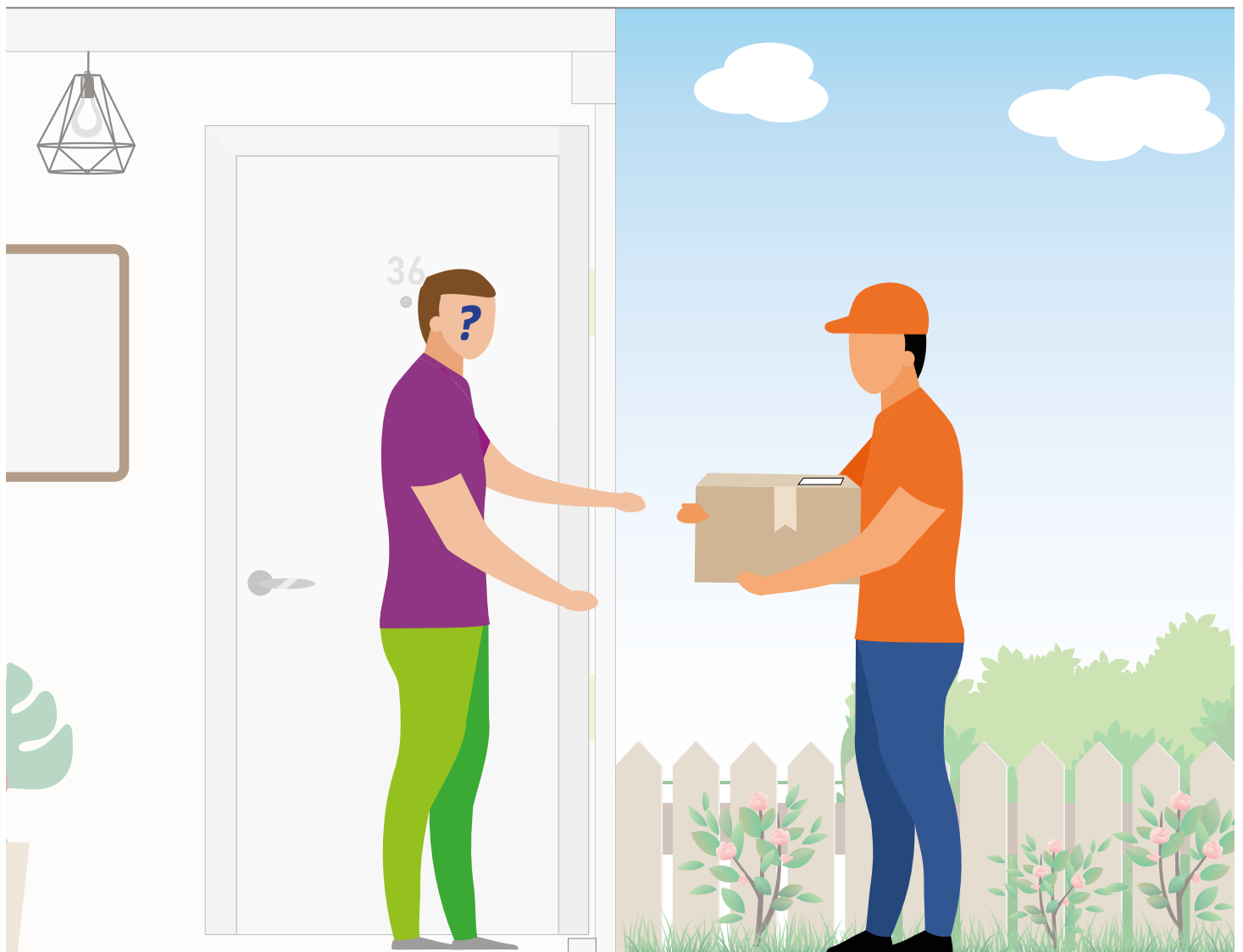# Strategically generating address validation as part of a digital identity

An opportunity for PostNL to establish a reliable digital relationship with Dutch consumers in order to realise improved shipment matching and provide a more fraud resistant delivery ecosystem

Strategic Product Design
Master thesis Ayyoeb Ichaarine
December 2021

Strategically generating address validation as part of a digital identity

An opportunity for PostNL to establish a reliable digital relationship with Dutch consumers in order to realise improved shipment matching and provide a more fraud resistant delivery ecosystem.

Author:
Ayyoeb Ichaarine

Chair:
Prof. dr. Jan Schoormans
Faculty of Industrial Design Engineering
TU Delft

Mentor:
Dr. Pinar Cankurtaran
Faculty of Industrial Design Engineering
TU Delft

Company mentor:
Nadine Kost
Senior Business Development Manager
PostNL

Problem owner:
Drs. Jikkelien van Marle
Strategic Program Manager Consumer
PostNL

PREFACE

Dear reader,

In front of you is what concludes my time as a student of the master specialisation Strategic Product Design at the Delft University of Technology. This graduation project for PostNL has been a great experience in which I learned a lot about strategic design, the logistics service industry and myself.

It feels just like yesterday that I participated in a brainstorm session in which I got in contact with PostNL for the first time. Who would have thought that this would eventually lead to this specific graduation project?

My intrinsic interest in the topic resulted in the fact that at some points I went perhaps so deep in the project that I seemed to forget I was actually doing my graduation project. However, time has passed by quickly since and I did not take the easy road, which required the necessary perseverance at some points. I am happy that I got the chance to apply my strategic design skills in one of the largest Dutch corporations and came up with a result that I am proud of.

I would like to express my gratitude to everyone who made this possible. First of all, I would like to thank PostNL for giving me the opportunity to work on this strategic topic and making sure that I could utilize all available resources as a graduate intern. Thank you, Nadine Kost, for guiding me the through PostNL and for all your critical yet constructive feedback during our update meetings. Jikkelien van Marle, I appreciate you for trusting me with this assignment and always making time for me despite your busy schedule.

I am also thankful for my supervisors from the TU Delft: Jan Schoormans, your straightforward feedback kept me sharp and I enjoyed our meetings in which you always had a lot to tell. Pinar Cankurtaran, I admire your eye for detail and your motivating words meant a lot to me.

Thank you, Charity, for always having my back and supporting me whenever I needed it the most. Karina, Shuaib, Sascha, and Fred, your help made a difference, thank you.

Finally, I would like to thank all other friends, family members, and everyone in & outside of PostNL that supported me during this project or contributed to it in any way.

I could not have done it without all of you.

Enjoy reading!

Ayyoeb Ichaarine
26-11-2021

EXECUTIVE SUMMARY

The initial goal of this graduation project was to find a way to establish a reliable digital relationship with PostNL's consumer. This is considered an important part of a digital transformation strategy that is necessary for traditional postal companies to stay relevant in a digital era. One of the main challenges of this digital era, relevant for PostNL, is the increasing uncertainty of knowing who one is dealing with online.

This assignment focuses on the idea of implementing a digital identity (eID) that can be used during digital and physical encounters with PostNL and is able to provide the desired certainty to ensure a more safe and seamless service. Thereby the focus during this project is especially on how this digital identity can be established, with whom and which certainties are absolutely necessary for doing so.

Digital identities that enable a consumer to prove who he or she is online, can exist out of multiple attributes that define this (online) user. Worldwide these digital identities are increasingly being adopted by companies active in multiple service industries, including LSPs. However, this does not mean that companies can simply request all kinds of data from their consumers to confirm the needed attributes. With regard to regulations including those concerned with privacy (GDPR), they are required to keep data processing to a minimum and are therefore only allowed to request data that is absolutely necessary. For PostNL, it was found that sufficient desired certainty would be possible to be established by personal validation or address validation.

Although consumers do see PostNL as a reliable party (the most reliable within the Netherlands), they do not seem to be willing to (digitally) share sensitive personal information such as a picture of their ID with PostNL. Address validation on the other hand does not require too much personal information about an individual but does provide the assurance that that individual has a high probability of righteous access to the address he/she uses online. For PostNL this is most important since they provide logistics services at these addresses.

As a privatized company that is not allowed to simply make use of governmental databases, PostNL is currently mainly dependent on other (commercial) parties. However, it is highly desired to establish certainty themselves, create and keep data internal. This resulted in the suggestion of a multilayered address validation system enable to establish different types of address certainty. In the ideal situation, a consumer should be processed through as many layers as possible to realize maximum certainty. Thereby the starting point is to make it as convenient as possible for consumers while raising a threshold as high as possible for fraudsters. Not only does this strengthen security, but it also increases the reach as each type is being preferred by a different group of consumers. It also enables PostNL to create, use and keep internal data while offering significant added value for the consumers in return.

One element of this system has shown high potential and was selected for further elaboration, Stikky: a smart solution that combines the physical with the digital. It enables consumers to prove that they have righteous access to an address, while simultaneously adding significant value to them. As a result, this enables PostNL to achieve a higher first-time-right while simultaneously making it more difficult for malicious people to commit package fraud. Interesting target groups for Stikky are considered: frequent orderers, digital-savvy millennials living in urbanized areas, and worried receiving consumers.

Finally, a design roadmap has been discussed that shows a long term strategy towards a multi-purpose eCommerce-ID. To have a starting point for this, also a short-term implementation plan has been provided that guides Stikky the way to a successful market introduction within six months.

GLOSSARY

Abbreviations & Definitions

AI (Artificial Intelligence): A digital computer's or a computer-controlled robot's ability to perform tasks commonly associated with intelligent beings, among which: calculating, learning, and decision-making.

BRP (BasisRegistratie Personen): The governmental database that contains data about people that are officially registered in The Netherlands, among which one's address.

FTR (First-Time-Right): Delivering a shipment in one go (exactly as how it is supposed to be), according to the consumer's preferences.

HVO (Handtekening Voor Ontvangst): An additional service offered by PostNL that requires consumers to sign for a package or letter.

IDE (Industrial Design Engineering): The faculty of the Delft University of Technology this master is part of.

IOT (Internet Of Things): a network of physical objects that are embedded with technologies including sensors and software, for the purpose of connecting and exchanging data with other devices and systems over the internet.

LSP (Logistics Service Provider): Any company that provides logistics services, such as PostNL, DHL, UPS etc.

NAD (Niet Aanvullende Dienst): A regular delivery with no additional services.

Portikosten: The price that is being paid for a shipment.

PC-4 (Postcode 4): The first four numbers of a Dutch ZIP code.

PC-6: The four numbers and two letters of a Dutch ZIP code.

SKNJ (Sinterklaas, Kerst, NieuwJaar): The busiest period of the year for PostNL, namely the one between Sinterklaas and the start of the new year.

SPD (Strategic Product design): The specific master track this graduation project is part of the curriculum of.

T&T (Track & Trace): A traceable link that shows the logistic status of a certain shipment. This code can be received via e-mail or is visible when logging in into your PostNL account. That is, if the same e-mail is used for an online order.

TVI (TijdsVakIndicatie): An (online) indication of the estimated timespan of a delivery that is displayed on the handheld of the deliverer or the consumer's T&T page.

UPD (Universele PostDienst): This is laid down in the Postal Act with the aim of ensuring that sending and receiving mail remains accessible to everyone in the Netherlands. The Dutch government has appointed PostNL to carry out the UPD.

TABLE OF CONTENTS

01

Project Introduction

This chapter introduces the graduation assignment, elaborates on the reason why this project has been initiated, describes the goal of the assignment, shows who is involved and explains the approach.

01. PRODUCT INTRODUCTION

1.1 Introduction

Back in the days pretty much everyone knew the postman. In his gray PTT uniform, he was a welcome and trusted person for many people. In addition to delivering letters, packages and telegrams by bicycle or postal cart, his tasks also involved selling stamps and postcards at the door. He even had the authority to pay people their state pension (AOW). It also happened that rural residents entrusted their savings to the postman, who then put the money in their 'savings account booklet' in the city. As a token of appreciation for the services these postmen provided, they were often allowed to sit down for a cup of coffee or a drink at the residents' home (Historisch museum Ede, 2011). Postmen had a lot of contact with the people, felt free and their work was much appreciated. At the end of the year, they sometimes got a bottle of wine or a currant bread as a token of appreciation (Historisch museum Ede, 2011).

Decades ago, the world used to be less connected; all communication took place physically and in-person, including that with the postman. Whereas trust and reliability back then were mainly driven and influenced by human interactions in a physical environment, this is a completely different story nowadays.

At this moment, we are finding ourselves in the year 2021 and the former state-owned PTT has gone through several transitions that eventually led to 'PostNL', which it is currently known for. However, not only this name but the whole world (including the postal sector) has significantly changed. Whereas PostNL is traditionally known as a postal service company mainly responsible for mail traffic within, to, and from the Netherlands, the technological and digital developments in the world are forcing them to respond and adapt in order to stay relevant in the future.

The ongoing fourth industrial revolution, so-called Industry 4.0, is triggered by the digitalization of manufacturing industries. Thereby the implementation of new technologies such as AI, IoT and smart use of data is being progressively adopted in order to increase matters such as

Figure 1: The PTT postmen on their bikes.

Figure 2: A postman enjoing a cup of coffee at a resident's home.

effectivity, efficiency, productivity and precision. For postal companies, this increasingly connected and digitalized world results in a strong annual drop in mail volume.

And then there is something else. We cannot get around the fact that since last year the world has been dealing with another development, one that has had a huge impact on all our lives. Although COVID-19 brings mainly negative associations with it, from a business perspective the developments have contributed to a year for PostNL that broke records regarding the annual revenue and the number of parcels shipped. It also broke the downward trend of mail volume. Worldwide, COVID-19 dramatically accelerated digital transformation, both in speed of change as investment. And not only for PostNL.

According to a study performed by KPMG (2020), 67% of respondents indicated that they have accelerated their digital transformation strategy as a result of COVID-19. Furthermore, 63% of respondents says they have increased their digital transformation budget as a result of COVID-19.

Although it is needed to keep up with the developments, remain profitable and stay ahead of the competition, these digital developments might not always be as rosy as they sound. They come with a couple of important complications, such as the concerns about privacy and losing the 'human factor'. Especially the latter has a big influence on mostly traditional companies that are known this for and have heavily relied on this aspect (such as PostNL).

Furthermore, in the digital world there is a serious lack of trust when citizens and companies do business with each other and with the government. On of the key questions is: How do you communicate and prove who you are on the internet and in a digital environment?

The enormous availability of personal data that can be found online and the fact that anyone can participate anonymously online makes it increasingly difficult to distinguish real from fake while simultaneously relatively easy to manipulate people. Take for example fake news (theories related to COVID and 5G) or deepfakes, which can sometimes be funny (, for political influence (the zoom meeting with 'chief of staff' of Russian opposition leader Navalny) or criminal activities (using AI to mimic CEO's voice to demand a fraudulent transfer) and phishing mails (like from PostNL or ING or to bol.com). You don't know who is behind it and that can make people doubt the reliability of a certain party or individual.

However, digital transformation is not seen as an option, but a must:

"The pace and the degree of digital transformation is accelerating in the wake of COVID-19, with ever greater pressure to meet customers wherever they are. This calls for flexible, 'commerce everywhere' business models, and a renewed focus on employee experience to drive an enhanced customer experience." (KPMG, 2021)

Also for PostNL these worldwide digital developments bring new challenges to the table. As a result, digitization has already become an important part of PostNL's strategy as can be found on the PostNL website. In an interview with 'Het Financieele Dagblad' published in March of this year, Herna Verhagen (CEO of PostNL) also expressed:

"We are going to invest much more in the digitization of customer contact, in the sorting and distribution centers and in our apps. In the future, consumers will be able to better choose how and when they want to receive the package. We are talking about a total investment of €80 million, half of which is in digitization of programs."

This has manifested itself, among other things, in the setting up of the 'Digital' department in February this year that focuses on creating innovative value propositions, improving the consumer service and developing new business models.

Figure 3: Investing in digital solutions. top: purchasing shipping labels or sending postcards with use of the app; middle: purchasing a 'stamp-code'; bottom: placing digital trackers in roll containers.

1.2 Initial assignment

PostNL can be found almost every day in almost every street in The Netherlands, having interactions with hundreds of thousands of people on a daily basis. However, it was found that they know very little about the people who live behind all the doors where these deliveries take place. In order to maintain and improve the quality of the delivery services in the near future necessary for staying relevant, the need has emerged to better know these people.

Being in the middle of their digital transformation, PostNL would like to better know their customers in order to provide an improved overall service that is safe and seamless in order to stay relevant in the digital future. As part of the business unit Online & Consumer of the Digital department within PostNL, the main question underlying this project is:

'How can PostNL establish a reliable digital relationship with their consumers?'

It is believed that establishing such a relationship can play a significant role in:

1) Minimizing fraud in the parcel as well as mail sector by making sure shipments end up at the right place and the right person. This increases service attractiveness with regard to stakeholders and shows the acts of taking social responsibility.
2) A **higher FTR** delivery, which increases consumer satisfaction, reduces waste of time and saves unnecessary costs due to better and quicker matching of shipments with consumers. Therefore a package or letter needs to be able to be linked to a person.
3) Personalizing the approach and services and offering the most relevant content to maximize the customer experience.
4) Discovering and responding to **new opportunities** beyond the current logistics service processes (e.g. Identity-as-a-Service).

With this reliable digital relation is meant: Both parties being able to assume that they are actually who they say they are and don not (and cannot) pretend otherwise. This includes a reciprocal effect: in order to be able to serve the consumer better and to meet the desire for more flexibility by giving him control, more certainty is from this consumer is needed.

It was found that consumers are more on their phones, more online and also buy more online every year (Ruigrok, 2020 and CBS 2021). For 72% of the Dutch, the mobile phone is very important, while 51% indicated that they could not live without their mobile phone. That is why it is very important to start focusing on the digital world.

Devices are connected and all data that is retrieved from them is big business. Data-driven consumer insights can make a large difference in the quality of offered (personalized) services and the resulting customer experience. In a highly competitive market, you will be overtaken by the competition if you do not.

Consumers want more grip and to be in control. An example of an initiative that responds to this is the introduction of the delivery passport. Here consumers can indicate online how and where they would like their package to be delivered when they are not home to receive it themselves. Whereas the consumer wants more flexibility, PostNL wants a high FTR. To do so, they need a higher degree of certainty. Therefore it is necessary to find a way how to process 'physical' trust, certainty and reliability into a digital environment. This does not mean that it should be at the expense of the physically reliable relationship, but rather serves as an extra digital layer on top of the already existing physical one.

"We want to meet the needs of consumers, but not too easily. Some services (such as delivering a parcel in the backyard) are not possible for everyone. Therefore we want to know and make sure that someone really is that someone".

The desire for a reliable digital relationship brings a lot of challenges and trade-offs to the table. Think about the one between flexibility and certainty. Or the one between security and privacy. Especially relevant for a company that possesses one of the largest datasets of the Netherlands which comes with a big responsibility. Furthermore, ethical and practical complications such as (unconscious) discrimination, peer pressure, increased workload and more might come into play.

Figure 4: A digital consumer relationship.

This assignment fits within the desire to establish more certainty about digital consumers in order to provide a a more convenient service. PostNL would like to explore the possibilities of this without being dependent of other instances. Thereby they are looking for an ad-hoc solution, something that can be implemented rather directly instead of in a few years.

Within this thesis report at least the following questions will be addressed:

• *How do digital developments influence the logistics service industry and what does this mean for PostNL?*
• *How can in the most certain way possible be known that a consumer can and may lawfully use a certain service?*
• *Which certainties are needed for which service?*
• *Which group(s) is/are most interesting and relevant to enter into a reliable (digital) relationship with?*
• *What are new interesting (business) opportunities for and upon establishing this digital relationship?*
• *How does a reliable digital relationship disrupt current processes and relationships?*

1.3 Project Stakeholders

This project involves various stakeholders, both within and outside the company. In order to get an optimal insight into these different parties, they are divided into two categories, namely 1) a holistic overview of the project scope and 2) an overview from a personal development perspective.

1.3.1 Scope stakeholders

Regarding to the scope of this project, already three main categories of stakeholders can be identified (see figure 6).

1. Parties that are involved in sending mail & parcels: Webshops, companies and /or other institutions that offer products that can be purchased by customers, want those products to be delivered appropriately and to the right person/address.

2. Parties that are involved in receiving mail and parcels: Package points that are managed by local retailers or residents, serving as an intermediate station for the final receivers, conscious receivers who receive parcels that are ordered by themselves, unconscious receivers who receive parcels that they did not order themselves, people that pick up parcels received (and signed for) by someone else.

3. PostNL: Provides and facilitates the service that connects both parties mentioned above to ensure a smooth mail/package journey from one to the other. Also strives to deliver optimal customer experience by informing on status/processes, answering questions and handling complaints.

All of these stakeholders can also be found and interact with each other online and in the digital environment:

1.3.2 Stakeholders personal perspective

From a personal perspective, there have been numerous people involved in this project (see figure 7), of which there are two major ones. On the one hand, there is the TU Delft who requires that this project fits within the master 'Strategic Product Design' and makes sure it meets the academic standards in order to speak of a successfully executed graduation project and hand out the 'MSc title'. On the other hand there is PostNL that has provided the challenge to come up with a solution and strategy that can establish a reliable digital consumer relationship.

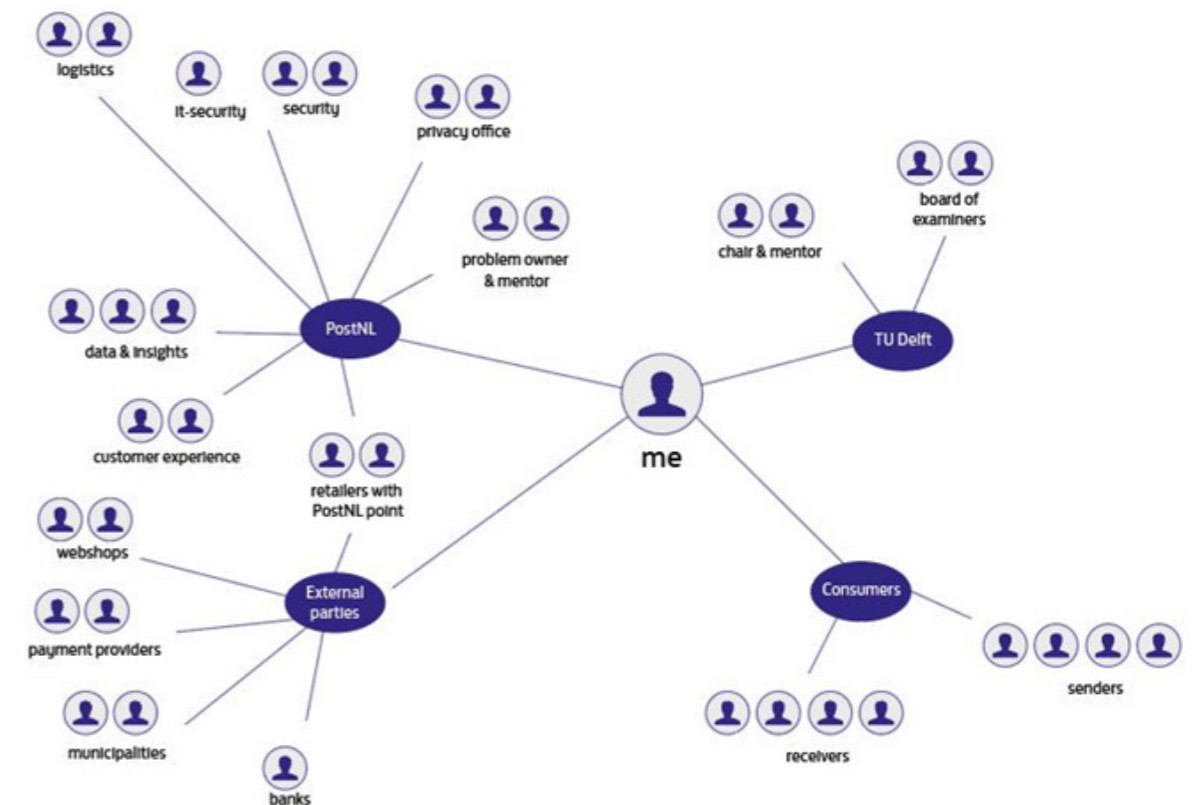*Figure 6: Overview of stakeholders from scope perspective.*

Figure 7: Overview of stakeholders from personal perspective

1.4 Project approach

In order to find an opportunity for PostNL to establish this reliable digital relationship with their consumer, a strategic and human-centered design approach was adopted to have a project outcome that is desirable, viable and feasible.
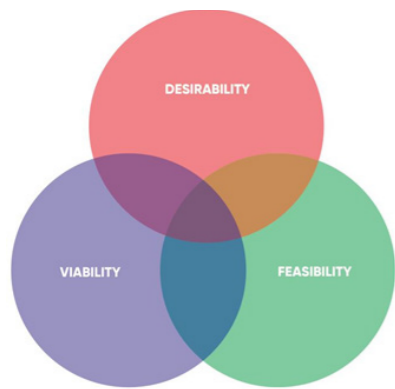
1.4.1 Design process

The design process during this project as well as the report structure is based on the double diamond model developed by the British Design Council (2005). The first diamond represents the research stage that looks at the problem space of a certain challenge and aims to focus on designing the right thing. It includes the 'discover' and 'define' phases. The second diamond on the other hand represents the design stage that looks into the solution space. Here the focus is on designing the thing right. The design stage includes the 'develop' and the 'deliver' phase.

Each of these diamonds exists out of a diverging part in which the breadth and depth of a challenge are explored. Here, all drivers, causes and possibilities are tried to be identified. This is followed by a converging part in which the most essential and concrete findings and actions are listed for further processing.

With regard to this specific project, the four phases were approached as follows:

• **Discover** (diverging): Getting insight into the problem and broadening knowledge by means of extensive research. This is done by looking for theoretical knowledge in literature and getting to know the company by talking with a lot of employees and experts from multiple different hierarchical layers. Furthermore trying to immerse in the real environment and the context

PostNL operates in, including stakeholders and competitors. Eventually, this might lead already to a couple of interesting opportunity areas.

• **Define** (converging): Empathizing with the consumer by getting to know what their values, needs and requirements are. After clustering all insights, it is possible to define a vision statement and a problem statement. This will determine the solution area for a establishing a reliable digital relationship.

• **Develop** (diverging): Based on the found opportunity, the related context will be focused upon once more. Thereafter, a design brief will be formulated that will form the base of the ideation phase. In this ideation phase the goal is to generate as many ideas as possible, after which the ones with the most potential will be worked out further. During the development of these concepts, a research through design approach is used by means of closely involving consumers and stakeholders.

• **Deliver** (converging): During the delivery phase, the concepts will be prototyped and judged based upon the design criteria with regard to desirability, viability and feasibility. This will result in a smaller amount of concepts and only the high potential ones will remain. In the end, the goal is to decide upon one final design that entails a solution that works.

This approach might perhaps be perceived as a fixed format in the first instance. However, it is worth noting that this design process is actually non-linear and iterative. Furthermore, this project has been approached from a very practical side in order to fully make use of the available resources and actually learn from reality. Since security and - with it - certainty is of crucial importance for this assignment, regular contact with this department was maintained in order to make sure the final solution would meet the most important requirements.

1.4.2 Report structure

Figure 9 provides an overview of the completed process on a holistic level together with the corresponding chapters that make the structure of the report. As can be seen, there is an additional third diamond included that represents a second iteration process, namely the design phase of the final focus: Stikky.
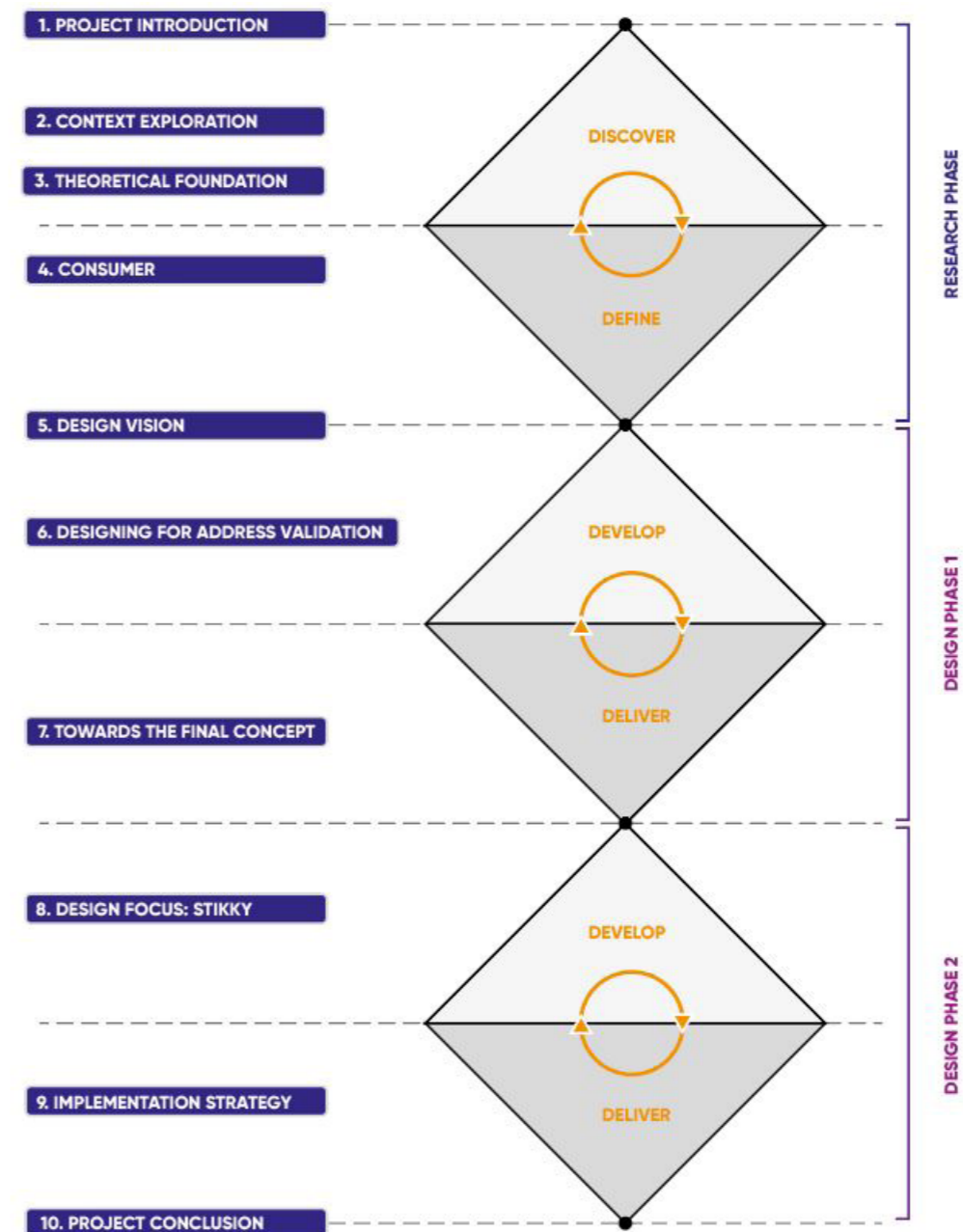
Chapter 1 - Key takeaways

• This graduation project is part of the SPD-curriculum and executed for the Digital department of PostNL, the main logistics service provider within The Netherlands. In order to stay relevant in a digital future with new technologies, they are reinventing their core business and seeking for ways to better know their consumers in order to provide them with a more safe and seamless service.
• In this connected and digital world, it is becoming increasingly difficult to distinguish real from fake. Especially in the online environment, interactions might be less certain. Therefore, the goal of this project is to '*establish a reliable digital relationship between PostNL and consumer*'.
• It is believed that a reliable digital relationship can contribute to 1) minimizing fraud, 2) a higher FTR, 3) personalization of services and 4) new business models.
• The assignment is approached from an HCD perspective and astrategic point of view. Thereby use was made of the well-known 'double diamond-model', an iterative process in which there are multiple stages of diverging and converging. Also, an additional third diamond is included that focuses on a specific part of the final design and its implementation.

