

Federated e-IDs

as a value driver in the banking sector based on
experience from Nordic markets



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EXECUTIVE SUMMARY

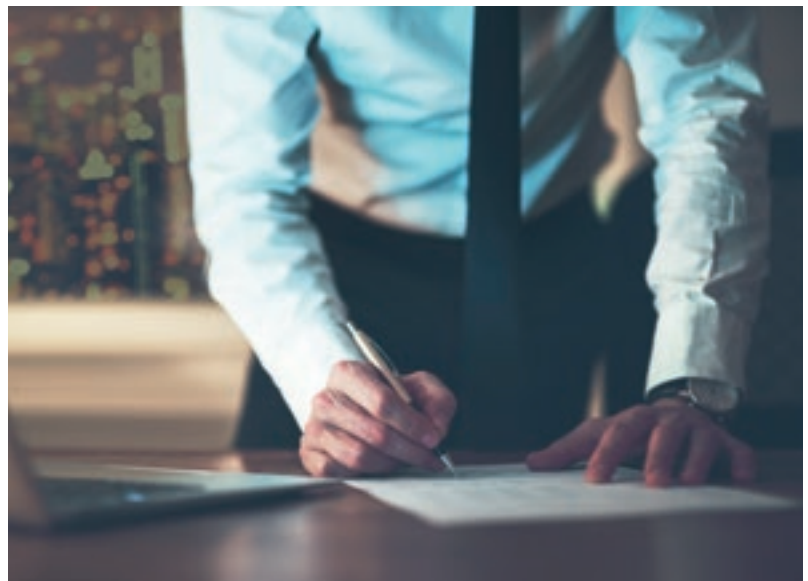
PROVING YOUR IDENTITY IN AN ONLINE WORLD

Modern life increasingly takes place online, with a dizzying array of services and platforms. However, unlike in the real world, there is no outward face that reveals the true nature of these digital inhabitants. How do we prove that we are who we say we are?

The Nordic countries have solved this by successfully establishing electronic Identity (e-ID) schemes, giving their citizens an online identity which is recognized both by casual users, and by the most secure authorities in the nation. Over time many solutions have evolved, but in all four countries a solution jointly initiated by a group of banks has taken the dominant position. This is because banks in collaboration have a huge advantage over governmental and third-party solutions. They are the only players who have already authenticated the majority of their country's citizens and transferred them to an online solution – online banking. However, collaboration amongst banks alone is not enough to guarantee success.

“ It is significantly easier to win a client who uses BankID rather than other forms of ID. From our experience, 8 out of 10 consumer loan applicants complete their applications when using BankID, as opposed to 5 out of 10 normally. For car loans, the ratio is even more striking: 7 out of 10 for BankID users, compared to only 2 out of 10 for non BankID users. ”

Manager Santander Consumer Bank



E-IDS FACILITATE BUSINESS

In order to form sufficient practical use cases for the solution, incentivising the transfer of a whole society to it, further cooperation with the respective governmental institutions and service providers is necessary.

Despite initial hesitance and doubts around bringing such an all-encompassing solution to the market, banks in the Nordics now see their e-ID schemes as an enabler for their businesses and as a product from which many other services can profit. With the help of strong partners, they came to the understanding that a collaborative solution gives each of them a chance to improve existing business. For example, modern mortgage applica-

tions are 100 percent paperless, with no postal and near-instant processing time. In Norway alone, this results in savings of up to 10 million euros annually. Furthermore, federated e-IDs serve as a platform to

launch new, better services to customers - this new business model is nowadays also used beyond the financial sector. Select e-ID business customers report that they are happy to pay for the service, as its benefits outweigh the costs. Just to name one example, a rental service provider, states that with e-ID 90 percent of his customers sign online – decreasing costs, boosting sales and overall generating stronger margins.

“ If all paper signatures in banking are replaced by electronic, gains are at least 150 million euros per year. ”

Nets Norway

WELCOMING NEW OPPORTUNITIES

The trust gained through this venture has enabled the collaborating banks to develop new solutions and products together, which can be implemented much faster in the market. Swish, which originated as a Swedish mobile peer-to-peer payment solution, launched in 2012 and is now the number two payment solution of choice at point of sale.

It took Sweden, as the first country to initiate federated e-ID developed by banks, roughly 13 years from launching the first e-ID to having all major banks on board and providing an essential part of daily life for millions of Swedes. Denmark, which started about 10 years later needed only half this time to write its own success story, having learned from the other Nordics. By examining the Nordic countries and learning from their stories, banks will be able to digitalise and improve their business faster than ever before.

PREFACE

MAJOR BANKS IN COLLABORATION

The Nordic countries are stand-out examples to learn from when talking about digitalisation of the banking sector and the economy as a whole. Each country has their own unique story of the evolution of e-IDs - but they all have one thing in common, which is that each country's leading solution was initiated by a strong collaboration between major banks.

After initial hesitance and reluctance to a federated e-ID, nowadays all major banks issue and support e-ID schemes. They have understood that this enables them to digitalise their business – offering 24/7 service, cutting costs and increasing sales. Furthermore, they have seen the benefits in offering federated e-IDs as a service to third parties and designing new products leveraging on these solutions, thereby digitalising the whole economy.

DIGITALIZATION OF ECONOMIES

In telling the Nordic story, we like to encourage banks to set aside their initial fears, and to understand the advantages offered by a federated e-ID for their business and the digitalisation of their country. Banks who jointly deliver these solutions will set the standards of the future in terms of security and accessibility - and who doesn't want to be a leader rather than a follower?

This paper examines the success factors for a federated e-ID scheme by looking at the Nordic countries' success stories. Furthermore, it highlights the positive impact of e-IDs on the incumbent banks and how they have changed the Nordic banking sectors as well as digitalised whole economies. For readers wanting to learn about the evolution of e-ID schemes in the Nordics in greater detail, the four countries' stories are told in the appendix of this paper. Additionally, the appendix features an in-depth case study on the major Norwegian bank DNB's journey in incorporating an e-ID.



BANKID

- 78% penetration
- On card and file; mobile version App based, independent of bank/SIM card used



TUPAS ID

- 87% penetration
- Each bank has own solution, with shared common interface



BANKID

- 74% penetration
- Bank specific code devices; mobile version bank independent, requires right SIM card



NEM ID

- 85% penetration
- Initially pass-words on paper, code app launched May 2018

INTRODUCTION

NATIONAL ROLE IN E-ID ADOPTION

WHAT IS AN E-ID?

An e-ID system is the digital counterpart to a physical identification method in the offline world such as a passport, ID-card or driver's license. It provides the credentials necessary to trust that a person is who he/she claims to be online.

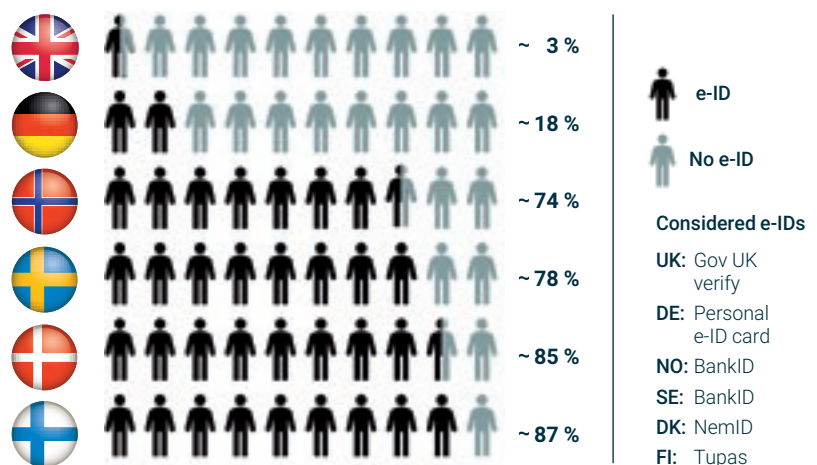
In the physical world we authenticate ourselves with ID-cards, passports or a driver's license; but as business increasingly takes place online, and services are moved to the virtual world, how do we prove we are who we claim to be?

Governments, financial institutions, telecommunications providers and other parties have all attempted to develop digital identity solutions – however, the difficulty of gaining wide spread attention and acceptance in a two-sided market often causes these efforts to fail. In Germany, only 18 percent of the population has activated the e-ID function on their national identity card. The UK has fared even worse, reaching a meagre 3 percent of the population in 2 years, while only offering use cases in the public sector. Despite the setbacks some nations have seen, a few countries have been successful in implementing e-ID systems. Sweden, Norway, Finland and Denmark have overcome the hurdles of creating nationwide e-ID solutions, providing over 70 percent of their population with a digital identity. The authorities did not do it alone – the major banks, in collaboration with wider industry, were the deciding factor in effective roll-out.

