the same amount in return. Unfortunately, we are still a bit too small for the big firms to believe in a balanced share ratio with us.* – Interviewee #5

Considering what constitutes sustainable collaborations, a combination of three topics emerged in our findings: i) an actual business problem, ii) new research, and iii) the ability to utilize emerging technologies. As changes caused by digital transformations and emerging technologies increase businesses' need to acquire in-depth knowledge of new phenomena, academia poses as a potential partner for companies needing such professional input. Well-known for conducting relevant research in various fields, such partnerships are also excellent opportunities for academia to obtain empirical data. Moreover, being able to utilize emerging technologies is considered a necessary capability to exploit their potential. As interviewee #4 pointed out, many incumbent banks have started to in-house technological development instead of outsourcing or even offshoring this part of their operations as they used to do to save money.

*The combination of a promising business case, new research, and the ability to utilize new technologies is appealing for future collaborations.* – Interviewee #2

## Trust

According to our interviewees, there is no doubt that technologies like RPA and AI increase the interaction between humans and machines. For the incumbent banks, this development threatens their most prominent characteristic as human interaction used to be an essential part of their business model—from the branch model towards neobanks with call centers. Customers are used to having their financial inquiries processed by human professionals, and thus, socially conditioned to believe that human assessment is essential in financial matters. This level of trust is considered an intangible asset by the incumbent banks and thereby a competitive advantage compared to the new FinTechs. At the same time, technological innovations are disrupting the industry, forcing traditional banks to renew themselves before their services are taken over by others.

*We need to maintain customer trust while simultaneously focusing on innovation. It truly is a problematic trade-off.* – Interviewee #4

Our banking interviewees explained that they automate and utilize artificial intelligence in different aspects of their business, such as chatbots to handle simple inquiries like blocking stolen bank cards or fraudulent transactions. Furthermore, interviewee #4 talked about a hypothetical chatbot example involving potential complications that could arise if a chatbot is the only contact point for customers who get their loan application declined. Firstly, he argued that the bot would have to communicate the rejection professionally, but with human empathy and sympathy, and secondly, it must be able to have a constructive conversation even though the customer may be rude and act irrationally, expecting an opportunity to negotiate. Although the interviewee argued that this example belongs to the future, it illustrates how sophisticated machines have to become before completely eradicating the need for human interaction in customer support—an integral part of today’s banking experience. However, banks are not obligated to provide extensive information to customers regarding the basis of their final decision, thereby restricting the customer’s room to discuss and negotiate. Conclusively, the chatbot only has to be intelligent enough to communicate standardized rejections professionally, according to the bank’s rigid guidelines.

Interviewee #1 argued that there are no logical reasons as to why FinTech startups should be imposed to answer differently than traditional financial institutions if customers ask for the basis of their decision, explaining that it is irrelevant whether the decision derives from a neural network, an algorithm, or a person. He did not give the impression of being worried that customers might demand a more thorough explanation in the future when artificial intelligence and electronic application forms handle their inquiries automatically, in contrast to their current assessment practices that often require human oversight.

*We’re not obligated to provide detailed explanations to our customers if their loan application gets rejected. So, if our competitors communicate rejections in general terms (according to the law, of course), we will too. If the authorities have any problems with this practice, it’s their responsibility to make the proper changes.* – Interviewee #2

Interviewee #2 explained how trust—in some cases—could be built faster and to a greater extent between humans and machines compared to just humans. He believes people may have a presumption that trust is only created between humans, and emphasized how that often is the case. However, if a person experiences financial difficulties, a bank branch with seemingly successful and well-dressed people may necessarily not be the best environment



to discuss financial failure. Describing this situation as a paradox, he explained that when people need financial advice the most, the threshold to ask for help often is at its highest.

*People with financial problems are often too ashamed to ask for help, and research shows that it may be easier for people in desperate need of a financial advisor to initiate contact with a machine because it's unbiased and doesn't judge their life choices. Therefore, we believe that artificial intelligence has a unique opportunity in personal financial management.* – Interviewee #2

Technological maturity is another aspect that affects trust between humans and machines. As digital transformations lead customers towards more intuitive solutions and digital contact points such as virtual machines, the gap in the technological maturity between the elder and younger are closing in Norway, rated as the second most advanced digital economy in Europe (Norwegian Ministry of Foreign Affairs, 2017). Perceived as ‘early movers’, Norwegians have high trust digital services, understanding their use cases, and how they can benefit them in their everyday life. Hence, one of our interviewees pointed out that most people understand that bots are less likely to fail compared to humans and that they neither can be negotiated with nor be influenced in other ways. In his opinion, this technological maturity poses as an opportunity for startups in the Norwegian FinTech scene, although he emphasized that customer trust still is solid towards the traditional banks.