02

Exploring the context

This part will provide relevant background information about PostNL, discuss the most interesting findings of the internal & external context, and elaborate on the need for a reliable digital relationship.

02. CONTEXT EXPLORATION

2.1 About PostNL

PostNL is a listed company active in the Benelux that offers customers postal & parcel delivery, logistics solutions for e-commerce, and cross-border solutions. The three logistic core activities include: collecting, sorting, and delivering.

Figure 10: A recognizable image on the street

Over the decades, the company has changed names several times (see figure 12). Whereas they were formerly known as the 'Staatsbedrijf der PTT' (State-owned enterprise for Post, Telegraph and Telephony), after the start of the privatization in 1989 this name changed to KPN, which included PTT Telecom and PTT Post. In 1998 this postal section split off and became TPG. In 2006 TPG Post changed to TNT Post and in 2011 the final change of name took place: TNT Post became 'PostNL' and continued independently.

The UPD

The national government has appointed PostNL to carry out the basic package of postal services. Postal services covered by the UPD (Universele PostDienst) must be available and affordable to everyone. The requirements for the chosen postal service provider are set out in the Postwet 2009 (Overheid, 2009).

The UPD guarantees that:
• public mailboxes and postal service points are set up throughout the country;
•the postal company empties the public mailboxes 5 days a week;
• the postal company delivers mail 5 days a week (6 days for funeral mail and medical mail)
• on average at least 95% of the letters are delivered the next day.

The Autoriteit Consument & Markt (ACM) monitors compliance with the Postwet 2009. This applies to all postal transport companies that are active in the postal market. The ACM also checks if postal companies comply with letter secrecy and whether they have a complaints procedure.

Average number of letters delivered per working day (in the Netherlands, incl. Sandd)

8.1 million

Average number of parcels delivered per working day (in the Benelux)

1.1 million

Number of PostNL employees

40,541

Unique PostNL accounts

6.0 million

Online visits to postnl.nl

779 million

Active business customers on mijnpostnl.nl

92,607

Figure 11: PostNL's 2020 key figures

Figure 12: A timeline of PostNL's history.
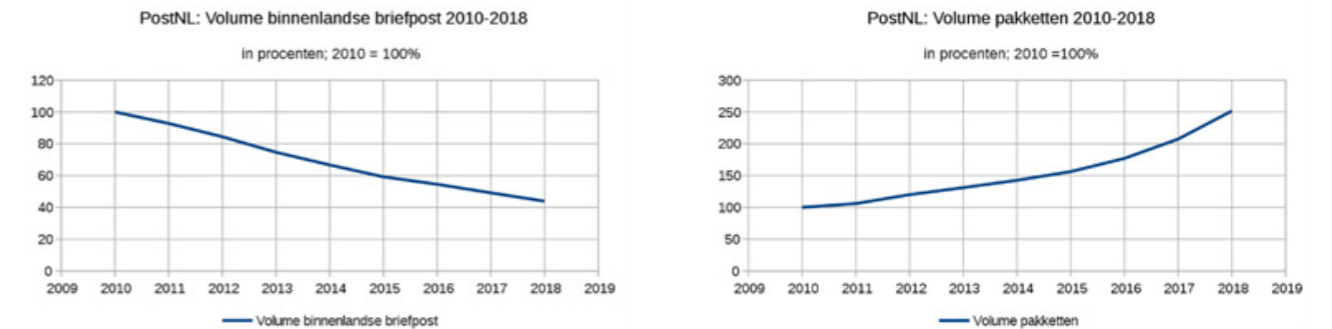
Figure 13: The decrease of mail and increase of packages over the years

Adapting to a digital and changing world

PostNL now positions itself as a logistics service provider, since mail volumes are quickly decreasing while parcel volumes are increasing and the e-commerce market is rapidly growing (see figure 13). As operational director Iris van Wees mentions:

"With us, you see a transition from a postal company to a parcel company and now to an e-commerce company. We have seen the delivery of parcels from A to B grow by about 9% per year between 2010 and 2016. From 2017 we even see a growth of more than 20% per year. So we notice that the consumer has really discovered online shopping in recent years." (MyParcel, 2020)

Last year (2020) PostNL broke their record of parcel volume with an amount of 337 million and an annual turnover of 3.3 billion euros, of which 57% came from e-commerce activities. The COVID measures have undoubtedly contributed to this volume. According to PostNL, this is about 7,5% (25 million packages).

Another more permanent factor is the ease and speed with which consumers can organise and arrange almost everything online and on their phone, including buying. As can be seen in the figure 14, at the end of this year, there will be more webshops than physical non-food shops in The Netherlands.

More and more people do not even stay home anymore to accept a package (except during COVID), but rather demand flexibility concerning to the delivery of their shipments. This is a challenge for PostNL since they strive for a high as possible FTR (First-Time-Right) delivery.

However, to meet these consumer wishes, more certainty is required to make sure everything still works in a reliably and securely.

As a result of these digital developments and to respond to this new consumer behaviour, companies have to switch to digital too. Although not everyone might always be happy with it, for some companies to stay relevant, digital transformation isn't a choice anymore, but a must. Being close to the customer is essential in today's digital era to meet these raised consumer expectations.
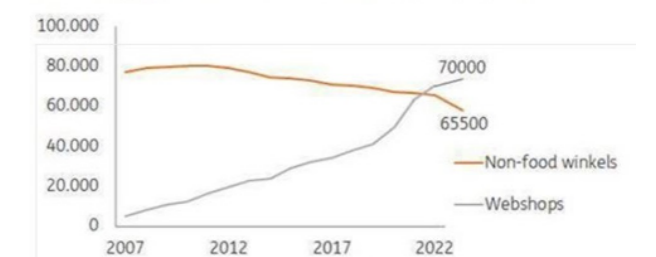
Figure 14: The decrease of physical shops and increase of webshops

Organisational structure

PostNL can roughly be divided into two parts: On the one hand there is the mail part and on the other hand, the parcels & logistics part (see figure 15). Within PostNL there are multiple departments active with business units that focus on tackling relevant challenges, making new value propositions, and improving the logistics service processes.
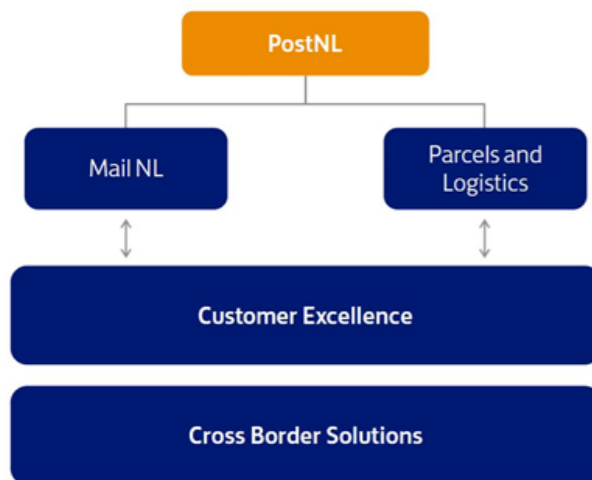
Figure 15: A simplified overview of PostNL's organisational structure.

Whenever these business units encounter a problem, they can get in contact with the Innovation Studio in Amsterdam that will then also dive into it and provide support during the project.

Figure 16: The location of PostNL's Innovation Studio

Consumer & Customer

There are not a lot of companies that can say that almost everyone living in the country has been a consumer of them. PostNL makes a distinction between a customer and a consumer. A customer is someone that is paying for the service of PostNL (webshops such as bol.com or people that pay to send a package abroad). A consumer is anyone that makes use of a service of PostNL without necessarily paying PostNL directly for this service (such as people that receive an ordered package from Zalando or return it). Three main categories make use of PostNL's services: Businesses, Senders and Receivers:

1) Business party: can choose the logistics service by himself, often in the form of a contract.
2) Sending party: can choose the logistics service by himself per package.
3) Receiving party: can not choose the logistics service by himself and is dependent on the one sender that makes this choice.

In consultation with multiple PostNL departments, the decision was made to focus on the receiving consumer, since this is the area that currently lacks but requires a high degree of certainty. This person is the last link in the logistic chain and is most dependent on PostNL. After all, in the end it should be made sure that the recipient is the same person as the addressee for the package to arrive at the correct place.

Figure 17: Focusing on the receiving consumer

2.2 Crucial touchpoints

Before it can become clear how a digital relationship between PostNL and these (receiving) consumers can be established, first a clear overview must be made of what PostNL's current (digital) ecosystem looks like. Thereby, touchpoints are of crucial importance in delivering a good service. They represent the moments of interaction between PostNL and consumer and influence the relationship between the two. Therefore, the most important physical and digital touchpoints are discussed as well as combinations between them.

Physical 1: The deliverers (post & parcels)
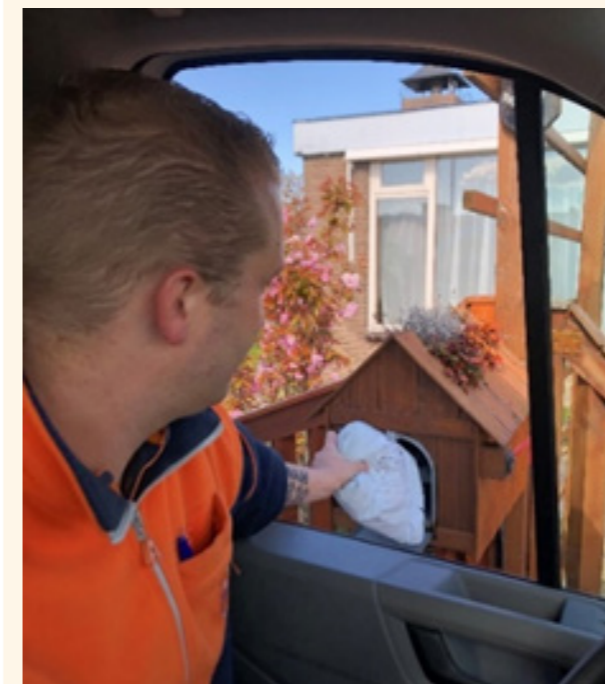
Figure 18: A unique delivery.

The mailman or parcel deliverer is the touchpoint of the last mile between a letter/parcel and a delivery at someone's home. Many of these deliverers are seen as a welcome sight in the neighborhood. Some areas have a fixed deliverer with whom even a social and more personal bond is built over time.

Approximately 4500 PostNL parcel deliverers are daily on their way. About three main categories of delivery personnel can be distinguished, each having its own interests (PostNL, 2020).

1) *Deliverers in permanent employment:* have been employed for a longer period of time, usually older (50+) and more involved. Earn an fixed salary and build up a pension. They are often retrained former postmen. (25%)

2) *Freelancers (ZZP'ers)*: are paid per address (stop) and the number of packages per address. They will benefit most from having the package delivered in the right way. If a consumer is not are not at home, they often ring at other addresses to stell get the package delivered. (5%)

3) *Subcontractors who mainly employ delivery staff (actually ZMP)*: People who work for freelancers. Get part of the head freelancer. They make easy money, but also have to bear the risks. (70%)

In order to find out what the context looks like in practice through the eyes of a deliverer and to obtain a firsthand experience relevant for this research, one of the process managers working at the 'Den Hoorn – depot' was contacted, who made it possible to accompany one of the drivers during his working shift from start to end. During this day, the deliverer was interviewed, he and the environment were observed and also several tasks were self-performed. An overview of all insights gained can be found in appendix B. Most important being:

• Just before the deliverer leaves the depot, the TVI is passed on to the consumer. which sets the final expectations.
• The delivery person then aims to drive '100%' (every package within the given TVI). Thereby time is his most valuable asset.
• The deliverer performs most of the tasks according to his preferences. From the docking process till the delivery style. As long as there are no complaints, all is well.
• The fixed deliverer knows everything about his neighbourhood and its residents.
• Has mainly verbal agreements with the receiving consumers and does not think that people will take the trouble to indicate this digitally.
• Furthermore, local residents should be kept as a friend to enjoy the work day and to get rid of packages.

Physical 2: PostNL parcel point

Figure 19: The PostNL point

In the Netherlands, there are over 4000 PostNL points (mainly located in supermarkets and other retail locations) where consumers can make use of PostNL services. This mainly includes dropping off and collecting packages. The latter is due to a consumer not being at home during the delivery attempt or choosing the PostNL pickup point when ordering online.

After visiting, observing, and interviewing the manager of a retail store with a PostNL point (that handles about 80 packages per day), several insights emerged:

• One of the major reasons for retailers to start a PostNL point is to generate a higher influx of consumers who may also buy other products from the store. Financially, it does not yield that much.
• The extent to which people are used to convenience nowadays is surprising, this is expressed in how they assume that everything is already arranged and free.
• The identification method preferred by PostNL point is scanning the QR-code of one's driving license QR code scanning because it is by far the quickest way. By trying this myself I found out that it only contains the document number.
• The deliver the delivery person delivers two categories of packages: PakJeGemak and packagesof which the delivery was not successful. The proof of the transfer, however, is not always checked in practice.
• The PostNL point would like to have less accountability to consumers for things they have no influence on. Furthermore, a better-prepared consumer who knows what he is coming for, knows how it works, and does not think too lightly, will contribute to a quicker service and finer process.

Physical/digital 1: Letter- and parcelmachines

Figure 20: Using the letter- and parcel machine

In the Netherlands, LSPs are increasingly installing these 'package walls' that build on the emerging self-service trend. Seven days a week, twenty-four hours a day consumers can send and receive shipments with these machines for parcels and leters, completely by themselves.

PostNL currently has about 170 of these machines across the country. However, a press release from Q2 of this year states that the plan is to expand the number of parcel lockers to approximately 1,500 by 2024.

When ordering something on a website a consumer can choose the option 'Pick up at a PostNL location'. This will be shown automatically if the option is available at this webstore after which delivery in the parcel and letter machine can be selected.

As soon as a package delivery is made in the machine, the consumer gets a notification through SMS and a unique code via e-mail. Within 72 hours the consumer can open the designated locker containing their package.

Due to the anonymity that comes with self-service, it is crucial to make sure that the collector and the addressee are certainly the same.

Physical/digital 2: Scan & Go

Figure 21: The Scan & Go machine

During the visit to the retail PostNL location, also the Scan & Go machine was observed, discussed, and tested. This Scan & Go is also a self-service system and enables consumers to perform the administrative and practical side of sending packages themselves. The most interesting insights were as follows:

• It significantly reduces the pressure on the retail staff, especially when the line behind the counter is too busy. By occasionally walking past the line and indicating that people can also use the Scan & Go to send or return a package, they are often willing to do so.
• When consumers go through the Scan & Go process they sometimes make mistakes. Some of them can not be solved immediately which leads to a frustrated consumer.
• Due to crowds in the store and a lack of space, the Scan & Go might not always be in sight, which might make it susceptible to fraud. The dummy camera and store cameras are security measures of which the footage can always be transferred to the competent authorities. But that is always afterwards.

Digital 1: Social Media
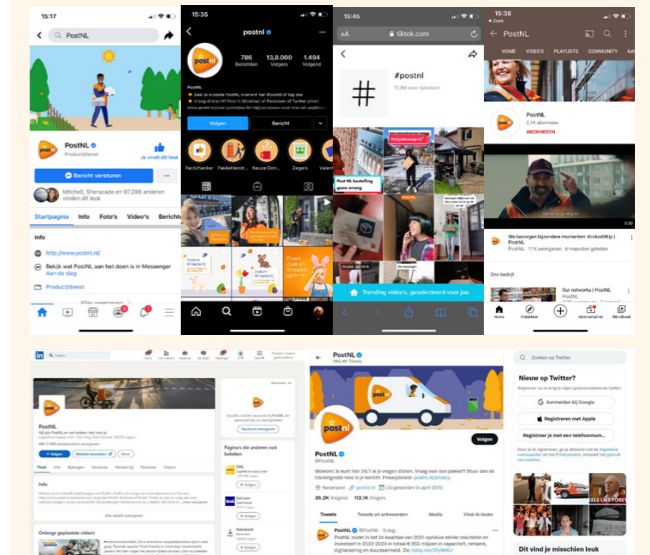
Figure 22: PostNL's social media channels

In order to see on which social media platform PostNL has the highest reach, they are arranged according to the following and subscriber base:

Twitter: 112.100 followers, Facebook: 101.635 followers, LinkedIn: 57.000 followers Instagram: 13.600 followers, YouTube: 2.1K subscribers. Although PostNL is not active on TikTok, the hashtag #PostNL has already reached 11.3 million views.

This reach is quite small when considering the number of consumers PostNL serves, especially when also comparing it with other Dutch (large) companies. What is remarkable about this social media touchpoint is that whenever you look at it, it is mainly used by consumers to issue complaints and express their dissatisfaction. Thereby the most frequently asked question is: *"Where is my package?"*.

Currently, it is not possible to recognize consumers through social media. However, this might be very interesting with the goal of a connected digital ecosystem in mind.

Digital 2: The app

Figure 23: The PostNL app

The PostNL app is downloadable on Android and IOS devices and is very convenient for consumers that are regularly expecting packages. Due to push-notifications consumers are quickly aware of status updates regarding their shipments. Next to that, it is also possible to send personalized postcards to others via this app.

What makes the app unique, is the so-called 'MyMail' service which is free and shows the consumer already beforehand what mail is heading towards his address and when. Requesting MyMail can be done in the app, after which it will take up to three working days before receiving a letter with a unique code. Entering this code serves as 'proof', after which the service will become available.

(Due to the sensitivity of this information concerning security, further elaboration and examples can be found in the confidential appendix 1 which is available upon request.)

Dgital 3: Website

Figure 24: The PostNL website

A consumer can consult the PostNL website if there is a desire to check the status of a certain shipment in case this person is not interested in downloading the app. Next to that, creating a personal PostNL account also has to be done on this website.

(Due to the sensitivity of this information concerning security, further elaboration and examples can be found in the confidential appendix 2 which is available upon request.)

In 2019, PostNL stopped with their second delivery moments. After a failed delivery, a consumer can now indicate where he wants this package to be delivered in case he is not able to take the package himself at home: the delivery passport. This gives you three options: 1) At the neighbors, 2) At a PostNL point, 3) At an appointed place.

By giving permission in advance for making use of the appointed place, people confirm that PostNL is not liable in the event of damage, loss, or theft. As they state on the website "As bad as we think this is for you, unfortunately we can't do anything for you". So if your package has been delivered to the 'appointed place' according to the track & trace but it is not there, this could be quite annoying since it has become your own responsibility. This could unfortunately have a significant negative impact on the consumer relationship.

2.3 Stakeholders

At this stage, already four main stakeholders can be identified that play an important role with regard to a reliable and succesfull logistic process.

1) The e-commerce party
The goal of this party is to earn money by selling goods to consumers. In order for these goods to arrive at the person that orders them, they choose and hire an LSP that will make this happen for them. In case of large e-commerce parties, this is often accompanied by a customized contract. Companies are legally obliged to offer a payment method that enables their customers to pay at least 50% of their purchases afterwards. However, they can also oblige their customers to pay 50% already in advance.

2) The (after)payment provider
Several of these e-commerce parties, therefore, make use of the service of certain payment providers that make it possible for consumers to be able to pay later by advancing the amount themselves. Although this entails more costs for the e-commerce party, they do have more certainty that payment will be made. The most well-known examples in the Netherlands are AfterPay and Klarna. These afterpay methods can lead to a lot of frustration when being used by fraudsters that use someone else's (address) data. However, due to the convenience and speed that they offer to consumers, they are adopted by many e-commerce parties.

3) PostNL
Thirdly, there is an LSP such as PostNL that connects these webshops with their customers by transporting the purchased goods. By delivering an excellent service they are more attractive for e-commerce parties when they compare PostNL with other LSP's. Furthermore, they also offer an additional HVO-service that enables e-commerce parties to insure the shipment.

4) The receiving consumer
The last important stakeholder is the receiving consumer that receives the package from PostNL. This happens after ordering it at a specific e-commerce party and (afterwards) paying the invoice. The receiving consumer is therefore dependent on multiple other stakeholders for a successful outcome.

2.4 The need for a reliable digital relationship

PostNL wants to make consumers' lives easier by providing a more safe and seamless service. It is becoming clear that PostNL has to adapt to the digital world to do so. As was found in the literature review, delivering a customer experience that meets expectations is therefore crucial. Also, smart use of the right data is seen as a great enabler in finding opportunities to live up to these raised expectations of consumers.

2.4.1 Improved matching

Just as all other logistics service providers, PostNL strives for the highest possible FTR, which means that a shipment is delivered exactly how it is supposed to, where consumer expectations are met in one go. This not only results in a higher consumer satisfaction, but also saves precious time in delivery attempts and therefore costs.

To be able to quickly notify and update a receiving consumer (which is the start for setting these expectations), PostNL currently depends on the data that the sender provides them in

the pre-notification (see figue 25). For example, if the e-mail address is also included and is recognized in the PostNL system, it is automatically linked to the correct consumer, who can easily track & trace his order. The sooner and more clearly this happens, the sooner the consumer can be in control and take actions (such as taking into account to stay at home during the delivery period or changing the delivery).

As was tried individually, creating a PostNL account can be done very quickly and easily without submitting any proof of identity. These aspects, together with the fact that PostNL is now a private commercial non-state-owned company, make it really difficult to identify and obtain certainty about their users. Most other leading postal companies in the world are (still) state-owned which and are therefore rather entitled to use government data and processes in order to validate users. This brings us to the second major reason concerning to the need for a reliable digital relationship.

2.4.2 Preventing misbehaviour & fraud

Not only companies and other institutions are switching from physical to digital, what also makes it interesting for criminals to do so, is the

ability to scale up, stay anonymous, and the possibility to trade with other criminals. According to annual figures of 2020, the Dutch police saw a more than doubling of the number of registered digital crimes compared to 2019. Criminals that were previously involved in traditional activities such as drug trafficking and burglaries are shifting their sphere of activity to the Internet. In this digital environment, all the necessities to commit fraud can be found (personal data, software, fake pages or webshop, etc.). The police also saw more fraud with online trade, where people pay for something, but never receive the corresponding item. (Volkskrant, 2021). According to the numbers, cybercrime and digitized crime increase by about 25 percent every year. In 2018, 8.5 percent of internet users aged 12 years or older indicated that they had been victims of digital crime in the past 12 months. That equates to more than 1.2 million people. Especially young people were victims. (CBS, 2019).

As can be seen, criminals are getting smarter and smarter on a digital level. And sometimes they do not even have to. (Cyber)crime-as-a-Service (CaaS) is when a professional criminal or group of criminals develop advanced tools, "kits" and other packaged services which are then offered up for sale or rent to other criminals who are usually less experienced. These ready-made 'fraud packages' include matters such as counterfeit banking apps, lists of cracked credentials, or malicious software for ransomware attacks. This impacts the world of crime as it lowers the bar for inexperienced actors to engage in cyber-attacks and scams (Cybernews.com, 2020).

PostNL
PostNL is also experiencing the consequences of the increase in digital crime. The anonymity of criminals and the wide availability of loose data (due to numerous (unreported) data leaks) can be an attractive opportunity for criminal and illegal activities to mislead people and cause a lot of trouble. One of the main things that makes it even easier, is the possibility of paying afterwards with for example AfterPay or Klarna. However, webshops still choose to make use of these services due to various reasons (e.g. keep attracting consumers and/or they still make a higher profit than without the service). Also, companies are legally obliged to offer a post-payment method for 50% of the amount.

Identity fraud is always part of the majority of fraud reported (FraudHelpdesk, n.d.) Figure xx shows the general process a fraudster goes through when committing fraud.

If a scammer doesn't want to take the risk of being recognized, he starts by covering up his identity (see figure 26). In the past this was done by giving a false name and address, in the digital age complete identities can be put together. A well-known example is dating fraud where a scammer can create an account and uses photos stolen from the internet to a completely made-up profile. With that account, the scammer can do everything he wants.
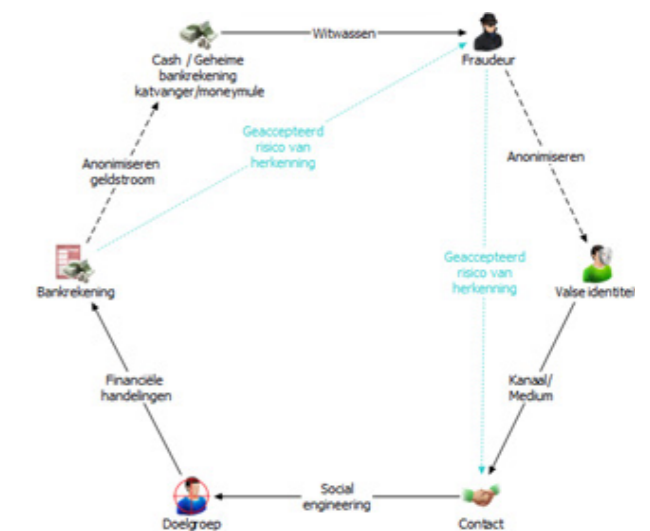
Figure 26: The fraud cycle (Helpdesk, n.d.)

The three possible initiators
The initiator(s) could be at least one out of the following three categories: a consumer, a PostNL employee, or an external person (such as a neighbour or a member of a criminal organization):

(Due to the sensitivity of this information concerning security, further elaboration and examples can be found in the confidential appendix 3 which is available upon request.)

Important is that these are all matters that affect the reliability and can disrupt the relationship between PostNL, (business) customers, consumers, and between consumers among themselves. Although PostNL is not necessarily responsible in all scenarios, by performing their service, they do occasionally and unconsciously facilitate the misery that takes place at addresses inhabited by innocent people.

Figure 25: The perfect package journey

2.4.3 PostNL priorities

PostNL wants to make consumers' lives easier by providing a more safe and seamless service. Concerning the 'safe' part, it was found that there are a multiple ways in which involved people conduct misbehaviour and commit fraud within the logistics service context. However, within PostNL there is a top four priorities regarding this matter.

(Due to the sensitivity of this information concerning security, further elaboration and examples can be found in the confidential appendix 4 which is available upon request.)

Investigations into fraud cases by authorities are always time-consuming, costing money, and have to deal with complicated privacy issues. Especially due to the large time commitment of fraud investigations, priorities of authorities are often placed elsewhere. This also explains why fraudsters can continue with their activities unhindered for a long time. Especially when working internationally with the world wide web as a channel for their deceptive activities.

e-ID
There is a need for an easily understandable standardized way of identifying, approving (and recording) events, since the first thing a fraudster does if he does not want to get caught, is to hide his identity. Every form of validating is an extra threshold for this person, making him question if it's still worthwhile to invest in this type of fraud, considering the effort he will have to put in. A promising and trending possibility to realise validations is through a reliable digital identity, also known as an electronic ID (eID).

Figure 27: Impression of an eID

It would be interesting for PostNL to look at the possibilities of such a digital identity. In the confidential appendix, a visual overview of the top four fraud priorities can be found in the form of process flows. These show how these fraudulent processes are currently happening versus what the impact will be with the implementation of a digital identity.

It was found that in order to be able to raise a threshold for fraud, 2 main types of validation could contribute to the desired certainty:

1) Personal validation
Hereby it needs to be made sure that the entered data is linked to a specific person and actually belongs to that person. In this way it possible to know who exactly is making use of a service. Furthermore, actions can be traced back to an individual. Also being able to trace back the identity of a fraudster afterwards would make it easier to catch this person. Simultaneously it also raises a threshold.

2) Address validation
This is more focused on prevention and means that it needs to be certain that an addressee actually has lawful access to a provided address. When being sure that a consumer account belongs to a specific address, it is possible to allow this person to make changes with regard to the delivery. It also prevents others from being able to misuse an address.

2.4.4 Current levels of digital certainty

Currently, PostNL has more than 6 million individual user accounts. The degree of certainty that PostNL currently has regarding these consumer accounts, can be divided into different levels, ranked from high to low.

(Due to the sensitivy of this information concerning security, further elaboration can be found in the confidential appendix 5 which is available upon request.)

2.4.4 Interesting target groups

Important to mention is that with regard to fraud, not necessarily every consumer needs to be validated. This is only necessary when a consumer is engaging in activities where there is risk involved. However, the more consumers are validated, the higher the FTR possibility.

To be able to find an interesting target group to focus on (first), it is necessary to know more about the data related to the previously mentioned aspects. Therefore a meeting was scheduled with the data analysis team.