This paper examines the key factors that led the Nordics to success, which may serve as a model for other aspiring digital nations. It particularly highlights why banks are the natural providers of e-ID solutions - sharing insights into how the solutions, once well-established, improve margins on existing business and drive future growth.

E-ID DISTRIBUTION

In percentage of population



The information provided in this paper was gathered by conducting interviews with key personnel from Nordic banks such as Ivar A. Johnsen, former manager DNB ASA and Niclas Westén, Senior Product Manager BankID in Nordea Bank AB, as well as from official data sources such as Finansiel ID-Teknik ID AB.

SUCCESS FACTORS FOR A FEDERATED E-ID

MARKET-MAKING PLATFORM

Unified country level e-IDs function foremost as a platform. There must be registered users, with services that they want to use, before a e-ID actually works in practice. In Norway, the first decisive service that generated users was online banking. After that was well established, it was easy to start creating other online services based on the same e-ID, since users were there and used to the authentication mechanism.

As can be seen in Germany and the UK, e-IDs are difficult to implement even when designed by motivated, highly competent players. To safeguard the success of a digital identity venture, it is crucial to examine the often decadeslong histories that underpin eventual victories. The key learnings provided by the Nordic e-ID solutions should serve as a blueprint when navigating the complicated road to nationwide digital identification – with six main factors singled out as the most important.

“ Security is nothing we compete on – we don’t gain anything by saying, doing business with Handelsbanken is more secure than with SEB. ”

Manager Handelsbanken

THE NORDICS’ E-IDS



BANKID

- First issued in 2003
- 8 million users
- 2.5 billion transactions
- Mobile version since 2010



BANKID

- First issued in 2004
- 3.9 million users
- 600 million transactions
- Mobile version since 2009



TUPAS

- First issued in 2003
- 4.7 million users
- Transactions n/a
- Mobile version since n/a



NEMID

- First issued in 2010
- 4.8 million users
- 704 million transactions
- Mobile version since 2018

PRE-AUTHENTICATED USER BASE

Collaboration – The collaboration of different players, particularly large banks, is essential for the success of an e-ID system. Banks have the initial infrastructure and customer base, and they are the only players who have already authenticated the majority of a country’s citizens and transferred them to an online solution – online banking. Although authorities can’t do it alone, they profit from being a facilitator for federated e-IDs, using the e-ID platform to digitalize their services

“

Nordea lost some customers and contracts when joining BankID, as these consumers already had BankID with other banks. That said, if we hadn't joined at that time, we would probably have lost more customers as Nordea couldn't provide a mobile solution.

”

Manager Nordea

and provide use cases for e-IDs. The best solution is developed by strong, trusted partners who understand the merchants' needs, combined with the blessing and support of the government.

DEVELOPMENT OF USE CASES

Volume – A crucial key to succeeding with an e-ID is to gain sufficient critical mass in a two-sided market. Citizens will only see the benefits if there are enough use cases, and the same holds true for companies in need of strong authentication and e-signature services. Any provider who is already active in two-sided markets, such as a large bank, has a competitive advantage; they can offer a new service that all their customers, consumer and corporate, benefit from.

E-ID AS CONNECTOR IN A 2-SIDED MARKET



ONLINE REGISTRATION

Easy access – Registering for the e-ID must be simple, and preferably online – otherwise consumers won't bother. The stories of the Nordic countries demonstrate that providers such as governments and telecommunications companies struggled to find customers because they required undergoing a face to face registration. Banks did better, as all their customers already had log-in credentials.

Trust – A vital component to a federated e-ID is widespread confidence in its security, stability and strong representation of a person's identity. The creators of the solution must

“ It was a long trip because it was not only about changing the solution, but routines would change and that would affect the employees, that had been doing the same work forever. ”

Manager Handelsbanken

”

BankID at that time had developed Mobile BankID, one important driver to join BankID – as a mobile version was required by customers and developing an own solution would have been very costly.

“

Manager Nordea

BANKS AS TRUSTED PARTNERS

trust one another, as must the owners of e-IDs, the media and the government. Recent studies have shown that consumers prefer banks over government, retail or social media platforms as providers of their e-IDs. This is because they already use their bank credentials on a weekly basis to pay bills or check their balance. Linking credentials to the bank's identity data base (where personal identifiers are based on a thorough KYC process) makes bank issued e-IDs equivalent to or stronger than a face-to-face ID check with a passport or physical ID card. It is stronger because it isn't based on ID verification alone, but also on the ongoing business record between bank and customer.

Commitment – Developing and rolling out technology is a long-term investment. Focus and a future oriented outlook are needed, and only those who are really eager to succeed will do so.

NEED OF LATEST TECHNOLOGY

State of the art technology – If the solution can be accessed at any time and from any place, people will use it more. In Sweden it was the release of Mobile BankID that drove transaction rates to several billion a year, while the usage for BankID on card and file remained stable. In 2017, Mobile BankID was used for 95 percent of the 2.5 billion transactions in Sweden. Also the number of newly issued BankIDs on file and card has been declining ever since the introduction of Mobile BankID, whereas the user base of Mobile BankID grows every week. Nowadays 94 percent of BankID users have a Mobile BankID.



E-IDS AS A VALUE DRIVER FOR INCUMBENT BANKS

INCREASING MARGINS, ATTRACTING NEW BUSINESS

The Nordics have shown that the advantages of e-IDs aren't just restricted to the customers. Major banks that have instituted e-IDs like DNB and Nordea have seen improvements on existing processes, making them more efficient and less cost-intensive. Not only does this increase margins for the banks, but it can also be a factor in attracting and retaining customers.

Active in a digital world – E-ID active banks in the Nordic region jointly attract the brightest minds in security, leading to a more secure infrastructure, while simultaneously sharing R&D costs amongst several collaborating players. In a nutshell, e-IDs are the main driver of digitalization in banks, strengthening technological competence in various operational sectors.

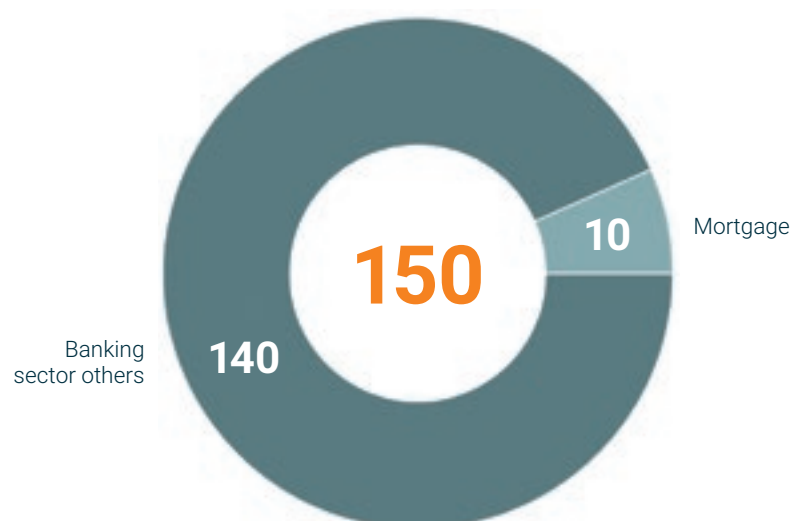
“ We have not seen any shift that customers move away easier due to BankID. As we don't compete on security our focus is to offer better service and products. ”

Product Manager Nordea

Better user experience – Previously, new customers needed face-to-face contact with banks when buying products. Now, as many services have shifted to the online world, customers can authenticate and sign contracts within minutes at their own convenience.