According to Covey and Merrill (2006, p. 36), trust is the most neglected and underestimated possibility of our time. In connection with the SWOT framework, this was mentioned as a weakness for the new market entrants, and conversely a strength for the incumbent banks which benefit from a long-lasting established customer trust. Their opinion was that customers do not feel worried about letting banks handle their finances and personal data as they consider the banks to be safe and committed to protecting their privacy. Moreover, every participant acknowledged the importance of regulating sensitive information to maintain people’s trust in financial institutions, especially if international platform titans like Facebook and Amazon enter the Norwegian financial services industry.

*Scandals involving sale and distribution of sensitive information, like the one with Facebook and Cambridge Analytica, are contributing to people’s reluctance to give large tech companies access to their finances. Although banks have a reputation for being a bit boring and conservative, people trust them. At least they have that.* – Interviewee #4

According to our interviewees, most people are restrictive when it comes to sharing their financial information with third parties unless it is a company whose brand is associated with trust and integrity. Accordingly, a Bain & Company survey states that firms such as Amazon and Paypal “garner a level of trust with consumers almost as high as banks in general” (du Toit, Bradley, Swinton, Burns, & de Gooyer, 2018). Interviewee #5 stressed the importance of collaborating with esteemed companies and that they are continually looking for new opportunities to further develop their business—even with non-traditional financial firms.

*We provide a virtual financial adviser that suggests new deals for everyday consumer products and services based on historical data. Our algorithms work great, but we aren't growing fast enough due to credibility concerns. Hence, we depend on big brand names to convince customers that our suggestions are legit. Customers unfamiliar with our niche suppliers will probably not use our services, although we may save them a lot of money.* – Interviewee #5

## 5 Discussion

Firstly, the purpose of this section is to discuss our findings from the literature review and interview analysis, by which we have divided into two topics with reference to our research question: i) how providers of financial technology utilize intelligent automation, and ii) how incumbent and startups collaborate to improve their business models. Lastly, we have addressed the limitations of our study and suggested future work.

### 5.1 Interpretation of Findings

#### 5.1.1 Utilization

According to the interviews, all our participants were familiar with both RPA and AI, having worked on projects involving at least one of these technologies in the past. However, only 50 percent of our selection had heard about IA, whereby these three had ongoing projects involving it in their respective companies. Nonetheless, everyone expressed a positive attitude towards the application of IA and its potential in the future—including the ones that were unfamiliar with the concept beforehand. As the topic is trending on Google (see Figure 2.4), this lack of awareness amongst our interviewees surprised us.

Our selection's knowledge of the technologies that constitute intelligent automation, combined with the positive attitude towards the application of it, indicates that the concept may experience increased demand in the future Norwegian financial services industry. Notwithstanding, our research found obstacles concerning the 'intelligent' component of such automation technology: i) the commercial technology is not advanced enough and, ii) the data must be obtained and structured.

In order to take a company to the next step with intelligent automation, its capabilities need to progress. For instance, the participants with projects involving natural language processing use chatbots and virtual assistants that can only perform simple, standardized operations. As mentioned by Capgemini (2018) and interviewee #6, insufficiently advanced or unavailability of cutting-edge technology may contribute to the low number of use cases.

Also, in recent years, customers have become used to excellent user experiences from other industries, which influence their expectations to financial services. To provide the best customer experiences, companies often need vast amounts of data, which again depends on

having enough customers that generate it. Every interviewee emphasized the importance of access to such data, explaining that their objective is to maximize data revenues. However, sufficient amounts of data must be obtained and structured before providers of financial technology can utilize the full potential of artificial intelligence, e.g., machine learning. If FinTechs overcome that obstacle, the conditions for intelligent automation to prevail in the Norwegian financial services industry are one step closer to fulfillment.