Based on the validation data, the first interesting group is that of the most frequent orderers. This is the top 20% concerning reception frequency. It was found that the frequent ordering accounts receive at least half of the total number of packages. For the most frequent ordering addresses, it was found that this was even more. This means that if all these frequent orderers could be validated strongly, already half of the shipments are secured.

Other groups that seem interesting are: consumers that already have the app and/or are digitally skilled and household compositions of which one person is already validated.

2.4.5 New problem statement

As a result of the insights gained so far in this chapter, the problem statement is reframed as follows:

"How can PostNL eventually obtain a person's relevant attributes such as a legal name, age, address or other variables to validate this person's activity with sufficient certainty at any given moment in time?"

Chapter 2 (internal) - Key takeaways

• PostNL is a privatized company that provides logistics services within the Netherlands and is appointed by the government to execute the UPD. However, physical mail is declining quickly while the amount of shipped parcels is growing rapidly. Therefore, PostNL has to adapt and make a shift to the digital (e-commerce) environment in order to stay relevant in the future.
• In order to ensure a safe and seamless service in this future, there is a need to better know consumers, especially when making use of digital environments.
• The focus during this project with regard to a reliable relationship will be on the receiving consumer. They have no choice in selecting the LSP, are most dependent and most vulnerable during the process. Furthermore, PostNL lacks sufficient certainty with regard to this group.
• There is a wide variety of touchpoints that receiving consumers encounter, physical as well as digital ones. These all influence the reliability of the relationship between PostNL and a consumer in their own way.
• PostNL has the unique strategic advantage of being in almost every street in The Netherlands every day in front of an open door and having interactions with countless consumers.
• PostNL wants to make consumers' lives easier by providing a more safe and seamless service. Therefore, the need for a reliable digital relationship with their consumers is based on two main needs. 1) Improved matching that can lead to an improved consumer experience and save unnecessary costs. 2) Reducing the risk and opportunities with regard to fraud.
• To be able to inform the consumer of his delivery, PostNL is dependent on the pre-notification of the sender. The sooner and more complete this information is provided, the better.
• Within the stakeholder field, afterpayment providers such as Afterpay, Klarna create an opportunity for package fraud by shifting the crucial moment of paying. Everyone can become a victim of this package fraud, due to data leaks phishing activities or dishonest behaviour. Fraud could be initiated by consumers, PostNL employees, external individuals/groups or a combination.
• Since the first thing a fraudster does to (keep) commit(ting) fraud is hiding his identity, this is where certainty needs to be established. There are two main directions that seem to be able to establish this certainty: person validation and address validation.
• PostNL currently has more than 6 million individual user accounts, of which only a certain amount is considered 'validated'. These validated accounts have different levels of certainty.
• An interesting target audience would be the frequent ordering addresses since they are responsible for more than half of the total package volume.
• The new problem statement reads: *"How can PostNL eventually obtain a person's relevant attributes such as a legal name, age, address or other variables to validate this person's activity with sufficient certainty at any given moment in time?"*

2.5 The competitor field

After taking a closer look at PostNL internally, it is now time to broaden the view and look at the most interesting matters outside PostNL.

To see where PostNL stands relative to its competitors, the competitor field was also looked at. Since the postal market is declining at a fast pace every year and PostNL already has a monopoly-like position in this area (also due to the UPD), the main competition comes from the parcel market.

Since the scope of this assignment is on receiving consumers in The Netherlands, the tables below show the market shares in the domestic parcel delivery market (Autoriteit Consument & Markt, 2021). As can be seen, PostNL's market share in 2020 decreased (compared to 2019) to 55-60% based on both volume and revenue. After PostNL, DHL Parcel is the carrier with the largest market share (just like previous years). They achieved the largest percentage growth of domestic delivery in 2020, which both in volume and turnover is 30-35%. The other parties follow at a considerable distance with their market share.

PostNL was the largest parcel carrier in the B2C segment in 2020 with a market share of 55-60%, but its market share has decreased compared to previous years. DHL Parcel's market share in the B2C segment has increased compared to previous years, from 25-30% in 2019 to 30-35% in 2020.

In the B2B segment, the market shares of the various parcel carriers are closer together. In 2020, PostNL was the largest parcel carrier in this segment with a market share of 45-50% based on volume. DHL Parcel follows with a market share of 30-35%. GLS and DPD both have a market share of 5-10%. Compared to a year ago, DHL Parcel's market share (as in recent years) has increased the fastest in percentage terms.

In 2020, as in previous years, PostNL was by far the largest parcel carrier in the C2X segment with a market share of 75-80% by volume and 80-85% by turnover. DHL Parcel follows at a considerable distance, with a market share of 10-15%. DHL Parcel's C2X market share has increased compared to a year ago.

	2016	2017	2018	2019	2020
PostNL	60-65%	60-65%	60-65%	60-65%	55-60%
DHL	20-25%	25-30%	25-30%	25-30%	30-35%
DPD	5-10%	0-5%	0-5%	0-5%	0-5%
GLS	5-10%	5-10%	0-5%	0-5%	0-5%
UPS	0-5%	0-5%	0-5%	0-5%	0-5%
TNT	0-5%	0-5%	0-5%	0-5%	0-5%

Marktaandelen binnenlands vervoer op basis van volume

	2016	2017	2018	2019	2020
PostNL	65-70%	65-70%	65-70%	65-70%	55-60%
DHL	25-30%	25-30%	25-30%	25-30%	30-35%
DPD	0-5%	0-5%	0-5%	0-5%	0-5%
GLS	0-5%	0-5%	0-5%	0-5%	0-5%
UPS	0-5%	0-5%	0-5%	0-5%	0-5%
TNT	0-5%	0-5%	0-5%	0-5%	0-5%

Marktaandelen op het B2C-segment

	2016	2017	2018	2019	2020
PostNL	40-45%	45-50%	45-50%	45-50%	45-50%
DHL	25-30%	25-30%	30-35%	30-35%	30-35%
DPD	5-10%	5-10%	5-10%	5-10%	5-10%
GLS	10-15%	10-15%	5-10%	5-10%	5-10%
UPS	5-10%	5-10%	5-10%	5-10%	0-5%
TNT	0-5%	0-5%	0-5%	0-5%	0-5%

Marktaandelen op het B2B-segment

	2016	2017	2018	2019	2020
PostNL	80-85%	80-85%	75-80%	75-80%	75-80%
DHL	10-15%	5-10%	5-10%	5-10%	10-15%
DPD	5-10%	0-5%	0-5%	5-10%	0-5%
GLS	0-5%	0-5%	0-5%	0-5%	0-5%
UPS	0-0%	5-10%	5-10%	5-10%	5-10%

Marktaandelen op het C2X-segment

Figure 28: Market shares of top LSPs

In a quantitative study that will be discussed in detail later (in chapters 4 & 7) participants' trust in logistics service providers within the Dutch parcel market was also researched (see figure 29). It was found that regarding the delivery of a package, participants have by far the most faith in PostNL (81,8%), followed by DHL (58,2%) and UPS (23,2%). The majority (37,3%) do not lack any trust in LSP's. The LSP that participants do have the least trust in is DHL (29,4%) followed by DPD (21,6%). Only 3,9% have mentioned PostNL as one of the LSP's that they trust the least.

Welke bedrijven vertrouw je het meest met de bezorging van een voor jou bestemd pakketje?
55 antwoorden
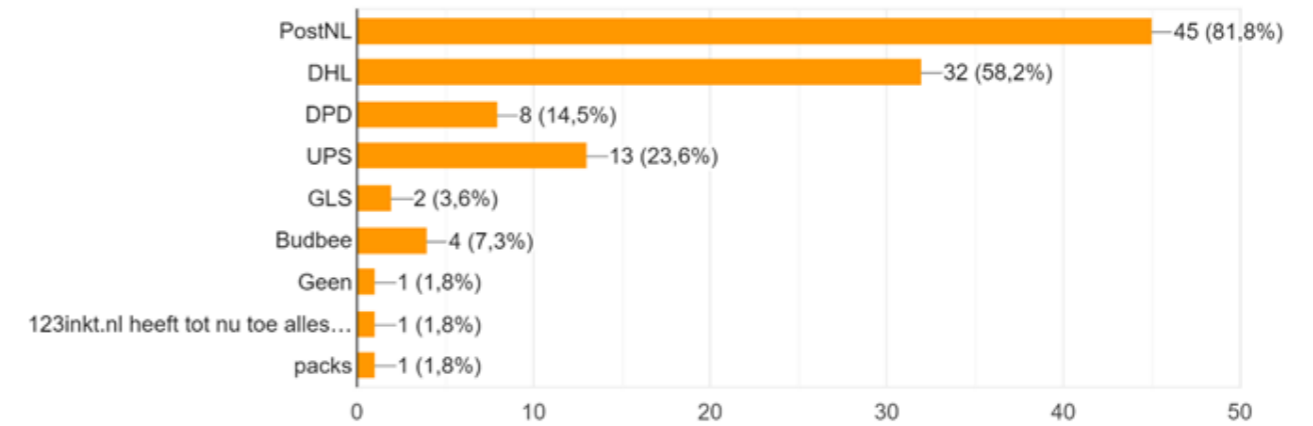
Welke bedrijven vertrouw je het minst met de bezorging van een voor jou bestemd pakketje?
51 antwoorden
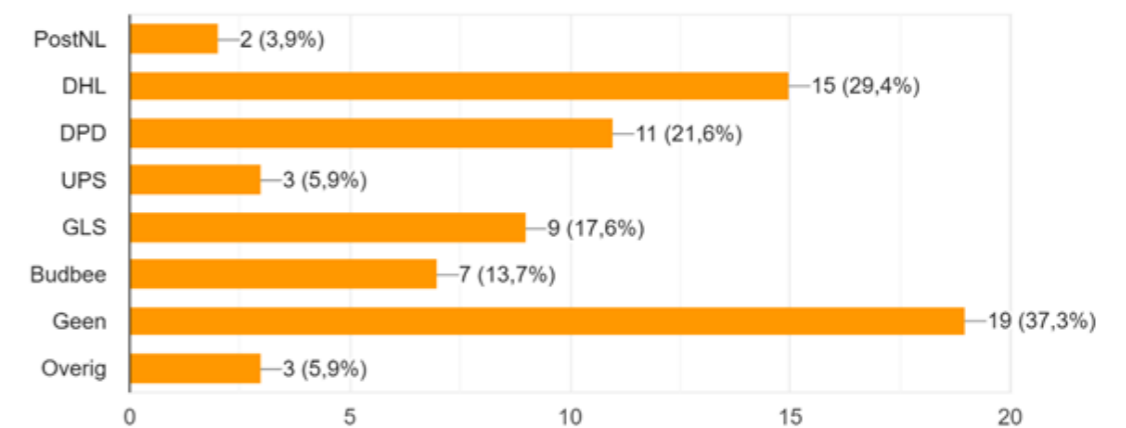
Figure 29: Consumer trust towards LSP's

In short, PostNL has by far the largest market share within the domestic parcel market. However, they are starting to lose market share to DHL, especially in the B2C market. This means that PostNL has to find a way to differentiate itself from competitors especially with regard to their business customers. This is important since this B2C market is also increasing as can be seen in the greater increase in the number of webshops, discussed in the previous sector.

Improving the reliability of their delivery services could be a possible way to make them more attractive to business customers. Also, it is interesting to see that PostNL is also the most reliable LSP according to consumers and DHL the least reliable one.

Furthermore, PostNL should take new entrants into account that compete for the last mile. These can be small players such as 'Red Je Pakketje' or de 'Fietskoerier'. However, also large companies that execute a direct-to-consumer strategy such as Amazon and Coolblue need to be taken into account.

2.6 Examples and best practices

2.6.1 Case study: Digital certainty efforts by other service companies

In an increasingly digital world, PostNL has not been the only one looking for a way to establish digital reliability and certainty regarding their customers and consumers. To see where to take lessons from, the efforts and best practices of several other service companies will be highlighted.

Serrat (2008) defines a good practice as anything that has been tried and shown to work in some way—whether fully or in part but with at least some evidence of effectiveness—and that may have implications for practice at any level elsewhere. Below an overview of several examples and best practices can be found of companies that provide a service.
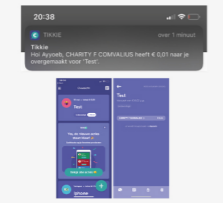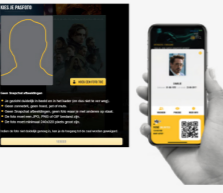
In order to be inspired, a wide variety is taken. Although these companies operate in different industries and markets, for all of them it is really necessary and crucial to know who the consumer is and that this person actually is who he says he is in a digital environment.

The figure below provides an overview of how other companies are dealing or have dealt with (digital) challenges that are to some extent similar to those of PostNL.

Figure 30: Efforts and best practices of other service companies

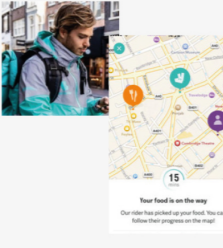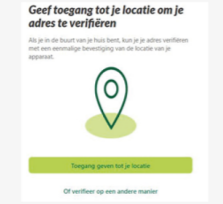|	Company	Examples	Description	Digital reliability & certainty efforts	Valuable lessons
Accomodation stay	airbnb		Airbnb is an online marketplace founded in August 2008 on which accommodations owned by private individuals, hotels and investors can be rented and booked. On this platform online strangers make agreements regarding staying at each other's places. In 2019, more than six million accommodations in more than 81.000 cities were listed on this platform, of which 55.000 accomodations in the Netherlands.	• Asking consumers to submit a picture of a valid and official identification document such as a driver's license, passport, identity card or visa. • Asking the consumer for (multiple different) facial pictures. • Comparing a consumer's name and address with databases of third parties such as financial institutions or utility companies • Instead of the exact location of the offered accomodations, only showing a radius in which the accommodation is located. This helps preventing being an easy target for burglars etc. • Assigning a status ('superhost') to consumers that have proved competence for a longer amount of time.	• Try to avoid using special personal data (such as the citizen service number) as much as possible since this makes you more vulnerable (e.g. for data breaches) and also might arouse suspicion among consumers and supervisory parties . Paying attention to the privacy regulations is important to avoid negative publicity and a negative brand image. • If it is really not possible by yourself to ensure sufficient certainty with regard to several identity attributes, there might be other third parties that can be called upon. • Assigning a status after proved competence contributes to the reliability perception. • Never assure absolute certainty if you cannot make it happen.
Food delivery	deliveroo		Deliveroo is a British service provider established in 2013 that delivers meals to customers at home by making use of bicycle or scooter couriers in 1105 cities in 14 countries. The meals come from a range of affiliated partner restaurants and are ordered via the website or their app. These orders might include items with an age restriction, such as alcohol, of which selling them to minors in against the law.	• Validating yourself as a consumer is only done through e-mail- and phone- confirmation. Also the consumer has to pay in advance when ordering. • When too many different accounts use the same bankaccount number (e.g. creating multiple accounts in order to frequently use a discount code), blocking this bankaccount from performing further actions with the company. • Letting a consumers ID be checked multiple times and in person by the deliverer every time age-restricted items are included. Also notifying the consumer in advance. • Providing an estimation of delivery time already before ordering and enabling the consumer to real time check the location of the rider. • Providing a direct link for communication between the receiving consumer and deliverer for extra certainty.	• Do not put too much responsibility (regarding enforcing rules and measures) into the hands of the practical employees. Especially when making use of a 'consumer-review system' since this might have a higher priority for these employees than actually acting upon the rules. • Giving the consumer updated indications about the process and allowing the consumer to check for the latest updates and progress at his/her own convenience. • Having to validate yourself online only once, does not provide that much certainty about the the actual end user(s), as use can be made of someone else's validation. • The possibility of direct human communication might be a very convenient 'plan B' in case of sudden changes or digital malfunctioning. • Having to pay first for the service and related products can take away the possibility for fraud.
Banking	ABN·AMRO Bank / TIKKIE		Tikkie is a mobile app developed by ABN AMRO which enables consumers to send digital payment requests. These requests can easily be paid by other consumers on their phone by clicking on the link and making use of iDeal. Whereas it was in the begin especiallt convenient for splitting the bill, nowadays it is also being used for business payments. Currently Tikkie has over 7 million users.	• Displaying a green check mark when bank account number and the name of the corresponding account holder match. • Making the application also work for consumers of other financial institutions, so everyone knows that they can use and rely on the service. • Getting a direct update in the app as soon as a consumer has paid your Tikkie' so you certainly know it is actually true and do not have to take someone at his word only. • Providing a detailed overview of all previous actions ensures that you will not forget whether or not you have paid a Tikkie or someone else has paid your Tikkie.	• It is possible and appreciated when a combination is made between someting serious (arranging financial affairs) and fun (displaying a GIF after having paid). • Working together with other players (even competitors) in the market can lead to a better overal functioning of the service and quicker adoption by consumers. • Direct and clear updates as well as a history overview makes the consumer feel in control. • Look for opportunities in which the consumer can use the service carefree while they are easy to build with current resources.
Entertainment	PATHÉ!		Pathé is from origin a French movie industry company, which has also been active in the Netherlands since 1995, currently with a chain of 30 movie theaters across the country. With their personal Pathé Unlimited-subscription', it is possible for consumers to visit an unlimited amount of movies in all of their movie theaters for a fixed price per month.	• Requiring consumers to upload a clear and recognizable facial picture when purchasing the service. In this way service employees in the cinema can compare this digital face with with the face in order to provide you access to the movie • Integrating a real-time running clock on the image, making it more difficult to replicate • Make it possible for consumers to reserve seats already beforehand, but removing these reservations if tickets arent collected 10 min before the start, so other people will have a seat. • Asking the consumer to pay the invoice forward or otherwise their account will be blocked.	• QR codes can easily be copied and distributed. Therefore they are not always reliable enough for being used in identification processes. • Moving image raises the threshold to commit fraud compared to screenshots. • It shows good service when putting the consumer in control, but you have to be careful that it does not backfire on you and ruins your business model. • Human (control) factors can make a difference with regard to the certainty of one's identity.
Mobility	felyx		Felyx was established in 2017 and enables consumers to make use of their electric scooter-sharing system by paying a fixed price per minute of use. In the app it is visible where these scooters can be used. Since driving a scooter is only allowed if you are 16 years or older and have a valid driver's license, this needs to be made sure digitally when creating an account.	• Requiring proof of a valid driver license when a consumer wants to create an account. This person has to do this by filming, so the AI will know it is real-time and not a forwarded copy. • Using GPS location in the app, so consumers know where they are able to park the scooter after using it. Felyx also knows where these scooters have driven. • Making a picture of the scooter once the ride is finished, so you prove that you have left it at a certain place and in good condition. • When making use of alternative methods such as PayPal, consumers may be asked to verify their bankaccount by transferring €0,01 to the company, making sure that they are legitimate consumers and their accounts are not blocked.	• Having a validated account does not mean that a service is actually being used by the person who's validation is being used to make use of the service in the first place • Almost all phones have a camera nowadays so visual proof is easy to ask for. However it should make sense and guarantee privacy. • With current AI technologies it is possible to distinguish a pre-made picture or movie from one that is made real-time. • Try to only ask for the most essential data you need instead of collecting all kind of different data. • By using data in a smart way, you can already expect what do where and when.
Social networking	nextdoor		Nextdoor is a social networking site / app especially for local residents of a neighborhood and is active in the Netherlands since February 2016. There it is already being used by people in more than 6500 neigborhoods. On the platform people that ask for help and people that offer help can find each other. Furthermore it also offers space for important notifications, announcements and alert messages.	• Validation is done by means of e-mail confirmation, phone number confirmation and one-time location sharing. • Making use of a 'cookiewall', which means that it is not possible to make use of the service without agreeing to your data being collected. This data is used for identificcation as well commercial purposes. This way of working is quite controversial in the Netherlands. • Using two-step verification for logging in. • Sending invitation letters to neighbors with consumers names on it, which might be recognized by other consumers in the neighborhood.	• One-time location validation using GPS is not very reliable. Although most people will not use this with malicious intent, in principle anyone can go to a certain location and then quickly turn on their GPS at the time of validation. This was also warned for by the Dutch police. • Visualising data makes it more appealing and understandable. • Do not do anything on behalf of a consumer without this person explicitly agreeing with it. • Also think about the long-term reliability: make sure the consumer knows what he is doing and does not automatically agree with something that he might regret later.

2.6.2 Case study: Best practices in digitized postal & logistics services

Closer to the scope of the assignment, it is interesting to see how postal companies world-wide are (successfully) dealing with digitization, the concept of digital identity, consumer rela-tionships, and reliability in general.

Figure 32: Efforts and best practices of other LSP's

	LSP	Initiative	Impression	Best practices
France	La Poste	*L'identité numerique*		• After validating your adress and identity you are able to arrange important personal things such as: paying taxes, monitor nsurances, and apply for or renew driving licenses. Furthermore, with L'identité Numerique you can gain access to hundreds of sites with a single login which takes away the hassle of managing multiple accounts and passwords. Furthermore you are notified each time you attempt to connect. If this is done by yourself, you can validate it, otherwise you are able to block it. It makes use of a strong MFA ethod which includes the unique combination of your username, app and password.
Australia	Australia Post	*Australia Keypass ID*		• The Keypass ID is a digital pass issued by Australia Post with which you can pick up anything at the post office and apply for a mail redirection or hold. It also has age validation, showing if you are already 18+. It can be used for multiple purposes and across a wide range of organizations. For example you can create a bank account with it, gain access to concerts, use it when applying for a job, check in at the airport and hotels. It keeps sensitive information such as birthday and address private yet serves as evidence that you are allowed to perform certain actions.
Finland	Posti	*Oma Posti*		• The digital 'OmaPosti' service has been launched in 2018 and has already been used by 1.6 million Fins. This OmaPosti serves as an electronic mailbox that makes it easy to manage let It collects all letters, invoices (with due dates) and parcels in one place. Furthermore it enables consumers to also Track & Trace parcels from other LSP's instead of solely themself. When creating an account, you will need to prove your identity. Thereby you have the option to choose between logging in with your online banking credentials, with ID chip card or prove your identity in a Posti shop.
Belgium	bpost	*Smart doorbell*		• Currently bpost is testing deliveries with a smart doorbell and smartlock combination. In the event of consumer not being home at the time of delivery, the package can still be delivered at his or her place. When the deliverer presses the doorbell, the consumer gets a notification on his phone and can see the person that is standing in front of the door through the camera integrated in the smart doorbell. If this person is the deliverer, the consumer can unlock the door from a distance after which the deliverer can place the package in the house and close the door.
United Kingdom	The Post Office	*EasyID*		• The Post Office's EasyID app allows consumers to prove their identity age and other important details to other people or businesses. Thereby it only shares the details that are needed in order to keep this personal information safe and only accessible by the owner of this data. The EasyID can be used with thousands of retailers and organisations, among which: banks, work-related options and picking up mail and packages. Furthermore it is only possible to obtain an EasyID if you are over 18 and are veri-fied using biometris.

2.7 Interesting trends and developments

The emerge of future foresight in the discipline of design has led to increased attention for creative trend research (Simonse, 2017). To spot trends that are relevant with regard to the context of an LSP need of digital certainty, the decision was made to perform a DESTEP analysis (see figure 33). The full list of trends can be found in appendix C. Therefore we will highlight solely the most interesting ones here.

Demographic factors dealing with the composition of the population:

• Since 2016, every year more than a million people move within the Netherlands. This happens most frequently in Zuid-Holland, followed by Noord-Holland, Noord-Brabant and Gelderland (CBS, 2021). This means that every month about 80,000 - 100,000 people move to the Netherlands. Assuming that the average household size is 2.14 people in 2021 (CBS, 2021), this means that every year approximately 500.000 households live at a new address.
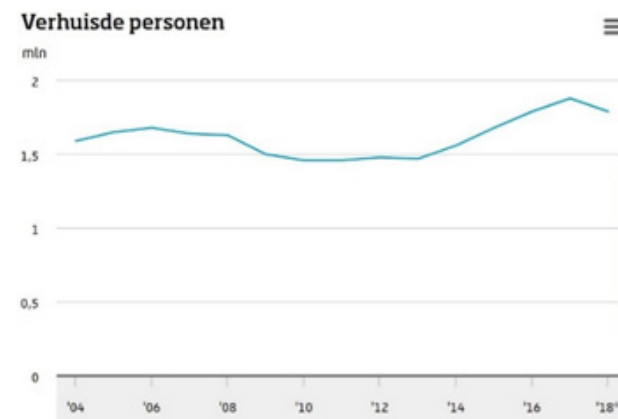
• People in the age group of 20-30 years are the most frequent movers in the Netherlands (CBS, 2018).
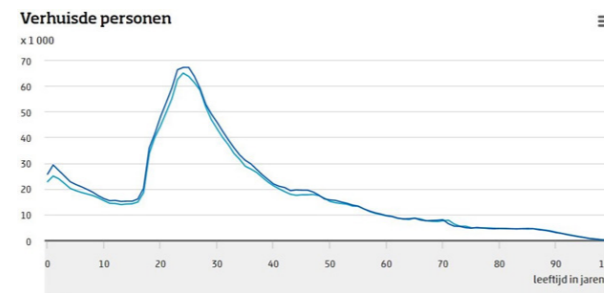
Economic: factors that have to do with economic growth, inflation, purchasing power, etc:

• Especially 25- to 45-year-olds like to buy via the internet; in 2019, 92 percent of them bought goods or services online. The growth was greatest among the over-65s. In 2019, 63 percent of 65 to 74-year-olds shopped online, up from 45 percent four years earlier. Of the over-75s, 30 percent made online purchases, compared to 17 percent in 2015. Not only are more and more people making online purchases, but the purchase amount has also increased in recent years. (CBS, 2020)
• Of the postpay methods, Afterpay is used most often (20%). The use of this provider is followed by post-payment via the webshop itself (14%) or Klarna (13%) (Ruigrok, 2020).
• The amount of Dutch people that buy via a smartphone has tripled in 4 years. The well-known millennials (23-37 years old) buy online with the highest frequency of all generations. 69% orders a product or service at least once a month (versus 53% of all Dutch people) (Ruigrok, 2020).

Figure 33: Overview of a DESTEP trends analysis
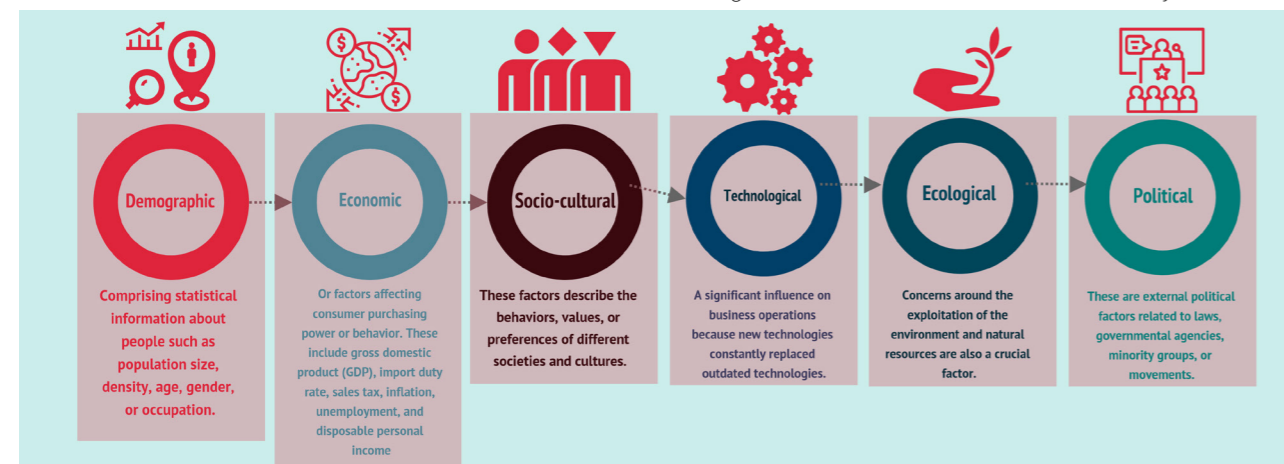
• Not paying directly at e-commerce companies is becoming increasingly popular in the Netherlands. Today, a third of consumers (36%) regularly pay afterwards for online purchases. This is especially popular in the 25 to 45 age group, 43% percent of this population group sometimes uses this payment method. This is also the group that buys online most often, with 24 percent doing so at least once a week. On average for all Dutch people, this is 15 percent (Ruigrok, 2020).
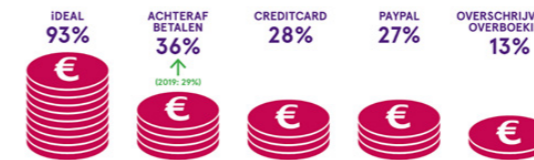
• In the period 2010 – 2020 there was an increase of about 300% in the number of parcels sent in the Netherlands. The increase is not only due to the corona crisis but also to the increase in e-commerce in general (De Buren, 2021).

Social & Cultural: characteristics in the area of culture and way of life.

• In Scandinavian countries, more than 70% of parcels are already collected from a package safe (DeBuren, 2021).
• Digital teenagers are also keener than the older generations to get what they want as quickly as possible. They are more often annoyed by long delivery times, products that are not in stock, or if the delivery is late.
• High shipping costs are number 1 for all generations when it comes to online shopping annoyances.

Technological: all developments and innovations an organisation has to respond to in order to keep up with the times.

• In the robotics market, the automotive industry has always been the largest market, and last year, for the first time, the logistics market outperformed that.
• Faster, more efficient, and bigger has been overtaken by smarter, smaller, and connected. Within the logistics sector, themes such as digitization, robotization, and smart collaboration are the order of the day (Arnhem Business 06, 2020).

• Partial autonomy of means of transport is close by, meaning that modes of transport function largely autonomously, but that certain human actions are still required (Arnhem Business 06, 2020).
• Covid-19 has boosted our digital identity (Trends Knack BE/Itsme, 2021).
• Transparency & Data will play an increasingly important role (Boltrics, 2020) & big data is big business (Adaption-it, 2020).

Ecological factors are those that are of influence on the environment and physical surroundings.