SAVING WITH E-SIGNATURE

In million Euros, banking sector Norway



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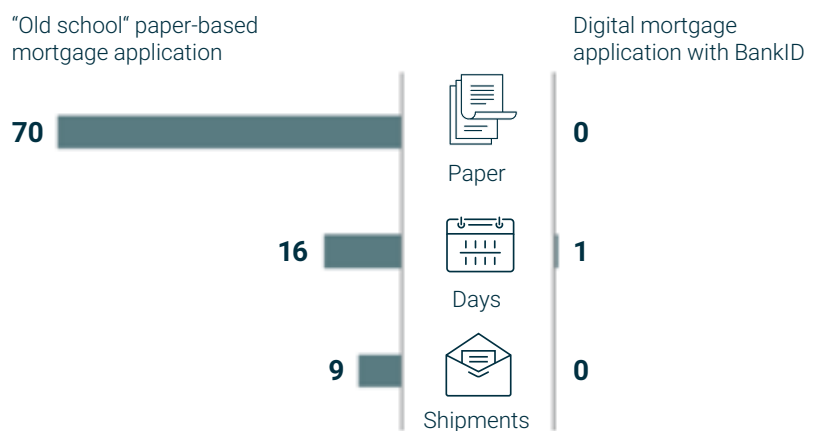
Prior to BankID, those who ordered our credit cards had to receive a form by post, sign and post it to us. 65 % never sent the form back to us. With BankID, the customer is identified and signs online and agreement is completed for all who are qualified.

”

Business Manager DNB

HOW MUCH MORE EFFICIENT CAN IT BE?

Numbers from Norway



SAVINGS IN RESOURCES AND COSTS

Reduction of costs by process efficiency – E-IDs have enabled banks to automate and digitalize their processes through online authentication and e-signature. A financial service provider has reported that they were able to sign 70 percent of contracts digitally within 1.5 years of introducing e-signature, a major achievement enabled by e-IDs. Finance Norway reports that "back in the old days" a paper-based mortgage application took on average 16 days, 70 sheets of paper and 9 mail shipments. With BankID this process is reduced to one day, no paper and no mail shipments. Estimations by Nets Norway reveal that one paper-based application in the banking sector costs roughly 180 euros in processing and shipping costs - if all signatures in Norwegian banking were electronic, the gains are estimated at 150 million euros annually, with 10 million euros in savings for the Norwegian mortgage market alone.

Reduced need for resources by offering instant service 24/7 – Through the e-ID solutions, banks are able to offer many services "24/7" online, where customers can buy and sign for new products instantly at any time and from any location. In contrast, products and services from banks in other countries can also be bought online; but authentication cannot take place instantly, as even video authentication has opening hours or needs further processing to confirm the identity. Especially young customers do not want to use bank services in a physical branch, but rather expect to access the services instantly online, without comprising on security. Some banks state that only 5-10 percent of customer services are still handled in person, since e-IDs guarantee customer identity online. This enables less administrative work, as well as opening the door for automated or AI driven help

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The next generation of NemID solution (MitID) is expected to save companies up to 25-50 million Euros annually.

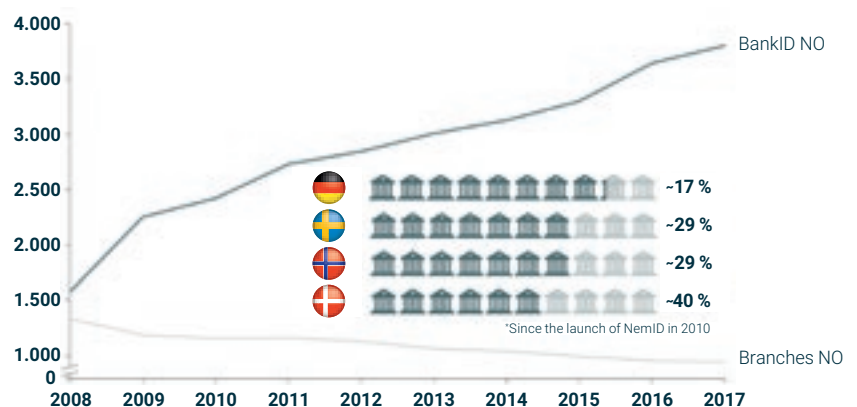
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Danish authorities

lines. Furthermore, banks need less branches to serve their customer base. In Norway and Sweden the number of bank branches has been reduced by 29 percent since 2008. This coincides with the rise of BankID, where banks discovered how to reduce service channel costs. In Germany, the number of branches has been reduced by only 17 percent in the same period. Since the introduction of NemID Denmark has even reduced the number of branches by 40 percent.

REDUCTION IN BANK BRANCHES SINCE 2008 VS. GROWTH OF BANKID NORWAY USER BASIS

BankID in thousands



E-ID AS A SALES BOOSTER

Increase sales – DNB reports that prior to BankID, customers requesting a credit card needed to receive a form via post, sign it and send it back. Only 35 percent ever sent the form back. But with BankID, the customer can identify and sign the contract on the spot and it is immediately transferred to the bank. The dropout rate is much lower and therefore, sales increase. In life insurance, DNB made a wholly-electronic purchase and payment process which increased sales and funds. Later, purchasing of consumer credit was fully automated, boosting sales. Furthermore, banks agree that cross sales have increased due to e-IDs, as it is easier to sell further products to one customer thereby improving their customer product ratios.

E-IDS AS ENABLER FOR NEW BUSINESS OPPORTUNITIES

E-IDs are a service, but also function as a product offering in and of themselves. They spread trust between banks, encouraging them to develop digital products together and separately. Although e-ID usage charges a fee to the merchant, they are happy to pay as it enables them to slowly get rid of their own log-in solutions.

OPENING NEW DOORS TO DIGITAL COMMERCE

With the help of digital identity service providers, many banks have understood that they can use e-ID as an extended product offering to their corporate clients in need of log-ins or strong authentication solutions for their own business. Difi, the Norwegian Agency for Public Management and eGovernment, states that BankID saves companies 5 euros per signature. Examples include:

- Deal.no, a Norwegian e-commerce platform, found that BankID made trading easier, as well as preventing even a single fraud attempt through the BankID platform.
- UniPluss Rental Systems says that BankID can be credited with 90 percent of rental contracts being signed electronically, which enabled them to reduce acceptance deadlines and to receive higher rental value. Furthermore, administrative costs are reduced, and postal costs are eliminated.

CUSTOMERS SIGN...



“ Only 10 % of our customers still use normal password and username, 90 % of the customer identifies themselves with BankID. ”

Customer BankID

E-ID FACILITATES NEW PRODUCTS

Furthermore, DNB Bank ASA, Danske Bank A/S, Nordea Bank AB, Handelsbanken AB and Skandinaviska Enskilda Banken AB have announced the formation of a joint venture, Nordic KYC Utility. It intends to provide an efficient, common, secure and cost-efficient KYC, know-your-customer, infrastructure initially servicing large and midsize Nordic corporations.

MOBILE PAYMENT SOLUTIONS



LAUNCHED END OF 2012

- 6.5 million users (~ 64 % of citizens)
- Over 1 million transactions daily



LAUNCHED MID OF 2013

- 3.9 million users (~ 73 % of citizens)
- 790,000 transactions daily



LAUNCHED MID OF 2015

- 3.0 million users (~ 53 % of citizens)
- 500,000 transactions daily

Having successfully collaborated to form e-IDs systems, trust amongst the banks has been established, which enables them to collaborate further on joint products together. Examples of this is Swish in Sweden, a mobile peer-to-peer payment solution, which is now the number two payment method of choice for Swedes. It can be used as a payment method substituting cash or card in almost all stores, offline and online. A similar solution emerged in Denmark called MobilePay, and Vipps in Norway. All solutions are supported by several banks together and are highly successful in their respective countries.

“ Mortgages are our most important product. The process involves many documents and parts. With BankID we have got rid of all paper shipments also to the registration authorities. Gains are formidable when we do not have print, postage and manual handling of documents. ”

General Manager DNB

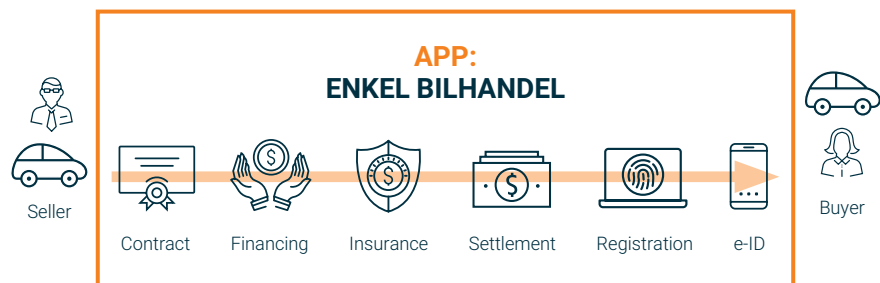
LEVERAGING DIGITAL SERVICES

While e-IDs have enabled banks to improve their existing business they have also encouraged them to design new digital products leveraging on the e-ID schemes. Examples include:

- The simplified mortgage applications by SpareBank 1, DNB, Skandiabanken and Nordea. Authenticating with BankID, citizens can consent to the Norwegian Tax Administration, Finans Norge and Brønnøysund Registers transmitting necessary data when applying for a mortgage loan at one of the collaborating banks. The solution saves customers the hassle of providing all the required documents, they get faster answers to their loan applications, and the data is of better quality.