Furthermore, our findings show that the incumbents consider RPA as merely a temporary solution to deal with technical debt and legacy systems because they lack the resources or time to fully integrate new projects in the same manner as the startups. Both interviewees representing incumbents agreed that entire IT systems are subject to modernization, but that the resources necessary to enhance them are being used to keep up with regulations and incremental change requests internally. This predicament seems to be typical for the incumbents, which is the price they have to pay for not upgrading their IT systems continuously (EVRY, n.d.-b). The necessity to deliver new customer-friendly products at a fast pace forces them to deploy RPA until new and improved solutions are in place. Especially interviewee #5's view on its function was in accordance with Heric (2018), who describes RPA as a tool "to fix and simplify processes, data, and systems".

According to Osmundsen et al. (2018), digital transformation is when digitalization or digital innovation is applied to enable substantial changes to how business is conducted, leading to a significant transformation of an organization or entire industries. To accomplish such successful digital transformations, our participants emphasized the importance of change management, arguing that technology only amounts to 20 percent of digital transformation, whereas change management makes up the rest. Unanimously rated as a critical success factor, it is therefore essential that the management engage and include the employees in their projects, and create a corporate culture that is willing to change. Furthermore, they have to consider long-term effects and maintain a holistic perspective and digitalize through the entire value chain. Our findings implicate that several areas of their business are affected when initiating digital projects and that change management may be equally challenging as the technology itself (KPMG Norway, 2018a).

An important aspect when utilizing technology is how it affects the business model. From our analysis, we found that robotic process automation and artificial intelligence, both separately and combined, affect both revenues and costs in FinTech firm's business models. As an example, RPA reduces labor costs and increase efficiency. Moreover, artificial intelligence has the potential to provide new solutions and impact profitability logic. Reallocation of labor from tedious tasks spurs innovation and may have a stimulating effect for the employees by letting them perform high-value tasks and improve the value

delivery, e.g., more time for tasks that demand human intelligence and interaction. Hence, our findings indicate that providers of financial technology capitalize on RPA and AI—and the combination of these—in terms of both new revenue streams and reduced costs, affecting all parts of their business model; value creation, value delivery, and value capture.

Besides, utilizing technology affects customer trust—an intangible asset that incumbents seek to leverage and that startups wish to obtain. As the presumption seems to be that trust is something created through human communication, interviewee #2 referred to research stating that this may not always be the case. On the contrary, people in financial distress often prefer initial interaction with a machine that is neither biased nor prejudiced. Because of that, we consider this finding to pose as a unique business opportunity for artificial intelligence in personal financial management.

As pointed out by the participant representing a third-party provider, trust is a challenge for them, and the literature seems divided in the opinion of customer trust towards such parties. As an example, Bain & Company performed a survey covering 150,000 consumers from 29 countries and found that 59 percent of the respondents trust at least one tech company more than banks in general (du Toit et al., 2018). Conversely, a Norwegian survey performed on behalf of Finance Norway found that the majority of consumers have more belief in their banks to deliver a common platform for aggregated financial information and payment initiation, compared to GAFAs combined. Also, almost 30 percent of the respondents were willing to share information with their bank in return for better customer experiences (Finans Norge, 2018). It appears from the report that the banks seem to be leveraging customer trust by creating third-party provider services that delay the foreign invasion from the global technology companies, stating that Vipps is second on the list of entities most likely to provide a common platform for aggregating financial information and payment initiation.

### 5.1.2 Collaboration

As the competitive landscape for financial services is changing as a result of PSD2, we also sought to analyze how and to what extent incumbent banks and new FinTech startups share knowledge or technology to improve their business models and customer experiences, of which several findings emerged. Firstly, the incumbents are subject to strict regulations and consequently obligated to report to the Financial Supervisory Authority to a greater extent than startups. Furthermore, market entrants unaffected by PSD2 believe that the directive creates a cultural change in the industry because it imposes incumbents to rethink their role in the financial ecosystem.

One of the main objectives of PSD2 compared to PSD is to lower the barriers for new market entrants by imposing the banks to share financial information and access with third-party providers. The banks recognize the development in the financial industry and seek to become partners with potential competitors instead of competing against everyone. According to our findings, PSD2 facilitates collaboration that goes beyond the scope of the directive as the banks possess valuable expertise and make great partners for specialized startups which are born ‘digital native’ and subject to less regulation.