• Sustainability is becoming increasingly important. Various companies are adapting innovations that stimulate the use of renewable energy. PostNL, therefore, wants to deliver all parcels and mail emission-free in the last mile in the Benelux by 2030 (PostNL, 2020).

Political includes all the measures that have to do with political legislation and decision-making.

• Since 25 May 2018, the General Data Protection Regulation (GDPR) applies, which means this privacy legislation applies throughout the whole European Union. The GDPR has ensured, among other things: strengthening and expanding privacy rights, more responsibilities for organisations, and the same strong powers for all European privacy regulators, such as the power to impose fines of up to 20 million euros. In the Netherlands, the supervisory party is the Autoriteit Persoonsgegevens (Personal Data Authority).

Chapter 2 (external) - Key takeaways

• PostNL is by far the market leader within the domestic parcel market. However, they are losing market share to DHL especially in the B2C market which is a growing market. Therefore it is necessary to remain attractive for (e-commerce) businesses.

• Considering all LSPs, participants trust PostNL most with the delivery of their package, followed by DHL. On the other hand, when asked which LSP is trusted the least with parcel delivery, DHL is also mentioned.

• While the parcel market is growing, competition is also increasing. Smaller companies battling for the (sustainable) last mile as well as larger companies with a direct-to-consumer strategy can be considered as threats.

• Multiple companies that are active in different services industries are dealing with the challenge of establishing digital certainty. To deliver a service the way it is intended, these companies need to ensure that a user is who he says he is, that he is authorized to make use of (parts) of the service, and that he has used the service responsibly.

• Examples are: being allowed to order alcohol online, being the actual user of an account that provides access to certain locations, being allowed to drive vehicles, proving that a bank account is allowed to make transactions.

• Examples of current initiatives to establish digital certainty are: submitting pictures (of e.g. passport, face and driver's license), verifying a unique code (e.g. in an e-mail or on a mobile phone), tracking data (e.g GPS, IP, and cookies), requesting data that can be compared with data of third parties (e.h address/name combinations) and communicating real-time in secured environments (e.g in-app messages and confirmations).

Several lessons about establishing digital certainty can already be learned from the previously mentioned initiatives and are listed below.

• The collection and processing of additional data that is not necessary for establishing certainty should be avoided to maintain a reliable image and long-term consumer relations.

• One-time validations can lose reliability and quality over time. Therefore it needs to be made sure that these are still valid in later stages to prevent having and making decisions based on incorrect data.

• Although submitting visual static proof is convenient for consumers, it can easily be distributed and manipulated, while the addition of dynamic elements already significantly raises the threshold for improper use as these are more difficult to create and easier recognized.

• Validations will never reach 100% since there are always errors involved in validation systems. A first cause could be a human malfunction, intended or unintended. Another reason could be a failure of technology.

• Collaboration with other parties can be interesting. Working together with competitors facing the same problem might lead to a quicker and holistic functioning overall solution for all involved parties. Next to that, companies in other industries might have valuable resources interesting for PostNL that they are willing to trade. Finally, closely involving consumers can result in new insights directly from practice.

• Worldwide postal companies and logistics service providers are increasingly adopting digital identities. Since most of these parties are still state-owned, they can use data from governmental resources. For privatized (postal) companies such as PostNL, this is unfortunately not the case. Therefore they have to find other ways to obtain reliable data. Various important lessons can be learned from LSPs that already launched initiatives establishing digital certainty (among which the implementation of digital identities).

• Showing only the authorizing element of a digital identity can protect an individual's privacy better than current methods. For example, only showing that a consumer is 18+ instead of displaying this person's full birth date. Or stating that a consumer is allowed to drive instead of exposing this person's complete driver's license to others. Also, with regard to security, this has an advan-

tage since it makes consumers less vulnerable to data leaks.

• Making sure that a digital identity is accepted and recognized by a wide variety of organizations makes it more valuable and convenient for consumers. In this way, consumers are able to use a single account to gain access to numerous sites and services (besides postal and logistics ones). This takes away the hassle of having to remember the log-in credentials of countless accounts. By making it an all-in-one place (e.g. combining tracking info with an invoice overview and electronic mailbox), it can be used more often by consumers and strengthen the digital relationship.

• To ensure security, measures, and requirements are set during different stages in the entire use process: when creating an account (scanning ID or using bank your bank accounts), when logging in to an account (Multi-factor authentication methods) and after gaining access to an account (receiving a confirmation message each time a log-in attempt is detected).

• Experimenting and making use of new technologies like smart systems connected to addresses (e.g smart doorbell and smart lock) can still enable a FTR delivery in case a consumer is not at home during a delivery moment.

• Digital environments and identities are not only adopted by the younger generations. While OmaPosti's largest user group is the 25–35 age group, the second largest user group is the one over 65-year-olds. This means that older generations have also embraced using the service.

• Every year more than a million people in the Netherlands change addresses, most of which are between the age of 20 - 30 years old. This group also uses their mobile phone most, orders the most online and makes use of afterpay the most. Since this group entails a lot of uncertainties while being very active digitally, this group also makes an interesting target audience for reliable digital relations next to the previously mentioned interesting target group of frequent orderers.

• Data is playing an increasingly important role for the business as well as the transparency about it for consumers. Since 2018, the GDPR strengthens citizens' fundamental rights and promotes trade by clarifying the rules for businesses in the digital age.

• An overview of the most interesting and relevant strengths, weaknesses, opportunities and threats for PostNL can be found in the SWOT matrix in figure 34.

Strengths	Weaknesses
• Perceived as a 'reliable' company by consumers • Having a good functioning logistic network • Easily recognizable due to brand style (colors/font) • Being the monopolist in the mail market and having the largest market share in the domestic parcel market • Having 6.2 million+ unique user accounts	• Not having a lot of digital expertise • Not enough data/information about customers • No consistent service nation wide due to being a large scale operations • Customers does not have a lot of choice • Difficult to differentiate from competitors
Opportunities	Threats
• Being in almost every street in the Netherlands, every day in front of an open door • Having almost everyone in the Netherlands as a consumer • People wanting more flexibility • Customers wanting more certainty • An increase of people shopping online: more e-commerce shops and parcel shipments	• Increase and acceleration of the digitalisation • Other people making advantage of the reliable image • Increased competition from new players • Webshops offering shopping flexibility by providing afterpay methods which are susceptible to fraud • People remember mainly the bad experiences • Regulations regarding privacy and sustainability

Figure 34: SWOT-matrix for PostNL

03

Theoretical foundation

This part will highlight and discuss the most interesting and relevant insights that were found in literature.

3. THEORETICAL FOUNDATION

3.1 Approach

To get a deeper understanding of digital reliability in consumer relationships and important factors when designing for a logistic service provider, a literature study was performed to gain sufficient theoretical knowledge.

3.1 Research questions

The aim was to be able to have an answer to the following research questions:

- **RQ1:** *What factors play a role in successful digital transformation that are of importance for the postal- and logistics industry?*
- **RQ2:** *What are the basic elements and principles of a good service?*
- **RQ3:** *What is important in (digital) consumer relationships? And what role does trust play?*
- **RQ4:** *What are the driving factors for fraud & misbehaviour and how to deal with those?*
- **RQ5:** *How to design a digital identification system that ensures a sufficient level of certainty and reliability?*

2.1.2 Search areas

Based on these research questions, an initial amount of eight search areas was defined that forms the basis of a deep-dive in a wide variety of sources:

Figure 35: Literature search areas

3.2 Literature review

The key terms of the search areas were used to find articles in scientific journals (such as the International Journal of Logistics Management, the International Journal of Human-Computer Studies). Covered literature streams include: 'digital transformation in the logistics service industry', 'trust in digital relationships', 'human drivers for fraud', and 'safety potential of digital identities'. Furthermore, also publications by leading consultancy firms such as KPMG, Deloitte, and PWC were used.

3.2.1 Challenges and success factors for digital transformation within the logistics services environment

Postal companies have already dealt with some burdens over the last three decades (KPMG, 2019), among which: 1) The privatization revolution that led to a denser competitor field, 2) the economical crisis and 3) The revolution of the internet that has transformed the way humans communicate. Especially this digital revolution currently is a big challenge for these mostly traditional postal companies. According to the Universal Postal Union, the digital transformation of postal services worldwide has become a strategic priority with the expansion of the digital economy. As a result, postal companies are implementing new technologies to diversify, adapt and modernize services to meet customer demands.

What is digital transformation?
Digital transformation (DT) is a topic that has been quite trending the last couple of years and has become a 'container term'. For this project the definition, DT is considered as 'a process that is about adopting disruptive technologies to increase productivity, value creation, and the social welfare' (Ebert & Duarte, 2018). Next to changing the bureaucratic and organizational culture, DT also significantly influences the relationships to stakeholders, including consumers (Mergel, Edelmann & Haug, 2019). It is disrupting the way businesses operate and the way their consumers behave (Escher, 2020).

This digital transformation (also known as Industry 4.0) will trigger changes in businesses and will have a significant positive impact with regard to revenue and reducing costs. However, only businesses that can keep up with this transformation and are able to come up with innovative business models are the ones that can take advantage of this digital revolution (Efendioglu & Woitsch, 2017). Therefore, organizations are reinventing their entire business processes or create new ones that include these digital technologies (Schreckling & Steiger, 2017).

Serving the consumer
The digital revolution has made customers' demand for good experiences even more powerful (Stickdorn et al, 2017). Instead of only being able to obtain information or purchase goods from a local environment, they can now choose between multiple channels for information or purchases all over the whole world. The wide availability of data and offers makes it possible to switch between channels whenever this is considered convenient. As people were forced to adapt and develop new ways of doing things due to the COVID-19 pandemic, it was found that this change in behaviour from consumers is rather permanent than temporary (PWC June 2021 Global Consumer Insights Pulse Survey, 2021). Apart from utilizing technology to provide customers greater insight into when their package is delivered, the opportunities to enhance the customer experience are considerable. (Escher, 2020). Intelligent use of data to optimize this consumer experience is therefore crucial in order to remain relevant and keep up with the competition.

Digital transformation challenges for LSPs
New technologies and changing customer demands have seen a dramatic shift in the strategic priorities of all post and parcel players. LSPs must improve the delivery experience while switching to new business models that realize growth and reduce costs. (Accenture, 2020). However, since postal companies such as PostNL are very traditional, digital transformation is not that easy and straightforward.

Cichosz, Wallenburg and Knemeyer (2020) found five major challenges that postal companies and logistics service providers encounter when dealing with the implementation of technological innovations:
1) First there is the *complexity of the logistics*

system and underlying processes. Current main postal companies are large, distributed all over the country and have tens of thousands of employees. They function as a connecting party and deal with numerous stakeholders of various sizes, divergent preferences, and different ways of working. Thereby difficulties are experienced concerning standardization and pressure from big and powerful clients. Making exceptions are found to be very difficult to manage in a later stage. Next to that, the flow of goods must still be organized in an analog world instead of in a digital one.

2) Secondly, LSPs seem to *lack resources*, especially digitally skilled employees. LSPs have to compete for these people with other last-mile delivery companies, including ones with a more digital appeal (such as e.g. Uber). Although companies do focus on purchasing innovative technologies, they lack the skills and capabilities to properly use the technologies to improve current value or create new value (Van der Bel, 2018). This also relates to the organizational structure and environment. Digital culture and training is the biggest challenge that transportation and logistics companies are facing (PWC, 2016).

3) Technology adoption is a third important barrier, especially with regard to picking the right technology at the right moment in time. As digital related choices are often perceived as belonging to the IT department, this often results in low engagement and contribution from future business owners. As a result, new interesting technology investments are made that might not always be the most effective and efficient ones with regard to serving a company's operational needs and that of their customers (Cichosz, Wallenburg and Knemeyer, 2020)

4) Resistance to (digital) change is a barrier to digital transformation that is frequently mentioned in literature (Gupta, 2018) and also applies to the logistics service industry. This might be understood to a certain extent as Keyes (2000) argues that change (positive as well as negative) always causes a disturbance in people, since humans desire stability. Cichosz, Wallenburg and Knemeyer (2020) distinguished between two types of resistance within LSPs. Institutional resistance has to do with the 'competency trap', which includes the tendency to rely on past and familiar priniciples, skills and

routines as it is believed that this will also lead to successes in the future without measuring their actual effectiveness. Although this was also sensed within individual resistance, another impart factor for employees is the presence of various types of 'fear' (e.g. for the unknown, fear of failure, fear of losing control, fear of job loss, fear of poor results and fear of worsening consumer experiences). Employees have habits and are afraid to deviate from them (Gupta, 2018)

5) The final major challenge to overcome is *data protection*. Successful implementation of digital transformation requires strong integration between applications and information storage that support business processes (Cichosz, Wallenburg and Knemeyer, 2020). In a connected world, communicating this information and data to cloud solutions opens a door for less security and privacy (Tadejko, 2015). As consumers nowadays require 'anytime, 'anywhere-access' to (self-)services, this increases the amount of data and therefore pressure on data access security and the prevention of data breaches (among which unauthorized access). Failing to protect this company and customer data could have several negative consequences as a result, among which losing customers and legal lawsuits.

Success factors
The following factors are all mentioned as success factors that might overcome the previously mentioned barriers and lead to new business models (Cichosz, Wallenburg & Knemeyer, 2020):

• Strong and 'active' leadership that orchestrates change, is able to inspire and motivate people, has a vision and can to communicate this to stakeholders.
• An organizational culture that supports customer-centricity the openness to change.
• Engaging with employees and partners by organizing events and programs that encourage employees to come up with new ideas, work together, and develop a 'growth mindset' that minimizes their resistance to change.
• Aligning business and IT strategies by simultaneously developing and and reconfiguring IT- and business resources across organizational processes.
• Process standardization and data integration by simplification where possible and encourag-

ing customers to cooperate.
• Training employees and developing digital skills that help them to adapt to digital business environments. This can be organized internally as well as by making use of external parties.
• Agile transformation management that makes it possible to rapidly reorganize and reassign resources in order to respond to new consumer demands and changes in dynamic markets.
• Leveraging internal and external (technological) knowledge by investing in own R&D centers that allow employees and partners (including start-ups) to come up with new ideas.

3.2.2 The role of service design

A shift in the design world
While design has till recently been mainly about products, nowadays society and industries have been sensing an ongoing shift towards service design. In their research, Rodriguez & Peralta (2014) identified four main factors that have influenced this shift. Next to the digital transformation-related factor that includes aspects such as networking technology, IT and internet development, also the trend towards user centeredness has been a major factor. Also, environmental awareness is a factor that causes designers to create fewer objects and think about offering them in a service context. Furthermore, the emergence of start-ups that enables the relatively fast design and development of new business models has also been mentioned as a factor that contributed to this shift.
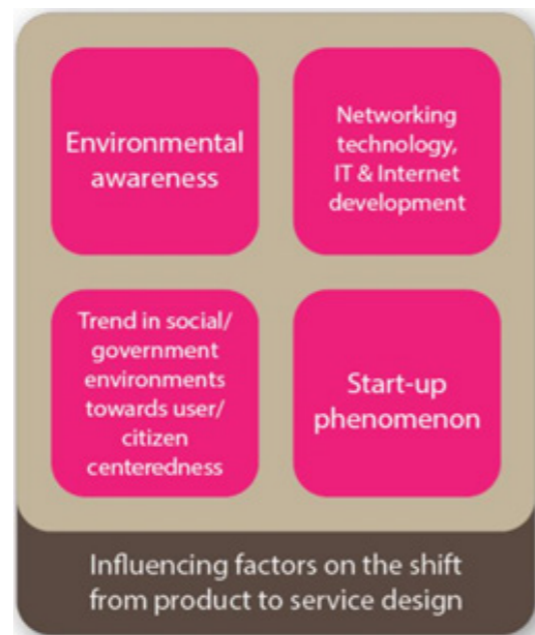
Figure 36: Four influencing factors on the shift to SD

In other words, also in the design world, a transformation took place where designers perceived the need to complement their problem-solving approach with system-thinking when approaching current design challenges (Rodriguez & Peralta, 2014). This is also when service-dominant logic (Vargo & Lusch, 2004) was introduced as a new way to think about the concept of service and the role it plays in exchanges, competition, and marketing. This includes a service being a fundamental unit of economic exchange and seeing goods and services as an integrated thing (Penin, 2018).

Service design
Services are exchanges of value that are essentially intangible and do not result in ownership (Kayastha, 2011). Consumers exchange money, time, day, or something else they value. Thereby they want an organization to co-create value with them by helping them, by taking away their problems, or by realizing their goals. In return, they expect organisations to provide experiences that reach or exceed expectations, meet emotional needs and fit in with their lives (Stickdorn et al, 2018).

Service design is based on creating better experiences that can be sensed frontstage (e.g. through channels, products, touchpoints, interfaces) and does this by understanding backstage processes (e.g. policies, technology, infrastructures, systems) as well as the business goals of an organisation. Thereby, a service blueprint allows an organisation to explore, create and manage all these issues concerning the design of a service (Shostack, 1982). Stickdorn et al. (2018) argue that an organisation's core competencies are taken for granted until a negative experience happens. Thereby it was stated that consumers are influenced more by an organisation's layers of experience than by its core offering.

Although services are essentially intangible, Shostack (1982) made a distinction between two types of service evidence: peripheral and essential evidence. Peripheral evidence such as an e-mail with a T&T link or a deliverer note is something tangible that a consumer can possess but does have little to no independent value. Essential evidence, such as a PostNL point or a delivery van, has an important role in the evaluation of the purchased services but cannot be owned by consumers.

Principles of service design
Stickdorn et al. (2018) defined six principles of service design:

1. Human-centered: Service design considers the experience of everyone that is in any way affected by the service. This means that the focus is not only on the users but also employees and other humans are taken into account.
2. Collaborative: In the service design process, all involved stakeholders of various kinds should be actively engaged.
3. Iterative: The approach of service design is exploratory, adaptive, and experimental. Thereby it iterates towards implementation.
4. Sequential: The service should be visualized and orchestrated as a sequence of interrelated actions.
5. Real: Research concerning consumers' needs and prototype testing should be done in reality. Evidence of intangible values should be provided physically or digitally.
6. Holistic: Services should sustainably address the needs of all stakeholders through the entire service and across the business.

Touchpoints and service encounters
Touch-points are points of contact between a service organisation and a consumer, and are considered as one of the central aspects of service design, essential for the consumer experience (Clatworthy, 2010). Shostack (1984) describes these touchpoints as "*everything the consumer uses to verify their service's effectiveness*" and states that they should be designed carefully.

Each time a person relates to or interacts with a touch-point, they have a service encounter. These service encounters could be seen as a triad (see figure 37) in which consumers and contact personnel engage in a service process in an environment that is defined by the service organisation (Bateson, 1985). For all three parties, it is mutually beneficial to work together to create service encounters that are positive (Cook et al, 2002).

Service encounters provide experiences to consumers and influence their relationship with a service and its provider. Clatworthy (2010) states that consumers' opinion of a service and its provider is shaped by the sum of all experiences from touch-point interactions.
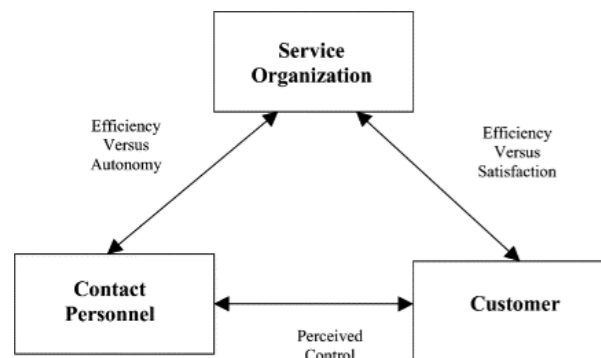
Figure 37: The service encounter triad (Bateson, 1985)

Although based on findings that are subject to debate among several behavioral researchers, Chase and Dasu (2001) have proposed five behavioral principles for designing service encounters:

1) Service encounters should finish strong as humans have a preference for improvement. Furthermore, Kahneman's peak-end rule (Kahneman et al., 1993) states that when people think back to an experience, they often do not remember the whole, but only certain details: the most intense point (the peak) and the end.
2) Undesirable experiences should be eliminated early in the service encounter. Research has indicated that people prefer to receive bad news before the good news.
3) Pleasure should be divided, while pain should be combined. The reasons for this are that events seem longer when being divided and that humans have an asymmetric reaction to losing & gaining, also known as 'loss aversion' (Kahneman & Tversky, 1979).
4) Control should be provided over the process through choice as this will improve consumer satisfaction.
5) Attention should be paid to norms and rituals as deviation from norms is often associated with failure.
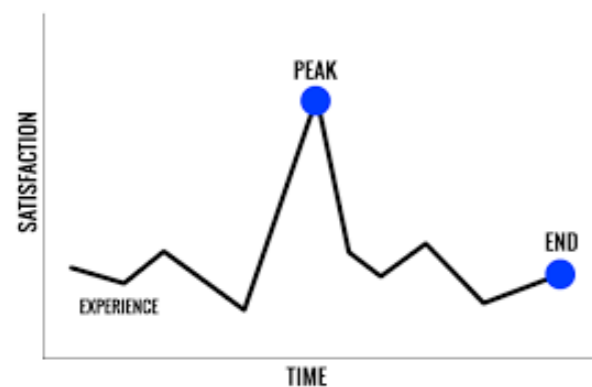
Figure 38: Kahneman's peak-end rule (1993)

3.2.3 Digital consumer relationships and the role of trust

Consumer relationships (management)
Payne and Frow (2004) describe CRM as "*a management approach that seeks to create, develop, and enhance relationships with carefully targeted customers to maximize customer value, corporate profitability, and thus, shareholder value*".

Developing relationships with consumers can be a promising opportunity to gain a competitive advantage. Companies that seek to engage with consumers in relationships and act in a way that inspires confidence, may find a positioning in their industry that has not yet been exploited (Priluck Grossman, 1998). When people are dissatisfied in relationships, this might lead to different types of behaviour, including exit (ending the relationship), voice (e.g. complaining), and loyalty (Hirschman, 1970). In interpersonal relationships, exiting is most likely to occur when individuals sense that love is not fully mutual (Holmes and Rempel, 1989).

The concept of trust
An important aspect of relationship maintenance is trust, which is also considered to be a crucial element in all human interactions (Butler, 1986). It enables people to live in situations that contain risk and uncertainty (Deutsch, 1962).

With trust, a distinction is made between slow and swift trust (Meyerson et al., 1996). Slow trust is developed over time and is therefore often seen in long-term relationships. Swift trust is established during short-term moments in which relationships are quickly created and ended. Another distinction is made between general and specific trust (Rotter, 1971). General trust is when a consumer has overall trust in another person (de deliverer), group (PostNL in general), or technology (visual T&T-info). Specific trust relates to the belief that a person, group, or technology will perform a particular way in a particular situation (e.g. putting a not-at-home note in the mailbox instead of in the doorframe).

Mayer et al. (1995) define trust as 'the willingness to accept vulnerability based on the expectation of a positive outcome of another party's actions'. Thereby they distinguish between three factors that drive overall trust.
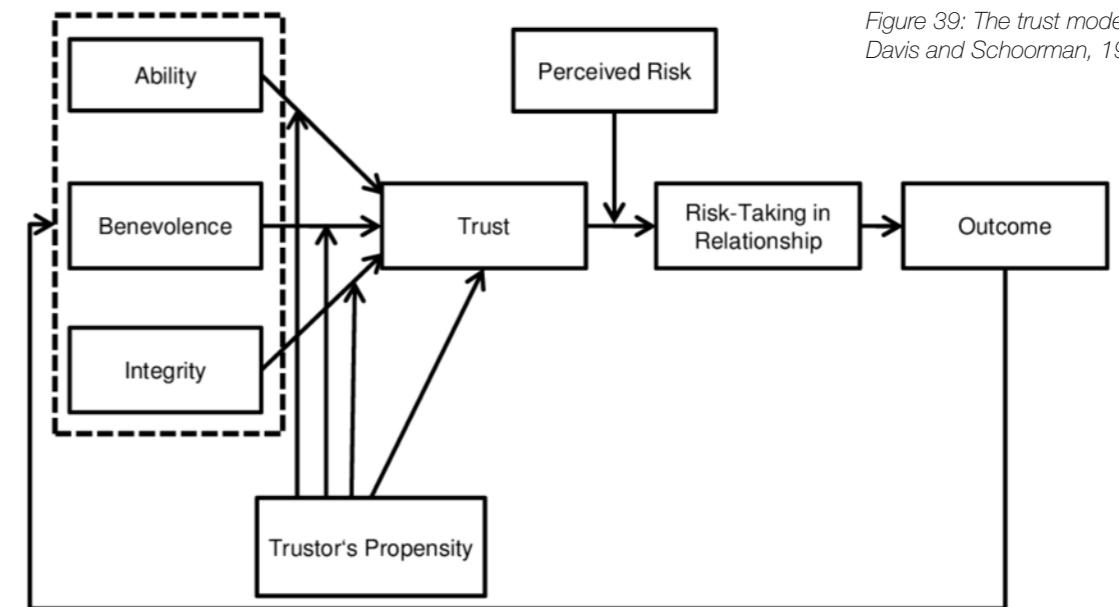
Figure 39: The trust model (Mayer, Davis and Schoorman, 1995)

These include the trustor's perceptions of a trustee's:

• *abilities:* the collection of knowledge and skills, and competence that enable the trustee to have influence within a specific domain (such as the logistics process).
• *integrity:* the trustor's perception that the trustee consistently follows a set of principles that the trustor finds acceptable.
• *benevolence*: the extent to which the trustee is believed to have a good intention and want to do good to the trustor, besides only making a profit.

According to the trust model (Mayers et al, 1995), the consequence of trust is risktaking (see figure 39). This can express itself in a change in intention to purchase, collaborate, or share information (Jarvis, Mackenzie & Podsakoff 2003) and also lead to the decision to transact within an online environment (Gefen, Karahanna & Straub 2003).

When consumers engage in online transactions, they are finding themselves in highly uncertain situations, which might be an obstacle for continuance (Gefen, 2000). He states that before people do complete an online transaction, they must have trust in two things: the organisation providing the service (in this case PostNL) and the means through which the interaction is realized (Tan and Theon, 2001). In this case that would be the PostNL website, app, or another digital touchpoint.

Trust cues
Stanford et al. (2002) argue that consumers tend to rely heavily on the design of a website when assessing reliability. In such a digital enviromnent, trust can be established by means of 'trust cues': elements embedded in the interface design that convey trustworthiness to users. Examples of these trust cues found by Nielsen et al. (2000) and Fogg et al. (2001) and include: 1) an overall professional look of the website (good use of visual design elements, professional images, and absence of typographical and grammatical errors) and 2) ease of use (during navigating, searching, and carrying out transactions).

Privacy
Although privacy is a frequently mentioned as a major concern in digital relationships, field experiments such as the one performed by Beresford, Kübler & Preibusch (2012) researching the willingness to pay for privacy, might question this. It was found that between two identical services, people would prefer a cheaper option that required more sensitive personal data. Furthermore, research conducted in the Netherlands, showed that half of the people are still concerned about privacy, but that trust in an organisation is by far the number one reason for consumers to share their personal data. (DDMA, 2021). Furthermore, it shows that clarity about data use has the greatest influence on trust, followed by a 'data quality mark' and how well known an organisation is. Security has a major impact on willingness to share data (50%), while 89% would like to have more control over their personal data (DDMA, 2021).

3.2.4 Fraud and Misbehaviour

What is fraud?
Fraud has been around since time immemorial and will also never go away. It is and remains an 'arms race' between scammers and investigators. Since these processes nowadays are increasingly started and executed online, this is also where a solution has to be found.

Remarkably, fraud itself is not a criminal offense. Instead, it is a container concept belonging to all kinds of deception aimed at gaining an advantage for the fraudster. This is usually a financial advantage, but it can also concern goods/products or a better personal position (FraudeHelpdesk.nl, 2019). Fraud does not have a criminal law article but the individual shapes and components related to it, do have this.

The most well-known article that concerns fraud is Article 326 of the 'Wetboek van Strafrecht' (scam):

"He who, for the purpose of taking advantage of himself or another, either by assuming a false name or a false status, or by cunning tricks, or by a fabric of fictions, induces anyone to give up any good, to provide a service, to make data available, to incur a debt, or to cancel a debt, as guilty of fraud, shall be punished with a term of imprisonment not exceeding four years or a fine of the fifth category." (Wetboek van Strafrecht, 2018).

Figure 40: The fraud triangle (Cressey, 1971)

Fraud is therefore punishable when all of the following are involved:
• a fraudster having a preconceived intention
• the law and the standards protected therein have been violated
• benefits for the fraudster
• a distortion of the truth
• a victim that acts on the basis of the false information obtained
• the victim is (financially) duped

Fraud always involves intentional deception and an injured party. Matters are presented differently by the fraudster than they really are (CCV, 2020). Dinstinction is made between two main categories of fraud (Politieacademie, 2013), namely: *1) Horizontal fraud,* which is about fraud that is aimed at citizens, businesses, and financial institutions and *2) Vertical fraud* which refers to fraud where the government is the victim. For the scope of this project, the focus will be on horizontal fraud.