- DNB's 2-minute home loan, where the customer submits personal data and loan data via the bank's website, and signs the application using BankID. The bank automatically retrieves information from a credit bureau and real estate agency. If the application is within the bank's requirements, it will automatically be approved. If there is a need for a further assessment, the case will be forwarded to manual processing by an adviser.



- “Enkel Bilhandel”, another product offered by DNB, is a solution which offers everything about used car purchase in one place. The purchase contract, financing, insurance, settlement of the car and re-registration all takes place through the app. Once all steps in the app are fulfilled, the entire process is complete - no need to register the car, print and sign papers or similar. Both the buyer and the seller identify themselves with BankID.

These new online products are only possible due to the respective e-ID solution. They have enabled each economy to become much more digital, increasing efficiency and reducing paper trails and manual processes.

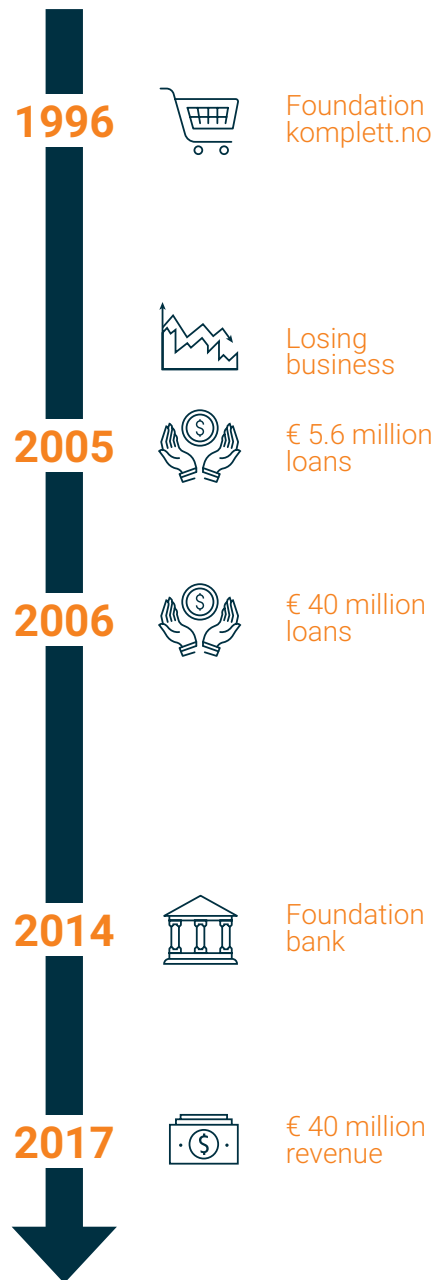
KOMPLETTBANK

Komplett Group, the largest Scandinavian online retailer, were losing significant business because customers did not have access to traditional on-line payment methods like credit cards. This meant they couldn't buy products at Komplett's webshop, instead going to competitors and their physical stores, where they could sign up for a consumer finance or leasing agreement and get the product.

Signicat, a digital identity service provider, suggested reusing national e-IDs for identity verification and binding signatures, adding this payment service to their check-out dashboard. The results exceeded expectations to such a degree that they immediately expanded to Sweden, and just recently founded a bank offering banking service under the KomplettBank brand. This means increased sales for Komplett, and revenue from the new business area 'Consumer Finance'.

Komplett's online consumer finance solution became the new customer journey that all financial institutions needed to have, and it spread to all other business lines such as funds, house and car loans and savings. It also created a push from banks towards regulators to change anti-money laundering (AML) regulation so financial institutions could use the e-IDs for customer onboarding. Back then, Komplett was not a finance institution so they were not stopped by old AML regulations demanding physical ID and signature with pen and ink. Instead they just "lent out their goods" without selling credit so they could use the banks BankID.

In 2005, Komplett started to provide loans. After 47 days, 5.6 million euros in loans were given to 610 clients. By September 2006, almost 40 million euros in loans had been extended to Norwegians and Swedes. The business of financing only keeps growing for Komplett - with the help of e-IDs they can offer a loan with an application time under 5 minutes, securing them a revenue of almost 40 million euros in 2017.



CONCLUSION

BANKS AS KEY COLLABORATORS

Looking at the success of the Nordic countries in setting up e-ID systems, one clear take away is that banks in collaboration have a huge advantage over governmental and third-party solutions. They are the only players who have already authenticated the majority of a country's citizens and transferred them to an online solution – online banking. Yet collaboration solely amongst banks is not enough to guarantee success. In order to form enough practical use cases for the solution and to transfer a whole society to it, further cooperation with the respective governmental institutions and service providers is necessary.

FUTURE IMPACT OUTSIDE FINANCE

Despite initial hesitance and doubts around bringing such an all-encompassing solution to the market, banks in the Nordics now see their e-ID schemes as an enabler for their businesses and as a product from which many other services can profit. With the help of strong partners, they came to the understanding that a collaborative solution gives each of them a chance to improve existing business, a platform to launch new better services to their customers, and a whole new business model in itself, which is nowadays also used beyond the financial sector. The trust gained in this venture has enabled them to make better solutions and products, which can be implemented much faster in the market. Nowadays, the respective e-IDs are part of the everyday lives of most Nordic citizens and have supported the movement of whole economies into the digital world.



A NORDIC SUCCESS STORY – THE EVOLUTION OF E-ID SOLUTIONS

SWEDEN

The Nordic countries of Sweden, Norway, Finland and Denmark share unique but similar stories. These stories all involve major banks taking the lead in creating e-ID services, ultimately achieving a sizeable enough user base to incentivize other actors to join. Each story demonstrates the complicated dynamics and key factors involved in setting up a successful federated e-ID.

SWEDEN

Everything starts in 2001, when EU law is changed to recognize an electronic signature as equal to a physical signature – the Swedish government quickly follows suit. Simultaneously, the digitalisation of the banking sector is accelerating, leading to 2.7 million e-banking customers and increased trust in high security e-banking systems.

At this time Swedish authorities started to discuss the possibility of 24/7 services for their citizens, such as submitting tax declarations or contacting the Social Insurance Agency online. The government realized that the key factor to provide online services was the existence of a secure, easy-to-use e-ID and e-signature system. Building this infrastructure in-house was considered too costly and time intensive – so the decision was made to outsource. They were looking for partners who could provide the necessary technology and knowledge: banks, some of which already had rudimentary e-ID systems, were a natural fit. In addition to their own solutions, banks adhered to the high security needs of the governmental authorities and had an incentive to generate more digital users. After initial talks were held with the Svenska Bankföreningen (Swedish Bankers' Association), a couple of banks agreed to form a con-

KEY EVENTS:

- 2001: Recognition of electronic signature equal to physical signature
- 2002: Establishment of Finansiell ID-Teknik ID AB
- 2003: Issuance of first BankID (as certificate)
- 2005: BankID available on card
- 2006: Over half a million users; 2 million uses in one month
- 2010: Launch of Mobile BankID
- 2011: Migration phase of Nordea to BankID starts
- 2015: Nordea as last large bank is fully migrated to BankID
- 2017: 7.5 million Swedes use BankID, 2.5 billion uses

sortium and to deliver "BankID" with an initial use case of submitting tax declarations online. In 2002, Finansiell ID-Teknik was established to continue the work started by the bank consortium. The first BankID, based on the Swedish personal identity number registered in the national population register, was issued in 2003. However, it was only available as a certificate issued by the respective collaborating banks. This accompanied the establishment of a business model with a small fee for log-in and a higher fee for e-signature services. In 2003, 27,000 Swedish citizens signed their tax declaration with a BankID. Curiously, despite providing this service to the government, banks kept holding on to their own authentication solutions and were reluctant to migrate to BankID, a solution they had developed themselves. This hesitance had its roots in a few key factors.

Costs – Initial investment costs upon implementing a new solution were high, especially when a well-functioning system was already in place. Additionally, each login or e-signature with BankID involved external costs – the business model BankID was based on a fee per use, where the merchant using the service pays and not the customer.

Dependency - Each bank had its own security department and substituting proprietary solutions with BankID meant losing independence and control over the solution.