The interviewees from the incumbent banks agreed that leveraging established customer trust poses as an opportunity for the providers of traditional financial services and that people generally trust the Norwegian banks, which historically have been subject to extensive regulations to secure the stability and efficiency of the well-functioning financial system in Norway (Norges Bank, 2018). Nonetheless, the incumbents, whose agility is restricted because of their size and technical debt, rely on partnerships to leverage their competitive advantage as the comprehensive regulations both limit and slow them down.

The projects suitable for collaborations depend on the relationship between the potential parties. If the companies are in direct competition, sharing technology is less likely as it may result in the other party copying and utilizing it to their advantage. Therefore, incumbents often resort to acquisitions and investments as alternative ways of obtaining new technology. To illustrate, one of the incumbents had recently invested in a company to utilize their technology in its financial services. Such strategies are typical from big companies and frequent in the technology industry, exemplified by Facebook’s USD 1 billion acquisition of Instagram, and Google’s USD 1.65 billion acquisition of YouTube (Rusli, 2012; Sawers, 2016). The Norwegian incumbent banks seem to behave similarly, as DNB, in 2017, granted NOK 250 million to a project named ‘DNB Venture’ in which the purpose was to invest in startups to deliver the best customer experiences and increase the pace of the innovative force in the company. As a spin-off, FinStart Nordic also represents another type of strategy (Weldeghebriel, 2017a, 2017b).

A partnership is another type of collaboration that all of our interviewees’ were involved with, of which one of the characteristics is that they share knowledge instead of technology, e.g., data and know-how. Hence, trust becomes an essential prerequisite for this type of partnership. However, although all parties may benefit from collaborating, e.g., by sharing data to improve mutual machine learning algorithms to prevent fraud or as an anti-money laundering measure, trust alone is not enough to enter such partnerships.

One of the findings suggests that incumbents are more concerned with the formalities when entering a collaboration while the startups are satisfied with a handshake. According to

Larkin and O'Halloran (2018), more than half of the attempts to collaborate in Europe fail due to a clash of mindsets between passionate, entrepreneurial startups, and more process oriented and risk-averse corporations. As the statistics estimate half of the collaborations to fail, it seems rational that big, risk-averse corporations focus on reducing such risk. Also, cooperation and experimentation come more naturally for passionate and entrepreneurial startups; thus, they prioritize such activities over formalities.

We also found differences in shareholders' mindsets when it comes to facilitating collaborations that may yield synergies between various companies. With Spotify's USD 27 billion IPO and iZettle's acquisition for USD 2.2 billion, Sweden is arguably Europe's top entrepreneurial hub. Already in 2015, Wharton School of Business described Sweden as a "unicorn factory" (O'Brien, 2018). As the FinTech environment in the Nordics is similar in many ways, and cooperation is an essential part of digital transformation, Norwegian FinTechs could benefit from observing the Swede's way of operating (Jonsdottir, Toivonen, Jaatinen, Utti, & Lindqvist, 2017).

Extensive cooperation in the Norwegian financial industry seems to fit well with the findings from our literature review. As PSD2 opens the financial systems for new market entrants, the Norwegian incumbents counteract by allying with new FinTechs to stay relevant, in line with Bill Gates' infamous quote from 1994: "Banking is necessary, banks are not" (Angelshaug & Saebi, 2017). The new alliances can be considered a positive side effect of PSD2 as its main objective is to facilitate innovation and improve financial services. From the banks' point of view, it seems like they are using what EVRY (n.d.-b) describes as the 'first-mover advantage' before PSD2 goes into full effect in September 2019—deploying their new services and winning market shares in the meantime.

## 5.2 Limitations and Future Work

Saunders et al. (2016, p. 400) argue that data from a small non-probability sample cannot be used to make statistical generalizations about an entire population. Accordingly, having conducted just six semi-structured interviews, this limits our study's generalizability. Furthermore, intelligent automation was surprisingly little widespread in the Norwegian financial services industry, although Blue Prism, UiPath, and Automation Anywhere already offer solutions with intelligent modules. Even though all the participants in our study were familiar with RPA, AI, and the vendors of automation technology mentioned above, IA's current capabilities were unknown to most of their knowledge.

According to Marr (2018b), 90 percent of the data in the world was generated between 2016 and 2018, and from 2020, this pace is likely to accelerate additionally as Telenor and others plan to launch the next generation’s mobile internet—5G. Combined with artificial intelligence and the Internet of Things (IoT), Brekke (2019) argues that this combination (i.e., 5G, AI, and IoT) represents the “perfect technological storm”. Hence, for future work, we suggest analyzing the following equation:

$$(RPA + AI) \times IoT = IA^n \tag{5.1}$$



## 6 Conclusion

By performing a literature review and conducting interviews with business leaders on robotic process automation and artificial intelligence in the Norwegian financial services industry, the objective of this master thesis has been to analyze how providers of financial technology utilize intelligent automation in light of PSD2.