Main drivers of fraud
Looking into why people do commit fraud and how it happens, literature provided several insights among which is the 'fraud triangle model' (see figure 40), developed by criminologist Donald R. Cressey (1971). As a result of interviewing 250 criminals that had accepted a position of trust in good faith and also had violated that trust, Cressy came up with three elements that must be present to violate trust and for fraud to occur:
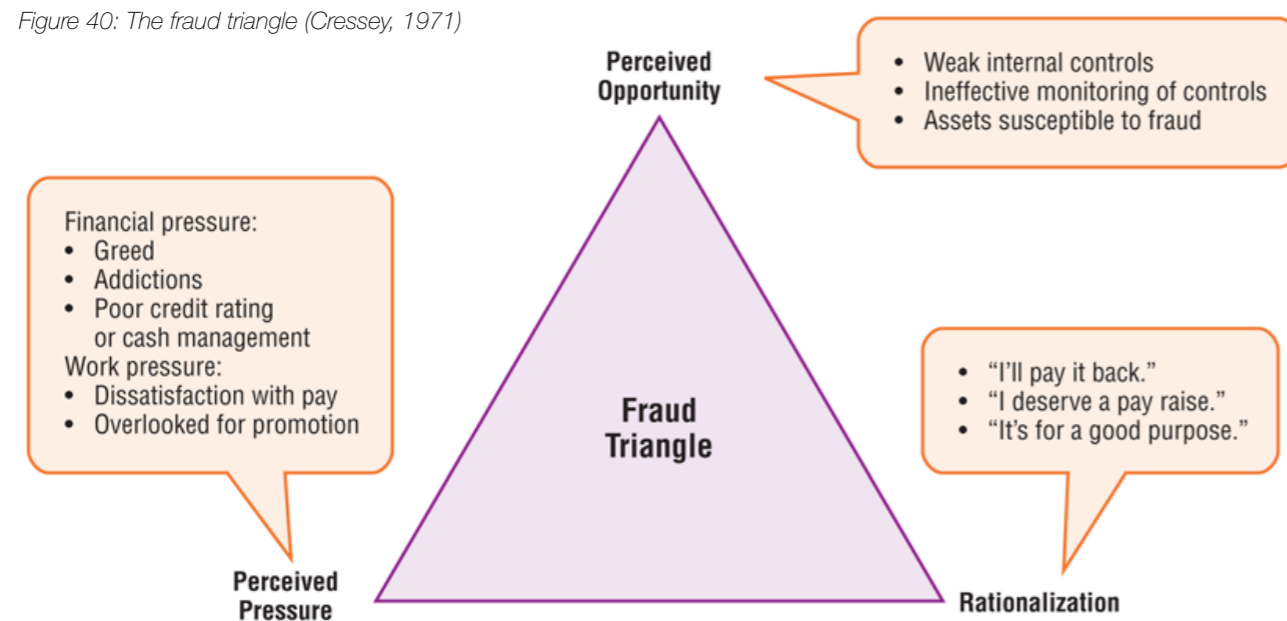
1) Motivation or Pressure: having a problem that is believed not to be able to be solved legally or with help from others.
2) Opportunity: the discovering of an internal weakness or perception of lack of supervision.
3) Rationalization: making a trade-off between the gains from the fraud and the possibility of being caught or justifying of fraudulent actions.

Wolfe and Hermanson (2004) revisited this theory and introduced another fourth element, namely: '*Capability'*. They believed that several frauds would not have happened without a fraudster that has the right capabilities to do so. Furthermore, they suggested four observable skills and traits for committing fraud:

1) The authoritative function or position an individual has within the organization, *2)* The capacity to understand and exploit the systems and their corresponding security weaknesses, *3*) The confidence that an individual has with regard to not being caught or easily getting out of a situation with confrontation and *4)* The capability of an individual concerning dealing with stress.

This might be valuable since Dorminey et al (2011) stated that the original model was not able to solve fraud sincet two of the three sides of the original fraud triangle can not be observed.

3.2.5 Digital identities

What and why?
The needs for identification and user registration have increased with the transposition of the offer of products and services of all kinds to the online sphere (Electronic ID, 2020). The capacity to prove that you are who you say you are is a fundamental component of economic, financial, and social development (GSMA, 2016). A possible way to realize this is by means of a digital identity: a key representation of a user and becoming a most crucial subject for information security (Tanvi, Sonal & Kumar, 2011). It can be considered as a digital environment with built-in certainties that enables an individual to prove who he or she is (online) and provides authorization to take certain actions. The World Economic Forum & Deloitte (2016) describe an identity as 'a collection of individual attributes (pieces of information) that describes an entity and determines the transactions in

which that entity can participate'. Thereby the following three main categories of attributes can be distinguished:

• *Inherent attributes*: attributes that are intrinsic to an entity and are not defined by relationships to external entities (such as age, height, date of birth, fingerprints, etc).
• *Accumulated attributes*: attributes that are gathered or developed over time. These attributes may change multiple times or evolve throughout an entity's lifespan (such as health records, preferences, behaviours, etc.)
• *Assigned attributes*: attributes that are attached to the entity, but are not related to its intrinsic nature. These attributes can change and generally are reflective of relationships that the entity holds with other bodies (such as BSN, phone number, email address, etc.)

Establishing certainty
As mobile phones have become indispensable in the daily life of humans, they have become sources containing large amounts of personal information. Needless to say, this sensitive data that could include for example pictures, videos, and other secret information such as several of the mentioned attributes should not be able to easily fall into the hands of others. This is where authentication mechanisms come in. On mobile devices, authentication is often the first entry point for getting access to a secured environment where entities have to be sure of the identity of another one. (Thullier, Menelas & Bouchard, 2016). Authentication and authorization are two of the most important security features for mobile transaction systems Over the past few years, various authentication schemes have been proposed. These can be divided into three broad categories:

• *Knowledge-based*: what you know. Here the main goal is exploiting a user's cognitive ability. Thereby a distinction can be made between explicit and implicit knowledge-based mechanisms. For explicit ones, the user is required to create new data and remember this in order to be able to use it later, such as the password for an email account or the PIN code of a debit card. For implicit ones this means exploiting the user's cognitive ability as this person has to make use of information that this person already knows. This could be personal information related to prior experiences or personal preferences which is often used for answering

a 'secret question' whenever a user forgot a password and would like to restore an account.
• *Token-based:* what you have. Mechanisms that use this principle, require a user to be in possession of a physical token or object for this person to be authenticated. Examples could be a one's key or mobile phone.
• *Biometrics-based:* what you are. It is always with the user, you can not forget it, since it is who you are and is linked with the uniqueness of a user. Thereby a distinction is made between physiological and behavioral elements. The first one relies on one's body characteristics (such as a fingerprint or iris), while the latter one deals with individual performed actions such as the way a person writes or walks.

An interesting way to make validation systems more reliable without sacrificing too much in terms of user convenience is by using a Multi-Factor Authentication method (MFA). This implies that the user has to go through two or more steps in order to get authorisation for performing a certain action. Token-based mechanisms are often used in security systems with two- or multiple-factor authentication processes. Schneider (2009) states that by using multiple authentication methods, our confidence in the result can be increased beyond what any single method provides. Integrating both three mechanisms into one authentication system significantly raises the threshold and decreases the attractiveness for fraudsters.
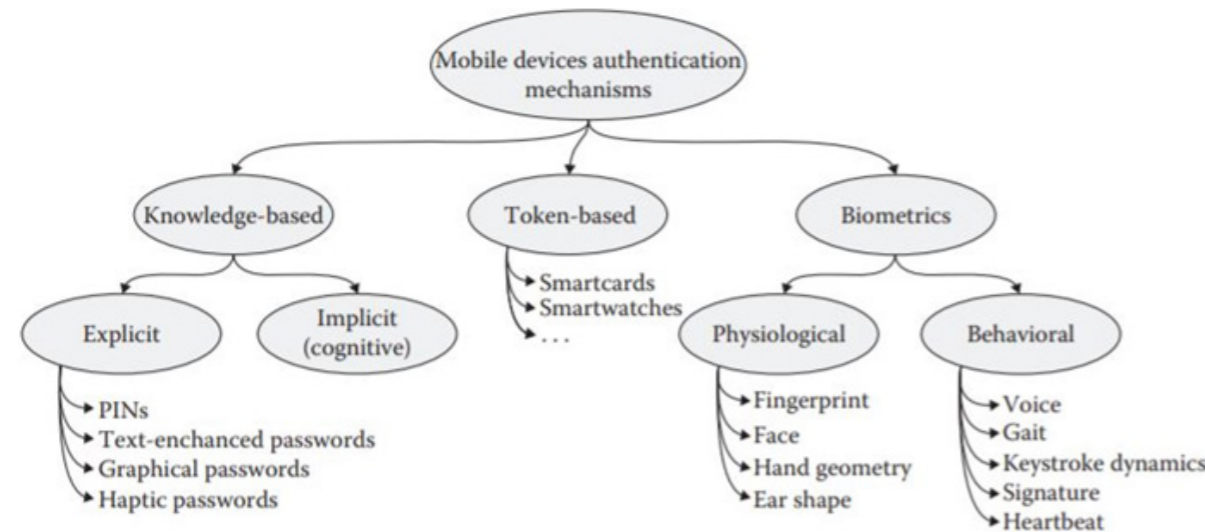
Figure 41: The three broad categories for authentication schemes, retrieved from (Thullier, Menelas & Bouchard, 2016)

Chapter 3 - Key takeaways

• With the expansion of the digital economy, digital transformation has become a strategic priority for postal services. Consequently, these postal companies are implementing new technologies to diversify, adapt and modernize services to meet consumer's expectations. Collecting data and using it in a smart way can significantly improve the consumer experience. This is absolutely necessary to stay ahead of the competition in a digital world with unlimited options for consumers to choose from.
• While digitally transforming, logistics services are dealing with five main challenges: 1) The (large scale) complexity of the logistics system and underlying processes, 2) the lack of (digitally skilled) resources, 3) the adoption of technology, 4) the resistance to change and 5) the protection of data.
• 1) Leadership, 2) a supportive organizational culture, 3) employee and partner engagement, 4) aligning business and IT strategies, 5) process standardization and data integration, 6) employee training and skills development, 7) agile transformation management and 8) leveraging internal & external (technological) knowledge are all mentioned as success factors that might overcome previously mentioned barriers for digital transformation and lead to new business models.

• During the last decade a shift has been taken place from product design to service design as the primary unit of exchange is moving from goods to services. Factors that have had an influence on this shift are environmental awareness, trends in user-centeredness, digital technologies and the start-up phenomenon.
• Marc Stickdorn describes service design as "*a human-centered, collaborative, interdisciplinary, iterative approach that uses research, prototyping, and a set of easily understood activities and visualization tools to create and orchestrate experiences that meet the needs of the business, the user, and other stakeholders*".
• Service design is about exchanging value. Although services are essentially intangible, their existence and effectiveness can be verified through service evidence, among which touchpoints. These touchpoints are points of contact between a service organization and a consumer and should be designed carefully.
• Service encounters can be considered as a triad in in which consumers and contact personnel engage in a service process. This happens in an environment that is defined by the service organization. A consumer's (reliability) perception of a service and its provider is shaped by the sum of these service encounters._ Five behavioural principles for designing service encounters include: ensure a strong finish, eliminate undesirable experiences early, divide pleasure & combine pain, provide control through choice, and pay attention to norms and rituals.

• Trust is the base for any transaction and is essential whenever risk is involved as it enables people to live in uncertain situations. Trust can be defined as 'the willingness to be vulnerable based on expectations of a good outcome'.
• Trust is the base for any transaction and is essential whenever risk is involved as it enables people to live in uncertain situations. Trust can be defined as 'the willingness to be vulnerable based on expectations of a good outcome'. It is considered to be driven by three factors: abilities, integrity, and benevolence. The consequence of trust is risktaking.
• Trust cues are a way to convey trustworthiness on digital channels. They are mainly determined by the overall professional look of a digital point and its ease of use.

• Fraud itself is not punishable (as it has no article in the Dutch Criminal Code, however the individual shapes and components are. For this specific project, the focus is on horizontal fraud, which entails fraud among consumers and companies.
• In order for fraud to happen, the presence is required of a motivation, a rationalization and an opportunity. Next to that also the capabilities of a fraudster play an important role with regard to succeeding in a fraudulent activity.
• Know Your Customer is the first step and is even required by law for financial institutions

• An identity can be described as a collection of individual attributes that belongs to an entity and determines the transactions in which that entity can participate. These attributes can be inherent, accumulated or assigned to an individual.
• There is a distinction between three types of authentication schemas, namely those based on knowledge (what you know), tokens (what you have) or biometrics (what you are). A combination of of these schemes is known as a multifactor authentication method and is considered significantly more reliable with regard to verification.

04

Empathizing with the consumer

The goal of this chapter is to understand the needs, values, and drivers of PostNL's receiving consumers that resulted from qualitative and quantitative research. Based on this, also several design principles are provided that are relevant for the design phase.

04. EMPATHIZING WITH THE CONSUMER

4.1 Introduction

Since a human-centered design approach is taken in this project and desirability (from a consumer perspective) is playing an essential role with regard to the success of the project outcome, the consumer has to be regularly involved in the process. From this moment there will be multiple moments of empathizing with consumers and in multiple stages. Both in-depth and more general, close by and from a distance, as will become clear shortly.

In principle, everyone in the Netherlands is a consumer of PostNL and could provide relevant insights for research. However, good to mention again is that the focus will be mainly on the receiving consumer, or: the 'addressee' of a shipment. This is due to the fact that they have limited choice with regard to the LSP, are most dependent and vulnerable in the process, and the required certainty for PostNL is considered the highest within this group.
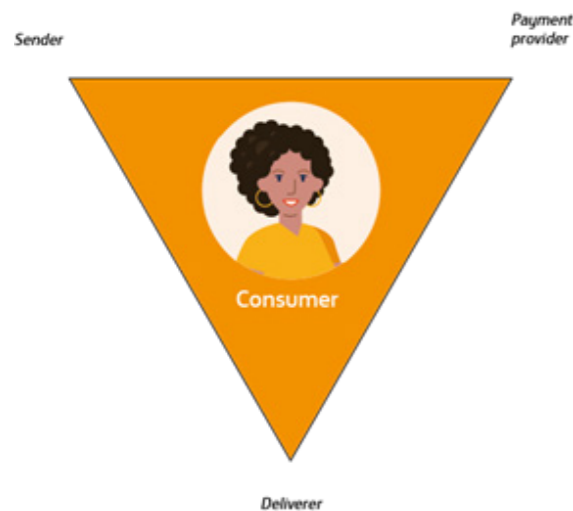
Figure 42: The consumer triangle

Figure 43: Focusing on the receiving consumer

With regard to the scope of this project, there are several factors and variables according to which this receiving consumer can be divided:

- *Size and composition of the household (alone, living together, family with children, living with parents, housemates).*
- *Properties of the home (delivery) environment (flat, student house, terraced house (with garden), detached house).*
- *Frequency of involvement in logistic related processes (rarely, regularly, often).*
- *Digital competence and skills (low, high medium). This might also be connected to age.*
- *Attitude towards data/privacy/digitalisation (positive, negative, neutral).*

For this assignment that focuses on establishing a reliable digital consumer relation, the focus during the consumer research is mainly on people between 20 and 30 years old that live in locations with a high address density. The reasons for this are as follows:

- They often live in multi-person households and in large cities.
- They almost always have a phone with them and are generally fairly digitally skilled.
- They are often located in several places (student house/(both) parents).
- They order relatively the most online (and pay afterwards).
- They are relatively easy to reach out to.

During the consumer research, the choice was made to perform at least a qualitative as well as a quantitive research study. The qualitative study was performed to be able to dig deeper into the problem and to gain an in-depth understanding of consumers' individual experiences, opinions and thoughts. Furthermore, it allowed for the opportunity to elaborate on the 'why' of their answers. The quantitative study was performed to quantify consumers' opinions and attitudes. This allows for the uncovering of patterns based on numerical data and as a result provides a more reliable overview of consumer's perceptions on a larger scale.

4.2 Qualitative Research

4.2.1 Research goal

The goal of the qualitative consumer research is to find out customer (latent) needs, worries, and underlying values concerning reliability within the LSP context and digital environments. Therefore, the following three main research questions were formulated to empathize with the consumer:

1) *How do consumers look towards the service of an LSP, what influences the delivery experience, and what factors impact the relationship between them with regard to reliability?*

2) *What are consumers' opinions towards digital efforts, what are the differences in digital behaviour, and what do consumers appreciate in digital environments?*

3) *How do consumers look towards proving their identity and how willing are they to validate their identity including attributes such as one's person or address?*

4.2.2 Approach

The approach used in this qualitative research was based on Glaser and Strauss's Grounded Theory Method (1967) as this generates theory that is 'grounded' in the data that has been systematically collected and analysed, continuing until this data is saturated (Strauss & Corbin, 1994). Furthermore, this theory makes it possible to uncover social processes which are important concerning this assignment. Therefore, key categories that play an important role will be created based on the collected data (Birks & Mills, 2015). With the Grounded Theory Method, it is possible to analyse and keep track of thoughts already as soon as possible. This makes it possible to adjust the focus if an interesting direction has been discovered.

4.2.3 Data collection

For the qualitative research method, the choice was made to conduct semi-structured interviews. These lasted for approximately 60 minutes and made it possible to deeply understand consumers due to the use of probing and emphasizing the 'why'. To ensure a smooth

running interview with the focus on the previously formulated research goals, an interview guide was prepared (see appendix D).

This interview guide was created according to Patton's guidelines for qualitative interviews (2002), requiring questions to be singular, open-ended, neutral and clear. Furthermore to ensure consistency during the process, as can be seen in the interview guide, use was made of certain topics that guided the conversations (Patton, 2002).

Unfortunately, the interviews had to be done remotely due to the COVID measures, which would take away some of the spontanity. Therefore use was made of Microsoft Teams. The interview sessions were recorded with the permission of the participants so they could be transcribed and analysed in a later stadium. This was done by coding, after which several interesting categories were found that form the theory.
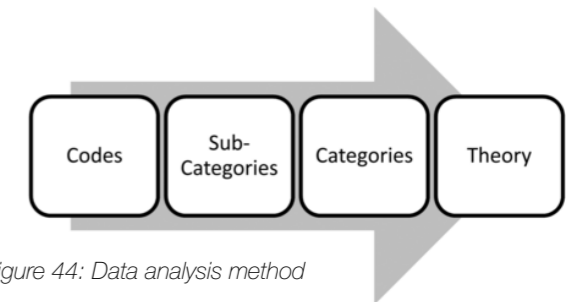
Figure 44: Data analysis method

4.2.4 Participants

The participants for this qualitative research were recruited by means of a purposive sampling strategy, using small samples of people. The only requirement was that they would have been involved in a logistics-related event of which the most recent one was not more than thirty days ago. The interviews with the participants were scheduled at least a week before with a request to already reflect back on their experience with logistics services and digital consumer experiences.

As will become clear in a moment, the interviews were mainly held with participants between 20 and 30 years old that are students or starters. Based on among other things, meetings with security (as described in chapter) and relevant trends (described in section 3), this turned out to be an interesting consumer group for further research.

A purposive sampling strategy was used to recruit participants. Based on, among other things, observations from security (as described in chapter 2) and occurring trends (described in chapter 3), 11 interviews were conducted with mainly students and starters.

The characteristics of the eleven participants that have been interviewed were as follows:

1) *20 years old, female, studying, Almere, shared household, terraced house.*
2) *23 years old, female, student, Delft, living alone, student flat.*
3) *24 years old, male, studying/working, Amsterdam, shared household.*
4) *25 years old, female, student, Eindhoven, shared household, detached house.*
5) *25 years old, female, student, Delft, shared household, student house.*
6) *25 years old, female, working, Rotterdam, living together, apartment.*
7) *26 years old, female, studying, Delft, living together, student flat.*
8) *27 years old, male, graduated, Den Haag, living alone, student flat.*
9) *29 years old, male, working, Den Haag, shared household, apartment block.*
10) *55 years old, female, working, Almere, shared household, semi-detached house.*
11) *78 years old, male, pensioned, Hoorn, living together, detached house.*
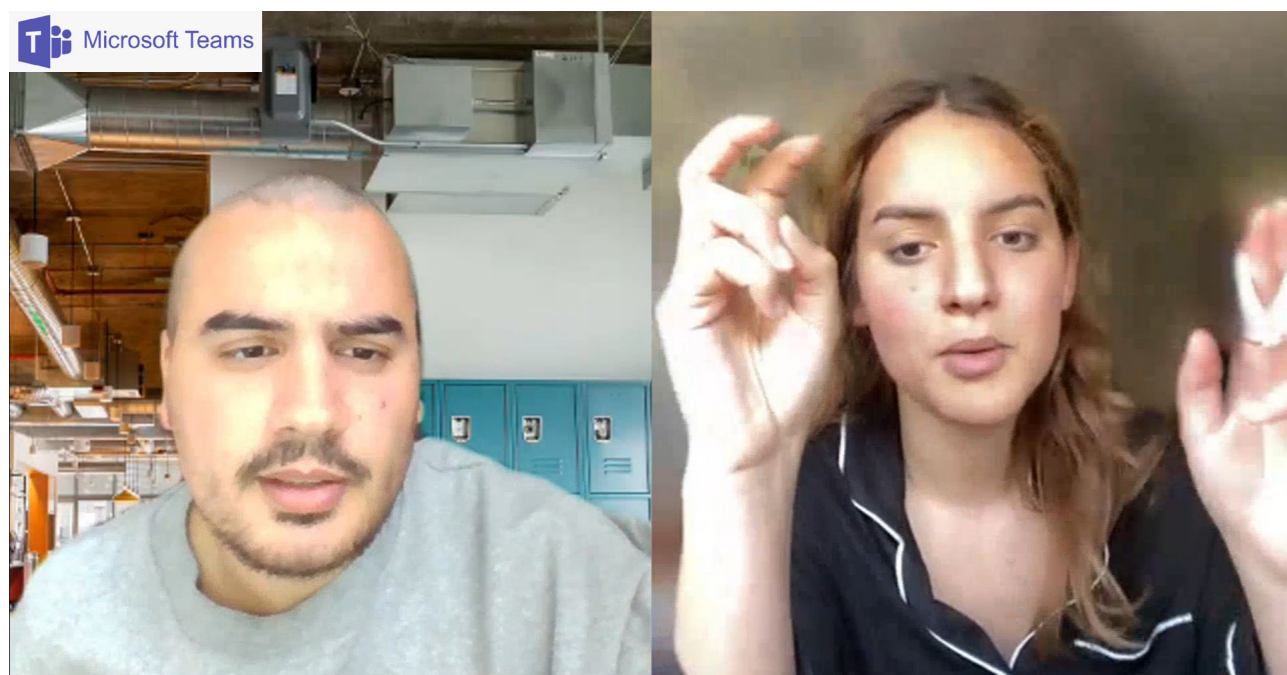
Figure 45: Impression of an online interview with one of the participants

4.2.5 Insights: digital certainty and reliable relationships

The next section includes the insights gained from the research and provides answers to the previously formulated research questions.

> **1. Factors influencing the delivery experience and the reliability of logistics service processes**

1.1 Living up to expectations

The one and **most important thing** people rask from an LSP (such as PostNL) is to just have whatever is being sent, **delivered in good condition and according to the agreements**. These agreements are what they base their expectations on and are what will lead to a positive, neutral or negative experience.

Thereby there is a group of consumers that is **not interested in additional services**:

> *"I just want my package to arrive well, I don't necessarily need anything else."*

while others expect that LSPs also have to **move with the times** and therefore appreciate the introduction of **innovations**:

> *"I recently tried the stamp-code and was really surprised by how well it works."*

Furthermore**, people already expect everything to go well.** As a result, most people find it far more difficult to remember a very good experience compared to a very bad one. This also counts for the negative experiences that are experienced by other people they know.

In general, **people perceive PostNL as a reliable brand**. Not only because of the quick service, they think so because it is such a large company, it is Dutch, and well-known by the public. They know the brand already from a young age and still come into contact with it everywhere.

> *"Everybody knows PostNL, they would not simply get away with screwing you."*

> *"Het voelt best vertrouwd sinds vroeger. 'Ik ken van jongs aan gewoon de punten van PostNL."*

It was found that **creating expectations significantly influences consumer satisfaction.** Creating tougher expectations lead to quicker disappointment, sometimes even being unnecessary. Therefore it is important that you **do what you promise**, which might not always be the case currently

> *"PostNL claims that they deliver to your front door, but that's not how it goes in the student flat here, where we have to go downstairs.."*

Consumers indicate that sometimes they would rather receive something a few days later - **matching their expectations** and according to what is communicated - instead of being able to have it as quick as possible.

> *"I stayed home especially for the package, but then the package did not arrive at all. If you are not able to deliver it the next day, don't make a false promise. I did not even need it that quick and wouldn't mind having to wait one or two days longer ."*

These expectations however are not per se always set by PostNL, also by the **sender**:

> *"Sometimes I see that webshops make a difference between 'ordered before xx, tomorrow delivered' and 'ordered before xx, sent today'. The first one promises something that might not always be the case."*

1.2 Personal living and housing situation

The **environment in which one lives** has a big influence on how a delivery is experienced and the the degree to which people trust in a good outcome.

The first found factor is a consumer's **type of house and its location**. Thereby a big difference was found between consumers that have their door directly at the street and consumers that live on higher floors, which might lead to less **involvement** with the LSP.

> *"He directly hands over the package and immediately walks back downstairs, so there is actually less interaction than before."*

> *"Back then the front door also was downstairs, so I could see everything: the delivery van, the loading out, etc."*

In some cases, especially with **large buildings,** the delivery person does not even come to the door:

> *"He rings the bell at all numbers downstairs and then you have to take the elevator down yourself to pick up your package there."*

The **composition of the household** is another factor that influences the delivery. The more people that live at his address, the more trust an addressee has in a good outcome of the delivery:

> *"Hadn't notified them but knew they were just home so it would be fine. Especially in COVID-times, there's always someone home."*

Having housemates that are frequent orderers also results in more **interaction moments** with the deliverer, which can **create a bond**:

> *"When the bell rings, we know it's for her, the deliverer knows us very well by now."*

Connection with neighbors is another factor that influences the trust in a good outcome:

> *"..you also live with so many people in this building and you don't know those people."*

> *"I trust my neighbors, so I know my package will be fine if I miss a delivery."*

1.3 Own influence on the process

As concluded in the previous section, expecting something to be there the next day and it isn't, really sucks. Providing consumers with a choice can **decrease the burden** on PostNL and simultaneously lead to **less dissappointment**. Consumers also indicated that they do **like to have choices** with regard to the delivery of an expected shipments, especially with regard to the **delivery moment**.

> *"I would like to be able to say, 'I'm not in a hurry' or 'I'm in a hurry'."*

> *"..take it easy with my package, you don't have to work overtime for that."*

Companies that already provide these options are much appreciated. Most mentioned were: de Bijenkorf, Albert Heijn, bol.com and Budbee.

> *"It's also nice that you can choose different delivery times and (size of) time slots during ordering."*

> *".. you can really choose anything by going through a kind of menu with different options. And then you can arrange it yourself."*

Consumers find it annoying that they currently can not do that with PostNL:

> *"I did not necessarily need it the next day, but I could not indicate it anywhere."*

> *"It's just like 'then we deliver it and then you figure it out'."*

However, they do appreciate the possibility of choosing the PostNL point as a **delivery place**, so they can be sure to pick it up the same day when not being at home unexpectedly.

Consumers that have choices also indicate that they are **willing to pay more** for different types of these choices. Examples are: paying for CO2-neutral delivery, faster delivery (in case of an emergency), or being able to choose between different LSPs. Thereby willing to pay slightly more for the more well-known LSP because it feels more certain.

> *"I know that I will be home then for 2 hours, so I pay extra."*

1.4 Perceived (in)competent behavior

When consumers see or find out that the **person responsible for delivering** their package acts irresponsible or unsatisfying, this influences their level of trust.

> *"They just left it in plain sight in front of the door once. As a result, I now always check the website in advance to see who they have as a carrier before I order."*

The **not-at-home notes are sometimes prone to mistakes and confusion.** They are sometimes unreadable or contain incorrect information. When not put in the mailbox, they are blown away, disappear, or are placed in illogical places. These **inconveniences** together with questioning the truth influence consumers' reliability perception of an LSP.

> *I often get a notification stating that the delivery was failed, while I was just being at home the whole time. I think that sometimes they don't even try to deliver it here on the 5th floor."*

People indicate that **digital reliability and physical reliability are not always as consistent** as they would like them to be: they perceive a gap. What deliverers are actually doing might regularly differ from what the digital channels state (e.g. delivery to the building entrance instead of the front door or already digitally confirming the receipt of the package before entering the street).

> *".. the delivered dropped off the package half an hour after the 'confirmed' delivery time. They probably already mark everything up front."*

Another example of incompetence perceived by consumers is **the ease** with which deliverers sometimes give packages to them (on the street). They do find it convenient to be able to still obtain their package when they just missed delivery but still see the deliverer in their street. However, approaching the deliverer and claiming to expect a package for a certain house number **without showing ID** or proof surprisingly seems enough to receive it:

> *"I feel like it used to be much safer back in the days, with a lot more and better control."*

1.5 Taking responsibility & empathizing

Delivering is people's work and therefore consumers **value a deliverer that they can connect with**, especially a fixed one. They share personal things with this person and sometimes even provide them with extra rewards. This deliverer also **contributes to the trust** consumers have in PostNL.

> *"The deliverer really is my friend."*

> *"..it is a pity that it is such a short moment of interaction."*

Consumers sense the rush and although they feel sorry for it, they do **understand the situation** of the delivery person to a certain extent. Mainly the **financial cause** was mentioned.

> *"I don't think they have time: they look busy, park the bus in the middle of the street, jump out of the car, etc."*

> *"Those people just don't get paid much and are in a hurry. That's why they're throwing it in like that. "It's a shame to be reminded every time that those people get paid so poorly."*

Consumers sometimes **feel guilty** with regard to the deliverer, they **reflect** upon their own actions and **think about what they can do** (to help). This varies from **emphatically thanking**, **helping** the deliverer to get rid of his package, or consider **buying in a physical store** instead.

> *"If someone stands there a little longer, I also say 'thank you' and 'good luck today'."*

> *"If they ask if you want to accept a package for the neighbors, you just say 'yes', because you know that otherwise the delivery person has to come back again."*

> *..do I really need this or can I just go to the store? I felt quite uneasy about it.*

However, although they are aware of the cause of this rush, they still think mainly about the **benefits for themselves**:

> *"I do want free shipping when I order myself, which might be a bit naive or hypocritical. I really notice that if that's not the case, I'm less inclined to order."*

Also, the **neighbors** play a role in how people experience the logistics process. It was found that people might have a **moral obligation** as well as **social motivation** to accept packages for others.

> *"I've also had a situation where I wasn't at home and..."*

> *"They do it for me sometimes, so the least I can do is return the favor."*

Some consumers even indicate that they actually **like taking packages for others**. In this way, they feel that that can **do something for the neighbourhood** and find it see it as a way to **maintain contact** with the neigbour.