SWEDEN

Inhabitants:	10.2 million (2018)
e-ID solution:	BankID
Users:	8 million (2018)
Mobile e-ID:	Yes



“ We do not compete on security, we compete on the services we offer. ”

Credo of collaborating BankID banks

Timing – None of the banks wanted to be the “test-case,” preferring to see how BankID played out with their competitors.

Prestige – Some banks feared a loss of prestige when collaborating with their peers.

COMMON FORMS OF E-IDS

Common forms of e-IDs Chip on card: The chip contains the personal data and can be read through a card reader.

File: A file containing the data stored on the computer.

Mobile: There are 2 forms of mobile versions. One where the data is stored on the SIM card and one where it is stored through an App.

Despite some reluctance from banks, BankID proved itself popular. In 2005 it became available on card, imbedded in the debit or credit cards issued by the Swedish banks. Furthermore, a growth in self-service offerings from governmental institutions and private companies for which an e-ID was required led to usage rates of 2 million cases in one month, with over 500,000 users by 2006. Next to BankID, two additional e-ID solutions were on the market. Nordea, a major bank with partial governmental ownership, issued its own e-ID system (although it would later join the BankID consortium). The third solution on the market was offered by Telia, a major telecommunications provider in Sweden. Together with the Tax agency, Telia offered a certificate stored on the Tax Agency ID, which could be used as an e-ID with its respective card reader. As opposed to BankID, no physical devices were needed.

Banks, knowing little about digitalisation and how third parties could benefit from BankID, didn't understand how to develop a business case. Particularly banks' Cash Management departments (which had the acquiring role in selling merchant access to use BankID) were not ready to sell e-ID services. Many banks pushed these sales to local branches and didn't have a central understanding of the real value of BankID and e-ID as a business enabler for digitalisation. A huge eye opener at that time was the lobbying undertaken by digital identity service providers, who approached banks to showcase the capabilities

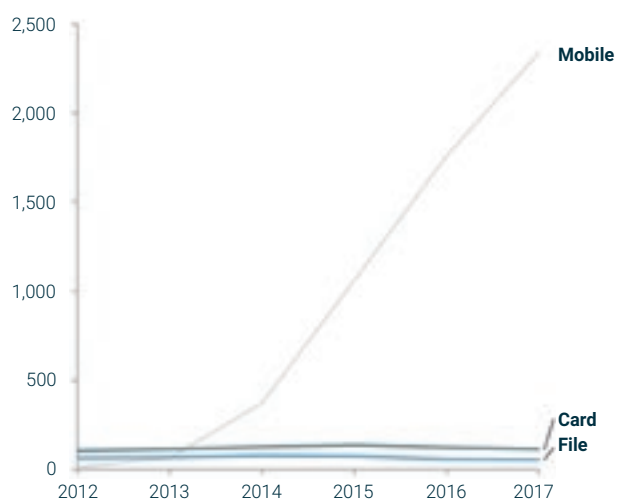
of BankID. Digital service providers such as Signicat were able to visualize how BankID could digitalize merchants' business. They were a crucial partner for banks to educate and establish merchants as BankID clients.

However, after BankID had been used by tax authorities and other services for a couple of years, the public started to have questions. Why would the banks not use a system they themselves had developed? As the benefits of adapting to the federated BankID became clear, the banks started to abandon their own solutions one by one. Much of what had previously been points of doubt, now became strengths.

Security – Although the banks were individualistic at first, they realised that one excellent and secure infrastructure is better than 5 semi-good infrastructures, where a single failure can risk the whole industry's reputation. Excellent security infrastructure was not seen as competitive edge but rather as a must-have for the whole industry.

USAGE OF BANKID

Number of transactions in millions



“

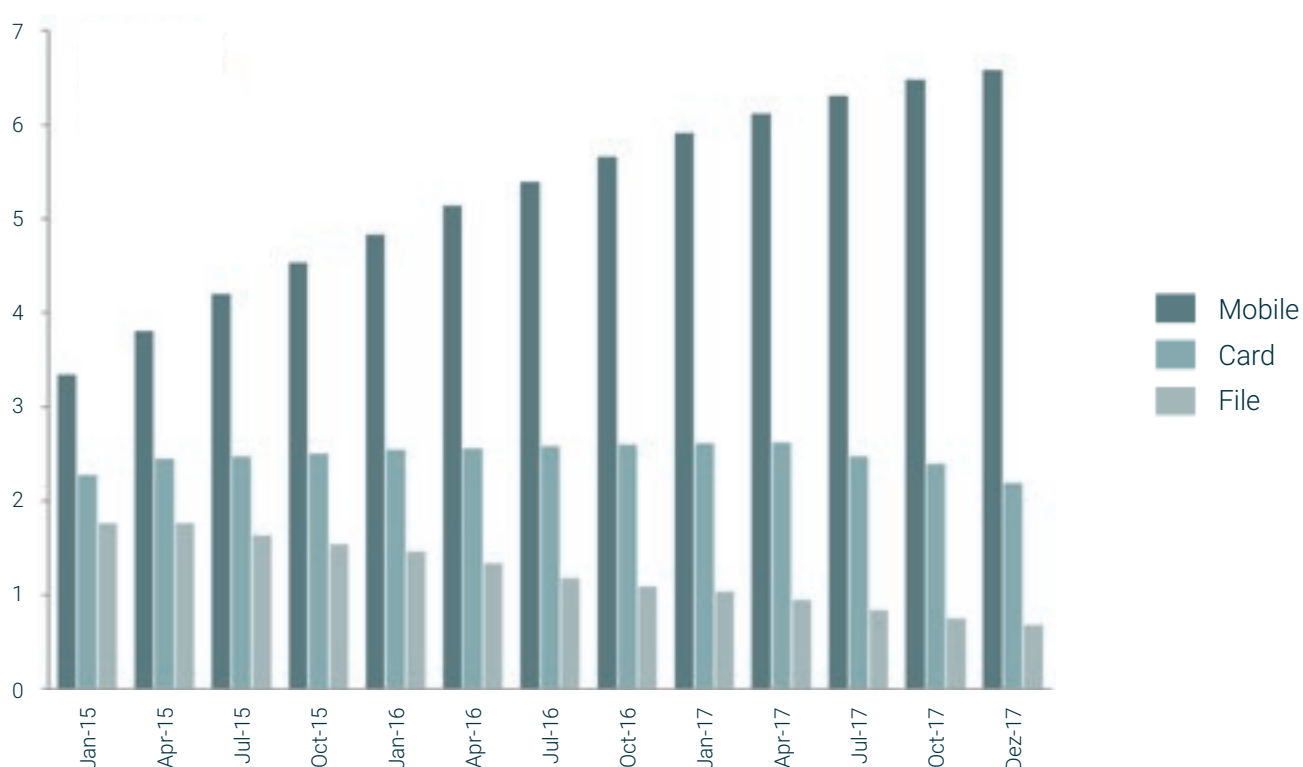
Sharing the costs of the infrastructure was seen as main benefit at the time of establishing BankID.

”

Senior Manager Handelsbanken

ISSUED BANKIDS BY TYPE

Numbers in millions



Cost sharing – R&D and operational costs, which before had to be covered by each bank independently, could now be split with other banks and even the government.

New services – Some smaller banks were not able to offer e-signature at all. BankID enabled them to provide new services to their customers.

Customer experience – Banks were more user-friendly after removing the necessity of several e-credentials (one for bank 1, one for bank 2, one for filling the tax declaration etc.).

Fear of being left behind – As more and more banks migrated to BankID and became part of the consortium, those who weren't

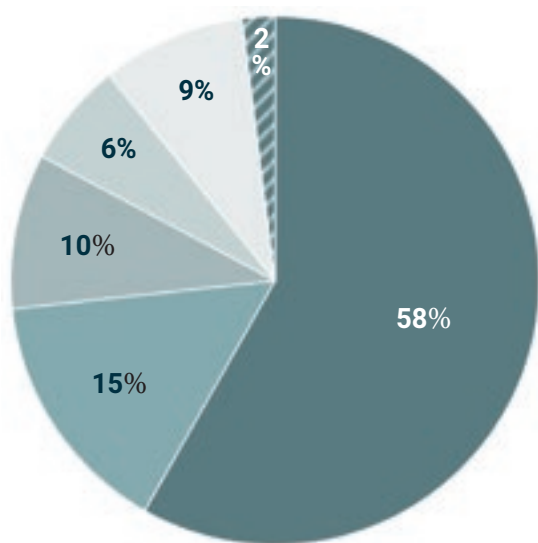
part of BankID yet developed a fear of being left behind on a crucial trend.