Our findings indicate that we cannot categorize intelligent automation as a generally known concept. However, all participants acknowledged its potential and possible use cases in the financial services industry. Although the level of utilization was surprisingly low amongst our interviewees' companies, the literature review revealed an even less extensive use. Furthermore, our findings suggest that utilizing intelligent automation could impact all the components of FinTech firms' business model; value creation, value delivery, and value capture. To illustrate, automatic re-invoicing of customers improve the value proposition by increasing straight-through processing. Furthermore, in addition to affecting the value delivery by providing new ways of interacting with customers, virtual assistants also impact the profitability logic by reducing costs and offering new revenue streams.

The assumption that digital native companies are familiar with automation was proven correct as all the new startups focused on automating business processes to scale and further develop their financial services. Being agile and with less technical debt, startups do not have the same need to standardize and automate rule-based tasks as the incumbent banks. Hence, instead of utilizing robotic process automation, our study confirmed that they favor more advanced solutions. Furthermore, both incumbents and startups seemed to be equally experimental with digital technologies, although with different purposes.

Accordingly, there was a high degree of consensus amongst our interviewees regarding RPA being a temporary fix, not a long-term solution to deal with end-to-end processes. Per our literature review, the technology simply poses as a "patching tool" that eventually will be replaced by APIs or web services and enhanced by AI to automate fully, including judgment-based tasks (Capgemini, 2018, p. 9). For instance, AI-enabled automation solutions can automate processes that deal with unstructured data, such as identifying invoice information. In addition to machine learning, other AI-based technologies holding significant innovation potential for providers of financial technology include natural language processing and computer vision. Nonetheless, our findings suggest that the current utilization of intelligent automation is restricted by artificial intelligence's capabilities and the necessity of access to sufficient amounts of data.

As the financial services industry experiences considerable upheaval based on digitalization and PSD2, providers of financial technology focus on utilizing digital technologies, whose purposes are to increase efficiency and competitiveness, and exploit new business opportunities (Sannes & Andersen, 2017, p. 43). Furthermore, to achieve successful digital transformations, our interviewees emphasized the importance of change management, describing it as a critical success factor. Unanimously, they agreed that digital transformation is more about change management than technology, of which vital aspects include the corporate culture and a long-term, holistic perspective.

Moreover, Norwegian incumbent banks are considered to be trustworthy by their customers. As our results indicate that trust is an intangible asset paramount towards both customers and potential business partners, they are well aware that this constitutes a competitive advantage over third-party providers. Nevertheless, emerging technologies and new regulations force incumbents to rethink the way they create, deliver, and capture value from business opportunities as the industry convergence between finance and technology threaten their current business model.

As PSD2 catalyzes collaboration, incumbents enter different types of partnerships with FinTech startups, in which knowledge and technologies are shared to improve their business models and customer experiences. Furthermore, incumbents and startups possess complementary capabilities the other party can exploit to increase their competitiveness, such as customer trust, business prowess, and technology. Our study revealed that all parties—even direct competitors—can benefit from collaborating, e.g., by sharing data to train mutual machine learning algorithms as an anti-money laundering measure.

Although robotic process automation, in its simplest form, is meant for deterministic processes and often deployed as a quick fix solution, it can yield extraordinary results. Exemplified by one of our interviewees, his simple RPA project provided a return on investment equal to 39,000 percent while their IT department spent years on developing a new solution. Hence, with artificial intelligence being a prime example of Amara's law, RPA's potential use cases could increase manifold if appropriately combined. Conclusively, intelligent automation could arguably disrupt the financial services industry in ways not thought of yet.

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# Appendices

## A1 Information Letter

### **Regarding our research project ‘Intelligent Automation in FinTechs’**

This is an invitation to participate in a research project whose purpose is to investigate Intelligent Automation’s implications for providers of financial technology. In this letter, we provide information regarding the project’s goals and what participation entails.