> *"Those are the only moments I have some interaction with them, which has led to a better and more personal relationship".*

> *"..such a package is a moment of bonding."*

Although most consumers appreciate a **good social bond** with their neighbours & deliverers and try to help each other where possible, this can also work against them. Thereby they can feel like being **saddled with a problem**. They don't want to have to take packages too often and be **treated as a 'dumping place'**.

> *"Because we were often at home, we became the standard address where delivery guys would ring the bell. Consequently, we simply had the whole hall full with packages."*

> *".. then you have a package that is not yours, in your house and you have to wait for that person to pick it up."*

Furthermore, consumers think it's a **matter of principle** that the actual receiver takes the delivery time into account and also should try to pick up their own package instead of automatically expecting that it will be brought to them.

> *"First they order all kinds of stuff while not even being at home during the delivery."*

> * I don't think it is a nice gesture to just leave and store these packages at someone else's home for a while till it irritates this person."*

1.7 Degree of transparency and the way of communicating

Lack of clear communication can lead to great **frustration** among receiving consumers:

> "Got the notification 'delivery time unknown'. Checked every day, but no new updates."

> "..not very clearly communicated to which neighbor it has been delivered."

Also, it can lead to sudden **surprises**:

> "It suddenly came in, really months later.., had no idea where it came from."

> "And then suddenly the bell rang and it was there. And I hadn't gotten anything from "he's coming today," "he's coming at this time.""

Clear communication enables consumers to **make an estimation** and takes away a lot of uncertainty with regard to receiving a package.

> "I really like it when they send a message or something with 'we'll be there in half an hour.'"

> "They let you know quite a lot, about we are there then and then. It's coming today, it's coming in 10 minutes. It's been delivered. And it's all just right too."

The visual (live) Track& Trace was often mentioned in particular as a an appreciated effort due to the **real-time updates** it provides.

> "That same day I received a text message with a link and could check from that moment exactly where the delivery person was driving and how many orders there were before me."

> "The timeslot already expired and I needed to leave. The live tracking however showed he was really close. I thought 'he's coming right now stayed for a couple more minutes.""

Also when consumers have to perform actions themselves, they expect to get **clear feedback**:

> "All I heard about it was 'thank you for doing it' and nothing else."

> "I had not received any confirmation or anything in the app."

1.6 Dealing with problems

When consumers sense that something goes wrong in the logistics process, such as a dealing with a missing package, they **do not always know what to do**:

> "I don't really know how to handle that. Maybe google it first and see if there might be a helpdesk somewhere that can check for you".

> "I believe you should be complaining to the senders. They are hiring the LSP and if multiple consumers issue complaints, this sender might reconsider their LSP choice."

When encountering a problem, the way an LSP reacts to it and **how they deal** with complaints influences consumers' perception of the brand and can make them doubt the reliability and competence of that LSP.

> "Really weird that they couldn't give any information. The package is in their sorting center. Why does there have to be any contact with the sender, he can't help me?"

Thereby they **hate the feeling of not being in control.**

> "With such a process, it is of course the case that you have to prove the contrary. "It feels so unfair that I have to be the one that has to chase it all the time when it's not even my own fault."

> "It made me feel a bit helpless and angry because it wasn't right. But I knew I was in my right."

Whenever problems are solved, but **no clear feedback** is provided, consumers might be afraid it will happen again and have less trust. Therefore they **take precautions** themselves:

> ".. but no explanation of what went wrong. So to be sure I'll just take pictures from now on."

Consumers appreciate it when companies come up with an **initiative** and/or provide a little **extra service**. As a result, **memorable experiences** can be shaped:

> "The nice thing was that they still fixed it while it was probably my own fault."

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2. Consumer needs, behavior and relationships in a digital environment

2.1 Digital capabilities & interests

Two factors found that have an effect on the view of digitization are **age** and **intrinsic interest**. Youngsters tend to be already used to quick changes and are more likely to adapt to them. Also because they use their **mobile phone** a lot. However, 'the old guard' do not always consider it **necessary** or does not completely **understand** it.

> "I know if I want to find something, how to find it. I grew up with a phone, so I think I know how it works."

> "I feel like I'm not very up to date with the latest trends. So I'm not the first in that area to make the switch."

As a result, consumers develop a positive or negative **attitude** towards the **adoption** of different type of digital innovations:

> "If I had my own house, I would really turn this into a smart house"

> "I don't quite trust that it always goes well."

2.2 App adoption

As part of a digital ecosystem, a touchpoint such as an app might play an interesting role in establishing a reliable digital relationship. People mostly think it might be **worthwhile to download** an app if it adds **significant added value** to them (e.g. **saving time**) or if they will be **making frequent** use of it, on a regular (daily) basis. Especially on a mobile phone, it is more convenient to use apps instead of going to a website each time. Apps that people use are mainly **social media**-related ones.

> "Look, Whatsapp you use every day, so you want to have it on your phone quickly."

> "Using the apps to get what you want takes less time than googling it or looking for it on the internet every time."

Having an app installed that is used so little, can cause **irritation** which might also lead to

getting rid of it:

> "I hate those apps that you hardly ever use."

> "I have to use it regularly, otherwise I look at it on my phone and delete it again."

With regard to the PostNL app, people do not use it that often enough to have an entire app for it. As a result, they **perceive no added value** in the app compared to simply visiting the website, or clicking on the link in their **e-mail**.

> "If you just have that link in your email, then I don't see why, yes, only so that they can track more data from me, but that is of little use to me."

> "AH just sends a text message, you don't need an app for that."

Furthermore, consumers notice that they are served by **multiple different LSPs**. Therefore they do not see themselves downloading the apps of all of these LSPs.

> "I get my packages delivered by all kinds of deliverers, so why should I download PostNL's app?"

> "You don't know in advance which delivery service will deliver, sometimes it's this one and sometimes that one. Then I might as well download all those apps. Better just nothing then, I guess."

When consumers do see added value in an app and consider downloading one, found factors that can make a difference, are: **reviews**, the **purpose** of the app, and the extent to which this purpose is **fulfilled**. Another reason for downloading an app is the possibility of **creating personal accounts** in it who then can be used as a **digital customer card** in the physical stores and for collecting credits.

> "Although you may not even use it often, it is still convenient that you can quickly use it, have an overview of previous orders, etc."

However, doing this too often can result in consumers **losing the overview**:

> "You already have so many accounts in your life, I don't keep track of it myself anymore."

2.3 Useful digital interactions and being informed

There is a group of people that has **the need to get the most actual information** and actively track the statuses of the delivery process.

"Following the status of my shipments really excites me. I like to know where my package is and when changes are happening. I even have a tab open that I regularly refresh."

"And then I definitely check a few times a day if the package is already on its way."

They do this because they feel **excited**, experience a bit of **uncertainty**, and like to **see progress**:

"You just want to know how long it's going to take, you're waiting for it and having it on your mind anyway."

'I want my package to arrive. I just want it. So when it comes, I'll have something to look forward to."

"I like it, because it's my package anyway and it follows a route."

Another smaller group has a more passive attitude, trusts that everything will be fine, and does not feel the need to check it more often.

During the tracking process, consumers sometimes experience **incongruity between different communication channels**, which leads to **stress**. Therefore it needs to be made sure that the same information is provided at the same time everyone sends the same when **multiple stakeholders** are involved.

"One said that it had been received by DHL, but the other site didn't say that yet, so I really had to look there for it myself."

Also, there are people that really like to be **up-to-date with push messages**:

"When looking forward to something and waiting for it, such as my salary, I would like to receive a push notification."

"I would like to be informed of changes as soon as possible."

"I really like it when they send a message or something with 'we'll be there in half an hour."

This allows them to **take actions** and **plan ahead**:

"So suppose I am at work and I receive such a notification, then I actually know that in advance. Then I know that I will visit the neighbors after work and then go home."

The **'your package is delivered'-message via e-mail or text message is appreciated** much by people that share a household. If the actual receiver is not at home and gets the delivery confirmation message, they are able to **directly check** with the other members of the household if everything went well.

"When I am at work and I get the notification that my package is delivered, I always contact one of my family members if this is indeed the case. Then, I finally feel at ease. "

Another group absolutely hates push messages. They want to **be in control** of when they perceive things and have everything turned off.

"I absolutely hate when I get messages on my phone all the time. Nowadays phones are designed to keep people on them as long as possible. I like to decide myself when I want to look at it."

In general, push messages with advertisements are hated as they provide no added value:

"That it doesn't help me, but only them. So it's really not aimed at me."

Furthermore, app communication is seen as quite **reliable** and a **controlling factor** that is seen as authentic. Therefore it might **decrease the risk** of being a victim of phishing.

"At first I thought it was fake, but after looking I saw that it was real, I think also because of the app."

"But then it was really via the bank app itself, so I trusted it then."

"Although it looked suspicious at first, the backup message in the app confirmed it."

With regard to the difference between **human and digital contact**, consumers indicate that if it is not urgent, they are fine with talking to the chatbot. But when it is **urgent**, they prefer talking to an actual person.

"When I am stressed, I am not waiting for a machine that keeps asking me the same questions."

2.4 Digital reliability & certainty

When consumers think about a reliable relationship, they see it as **mutual**. Parties engaged in this relationship **offer each other something**:

"That you know 'if I need something from them, they do or give it. But also the other way around. That they also ask you for help if they need it."

Therefore, it is also nice to know **what's behind it**, so not just only for personal gain.

"If you're in some sort of business relationship, I just want to know 'what's in it for you?' so I know what I'm actually giving."

Consumers indicate that the biggest difference between engaging in a physically and digitally reliable relationship is that it is much **easier to estimate it physically**.

"With people it is often that you just see body language and things like that. And digital it's always difficult since it is less transparent."

With regard to the **'not-at-home-preferences'**, certain participants indicate that the 'agreed place' in the garden is the worst thing a consumer can choose:

"You actually screw yourself if your package is not there, because you have to sign that it's your own responsibility if something goes wrong."

This **responsibility shift** from PostNL to the consumers is perceived by them as a **'sneaky move'**. This group is willing to make **extra effort** to pick up their package at a PostNL point in order to **feel more safe** and **have more certainty**.

2.5 Doing things digital: features & conveniences

Web applications, mobile phone apps, and the features they both include, can make consumers' lives considerably **more convenient**. Thereby, the Albert-Heijn app was a frequently mentioned and praised example.

Doing things digital enables consumers to **plan ahead** and **create overviews** (by already making choices), This makes it possible to **prepare** and **save time** with regard to doing things physically. Also, consumers **remain in control**:

"..can at the same time see how much it will cost. You can see very quickly and clearly if something is too expensive."

"I think it was there for 24 hours and you could adjust it. So if you forgot something, you could still add it later."

Also convenient of digital is the ability to **be connected**. Because changes are **immediately updated**, consumers are able to collectively make use of something while being in a different location:

"While one is in the store, the one at home can still add things to the list. That's ideal."

Next to the **hassle-freeness** that comes with **replacing physical items** (such as customer cards that you now always have with you), **personalized offerings** (e.g. recipes) make people curious and allow for **next best actions** that contribute to the **'all-in-one experience'**.

Also, the **ease** with which one can send postcards in the PostNL app is mentioned:

"Then I don't have to get any stamps and it's super easy. Just chilling on the couch on my mobile phone, putting together a card".

When people become **used to** the convenience and their new behaviour, they realize it becomes **indispensable**:

"I do so much with the app that now I would find it annoying to not have it. Doing it physically would take way more time and would require different actions."

2.6 Concerns about privacy & being aware of data usage

Awareness of data is becoming increasingly important. Due to the increase in (**news**) messages about 'phishing' and 'data leaks', consumers become more and more reluctant to **share data.** Especially when they take the time to think about it longer and more deeply.

> "You are more aware of how much data is available about you and that you do not have to release everything."

> "Because you visit sites and often accept cookies and such."

There is a gap between consumers about the **perception of privacy**. One group of people **values it** strongly and therefore they can be very **sceptical** about handing over (personal) data to a (commercial) company. Customers have **no idea what happens** with their data and information when and after they provide it to a company.

> "Look at data: you can't avoid it, it spreads. I want to limit it as much as possible. So if it's not necessary, I just don't want to give my data."

> "Because it could be used against me in the future. It's also a bit of uncertainty of 'what will happen to it?"

They indicate that it sometimes makes them **uncomfortable** when they have the feeling that they are **being watched** or that another party knows more about them than they would like:

> "The same applies to PostNL, they do not all have to keep track of how many packages I have ordered. They still do, but at least I don't want to get that idea."

> "if I've looked something up on Google and then when I'm on Instagram, I get an advertisement about it, that's really not normal.."

> "I do think of 'wow', really such a feeling of 'shit, they actually know about you. Well, then I think what do I actually do about it.."

Another group of people thinks that privacy **does not exist anymore** and that certain companies already know everything about everyone.

> "I think you don't have a lot of privacy anymore anyway, with everything you do on your phone."

> "To be honest, I don't care that much either, I don't really care if they know that about me."

Which can also have its **benefits**:

> "Sometimes it's convenient that if you were already looking for something and then suddenly it comes again."

However, being aware of the way data can be processed, might **lead to behavioral change**:

> "I don't just sign up for something anymore and also look at what they use data for, what exactly they need and why."

or not, if it takes **too much effort**:

> "I often disable cookies completely, but sometimes I'm quite easy with them."

> "The terms & conditions are always so much, so you never really read it all the way."

The willingness to actively and conscious share data, depends on what consumers **get in return** and **how valuable** that is to them:

> "And if I think 'there is an advantage to this', then I'm willing to give my data. But on social media, for example, really not there."

> "Clearly they use the data. I see they do it to improve service. And I assume most companies do it to improve service."

Thereby also a **distinction** is made between **commercial** parties and the **government**:

> "..those parties have no commercial interest in my data either."

> "When it comes to services, I'd rather have to pay for something than have it free. If it is for 'free', then you know for sure that you pay with your data."

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3. Identification processes and the willingness to validate

3.1 Understanding the need to validate

At first, consumers **do not seem to understand** why an LSP such as PostNL would need to have more certainty about one's identity attributes. They feel like there would **not be any actual change** for them whenever these attributes are provided and validated.

> "Why does PostNL want to know where I live? I can also just have something delivered to a different address, right?"

> "Suppose PostNL is 100% sure that I live here, nothing changes in the packages I order and receive. So why do they have to have that official in their documents that I live here?"

> "I'm registered with the municipality at this address, so 'I live here' and don't have to prove it."

Whenever there is a **clear added value** for them, they have more understanding of the need to validate:

> "But with your Digi-D, for example, if you use it for tax matters and things like that, you know, that really helps me."

> "And there is simply a digital account linked to it. It's really nice that it's there."

Also, the **perceived risk**, plays a role:

> "When it comes to money, it's different."

> "Picking up something at a PostNL point and have to identify yourself there seems legit, but delivering something to your home? I don't quite see what could be wrong with that."

Concerning fraud, consumers are **not that afraid of becoming a victim** of identity and address fraud in the first place. They believe that it would not be very likely to happen to them, which might hint at the **presence of the optimism bias**:

> "I'm actually not that afraid of address or identity fraud, how big is that chance?"

However, when thinking about it more deeply, experiences related to **uncertainty** are recalled:

> "I once received text messages full of spelling errors, supposedly from PostNL.."

> "With e-mails nowadays you don't know anything for sure anymore. Photo or code is possible, but can also be fake."

Next to that, also some understanding of the **responsibility** of PostNL is shown:

> "On the other hand, I also understand, because they are the ones who transport it and have a certain responsibility."

> "If I'm sure it's them and it's really an expensive package, then I'd also like to make sure it's going well. "I don't know, I find it really difficult."

3.2 Providing & submitting identity attributes

When given a clear explanation by a company about what they are going to do with it, the **willingness to submit identity attributes** depends on the **image they already have** of the asking company. Furthermore, consumers make a distinction between the **different types of attributes** that are requested then. Very clear already is that they do feel comfortable **digitally sending or sharing their ID** with an LSP such as PostNL.

> "I don't mind showing it physically, but sending it is just too much."

They **do not understand** why PostNL needs it from them and **do not want to do it all the time** for every company:

> "What should PostNL do with a photo of my passport? And do I have to do that with all delivery services? "

> "Then I think 'they really have no reason to have a picture of my face next to my name and address'."

Consumers indicate that they would think about it if there really aren't any **other ways to validate** that it is really them. Thereby **Digi-D** was frequently named as an alternative.

"I also have Digi-D by the way, can't I use that?"

"Why would I have to give them my ID if I can also just give my e-mail?"

Although the majority of consumers seems to not understand at first why PostNL (as described in the previous section) would need to validate their **address**, they do seem to find it **less invasive** than validation established by means of sharing their passport. Thereby other ways of validating, such as forwarding a picture of one's meter box, envelope number, and personal letter are seen as something else.

"Then it is not like you really have to throw a lot of data at them, but that is really to check 'is this your address'."

But still, the **privacy aspect** joins in once again:

"Taking pictures of the inside of my house, I think that's private."

"That is also against the AVG legislation, isn't it? You must have a demonstrable reason to be allowed to request that information."

Especially if other **external parties** are involved, suspicions might rise:

"..also, how are they going to check that number? That goes through a third party that supplies power, etc. So there is so much behind it, that I think 'sorry, but no'."

Still, all consumers have had to deal with validation processes at some point in their lives. Nowadays these proccesses occur often in an online environment: from taking a selfie and holding one's student card in front of the camera after finishing an exam to submitting a passport picture in a banking app.

Not only with regard to PostNL, but in general, people are less positive about digitally submitting a picture of their ID to another party and **don't really feel completely at ease** doing it.

".. was a bit weird, at first I thought 'should I do it'?"

People indicate to be **willing to show their ID** card in order to prove their identity, but find showing an ID something else than having to **upload** it. Thereby the **unknown, uncertainty, non-temporary, being out of sight** are the most frequent factors that scare them.

"You get the feeling that it is fixed after that, you don't know what happens to it and that it will always stay there."

For some companies and services, having to submit your ID is seen as **totally unnecessary** and leads to **avoiding the service** (e.g. submitting an ID to YouTube to be able to watch videos that are classified as 18+).

"Then I really think 'fuck off, I don't want to have to leave my passport everywhere."

When having to validate oneself in a physical environment - something that also occurs within the banking sector, e.g. when opening an account - **recognizability** and **familiarity** are of importance. When collaborating with other companies, this could be a problem:

"He was very friendly, but he wasn't from the ABN and also didn't look like someone from the ABN. It didn't feel quite familiar."

"Still feels weird to give your ID card at the door to someone you don't know and have it scanned. I just thought it was a bit shady."

"Anyone can stand in front of your door with such a device."

Consumers do **not** see validation as something that is **fun** to do:

"I cannot imagine that there is anyone that thinks: 'I am so looking forward to validating myself.'"

Therefore, multiple consumers indicate that they **prefer to do everything in one go**, instead of every time again. In that way, then can be done with it and do not have to think about it again. However, this is also strongly depends on what the validation is for. Furthermore, if possible they would like to go to an actual **physical and familiar location** when having to submit their ID, since this **feels more reliable** in multiple ways.

3.3 Questioning security, effectiveness, and side effects

Several participants expressed their **worries** about digital developments and wonder how PostNL is going to **establish certainty**:

"Your physical ID contains certain security features so that you (and others) can see that it is real, what about a digital ID? That seems more difficult to realize on a digital device."

"The quality of my camera is not very good, so the card with my name and all is completely blurry. You don't see my name quite right either, so I think hmm is this really working."

Also with regard to **safety and security**:

"I think it's less safe to solve it in a digital way."

"What if someone has managed to acquire that digital identity, then I really have a problem."

"Can't other people take screenshots, share it or log in from another location? Then you really do have a problem."

When consumers think about the bigger picture, they seem to **question the effectiveness** and side effects of being validated by PostNL. Thereby they think it will only work well if there is a large scale solution:

"Nice for PostNL that it works well for them, but not everything has been solved for the consumer and there are still threats. For the consumer, PostNL is only '1 of many'."

"Before you want to get rid of address fraud, everyone will have to work with such a verification."

Furthermore hearing about a digital identity or 'e-ID' sounds quite scary to certain consumers and also puts them off. Therefore, perhaps a 'PostNL pass' would be a better name instead. Also, the idea that consumers could be obliged to make use of it, can scare them off:

"Maybe that lowers my confidence in PostNL a bit, because I think 'this is quite a lot to ask from a customer'."

4.3 Consumer journey map

4.3.1 Approach

Now that more insights about consumers have been gained through qualitative research, the decision was made to visualise a consumer's experience during a relevant logistic event. This was done by means of a consumer journey.

The goal of this consumer journey is to find opportunities to improve the consumer experience by making this person's perspective transparent and clear. In this particular case, it was also used to determine the moments where certainty about one's identity is of crucial importance.

Since a lot of problems that concern package fraud are related to the possibility of paying afterwards and this has not yet been thoroughly discussed during the qualitative research, it was decided to get in contact with a consumer that regularly orders this way. Based on a discussion with this consumer, a journey for this scenario (of a consumer ordering online and making use of AfterPay) was created.

4.3.2 Insights

The consumer journey as illustrated below, provided the following insights:

• Consumers are excited when they have an intention to buy something. However, the overload of information and options can cause stress with regard to making the right choice.

• Factors that have major influence on making this choice, include shipping costs (including return costs) and promised speed of delivery.

• Although being confronted which a high price at first, consumers feel in control and feel protected from risks when there is a possibility of paying afterwards. Without having to pay directly during the moment of purchasing, they can order as much as they like without having the money for it. In case something goes wrong, they have not lost any money or do not have to wait for it to be returned. Especially since returning packages is often also free, consumers have no financial threshold to stop them from unlimited ordering. As a result, especially with clothing, consumers order multiple items in different sizes that they can fit and try at ease.

• Major irritations include 'not being aware of the scheduled delivery moment', 'not being able to change or influence a delivery', and 'having to pick up a parcel at a PostNL that is muchfurther than the nearest one'.

• With Klarna, it is possible to pay much later, sometimes even 60 days. This means that if someone's data is being used without their knowledge for the purpose of committing package fraud, this can only be detected after two months. This is way too late.

• In the consumer journey, three critical moments are found where certainty needs to be established when a consumer has made use ofan afterpayment method: (when selecting the afterpayment method, when changing a delivery and when a package is handed over). Lack of strong identification methods during these moments, results in a low threshold to commit fraud.
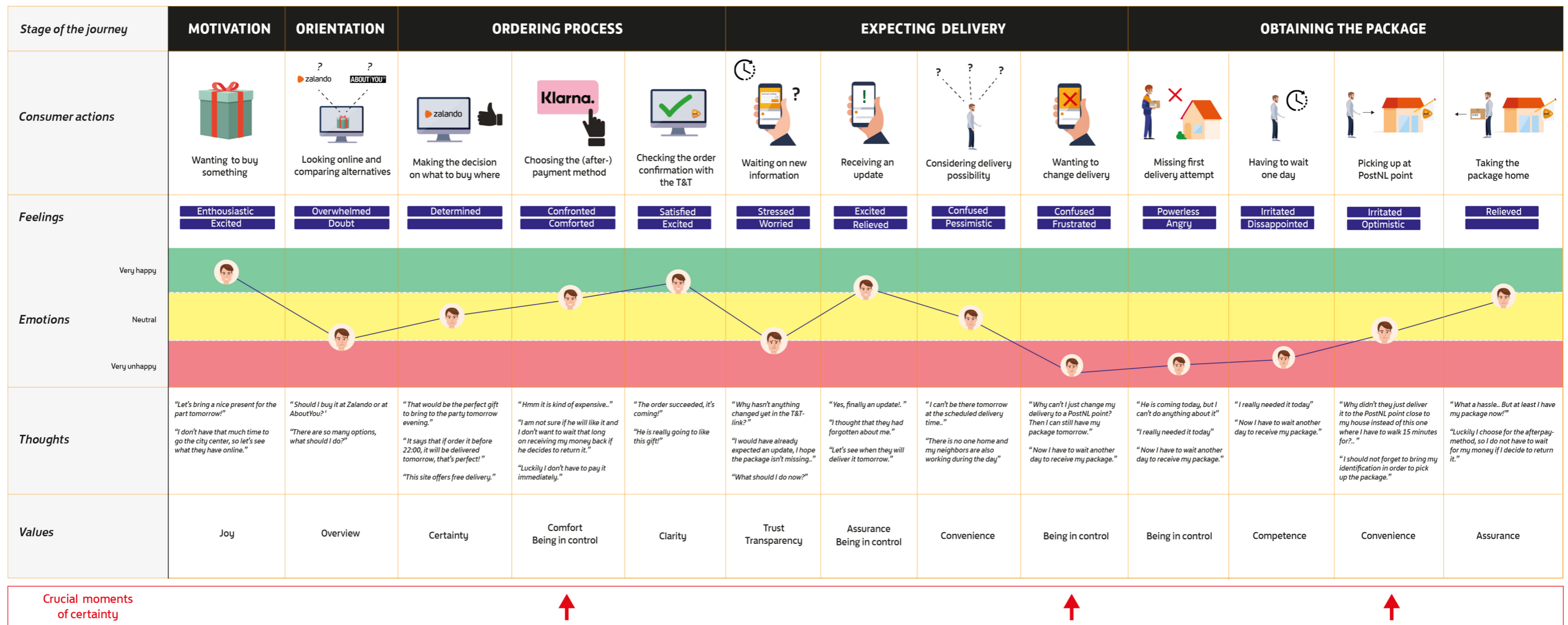
Figure 46: Consumer journey of a consumer using an afterpayment method

4.4 Quantitive research

4.4.1 Research goal & approach

For the quantitative research, a questionnaire was created and distributed online. The goal was to find out on a larger scale what consumers needs and perceptions are with regard to logistics services, address validation, and test assumptions based on the qualitative research.

The questionnaire was created according to Peterson's process of questionnaire construction (2000). Thereby the main research questions where similar to that in the qualitative study, with an extra emphasis on the security aspect and the consumer pain points. Then the types of questions were determined, which involved several multiple-choice questions and questions with a 5-point Likert-scale (ranging from totally disagree to totally agree). Furthermore there were several possibilities for respondents to elaborate on their choices. After the structure of the questionnaire was determined, the questionnaire was evaluated together with a test participant and adjusted accordingly.

4.4.2 Data collection

The questionnaire was created in Google Forms and the link was sent to the respondents. Although the aim was to have at least a hundred participants, fifty-five respondents eventually completed the questionnaire. Google already provided a visual overview of most responses, making them convenient for further analysis. The results of the questionnaire can be found in appendix E.

4.4.3 Participants

Participants were mainly recruited in the social environment. Family and friends were asked to fill in the created survey (see appendix xx) and also forward the link to others in their social circle. This could be considered as a random sampling technique with a wide variety of participant characteristics. To avoid influencing this study by duplicating results, all respondents that participated in this study differed from those participating in the qualitative study. The composition of the respondents of th quantitative study can be found in figure 47.

4.4.4 Insights

Based on the quantitative research, the following insights were retrieved:

Opinion towards package delivery
• In general, respondents are satisfied with the delivery of their packages as 72,7% indicated. 14,5% even indicated that they were very satisfied, while 12,7% showed a neutral attitude.
• Respondents' first and second preferences with regard to the alternative place of delivery (in case they are not home) are by far the neighbors and a PostNL package point (equally). The third preference for an alternative place of delivery would be a letter- and parcel machine.
• The most important requirement the delivery of a package must meet is that it arrives in good condition as mentioned by 85,5% of the sample. 52,7% indicated that the package must arrive at all. The third most important requirement (mentioned by 30,9%) is that the package must be easy to track.

Relationship with deliverers
• The extent to which consumers consider the relationship with their deliverers 'good' corresponds roughly to the normal distribution. 34,6% stated to have a good bond with their deliverers, while 23,7% indicated they do not.
• Regarding the extent to which consumers trust their deliverers, respondents were more positive (38,2%), while only 14,5% indicated that they do not trust their deliverers. However most respondents (47,3%) were neutral.
• None of the respondents indicated to have a personal bond with their deliverer. 60% even indicated that they absolutely don't have it.
• Only 3 out of the 55 participants indicated to have mutual agreements with their deliverer. The far majority stated that they do not know the deliverer that well to have those, did not know that it was possible in the first place or do not think it is necessary.

Digital activity
• Approximately half of the respondents have an app of an LSP, of which PostNL was mentioned most frequently. The major reasons for downloading this app were the easy tracking of packages and knowing which letter post is on its way.

Feeling safe and secure
• The majority of respondents (74,5%) is aware of the fact that scammers can order packages on your name and address fairly easily if they have certain personal information about them.
• Thereby the extent to which they are afraid that someone will have access to their personal information through phishing follows the curve of the normal distribution. Slightly more people are not afraid of this (29,1%) against 25,5% that is afraid for this. However, the majority (45,5%) has a neutral feeling towards phishing.
• On the other hand, they are more afraid that their personal information will fall into the hands of unauthorized people through data breaches. 47,3% expressed fear towards this phenomenon, while only 20% stated that they were not afraid of it.
• 36,4% of respondents are willing to confirm annually to the delivery service that they have access to a certain address in order to use all the services offered, against 38,2% that is not.
• The top three most import requirements with regard to this validation mentioned by the respondents are: security (47/55), privacy (34/55) and convenience (11/55).

Age:
Gender:
Receiving frequency per month:
Working situation:
Living situation:

Figure 47: Sample composition of the quantitative research

4.5 Design principles

Based on the insights of the qualitative and quantitative consumer research, the following six design principles were formulated that will be taken into account in the design phase:

1: Communicate the 'why'
Explain why you need which data and the purpose of asking. The willingness of consumers to provide data often depends on their interests and perceived value.

> *"What is the chance that I will become a victim of this fraud?"*

> *" That sounds very nice for PostNL, but what do I get out of it?"*

Especially regarding security & data leaks, the occurrence of the optimism bias is present.

2: Be transparent (about what and how)
Make clear what you are going to do with which data and in what way.

> *"PostNL really does not need to know how often I receive packages and when. Soon it will be used against me."*

3: Make it consistent
Have one clear way of establishing certainty and on a large scale.