Although the number of users and transactions for BankID was growing, and more banks were joining, the Swedish government tried to launch their own e-ID for usage in governmental services in 2010. While pitched as an e-ID they would have full control of, it was abandoned after a couple of years due to lack of usage. In April, as a pilot together with the mobile operators Telenor and Telia, Swedbank launched a SIM-card based mobile BankID. This was supposed to be the solution that eliminate the necessity of card readers and stored certificates. This new solution was not picked up by the users as expected, as in most cases a new SIM-card was required.

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Nowadays, BankID is an everyday feature of Swedish life.

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SPLIT BY USE CASE

- Internet and mobile banking services
- Payment services
- Financial Services
- Authorities
- other portal and private services
- Municipalities

BankID decided to abandon this solution and to introduce a software-based app solution in 2011, enabling anyone with a smartphone and a BankID to use “Mobile BankID” independent of both their phone and SIM-card provider. Having BankID available anywhere, anytime, and more conveniently than ever, boosted its usage rate to new heights.

By 2011, BankID had grown to a user base of 3.8 million Swedes, convincing the last large bank Nordea to join BankID. Nordea had not seen the need to join BankID, as they had their own well accepted “Nordea e-ID”, a very similar solution to BankID but exclusively issued by Nordea. The investment in this solution had been significant, which made the transition to BankID non-discussable. It wasn’t until Nordea had reached a point where a highly costly update to their own solution was necessary that joining BankID was considered.

Major advantages were seen in having a fully functional and proven solution in place, especially a functioning mobile solution – a must-have for the future. Furthermore, Nordea saw their collaboration with BankID as a strong message to the market, that if all banks collaborate on and use the same secu-

rity infrastructure, it must be secure. It still took until March 2015 for Nordea to complete their migration to BankID and terminate their own solution.

From 2013 onwards, BankID’s use rapidly increased, with especially Mobile BankID quickly outrunning the other solutions. BankID reached 1.5 billion transactions in 2016, and grew to 2.5 billion in 2017. In 2016, over 7 million Swedes had at least one form of BankID – whether a card, as a file or with Mobile BankID. In 2018, the 8 million users’ threshold was cracked.

Nowadays, BankID is an everyday feature of Swedish life. Over 91 percent of use cases are in the private sector, where Mobile BankID is preferred, with a usage rate 7 times higher than the card solution and 5 times higher than the file solution. Users do not need extra log-in data for e-commerce anymore; a user needing a new credit card authenticates himself and signs the contract online; no need to send any documents or visiting a branch or physically get authenticated: it is all done with Swedish BankID.

NORWAY

NORWAY

In 1999 the board of The Norwegian Bank Association decided to build a public key infrastructure (PKI) based e-ID system that could generate, distribute and check digital certificates. After some debate, the major banks agreed to form a common solution called BankID - although the solution shares its name with the Swedish solution, they are completely unrelated.

NORWAY

Inhabitants:	5.3 million (2018)
e-ID solution:	BankID
Users:	3.9 million (2018)
Mobile e-ID:	Yes



The process of creating a common operational BankID infrastructure started in 2000. The team behind BankID employed a project coordinator who, within 2-3 months, was supposed to ensure that all banks had issued BankID to their customers on smart cards. This task, as in the Swedish scenario, would turn out to take quite a lot longer.

BankID was originally a technology driven initiative where Nets (formerly BBS Norway), the co-owned financial database, played

a key part. They were selected to set up a "certificate factory" to deliver BankID certificates (the initial idea was to issue BankID on cards, but the idea was quickly dismissed). Nets' competence and experience played a vital part in establishing a solid concept - this would prove crucial, as various encryption experts tried to discredit the BankID solution over the next few years.

In 2002, additional providers of e-IDs entered the market. Amongst them were the postal services, telecom providers, other banks and the government, all providing the market with e-IDs in the form of certificates and cards.

In 2004 the first BankIDs were issued to customers for use in online banking, starting with Eika Group followed by Sparebank 1 Group in 2005. As in the Swedish case, large banks such as DNB (converted in 2008) and Nordea and Danske Bank (following in 2009) took a much longer time to convert their customers to BankID. Eventually by 2013 almost all the banks had implemented BankID. The migration took much longer than planned; partially due to internal roadblocks, but also because of strong opposition from government bodies who wanted their own solution.

Norwegian authorities were convinced that the best option was a proprietary one - government issued e-ID, in the form of a national ID Card. Influential academics stood against BankID, mainly due to a lack of information regarding the security concept, which was seen as too weak to support such sensitive information. The government also posed another difficulty, namely the adaptation of laws and regulations to e-signature. They initiated major investigations which involved expanding and rewriting enormous amounts of legislative text, which was unnecessarily time consuming. In retrospect, it is clear that the government was too focused on theoretical or bureaucratic requirements; the banking sector had the advantage of playing to the pragmatic needs of the market.

Although they were the most efficient, banks still underestimated the long and demanding innovation process ahead of them. The assumption made back in year 2000 was that all participating banks would make it mandatory to use BankID in

KEY EVENTS:

- 2001: Start of Initial BankID project
- 2004: Issuing of first BankID; Eika Group first bank to convert customers to BankID
- 2005: Sparebank1 Group converts customers
- 2008: DNB converts customers
- 2009: Launch of Mobile BankID; Nordea and Danske Bank convert customers
- 2013: Almost all banks have converted to BankID
- 2014: Establishment of BankID Norge AS
- 2017: 3.7 million Norwegian use BankID; 600 million transactions

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By 2016 Mobile BankID had 1 million users, on average using Mobile BankID 14 times a month.

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their online services, with a plan to convert all customers from existing security mechanisms over to BankID within 1-2 years' time. This was far too ambitious, and didn't consider the resistance to convert to BankID from the web bank owners.

There was an absence of creative atmosphere, and it was considered suspicious to have relations with competitors. An overly broad focus and miscalculation of complexity made this frustrating period drag on. Discouraging discussions about interoperability between the banks' different e-ID schemes sharply delayed development, and the lack of support from the IT departments of leading banks inhibited pilot testing and creating proof of concepts.

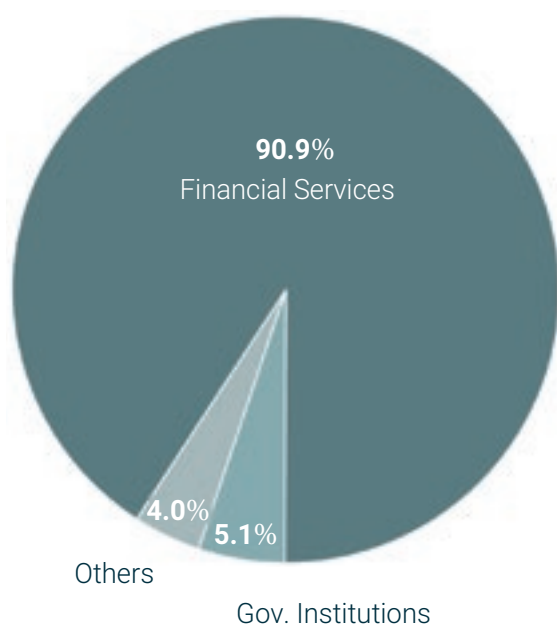
Several banks mismanaged their resources, engaging in small projects in the municipal sector with weak business cases, complex infrastructure and little to no money to invest. It was

only later that management understood the possibilities of doing business in a new manner. Innovation involves not only technical development and problem solving, but approaching tasks in wholly new ways, changing the chain of service production and consumer user experience in online processes. The key to bringing BankID forward was building a market for selling BankID services to merchants. This took the form of:

- Identification Services: Ensures the right identity on the internet. Approved as legal credentials in the Anti Money Laundering Regulations
- Electronic Signature Services: Advanced electronic signature in line with legislation. Approved as a qualified electronic signature in the Act of Electronic Signature of 2004

“ It often takes 10 years from the invention is done until the innovation is complete. To be successful, BankID needed all users to fully accept and approve of it. ”

BANKID TRANSACTION SPLIT



Again, digital identity service providers helped banks to understand the value of BankID and how to use it as a product. In Norway, Signicat is one of the skilled partners that assisted banks early on in forming a business case around BankID, currently holding 70 percent of the market for BankID services. At the time, BankID formed a partner program where IT companies and software vendors participated, resulting in new services that simplified the integration and use of BankID for merchants.