### **Purpose**

This research project concludes our education at the Norwegian School of Economics (NHH), where we immerse ourselves in Business Analytics. For this reason, we want to analyze a topic we have followed for a while because of its potential, in addition to our interest in digitization and previous employment in Sbanken. As a part of this thesis, we want to interview key people in Intelligent Automation projects (including projects on Robotic Process Automation and artificial intelligence) to analyze the implications this concept has for providers of financial technology.

As a consequence of our supervisor being an English speaker, the thesis will be written in English. However, we still want to conduct the interviews in Norwegian because we believe that this can contribute to a freer dialogue and fewer misunderstandings. Thus, our research question is:

*What are the implications of Intelligent Automation for providers of financial technology?*

### **What does participation entail?**

The interview will be unstructured, in the sense that we want to ask open questions. It is meant to last less than an hour, where we will ask questions regarding your thoughts, ideas, and experiences in terms of digitization, Intelligent Automation, and what implications it has for your company and the industry at large.

**Why are you getting this invitation?**

Our selection is based on an overview of the Norwegian FinTech scene, published by TheFactory.<sup>25</sup> The illustration divides the companies into eight segments, in which we aspire to interview at least one representative from each of these.

**Participation is voluntary**

Participation in this project is voluntary, and you may withdraw your consent at any time without giving any reason. If you are not interested in participating or choose to cancel at a later date, this will have no negative consequences for you.

**How we use the information**

We want to record the conversation to ensure that we capture all relevant information correctly. The interview will then be transcribed for further analysis and possibly translated into English. The equipment (PC and mobile phone) to be used in this regard belongs to NHH and will not be available to anyone other than the undersigned.

**What happens to the information when we complete the research project?**

The project is scheduled to end on June 1, 2019, by which sound recording and associated transcription subsequently will be deleted securely. This will be followed up by NSD – Norwegian Centre for Research Data AS.

**Your rights**

As long as you can be identified in the data material, you are entitled to:

- access your personal data,
- correct your personal data,
- have your personal data deleted,
- receive a copy of your personal data (data portability), and
- send a complaint to the Data Protection Officer or the Norwegian Data Protection Authority (Datatilsynet) about the processing of your personal data.

**What gives us the right to process your personal data?**

We process your data based on your consent.

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<sup>25</sup>We discovered this visualization on Christoffer Hernæs' blog, and TheFactory has confirmed that it contains Norwegian FinTech startups except for Vipps, Sbanken, and a few others. Furthermore, Nets and EVRY are excluded.

NHH



## A2 Interview Guide

### Introduction

The purpose is to introduce the interviewee and his/her company and let them describe their perception of the industry. We want to ask open and general questions to enhance our knowledge about Intelligent Automation and the given industry.

- Which drivers have you observed in your industry the last couple of years?
- How and to what extent do you cooperate with competitors?
- How would you define RPA, AI, IA, and FinTech?

### Digitalization

The purpose is to get a better understanding of which factors the interviewee considers essential in order to digitalize the company, and how Intelligent Automation can contribute.

- Do you have any ongoing projects involving RPA, AI, and IA?
- How does technology impact your business?
- How to achieve successful digital transformations?

### The future

The purpose is to investigate which direction the industry is heading, and how Intelligent Automation can contribute in this regard.

- What is these technologies' potential (separately and combined)?
- How will trust be affected by emerging technologies?

### Final questions

The purpose is to give the interviewee the opportunity to contribute with thoughts and reflections that we have not treated in the interview guide, nor the interview.

- Is there anything you would like to add?

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## A3 Declaration of Consent

Declaration of consent for a master thesis interview about ‘Intelligent Automation in FinTechs – an exploratory study of its implications for providers of financial technology.’

**Researchers:** Stian Abusdal and Jan Ricardo Irgens Gjermundnes

**Supervisor:** Ivan Belik

**Consent:** I confirm having read the ‘Information Letter’ from Stian Abusdal and Jan Ricardo Irgens Gjermundnes, and with this give my consent to data collection in connection with their master thesis at the Norwegian School of Economics. The data collection involves:

- audio recording of the interview,
- transcription of the interview,
- that the researchers have access to this information after the transcription, and
- citation in an anonymous form (position/title).

The interview will be conducted by Stian Abusdal and Jan Ricardo Irgens Gjermundnes.

I hereby confirm my voluntary participation in the study and that I am informed about the option to withdraw during the interview if experiencing discomfort or for any other reasons do not wish to continue.

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Place and date

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Signature interviewee