> *"The way I have to identify myself is often different, sometimes I have to show my ID, sometimes my girlfriend's ID, sometimes only she can pick it up."*

or:

> *"One time I just missed the delivery moment but asked the deliverer that was still in my street if he had a package for my house number. He just gave it to me. What if it was not me, but someone else?".*

4: Offer control:
Make it possible for consumers to indicate preferences and what they want to do (with their data) and what not (within security limits).

> *"I don't want to do it in this way, I prefer to put in more effort than to be exposed to an unnecessary risk".*

5: Don't underestimate the value of social connections
People appreciate the human factor that goes together with engaging in a logistic process.

> *"I really like my deliverer and even know his name, so often we have a small talk when he delivers my parcel"*

or:

> *"exchanging parcels is actually how I got to know my neighbours".*

6: Provide clear added value
In order to stimulate adoption and cooperation, consumers should be able to easily see what's in it for them.

> *"With MyMail I can easily see what is coming and when."*

or:

> *"But with your Digi-D, for example, if you use it for tax matters and things like that, you know, that helps me."*

Chapter 4 - Key takeaways

• Qualitative research was conducted according to the Grounded Theory Method, including semi-structured interviews with a total of 11 participants. Thereby the focus was on 3 directions: the delivery experience and the influence on reliability, needs and behavior in digital environments, and the willingness to prove one's identity attributes. These participants were mainly between 20 and 30 years old that live in locations with a high address density since the risk is perceived as the highest here while the opportunities seem promising.
• The way consumers experience logistic services provided by a particular LSP, influences their perceived reliability of this LSP. Seven factors were found that contribute to these reliable experiences in particular:

1) The first is the extent to which expectations are fulfilled. This can include: 1) overall (long-term) expectations (e.g. moving with times, innovating, and developing more user-friendly interfaces) and 2) more specific (short-term) expectations (e.g. being able to trust that your package will be delivered tomorrow in good condition and according to the communicated time slot) might question the competence of the LSP and decrease the degree of trust. Therefore also false or risky promises with regard to the delivery process need to be avoided as much as possible (by PostNL as well as senders and any other responsible parties)
2) The personal living environment such as the exact location of someone's home, the composition of this person's household, and backup possibilities such as trusted neighbours form the second important factor that influence the trust in a good outcome of the provided logistics service.
3) Own influence on the process and whether they have a choice. Consumers would like to feel in control and therefore be able to indicate requests and preferences. Especially with regard to the quickness (sometimes later is also fine if there is more certainty), time slot, delivery place, the type of delivery (e.g CO2 neutral), and an LSP of own choice. Consumers indicate that they are even willing to pay for having these choices.
4) Perceived incompetent behaviour of LSP employees negatively influences the degree of trust consumers have in that specific LSP. When consumers notice or experience a deliverer that fails to perform his duties properly (e.g. careless handling of packages, unclear physical notes, lack of control measures, etc.), they might question the competence and develop a negative attitude towards the LSP this deliverer belongs to.
5) The empathy of those involved in the hand-over part of the delivery. Consumers value deliverers they can connect with. Also, they sense that these deliverers are always in a rush which they consider as a result of being paid poorly. Therefore they think of ways to show appreciation and how they can make it easier for these deliverers. Furthermore, most consumers are fine with accepting packages for neighbours in order to return the favor, to do something for the neighbourhood and to start or maintain social relations. However, the feeling of being used by LSPs and neighbours as a 'storage place' is considered an unwanted consequence and disrupts the relations between these parties.
6) The degree of transparency and clear communication are major factors contributing to a reliable relationship with consumers. Consumers do not want to be worried due to uncertain moments when expecting a parcel but want to know what is (not) happening and why. Especially during tracking a package consumers experience a lack of clear communication. Providing consumers with more insight into the process (e.g. providing real-time (visual) information) enables consumers to (repeatedly) make estimations based on the latest information and act accordingly.
7) Finally, the last important factor concerning the desired reliable digital relationship is the way an LSP acts when consumers encounter a problem. Consumers often feel powerless against a large company such as PostNL and treated unfairly when having to prove something that they consider PostNL's mistake or responsibility. Taking initiative in helping to solve problems is strongly appreciated. This is important since it was also found that negative experiences stick way more compared to positive ones. Also, when no clear explanation has been provided, reliability might decrease strongly, resulting in consumers taking precautions themselves in order to create their own certainty.

• Found factors that influence the attitude towards technological initiatives and the willingness to adopt them include one's intrinsic interest, their age, and the environment they grew up in.

• Consumers think it is only worthwhile to download (and keep) an app if they will use it frequently (almost daily), if it has a clear purpose or if it adds significant added value to their lives (e.g saving time). Thereby, most used apps mainly include social media ones. In general, the PostNL app does always seem to add that much value.

• There is a huge gap between consumers that want to be notified of everything as soon as possible and consumers that want to decide for themselves when to absorb information. Furthermore, apps are considered a reliable environment for communication.

• Consumers see a reliable (digital) relationship as something mutual, where both parties offer each other something. Thereby they do not want to get the feeling of only being used but also want to rely on PostNL when needed. It is therefore important that responsibilities are not easily being shifted away or to each other.

• Digital and associated features bring a lot of convenience with it. Next to making use of afterpayment methods, it enables consumers to do things more efficiently with less hassle, and makes them feel more in control. Also, the possibility to connect and collaborate in real-time with other consumers is seen as valuable. Furthermore, personalized offerings with 'next-best-actions' are considered interesting and are seen as helpful although consumers still want to be able to make choices themselves.

• There is an increased awareness of data and the consequences of sharing it with others. This might trigger differences in behavior in order to protect their privacy. However, several participants stated that this concept of privacy does not exist anymore. Although consumers know that their data is often being tracked, they don't want to get this feeling the whole time since it is uncomfortable and scares off. Furthermore, the willingness to provide data (which comes at the expense of privacy) also depends on what consumers can get in return. Thereby a distinction is made between governmental and commercial parties.

• Consumers see validation and verification primarily as a problem for PostNL. They see PostNL as a reliable party, but do not understand why they need and should validate themselves (digitally). There is still too little feeling that this is really necessary and valuable for oneself. They see no danger in identity or address fraud (optimism bias). Also, just being able to (occasionally) change your delivery or pick up a package faster at a parcel point is not worth it. More frequent use or clear added value could stimulate the willingness.

• In general, consumers do trust PostNL but are not willing to (digitally) submit pictures of their passport to PostNL. This has to do with concerns about the unknown, uncertainty, non-temporary, being out of sight, and security. Therefore it is difficult to obtain reliable proof with regard to the attributes of one's personal identity. Concerning the address attribute, consumers have a less negative first response. This is interesting because validating this attribute can still provide a sufficient amount of certainty, without invading one's privacy too much.

• Since consumers get their packages delivered by multiple different LSPs, they see PostNL as 'one of the many'. They believe that if PostNL delivers a great service, this is only a part of their overall experience with regard to deliveries. Therefore they do not see all of their problems and negative experiences solved if only PostNL does a good job. With regard to address fraud, they see no added value in validating themselves.

• In the consumer journey, three critical moments were found: the moment of payment, the moment of process alteration, and the moment of package handover. Certainty should be established in at least one of them. As long as the package is still in possession of PostNL, there is no damage to the addressee.

• According to the quantitative analysis based on an online questionnaire with 55 random participants, approximately one-third of respondents is willing to annually confirm their address to an LSP against one third that is not. With regard to this validation, the most important requirements mentioned are: security (47/55), privacy (34/55), and convenience (11/55).

• Furthermore, three main categories of pain points have been identified that consumers experience with LSP's regarding trust en reliability. These have to do with the behaviour of the deliverer, the lack of (speed and clarity in) communication, and the feeling of not being in control themselves in the process, but being dependent on others.

• Overall, the consumer research resulted in the identification of six design principles, namely: clear communication, transparency, consistency, offering control, and providing added value. These principles will be taken into account in the design phase when developing the final design.

05

Design vision & focus

The goal of this chapter will elaborate on the spotted opportunity gap that emerged from the research phase, describe the scope, explain the vision, and show the reframed problem statement that forms the base for the design phase.

05. DESIGN FOCUS & VISION

5.1 The opportunity gap: validating the address attribute

As was found in the research phase, a reliable digital identity is of major importance to stay relevant in a digital era. There are already a lot of parties (including LSPs) working on establishing this. So why should PostNL do it?

First of all, as was found, a digital identity can exist out of multiple different attributes. PostNL does not have to focus on the validation of all these attributes. The attributes that were found to be strategically most relevant include the 'legal person'- and the 'address attribute'.

There are certainly a lot of other companies that could do better regarding the validation of a legal person (e.g. name or age that can be a deducted from a passport (picture)). Also, consumers seem to not understand why PostNL would need this attribute and lack the willingness to cooperate on this matter. Validating the address attribute (which is one of the most important things for an LSP) is seen more understandable and less privacy-invasive.

As a reliable link to a physical address still seems to be missing with current digital identities, this might be an interesting opportunity. And this is where PostNL can play an interesting role. They do have something interesting that no one else has. They are physically present in every street in The Netherlands every day, where they have access to every (open) front door on a daily basis. This opening of a door at the moment of delivery from the inside is quite a certainty that the person that receives a delivery has righteous access to that address. This is important since in many cases the lack of this certainty is an opening for fraud.

Furthermore, PostNL could also establish this validation dynamically. Since every time someone opens a door to receive a package, this certainty can be updated. While at other companies (even banks and financial institutions) you have to validate this address only once: at the first time you engage with this party (such as opening a bank account). However, over time the quality of these data might decrease when it is not up to date and reliable anymore. An example could be when someone moves to a different address and does not pass this on everywhere. PostNL has the ability to provide a certain degree of assurance that someone has righteous access to an address based on the (amount of) mail and parcels a person receives on that address.

Next to that, PostNL is considered to be a reliable party: people trust PostNL. Not only because they grew up with it (when it was still a state-owned company) and have known it from a young age, they are also seen as a very big company ("they can't just secretly scam you"). The fact that they are Dutch and act according to the 'confidentiality of correspondence' (not opening mail and parcels) also contributes to this. Next to that, sometimes ven strong social connections are formed since several consumers indicate that they know their mailman or parcel deliverer personally, and vice versa.

Furthermore, developing a secure digital identity and doing something against the fraud they are 'unconsciously' facilitating it is also part of the PostNL's social responsibility, considering their resources and abilities. Finally, as a company with 6 million+ individual accounts which is quite unique in the Netherlands, there is already a basis to connect and interact also on a digital level.

5.2 Scope

The scope can be described as:

"Improving consumer recognition and reducing fraud in the last mile through a reliable digital identity that can provide access to desired services with sufficient certainty about its user."

Thereby the focus will be on receiving consumers in The Netherlands. This is because they (unlike business and shipping customers) cannot choose the logistics service themselves and are fully dependent on PostNL. They are also the last link in the logistics process, and where the most uncertainties lie for PostNL

With a digital identity, a well-executed implementation depends on multiple parts. These parts can be divided into two main stages. The first stage has more to do with the initiation and data while the second stage is more about the user & actual use. In this project, the will focus on the first stage, because first you have a strong reliable basis is needed before starting to launch something that might not have the intended impact. Since anyone is allowed to create a PostNL account at this moment, there is not enough certainty about this creator. Therefore, the focus will be mainly on the verification & validation part of the first stage.

As explained in the previous section, the focus of this project will be on address validation. This fits best with PostNL's strengths, capabilities, and resources. Next to that, this type of validation is is also preferred by consumers. Furthermore, it can lead to a quick and significant decrease of two of the top four priorities PostNL has set regarding fraud, namely:

• The disputed delivery
• The picking up of fraudulent packages at retail locations

Considering these aspects, the address attribute is of major strategic importance for PostNL to obtain a sustainable competitive advantage concerning a digital identity.

With address validation is meant: making sure that the provider of an address actually has righteous access to that address. Being sure of this makes it more difficult for fraudsters to misuse other people's data, hide in anonymity and, in addition, the traceability that goes a with the validation raises a higher threshold to commit fraud.

Figure 48: The two streams of establishing digital certainty

5.3 Vision

The wheel of trust

PostNL is already perceived as a reliable company. According to consumers, it is even the most trusted one among all LSP's that are active in the Netherlands (see chapter 2.5). In this digital world where trust is increasingly becoming an issue, it is very important to hold on to this intangible asset and keep the wheel of trust spinning (see figure 49).

For a long time, people have trusted PostNL with their deepest secrets. The main challenge for PostNL is to keep their 'reliable image', and with more and more digitalization, translate this physical trust into digital reliability. Thereby they have to keep in mind that consumers' expectations and the degree to which these are met, have a big influence on the degree of trust. When consumers trust PostNL more, they tend to be more willing to corporate (e.g. providing necessary data) as was found during the research phase.

Trust takes years to build, seconds to break, and forever to repair. It's hard to trust someone the next time after they already gave you one reason not to trust them. The same happens with deliveries. As was found during the consumer analysis: even when you have had 100 good experiences, the bad one has had the most influence on the eventual perception of the brand.

PostNL's current overall vision is that they want to be the people's favorite deliverer. However, for the scope of the assignment another vision is formulated that describes how this challenge is approached:

> *"In order to stay relevant in a digital future, trust must be used as a strategic asset to improve the quality of logistic services and establish reliable connecting services between the physical and digital world."*
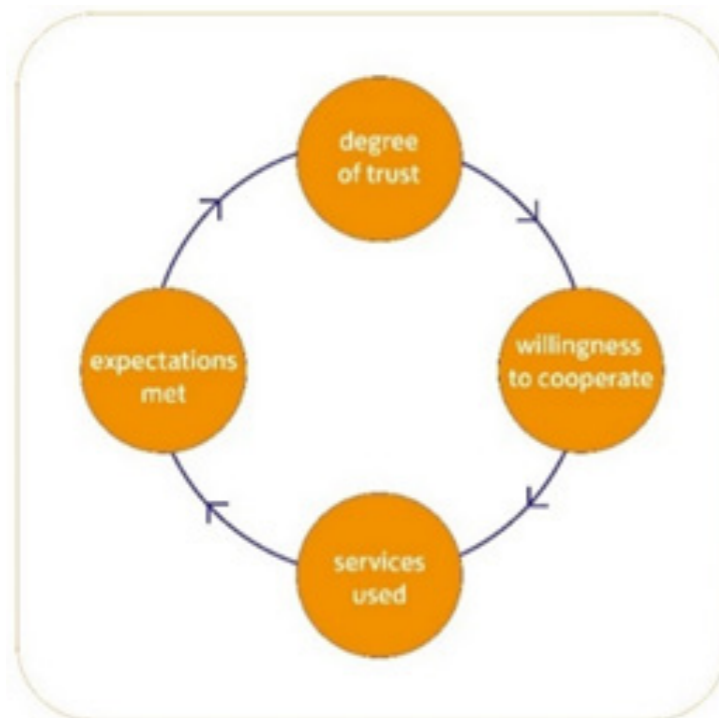
Figure 49: The wheel of trust

5.4 Reframed problem statement

Based on the discovery phase that included the literature review, the company deep-dive, the context analysis, and the consumer perspective, the problem statement that forms the basis for the next phase (development and ideation) was reframed as follows:

> *"**How** can PostNL **strategically** generate **dynamic address validation**, making use of their **existing physical and digital infrastructure** to have the **assurance** that an individual has **righteous access** to a certain address when engaging in a **logistics-related event**?"*

To fully understand this reframed problem statement, certain elements will be explained more in detail:

By **strategically** is meant: to be successful and effective, it also needs to have clear and significant value for the consumer. Furthermore, it should fit with PostNL and also be feasible in terms of costs and technology.

By **dynamic** is meant 'over time'. Currently, when someone moves from an address on which this person is validated, the data becomes incorrect. In order to prevent the loss of data quality over time, it should be able to be updated as soon as possible to match the actual situation.

The **existing physical and digital infrastructure** are necessary to ensure a quick implementation and minimize efforts. These include for example the deliverers, the already existing consumer accounts, and interfaces.

Righteous access means that a person is allowed and authorized to be at a certain location. With the knowledge and consent of the person(s) responsible for that location.

By **logistic related events** are meant: all the actions that are taken in the logistics process where consumers are involved (and interacted with), such as rerouting a shipment, picking up a package at a service point or, signing for it.

Figure 50: The challenge: connecting consumer, address and shipment

06

Designing for address validation

This chapter takes a closer look at the design phase. It will dive into the concept of an 'address', highlight the most important preconditions, and elaborate on the methods and techniques that resulted in the development of the final concepts.

06. DESIGNING FOR ADDRESS VALIDATION

6.1 The address

After the research phase, the opportunity gap to address validation was found (see chapter 5.1). This is, among other reasons already mentioned, due to the following:

• Certainty of address is a solution for two problems that have a high priority with regard to fraud prevention.
• Consumers are not (yet) willing to provide legal identification documents online.
• PostNL has a strategic advantage which is being in every street in the Netherlands every day in front of an open door.

Therefore, address validation could play an important role in the establishment of a reliable digital identity and as a result lead to a sustainable competitive advantage for PostNL. Not only in the field of logistic services, but also beyond.

Therefore, this chapter will be the start of the design phase in which the aim will be to find the 'innovation sweet spot' between desirability, viability, and feasibility to realize this strategical generation of address validation among PostNL consumers.

6.1.1 What is an address?

Before starting with the ideation and to better understand the complexity of this phenomenon, it is necessary to look closer into what an 'address' actually is and how it is defined:

• *"The combination of a name of a public space, a number indication, and a name of a place of residence. The address is assigned by the competent municipal body to an accommodation object, a place of residence, or a berth."* – (Kadastrale Kaart, 2021)

• *"The number of the house, name of the road, and name of the town where a person lives or works, and where letters can be sent."* and *"A place where someone lives."* – (Cambridge Dictionary, 2021)

• *"A registered physical location where a consumer could be reached and is able to receive something at."* - own definition

An address itself is static, but the relation it has with humans is dynamic. It changes for humans whenever they move to, live at or find themselves in a different place. Furthermore, people can have many different addresses.

In fact, at least 50 hyponyms of the word 'address' can be found (see figure 51).

Figure 51: Fifty hyponyms of the word 'address'.
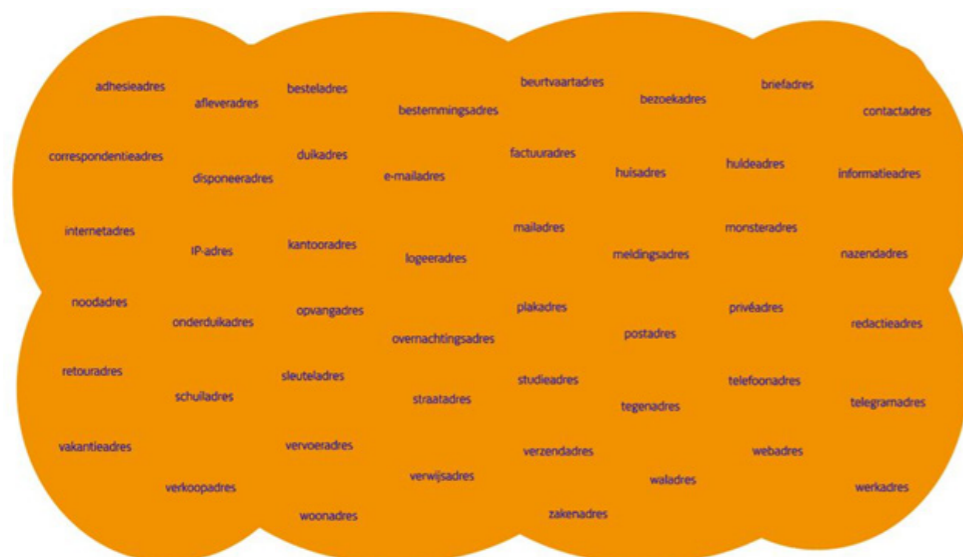
6.1.2 The context of addresses

On the 1st of January 2020, the Netherlands counted 7.9 million homes which is an increase of 300.000 homes with regard to five years earlier. Almost half of all homes are located in the western part of the Netherlands. The Northern Netherlands has the fewest homes, one in ten homes is in Groningen, Friesland, or Drenthe.

Almost six in ten Dutch homes are owner-occupied and more than four in ten are rental properties. At the beginning of 2019, there were 4.5 million owner-occupied homes and 3.3 million rental properties. In the four major cities, the share of rental homes is higher than the average in the Netherlands. There are more rental properties than owner-occupied homes in all four major cities. In Amsterdam, seven out of ten homes are rental properties. Both the average prices of owner-occupied homes and housing rents have increased every year in the Netherlands over the past five years (CBS, 2020).

Figure 53 shows the address density within The Netherlands. According to the security department, these (red) crowded areas are more susceptible to fraud due to a lack of overview. Therefore, these will be the areas to focus on.
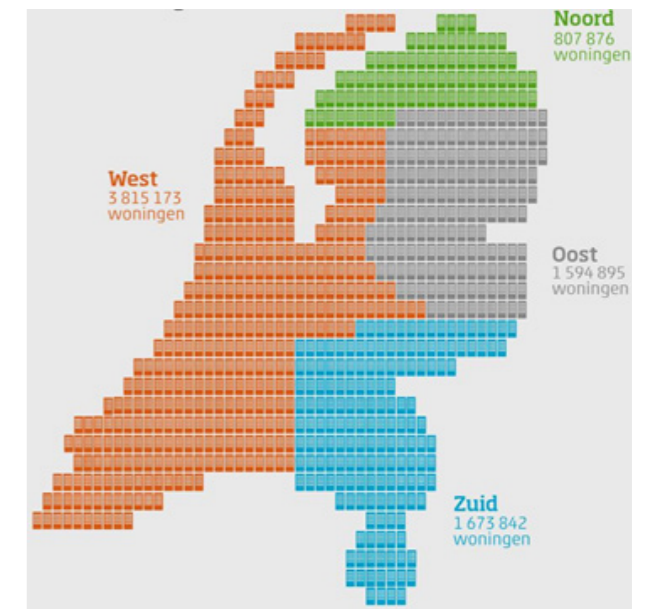
Figure 52: Amount of addresses in the Netherlands (CBS, 2020
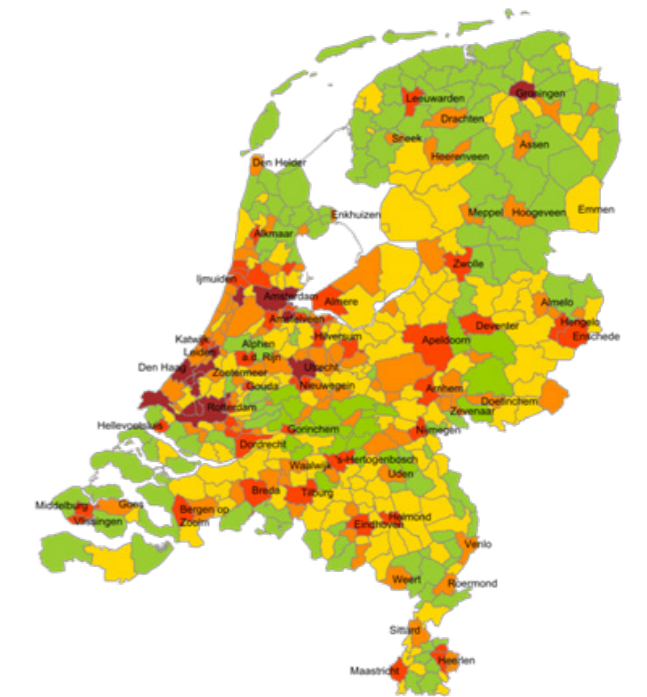
Figure 53: Address density within the Netherlands

6.2 What has been done already?

With regard to validating the address attribute of one's identity, a few initiatives have already been tried by PostNL and other parties. Insights into these efforts are important in order to learn from what did not work in practice and to prevent ending up with something similar.

6.2.1 Internal

Passport scan
Consumers were asked to upload a picture of their passport to validate themselves and their accounts. It was found that consumers were not willing to do this because it felt too personal and there were no justifiable reasons for them to do so (which corresponds with the qualitative study performed in chapter four). Furthermore, with this method, (identity) fraudsters could still create an account with a picture of an identification document of someone else.

Electricity meter number (EAN-code)
This is a unique identification code that can be found on one's meter cupboard, which is the house's entry point for electricity, gas, and water. With this EAN-number, the energy supplier and the network operator can identify and read the connection. Consumers were asked to upload a picture of their EAN number as proof of their address, after which these numbers could be checked with third parties such as energy suppliers. However, it turned out that consumers were not able to find this number by themselves, found it privacy-invasive, or did not understand why PostNL would need a picture of their meter cupboard.

Envelope code
Every letter that is directed to a certain address will get a unique 'address code' printed on it during the sorting process at the depot. By filling in the first 5 numbers of this envelope code on one of their received mail items, consumers were able to validate themselves. Although consumers thought this method fitted more with the brand PostNL, they indicated not always having two mail items ready. Therefore, it would take too much time to validate. Furthermore, this was perceived as an 'old-fashioned' solution that would eventually also be prone to fraud.

iDIN
This method is created by the same developer as iDeal and uses your bank account in order to verify your identity. It is based on financial institutions that require proof of an address once a consumer would like to open a bank account. Although this method is also preferred by the security department, this is not viable for PostNL and desirable from a user perspective (on the long term). The validation of the data is not being stored and so the validation has to be performed every time again, which also brings validation costs with it every time. Next to that, it also deters consumers when they hear that they have to perform an action with their bank account. Furthermore, when experimenting with iDIN myself, it was found that it is not that reliable at all.

IRMA
IRMA is a privacy-friendly identity platform for both authentication and signing which is developed by the Privacy by Design Foundation. When logging in, the user reveals only the necessary attributes of himself via the IRMA app on his mobile phone. Although this method guarantees one's privacy very well, consumers were not familiar with IRMA or not willing to download another app just for logistics services.

Figure 54: Overview of already tried initiatives

6.2.2 External

Investigations by the municipality
To obtain additional inspiration and knowledge, a meeting was arranged for an expert interview with an employee of the municipality 'Stichtse Vecht'. She is dealing with a similar topic, namely checking if people actually live or do not live at a certain address. She indicated that the basis for everything was the BRP (BasisRegistratie Personen) which is a database of all residents in The Netherlands and only accessible for governmental organizations.

Whenever there is a need for an address investigation, the first action that is taken is always sending a letter to the specified address in the BRP and await response. In case of no response, law enforcers or another third party are sent to the address and inform and ask for the concerned person.

One of the last attempts is to consult 'Suwinet', which offers governmental organizations the possibility to consult data of citizens that is stored with other government organizations or basic registrations, such as one's most recent employer.

6.3 Design brief

People are increasingly buying online. Therefore it is necessary to know who you are dealing with and with whom you are doing business in the digital field. Proof of who you are 'digitally' and where you live is needed. Section showed that prior initiatives did not meet all of PostNL's wishes concerning security, privacy and consumer experience. Furthermore, PostNL would like to keep the data internal to act indepent. Therefore the following problem statement and sub-statement are formulated:

> *"How can PostNL strategically generate dynamic address validation, making use of their existing physical and digital infrastructure to have the assurance that an individual has righteous access to a certain address when engaging in a logistics-related event?"*

> *"How can this be achieved quickly, easily and cheaply for both PostNL and the consumer?"*

To limit the solution space, the following design criteria are formulated in consultation with PostNL and resulting from consumer research:

• The validation method should be able to be introduced to the market as soons as possible
• It must be possible to perform the validation without interrupting the validation flow longer than 24h after expecting a delivery.
• Consumers should be willing to, able to and ready to adopt the validation solution. Therefore it has to be understandable and convenient.
• The established validation should be able to be recorded and stored digitally and internally in order to establish long term certainty.
• The privacy of the consumer needs to be guaranteed, therefore sensitive and special personal data must not come into the possession of others without the consent and knowledge of the owner.
• The price-quality ratio of the designed validation needs to be higher than that of MijnPost.
• The validation needs to fit with PostNL's vision and mission of being a connector and wanting to be the people's favorite deliverer.
• It must match the orange compass (PostNL's way of working), which means: keeping it simple, making it smart, and doing it together.

6.4 The ideation phase

In figure 55, the process and approach of the ideation phase can be found.

6.4.1 Individual ideation

After going through a first diamond (diverging, reverging, and converging) on an individual basis, 27 ideas were generated.

This was done using the brainwriting method, putting al thoughts on paper and making use of associations (see appendix F). Next to that, unique identifying factors of an address were captured using various maps of houses to get inspiration and think outside of the box.

6.4.2 Collective ideation

In order to generate new and more ideas from multiple perspectives, a physical brainstorm session was organized at the IDE faculty with 5 fellow (design) students (see figure 56). Next to that, brainstorming in groups enables participants to make associations and build upon each other's ideas. Several theorists in the field of creativity have argued that group idea sharing should be the source of significant cognitive stimulation (Osborn, 1957 & Paulus et al, 2000), leading to more and novel ideas.

The focus during the session was on how it could be made sure that a certain person has righteous access to a certain address. Use was made of different creative facilitationh methods as described by Heijne & Van der Meer (2019). To get participants into the mindset of houses and addresses, they had to mention two characteristics of their future dream house when introducing themselves.

Shortly after, the flower association method was used to make and build upon each other's associations with logistic services, PostNL, and addresses. The HKJ-method focused on how you can prove something and how you can get to know someone.

After a short break four different persona's and scenario's were introduced that required the participants to think of ways how these personas could prove where they live. Using the spontaneous clustering technique, different categories were formed from all the ideas, showing potential design directions. The result of this session can be found in appendix G.

stage	# ideas	mindset approach	description
Individual brainstorm		diverging	Brainwriting Assosicative brainstorming HKJ's
	27	reverging	Sequencing
		converging	Combining and eliminating the odd ones out
Creative sessions		diverging	Flower associations HKJ's Brainwriting 3-6-5
	21	reverging	Sponteneous clustering
		converging	WOW / NOW / HOW - sequencing Eliminating white category
	18	diverging	18 in depth elaborations with trend research and data
Internal & External Validation		reverging	Categorizing the elaborated ideas
		converging	Ordinal method: Product Profile, with later on weights added to the criteria
	12	reverging	12 most promising concepts are elaborated further
	4	converging	Four final concepts are chosen with highest overall high score regarding desirability, feasibility, viability
Final choices		reverging	Listing the unique advantage of all four concepts
	1	converging	Four final concepts integrated into one final concept

Final concept

Figure 55: Overview of synthesis phase

Figure 56: Impression of the creative group session

6.5 Concepts for establishing address validation

6.5.1 Approach

Out of all these first ideas (resulting from the individual session as well as the collective one), ideas with the least potential were combined and eliminated using the WOW/NOW/HOW-method. After sensing that there was already a wide variety in the type of ideas, a total of 18 ideas was chosen for further development. This might be considered quite a large amount for further development during a design process. However, since certainty and security are essential with regard to a successful solution, the choice was made to work out this many concepts.