A change in the top management of DNB and seeing new players in consumer finance and non-banking fund savings convinced DNB to finally migrate to BankID - other big banks followed. DNB was for years the only proactive bank in selling BankID services to merchants. As they already had 40-50 percent of the corporate banking market, DNB took the opportunity to develop this market alone. DNB was and is the leader in using e-ID and e-signature.

Furthermore, Telenor, a large Norwegian telecommunications provider, understood early on that a mobile version of e-ID is necessary to achieve full adoption. In 2009, Telenor launched

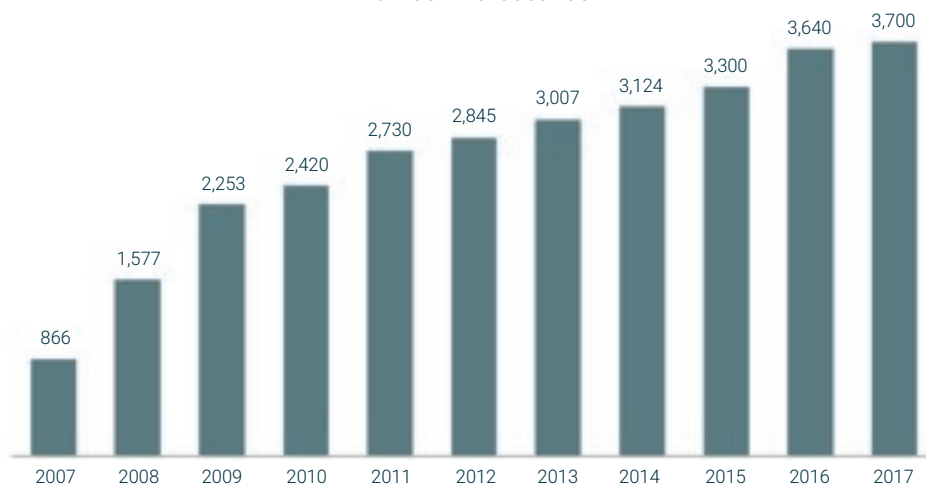
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Today, BankID has almost fully spread throughout the population with 3.9 million unique users - 8 out of 10 Norwegian adults have BankID.

”

USER BANKID

Number in thousands



Mobile BankID together with DNB, a joint project where Telenor's PKI functional SIM-cards were able to store the BankID certificate. Telenor, initially the only telecommunications provider offering Mobile BankID, soon noticed an increase in customers from other providers who wanted to use Mobile BankID. By early 2012, 100,000 users had gone mobile, prompting other telecommunication providers to join in. This started in 2013 with Tele2, and as the other remaining players started to offer BankID the user base grew to 250,000. Nowadays, all telecommunication providers and banks in Norway work together to deliver Mobile BankID services. Nevertheless, the Norwegian mobile solution was not as successful as the Swedish version due to its reliance on SIM-card based technology, meaning users needed to switch SIM-cards or even pay a usage fee.

In 2014, BankID Norge AS was established. The company owns the BankID brand and is responsible for its continued operation, development, communication and sales to merchants. Today, BankID has almost fully spread throughout the population with 3.9 million unique users – 8 out of 10 Norwegian adults have BankID. Every day, BankID is used 1.7 million times and over 600 million transactions happen

annually with BankID. It can be used for more than 1,800 services with 800 merchants, and new offers are being introduced every year.

The Norwegian and Swedish e-ID solutions were developed almost in parallel, and they prove that a collaboration of players that already encompass nearly the whole population within an authenticated customer base have a clear advantage over other providers. But to gain momentum in a two-sided market, further collaboration with authorities and third parties is essential to create enough use cases to anchor an e-ID solution. Both stories show that providing the user with a mobile version of BankID boosted the usage tremendously, where Sweden chose the smarter software-based app version. A solution defined by easy access, state of the art technology and low costs helped the Swedish model to increase transaction numbers much faster.

CASE STUDY DNB – HOW TO INCORPORATE BANKID

As BankID was emerging, DNB and other banks had little experience in coordinating cost gains on proprietary security devices. A small group of employees from DNB's payment and infrastructure segment were given responsibility for BankID cooperation and could act relatively undisturbed from their own organization. DNB's corporate segment, on the other hand, was completely uninterested in BankID, as they already

DNB IS NORWAY'S LARGEST BANK WITH MARKET SHARE FROM 20–50% IN MAIN SECTORS:

- Norway's largest Internet bank, with over 1.3 million users
- Norway's largest mobile banking service, with 800 000 users
- 210,000 corporate clients in Norway
- 1.2 million customers in life and pension insurance companies
- 218,000 individual non-life insurance customers
- One of Norway's largest real estate brokers
- Accounts for 50% of all payment transactions in Norway

had a well-functioning internet banking service, with high customer satisfaction. This uninterest was not outright hostile, just dismissive. However, after losing hundreds of thousands of customers to new entrants, and two mergers with other web-based banks, DNB's consumer branch was against anything that could make changing banks easier. As a result, federated e-ID was seen as a threat. Three diametrically different internal views saw BankID going into a stale mate for 3-4 years, and it seemed almost impossible to unravel the Gordian knot.

Despite initial unwillingness, BankID is now an obvious success for DNB and a vital part of their portfolio. But how did they get there? Back in 2000, complexity and willingness to change were systematically underestimated. The following is how to drive the evolution of e-ID within an organization:

1. Spread knowledge - build insights

Overcoming mistrust in a concept is hard. Achieve a common understanding that risk factors like security will be addressed and handled competently. Arrange conferences and seminars that allow for discussion and reflection on key issues to spread knowledge. Focus on building a complete and solid infrastructure that can deliver the desired solutions over time. Solve the

big issues in the cooperating network and do not let individual players in each organization have the upper hand.

2. Identify business cases

Create distinct use cases to estimate effects on sales, distribution power and process cost savings. Involve a broad range of industry sectors to choose the best business cases and prioritize between projects. Business areas that have weak electronic distribution will often see the greatest impact from e-ID and e-signature solutions. Prioritize projects in business areas that face strong competition in the online market such as consumer finance, life insurance, funds savings and consumer leasing. To create an interest in corporate banking, DNB demonstrated business improvements for key corporate customers showing how BankID can create more complete online purchasing solutions and compliance with legal requirements. Set up a limited sales force to visit target customers and key partners in consulting and IT. Make the effort in designing a decent partner program for the federated e-ID cooperation. Clarify legal issues early, so they won't become show stoppers for projects.

3. Build group e-ID Strategy

The importance of a well-reasoned strategy process can not be underestimated. Provide the right expertise and competency, anchoring the process in top management. Make sure that creating a strategy involves discussions with all relevant departments that will be affected. To succeed, the strategy report must stand out and be sustainable in the long term. Make sure that the strategy is distributed in the right forums, and that the final decision is made well known and understood in the organization.

BANKID USAGE IN DNB BY 2018:

- Preferred log in mechanism to DNB web site for all business sectors
- BankID e-signature is used in all major customer processes B2C and in increasing numbers of B2B processes
- BankID e-signature B2C is used in virtually all online services such as mortgages, consumer loans, online boarding, granting "use rights" to bank accounts, licensees on deposit accounts, credit cards, leasing and bidding on real estate
- BankID e-signature B2B is in use to assign rights and new users in online corporate banking and onboarding new corporate clients
- BankID is widely used in consumer finance, life insurance, asset management, real estate and non-life insurance

FINLAND

FINLAND

For several years, two e-ID solutions were run simultaneously in Finland. The banks' initiative was called Tupas, based on a 20-year long history of collaboration amongst all Finnish banks. The second, a governmental solution named FINeID, launched in 2000 as a physical card which could store an e-certificate for authentication on a chip.

In the early 2000s, banks in Finland each had their own log-in solution. The government, looking for a strong digital authentication method, approached the banks with the request to use the banks' infrastructure for an e-ID service. Unlike the other three Nordic countries, Finnish banks did not agree to develop one solution shared by all parties, but rather to create an interface combining all existing solutions to generate a certificate, Tupas.

The old solutions, with their own business models and pricing, worked well and had high popularity amongst bank customers – this made it less attractive to collaborate. Tupas made it possible for the banks to keep their independence and private databases. Nevertheless, they agreed to share a common interface: Tupas was owned and regulated by the Finnish bankers' association Finanssiala, enabling common use of each other's e-IDs in 2003.

FINLAND

Inhabitants:	5.5 million (2018)
e-ID solution:	Tupas
Users:	4.7 million (2017)
Mobile e-ID:	Yes



Every customer of online banking in Finland can automatically use these credentials as an e-ID, to authenticate and sign online via the Tupas interface. Third parties wanting to use Tupas for authentication of their customers need to sign a contract with each bank separately. It is widely used as strong authentication method by authorities, banks and third parties.

KEY EVENTS:

- 2000: Launch FINeID; Banks have own log-in solution
- 2003: Launch of Tupas
- 2008: Launch of MobileID
- 2009: All governmental services accept Tupas
- 2013: 4 banks agree that Tupas can be used for on boarding customers to MobileID
- 2015: Tupas usage in non-banking sector has risen to over once a week on average per user
- 2017: Almost all banks agree that Tupas can be used for onboarding customers to MobileID
- 2018: Tupas usage in non-banking sector has risen to over twice a week on average per user

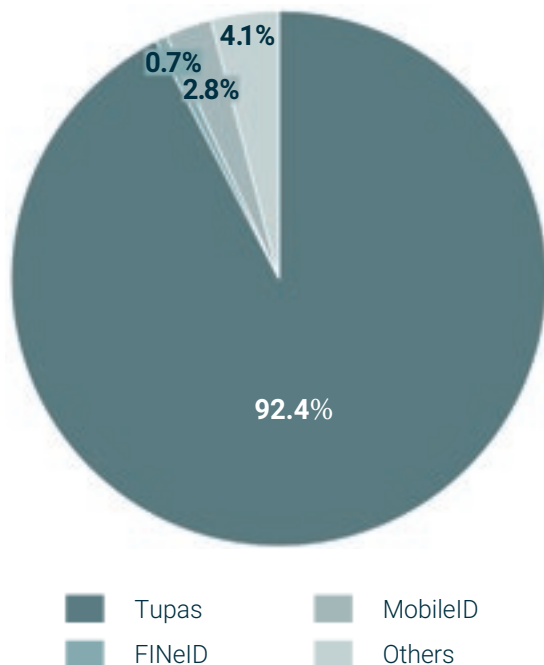
The government noticed the high acceptance and user friendliness of Tupas, and by 2009 all governmental online applications supported it, raising it to authentication method number one for federal online services. In contrast, only 400,000 FINeID cards with certificates had been issued by 2012, and less than 10 government services accepted FINeID. By 2015, customers were using Tupas at least once a month for non-banking services. Estimates predict that non-banking sector use such as for electricity companies, governmental services or insurance companies has risen to more than twice a month for Tupas nowadays.

Nevertheless, in parallel Finland's SIM-card penetration rose to over 100 percent in 2005, and customers demanding a mobile solution for e-ID drove innovation in the market. Government and public services authorities, mobile operators (TeliaSonera, Elisa and DNA) and the Finnish Federation for Communications and Teleinformatics (FiCom) formed a consortium in 2008 to develop MobileID. With the new MobileID no extra equipment was needed, and since all Finnish telecommunications providers collaborated on this solution, any person with a PKI functional SIM-card could apply for this e-ID scheme.

DENMARK

SPLIT OF IDENTIFICATION METHODS FOR PUBLIC E-SERVICES

In percentage, 2017



Until 2013, activation of MobileID was reliant on an onboarding process, where the customer had to authenticate himself - either physically going to an operator's store or use an online service. At this point, four banks agreed that their BankID (Tupas) could be used in the onboarding process for MobileID – today, almost all the banks have joined this movement. The banks have not yet launched a joint mobile version of Tupas, although it can often be used through their respective mobile banking apps. It will be interesting to see if the usage of MobileID increases over time. Despite it already working for 20,000 services, current usage in the public service is only 2.8 percent. Tupas with 93.7 percent is by far the leading solution.

As the Finnish government has understood the necessity of successful e-ID solutions in order to digitalize their own services and the whole country, they have recently introduced a new

law suppressing the free pricing models for e-IDs and their usage. All e-ID providers are now obliged to sell their solution through a broker for a set price. It will be interesting to see how this will affect the development of Tupas and MobileID.

The Finnish example shows that there are various depths on how banks can collaborate in order to provide a secure e-ID solution, which do not necessarily involve sharing the customer database.

DENMARK

The evolution of a federated e-ID in Denmark was very similar to the Swedish model – it just took place roughly 10 years later. In Denmark each bank had its own “bank-ID” which was used for online banking with the respective bank. The government on the other hand issued its own certificates, which were valid when using certain governmental services.

The Danish Bankers Association initiated preliminary discussions with the Danish government to form a joint e-ID in the early 2000s. The usage rate of 1-2 times a year for the public e-ID was low, (citizens often couldn't even remember their login data) so the government saw great potential in a joint e-ID. The main driver for banks to collaborate was again the security aspect. The cooperation of not only banks, but also authorities was mainly the result of extensive cost sharing possibilities.

The provider Nets, majority owned by Danish banks, was chosen to operate the 2010 launch of NemID, Denmark's national electronic ID and digital signature infrastructure based on PKI technology. In the first 9 months of NemID's existence, 3.5 mil-

DENMARK

Inhabitants:	5.7 million (2018)
e-ID solution:	NemID
Users:	4.8 million (2017)
Mobile e-ID:	Yes



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At the end of 2017 4.8 million Danes have a NemID, comprising 92 percent of the population over 15 years old – the age of eligibility to receive a NemID.

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KEY EVENTS:

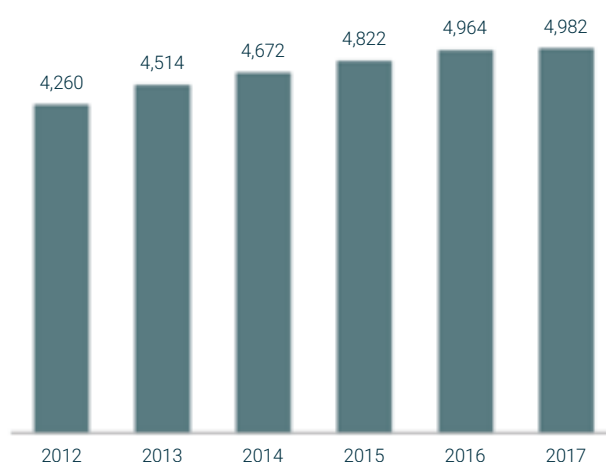
- 2000: Initial discussions
- 2010: Launch of NemID
- 2011: 3.5 million users
- 2012: Cracking 4 million users
- 2017: 4.8 million NemID users; 704 million uses
- 2018: Launch of Mobile NemID, banks and government form task force for new generation NemID - MitID

lion users joined. In contrast to the Swedish example, NemID is not exclusively issued by banks but also by the government itself. In fact, both sectors issue their own very similar solution branded as NemID, sharing one interface and accepting each other's solution, benefiting from each other's reputation and access to customers. The Danish government has pushed strongly for a digitalized government, and introduced many of their services as online self-services for which a NemID is mandatory – this being the main driver to apply for one. In 2017, 704 million uses of NemID took place, of which 223 million were to the public sector and 90 million for payments. Next to banks and the public sector, 400 private services accept NemID for authentication, log-in and e-signature in Denmark. And even 660 thousand companies have filed for a company NemID. At the end of 2017 4.8 million Danes have a NemID, comprising 92 percent of the population over 15 years old – the age of eligibility to receive a NemID.

Up to May 2018 NemID was only available on paper with one-time passwords, which led to a much lower number of transactions, with average usage of 0.5 times a day in the recent years compared to once a day in Sweden. But now it is also available on mobile and over 40 percent of Danes said they will definitely use the mobile version of NemID once it is out. As

ISSUED NEMID

Number in thousands



current contracts for NemID are running out, the Danish banks and authorities have formed an official task force in order to develop an upgraded version of NemID – MitID. This time, banks and government have entered a joint tender process which respects both parties' requirements. The recent years have shown that the two parties want to work even more closely together in order to deliver a robust, flexible and secure e-ID solution for Denmark.

The Danish example has proven that a rapid roll-out is possible by issuing NemID to over 60 percent of the population within the first 9 months. This was mainly possible thanks to the right collaboration model, as well as the digital maturity of the government and population. It is reasonable to think that other European countries could also drive volume for an e-ID scheme that rapidly, if done right.

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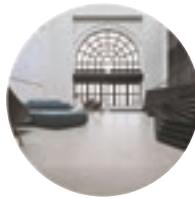
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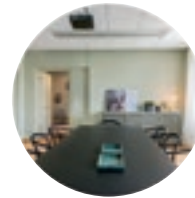
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