In this way, it would be less likely to end up with a non-effective concept and have to start all over again. Next to that, by working out this high amount of concepts it was possible to gain more understanding by learning from other concepts and also finding interesting combinations between them in a later stage.I

To to keep the concepts clear and suitable for presenting and communicating them with stakeholders, the decision was made to use the following format:

• *Title & subtitle*: short, clear, and catchy.
• *Idea description*: explaining the essence of the idea.
• *How does it work?*: a more detailed description of which steps are taken, how it will look like in practice, and who is doing what.
• *Interesting data*: this highlights the numerical substantiations and relevant trends regarding the concept.
• *PMI Evaluation*: this method evaluates the positive-, negative – and interesting points of an idea. These pros and cons already provide a good indication of the potential of the concept.

Figure 57: Overview of concept development approach

6.5.2 Overview of concepts

Below an overview of the elaborated ideas can be found, also describing the essence of these concepts. The development sheets of these concepts can be found in appendix H.

1. Using Wi-Fi to validate
Connecting your physical and digital address

If one has righteous access to an address, they often also have access to the WiFi of that particular address. So, being connected to a Wi-Fi network of a certain address also gives a degree of assurance that a person is linked to that addres due to elements such as the IP and MAC address

2. Collaboration with third parties
Data for certainty
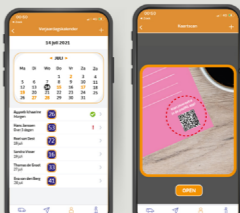
Different organisations are in possession of various data about people, addresses and processes. If there is way to share them in an anonimous way, it could be valuable for multiple parties with regard to more certainty.

3. Digital house key
A new way of access

If one has righteous access to an address, this person is often in possession of the house key to that address. If this can be digitized, we know which people have access to which address. Furthermore, these key owners can also pass the keys to others on the same address (e.g. housemates, family members, close relatives and well-known trusted neighbours).

4. Smart Birthday cards
Special moments in your mailbox

Instead of the boring MyMail letter, it could be made more joyful by combining it with a birthday calendar that makes it easier for people to send birthday cards to each other. Scanning a digital coded attachement creates a new validation after logging in.

5. Pick up request
A good neighbour is worth more than a distant friend

Connecting with the neighbours through a 'pickup request' can be used in first instance to just enhance transparency and communication over a delivery. Later on, after frequent connections are established between neighbours, it could be used as part of an address validation.

6. The deliverer knows
Inside out

The deliverer has a lot of knowledge about his neighborhood and the people that live in it. If this knowledge could be digitized, PostNL would have a lot of new interesting data about it consumers, also providing more certainty about them.

7. Validation by drones
Carrier pigeon of the future

Drones can get anywhere really quick, at any time and are able to objectively validate you. In this case you can pick a convenient time yourself when you would like to be validated. In this way you are also not limited to only the working hours (from 09:00 - 17:00).

8. Group Account
Linking up with others

We can find and think of new ways, but with the current amount of validated accounts it is possible to exponentially generate new validations by making use of consumers' social circle.
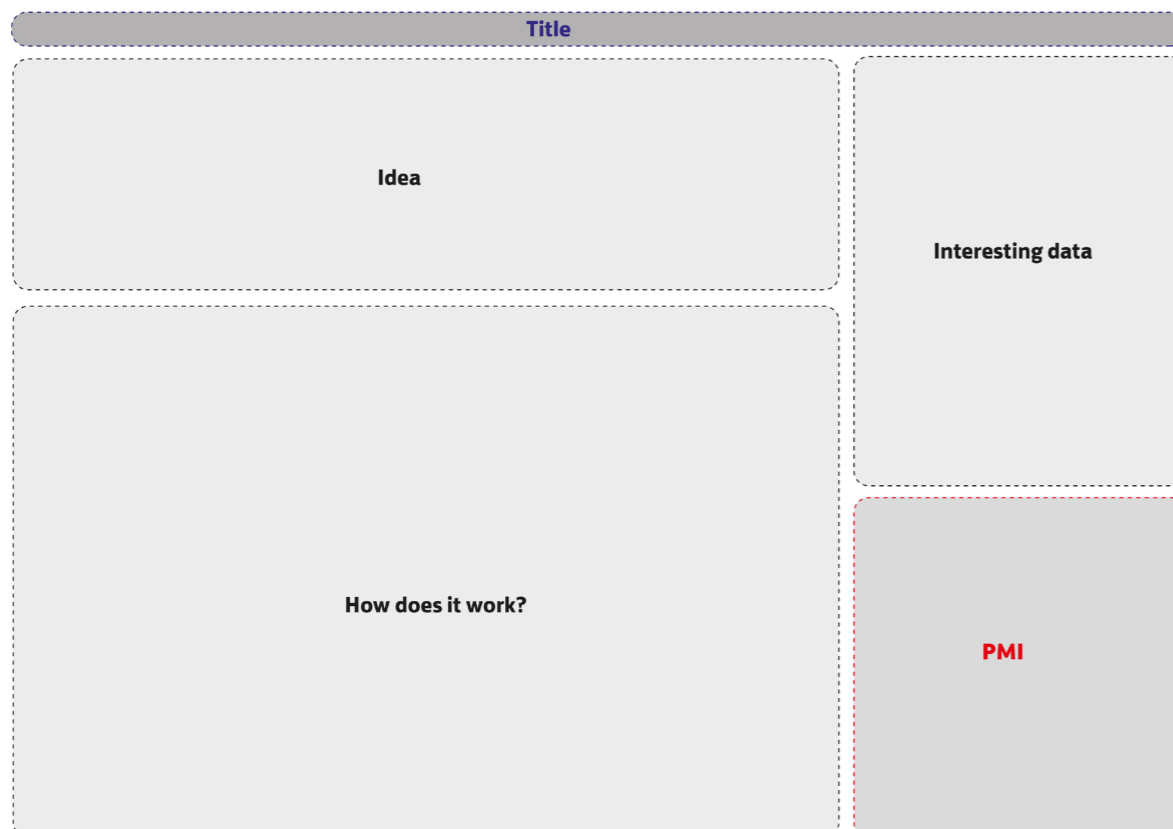
9. Smart Parcels
RFID- & NFC-trackable objects

Place trackable/scannable sticker on parcels, that can be scanned by both the deliverer and the receiver, so you have a two sided confirmation.

10. Location History
Where have you been?

By tracking someone's location for a certain amount of time, locations of interest can be found, one of which probably has to be the address that someone has righteous acces to.

11. Smart Connect sticker
Check at the door

A sticker on or close to your front door where people can reach you without having all your personal contact details. It can be used by deliverer, neigbors and others. Each sticker is tied to an address but only the resident has the authorisation to validate a parcel upon delivery.

12. Social media challenges
Create to validate - #OpenDeur

Participating in a short challenge on social media where you show that you open your frontdoor and say something. This proves that you have access to a certain address, while this validation method is fun to do and can spread fast by nominating others.

13. Parent network
And their children in elementary schools

Primary school children are not yet very mobile, but are often dependent on their parents for picking them up. Integrating an address overview of their children's classmates in the app provides an overview and certainty from multiple angles.

14. 'Het PostNL spel'
Gamificate to validate

Approaching it from a gamification angle where you for example have to decipher your own validation code. It can also be divided into multiple parts to simulate a kind of 'escape room' experience.

15. Digital link with deliverer
Communicate the update

Create a more personal bond with the deliverer. By knowing more about him, it might be easier to share also more about yourself. Next to that, frequent and strong connections can lead to more digitally captured certainty for both.

16. Address account
A digital place for all

Introduce an account that is tied to an address and is exclusively accessible for residents of that particular address and other people that have righteous access to it. Includes an overview of all involved people and possibilities for authorization.

17. Digital platforms
Building and strenghtening communities
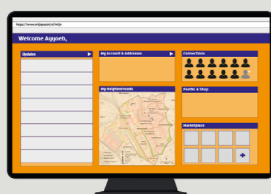
Make it possible for the 6.2 million accounts to find each other and connect on a digital platform. It can also be done on a small scale where you can see interesting things in and close to your neighborhood.

18. Smart Object Pairing
The digital handshake

Enable interactions for validation such as pairing with different PostNL touchpoints using smart technology on your device. This could be done using combinations such as the deliverer and a PostNL service point employee. It is also possible to scan your passport this way.

Chapter 6 - Key takeaways

• For this project, an address is defined as *'a registered physical location where a consumer can be reached and can receive something at'*. In the Netherlands, there are about 7.2 million addresses.
• Interesting about addresses is that there are multiple different types of them and in relation to a human they are dynamic: humans can easily change between them. Therefore, one does not necessarily have to live on the address that this person is 'officially' registered at as stated in the BRP. Next to that, it is possible to have righteous access to multiple addresses.
• The higher the address density of an area (or: the more crowded an area is), the less overview there is. This makes it also more vulnerable to fraud. Therefore the focus is on addresses located in the top 10 largest cities in the Netherlands and the 'Randstad'.

• Already existing initiatives aimed at validating one's address (such as iDIN, IRMA, envelope numbers, pictures of one's meter box number, etc.) are not perceived as ideal by PostNL due reasons that have to do with security and user convenience. Furthermore, PostNL prefers to keep the processed data internal.
• Unfortunately as a privatized company PostNL can not just extract information out of governmental databases (e.g. the BRP) or make use of their applications (e.g. Digi-D).

• The most important preconditions for the solution have to do with quickness to market, quickness to validate, privacy, user convenience, price/quality ratio, and strategic fit.

• During the synthesis phase, an individual, as well as a collective brainstorm session, have been executed in which use has been made of a variety of methods common in the idea generation phase of a design project.
• This has resulted in a total of 48 initial ideas, of which 18 have been selected for further development. Thereby use was made of A3 templates that include a catchy name with a slogan, explanation on the core idea, visual elaborations, interesting data & trends, and an overview of the positive/negative/interesting aspects of each concept.

07

Towards a final address validation system

This chapter will show the most interesting findings of the test- and validation sessions concerning the elaborated concepts. Furthermore, it will compare these concepts with each other based on the formulated criteria, ultimately leading to a final concept.

07. TOWARDS THE FINAL CONCEPT

Since 18 concepts are a bit too many to carefully go through one by one with consumers as well as PostNL employees, choices were made concerning which concepts were discussed with whom. With regard to the PostNL departments, the concepts to be discussed were chosen based on their expertise fit. With consumers that had more time, also the other concepts were discussed.

7.1 External and internal validation

For the validation system to function properly in the first place, the right balance needs to be established between three main factors: security, privacy and convenience.

When taking a history location tracking system for example that logs a device location every minute, it might be very convenient and secure: one does not have to do anything except for clicking once to agree upon sharing his location. Since GPS technology is quite accurate, saving your location every minute, it provides quite some certainty. However, consumers might notice that they do not have privacy anymore. The importance of privacy is taken quite seriously, not only by consumers but also by supervising authorities.

In April of this year, for example, the Dutch Data Protection Authority fined the municipality of Enschede 600,000 euros, because the municipality used WiFi tracking in the city center in a way that is not allowed according to the regulations (AP, 2021). To prevent matters like this, it is necessary to keep in close contact with PostNL's legal and privacy departmenst.

Interesting to notice, was the fact that consumers are wiling to give up some of their privacy if they can get something valuable in return. One consumer mentioned the Albert Heijn bonus card. It provides a lot of useful data to AH, but consumer does not really care. The consumer has a clear reason why he should use it and is mainly focused on the value and advantages it has for him: saving money.

The second important factor is convenience, especially something being quick and easy. A validation method might have a very high reliability and privacy assurance. However, needing to actively validate oneself for more than ten minutes every time one receives a parcel, a lot of effort is asked from the consumer. Also, falsely being rejected by the system might cause irritation. As a result, people might develop a negative attitude towards the service and the PostNL brand in general. This decrease in customer satisfaction could result in brand avoidance.

The third important factor is security. One can have a validation method that is simple and safeguards a consumer's privacy, but as long as it does not provide the certainty that is needed, it is useless.
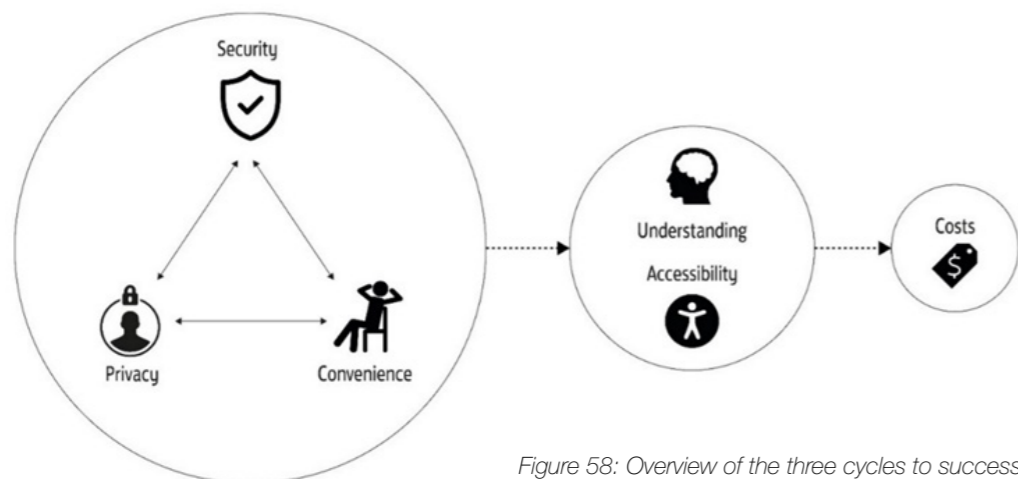
Figure 58: Overview of the three cycles to success

Only after a balance is found between these three factors, it is possible to look further.

During the external validation sessions, it was noticed that consumers still do not directly know and understand why they would need to validate themselves (and their addresses) in certain situations in the first place. A method can be reliable, convenient and have high privacy. However, if the consumer has no idea why he should perform, he has no intention and motivation to do it. As a result, two new interesting factors emerged, namely: understanding and accessibility. One way to avoid these factors is by making a hard demand: the consumer needs to do it or otherwise, making use of the service will be denied to the consumer. Of course, this would not be the most user-friendly option. Another way is not telling the consumer about it at all, because do they necessarily have to know everything?

Banks for example might trace a consumer's IP address when this person is banking online. The reason they do this is because it enables them to identify deviations in location activity and thus they will be able to intervene in time when irregularities are about to happen. Nevertheless, a lot of people do not know this but indicate that (unconsciously) being tracked feels a little bit weird and too personal. One consumer mentioned that "the closer and more personal something is to you, the higher the threshold to share it with someone else, especially with a company".

In some locations (such as airports, political buildings, courthouses and hotels) it does automatically make sense to validate oneself. However, for PostNL this is not yet the case. Currently, a clear reason why it is necessary seems to be missing for consumers. This led to the insight that regardless of the final design, extra attention should be paid to a clear communication strategy. An awareness campaign could be part of this. Here the emphasis can be placed on shared pain points such as long times of uncertainty regarding a parcel status which can be solved by better matching (as a result of address validation).

Finally, costs are the last important factor. Based on the estimated return on investment, a go- or no go-decision will be made. Money should not be poured into a bottomless pit.

7.2 The security vs user convenience challenge

For the design to provide the required certainty to be viable, it needs to be reliable enough. This means that it needs to be made sure that people cannot wrongfully validate an address if they are not supposed to. However, in all systems there are errors and due to a variety of reasons (among which taking into account user convenience) it is difficult to reach 100% reliability.

Therefore, it needs to be defined for PostNL what an acceptable margin of error is for this design. To gain more knowledge about the operation of validation systems, the field of biometric was explored where the performance is determined by the following items:

- **False Acceptance Rate** (FAR) or 'fraud rate': The percentage of times an invalid user is accepted by the system.
- **False Rejection Rate** (FRR): or 'insult rate': The percentage of times a valid user is rejected by the system.
- **Failure to Enroll Rate** (FTE or FER): The percentage of times a failure of the biometric system to form a proper enrolment template for a valid user occurs.

The Crossover Error Rate (CER) describes the point where the False Acceptance Rate (FAR) and False Rejection Rate (FRR) are equal (see figure 59). This CER is also known as the equal error rate (EER) and describes the overall accuracy of a biometric system (ISACA Biometric Auditing Guide, 2007).
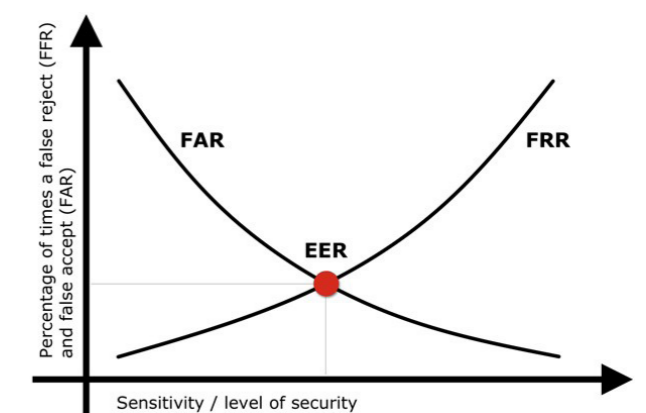
Figure 59: Finding the optimal EER

As can be seen in the figure, once the sensitivity of a biometric system increases, FRRs will rise and FARs will drop. Conversely, as the sensitivity is lowered, FRRs will drop and FARs will rise. If you try to reduce the FAR to the lowest possible level, the FRR is likely to rise sharply. This means that the more secure the authentication system is, the less convenient it will be, as users will be falsely rejected by the system. The same also applies the other way round.

In statistics, these False Rejection Rates and False Acceptance Rates are also known as Type I and Type II errors. The first one means rejecting the null hypothesis when it's actually true, while a Type II error means failing to reject the null hypothesis when it's actually false.

Regarding the topic of address validation, the used null hypothesis (H0) would be:

"Consumer X is not guilty of committing fraud by stating that he/she has righteous access to address A."

In case of a type I error, it means that the null hypothesis is falsely rejected and the system judges consumer X as guilty of committing fraud, while this is not true: the person does not commit fraud and has righteous access to the stated address.

When looking into a different context, such as the criminal justice system, this type of error could be quite serious. It could mean that an innocent person is judged as guilty in court (and possibly sent to prison), while this person did not commit a crime. However, in an authentication system such as with biometrics, this means that the consumer is found 'guilty' of committing 'fraud' but can try to authenticate again by putting his finger on the fingerprint scanner again. So, no big deal.

In authentication systems, A type II error however would be way more critical. It means that the system fails to reject the null hypothesis: it judges consumer X as not guilty of committing fraud, while he is actually a fraudster that does not have righteous access to the stated address. When taking the criminal justice system again as an example, it means that a person is judged not guilty and set free while he committed a crime.

Generally, type I errors are considered worse, since the consequences of making this type of error mean that changes or interventions are made which are unnecessary, and thus waste time, resources, etc. Type II errors typically lead to the preservation of the status quo (i.e. interventions remain the same) when change is needed. It is worse to conclude that a nonexisting effect is found, than miss an effect that does exist. However, one might argue with this, since it is highly dependent on the formulation of the null hypothesis. Adding a cost assessment could be a useful way to help identify which error type is worse in a specific situation (Dell Technologies, 2013).

Needless to say, is that regarding address validation for PostNL, Type II seem to be way worse, since it means 'no interventions' and thus letting fraudulent persons into the system and enabling them to falsely acquire a validation status. It is therefore absolutely necessary to try to reduce the probability (β) of this error (see figure below). However, it should be kept in mind that valid consumers still need to able to authenticate themselves, without making it too inconvenient for them.
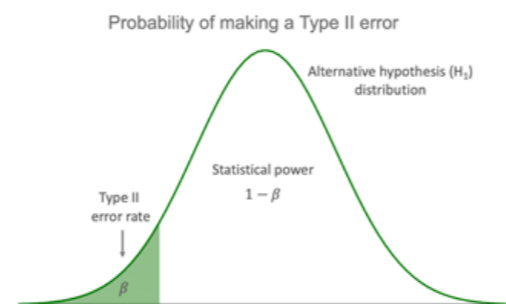
Figure 60: The probability of making a Type II error

Unfortunately, the security department could not provide an acceptable error margin and mentioned this could not be considered separately from other factors, such as the associated costs of the system. If the costs would justify it, a system with a higher error margin could even be preferred above one that is more reliable but has a much higher cost.

Therefore, estimations of the final concepts will be evaluated again with the security and business department together.

7.3 Judging the concepts

To find out which concepts have the most potential, the desirability, viability and feasibility are judged based on criteria relevant for this topic and were discussed with PostNL.

7.3.1 Design criteria

The criteria from the design brief were taken into account, reconsidered, and reformulated as follows:

• **Validation quickness**. How long does it take for the validation cycle to be completed and acquire a validation status? From a consumer's willingness (to validate) to a completed validation.

• **Impact**. How much will it change the current way of doing things? What will be the changes to the lives and processes of stakeholders? And how will it affect people's perception of the PostNL brand?

• **Time to market.** How long will it take before it does it take before it can be implemented and used?

• **Costs**. How much money is needed for this validation system? Could it be possible to earn money with it by creating a business model?

• **Privacy**. How close is this to the edge of what is possible regarding the regulations and to the principles of consumers? How privacy sensitive is it?

• **Effort for the consumer**. How many actions do consumers have to perform, for how long, and how often? What are the physical and mental burdens?

• **Effort for PostNL**. How many employees need to be involved to establish this and for how long?

• **Security**. How safe is it for stakeholders, consumers, PostNL employees, and the environment in general?

• **Certainty**. How reliable is it and with which degree of certainty does it come? How long does it stay reliable?

• **Strategic Fit**. How well does it fit with PostNL's core business, principles and their way of working?

7.3.2 Decision method

Due to the high amount of concepts, namely 18, it was considered to use kill criteria. These are criteria of such importance that if a concept does not score positive on them, this concept is not taken for further consideration and can be eliminated. However, due to the possibility of making new concept combinations at a later stage, it was decided not to work with kill criteria.

Instead, the concepts were judged according to an ordinal method: the product profile. This method should already provide a good insight into which concepts have the potential to be developed further. The results of the product profile can be found in appendix I.

However, after consideration with PostNL, it was decided to add weight to certain criteria that are considered more or less important than the others. As a result, the weight of the criteria 'certainty' and 'validation quickness' was increased (becoming 1,00), while the weight of privacy was decreased (to 0,33). The remaining criteria had a weight of 0,66.

Finally, an overview was made that showed the potential of the concepts. Thereby they were divided into three categories: strong potential, mediocre potency, and weak potency (see figure 61).

Figure 61: Concepts classified by potency

7.4 Selected concepts

After the concepts were judged by the criteria, the ones with strong potential were selected first and combinations with others were made, resulting in four final concepts (see figure 62).

7.4.1 The four final concepts

1. 'Kaartje met een staartje':
This concept is based on the already existing validation method, namely the letter to activate MyMail. Instead of having to wait for a few days for this boring letter to arrive, it is made more fun. This is done by adding a QR code on the mail item with a special message (such as an extra picture or voice message). The receiver can scan this QR code with his account and in this way, it is proved that a consumer living at a specific address has processed a unique code destined for this same specific address. Furthermore, integrating a birthday calendar in the app will help consumers to remember each other's birthday more easily and also provide the opportunity to quickly and easily act upon it. Since it is already possible to send postcards via the app, this concept can be implemented rather quickly. (This was also prototyped and used in a real life situation).

2. 'Homies':
This concept is based on social connections. Since a lot of PostNL consumers are definitely reliable enough to be validated but do not have a validated status yet, it could be an option to be validated by others. Although PostNL themselves might not have enough certainty about the identity of an individual, other consumers (such as neighbors, family members, or friends) could (indirectly) provide this certainty. PostNL already has more than 6 million user accounts, but there is no interaction possible between these accounts. Therefore the possibility is added for consumers to add social contacts to their consumer account (in the app or on the website) who they can communicate with. At the same time, PostNL will be able to see how consumers are linked to each other and if there are any validated accounts between these connections. In short, 'Homies' could be seen as a kind of passive validation system based on references while at the same time adding value to the consumers.

3. Stikky:
This concept includes a sticker with an NFC chip that has a direct link to the digital version of a consumer's physical address. It is pasted in the doorpost which means that it can only be scanned by someone when the door is open. This means that a person can confirm his or her address when scanning this sticker. Furthermore, also deliverers can use it instead of the 'HVO' since Stikky adds more certainty that a shipment is actually. delivered over the threshold. Therefore it adds value for both, including solving a shared pain point: the disputed delivery.

4. 'Buu(r)t Vrij:
This concept thrives on the knowledge of the deliverer. It was found that deliverers (especially the ones with a fixed delivery area) know almost everything about their neighbourhood. However, this knowledge is currently only available in the mind of this deliverer which makes it difficult for PostNL to use. By digitizing this knowledge, it becomes more tangible and can also be used for validation. The deliverer could for example already confirm the addresses of consumers that he has got to know over time. Furthermore, a direct digital communication link with the deliverer could be established by consumers when validating yourself through pairing your phone with that of the deliverer. The deliverer is already in the neighborhood and people trust this person, so why not use him for validation purposes. Clearly, this method would require a lot of responsibility and trust in the deliverer but would be an option to establish address validation quickly and on a large scale.

7.4.2 Scenario Evaluation

For each of the four final concepts, a scenario was created that could be used for discussion and evaluation with end-users as well as different employees of involved departments within PostNL. This provided relevant insights into the practical side of these concepts, highlighting crucial parts or possibly leading to a whole new concept. The scenarios were visualised (see appendix J).

During the sessions, both 'Kaartje met een Staartje' and 'Stikky' were preferred by the majority of consumers by far. This is mainly due to their uniqueness and the perceived added value of these concepts. About 'Kaartje met een Staartje', a consumer mentioned:

> " *I would definitely use it. I already send postcards via the app from time to time, but this would make it even funnier. The birthday calendar would also make me feel more in control.* "

while a PostNL employee stated:

> " *It is a nice and extra addition to something that already exists. However, there is no control about when this validation would happen and with whom.* "

With regard to Stikky, another process manager and service designer mentioned:

> " *It would be nice to use the momentum of the delivery. So the first time you use the sticker, the deliverer and consumer are doing it together.* "

> " *I really like that it is not visible until you open the door.* "

Consumers seemed to find it very interesting, but surprisingly they were more worried about the aesthetic properties:

> " *For me it is fine, but I already know my wife would probably say: "No I don't want it at that spot (above the lock)". Because our doorpost is grey, an orange sticker would draw a lot of attention being the first thing you see when opening the door.* "

Buu(r)t Vrij brought considerably more challenges with it:

> " *Some drivers are often under a lot of pressure. so it must be workable for the driver. Furthermore, success really depends on the neighbourhood itself. Especially for certain delivery areas, there might be a language barrier that makes communication challenging, it being the deliverer, the residents, or both.* "

while security mentioned less enthusiastic:

> " *When you give a person a certain power, you basically provide him with a commodity that is salable for fraud.* "

About Buu(r)t Vrij, a consumer mentioned:

> " *The deliverer now also has my phone number, which makes it possible to communicate. So if this would be easier and could be combined with the Track and Trace code, why not?* "

'Homies' was pretty straightforward for both parties and did not yield many new insights relevant to mention.

Figure 62: Overview of the four final concepts

1. Kaartje met een staartje: *a digital addition to a physical mail item.*
- delivering special moments
- fun to do
- new business model
- mailbox certainty
- long term brand attachment

(4 + 9)

2. Homies: *a network connecting people & places.*
- use your social connections
- less frustration
- increase app usage
- all-in one place
- connection certainty

(1 + 5 + 8)

3. Stikky: *a sticker that indicates that you and your parcel have access to an address.*
- key & sticker
- interesting home data
- address account
- 2-sided digital confirmation
- over-the-doorstep certainty

(11 + 16 + 18)

4. Buu(r)t Vrij: *digitizing the knowledge & relationships of the deliverer.*
- extra data & knowledge
- improved (personal) customer relationships
- digital handshake
- increased appreciation & recognition
- close contact certainty

(8 + 15 + 18)

7.5 The final concept: an address validation system

During the evaluation sessions, it quickly became clear that there is no single or one-size-fits-all solution. However, it was found that the separate final four concepts could all contribute to 'address certainty' in their own way by providing their unique type of evidence. Therefore, to increase the potential amount of validations and their strength, the decision was made to not choose the final concept as one of them, but rather see the final concept as an integrated holistic system with different parts that are also able to complement each other.

It was found that one of the best practices in cybersecurity has to do with making use of multiple layers in security models. Individual layers in such multi-layered systems focus on a specific area that could be attacked. These layers work together to tighten security and have a better chance of stopping intruders from breaching your networks than using a single security solution (ProSource, 2021). This was used as an inspiration for the address validation system.

Currently, the difference between a validated account and a non-validated account now seems to be the same as the difference be-tween 0 and 100% certainty. However, in reality it might rather be a degree of certainty some-where between 0-100%.

As a result, five different types of certainty are integrated into the address validation system and are driven by technology, the human factor, or a combination of both. In the ideal case, the consumer would need to complete as many certainties (layers) as possible to have the high-est possible validation strength.

Therefore, the idea of the system is that it provides as much certainty as possible while also being as convenient as possible for the consumers. Since the 'GPS-analysis concept' still seemed to be quite desirable for certain consumers due to the ease (despite the privacy aspect), this concept was also taken along in the system.

The address validation system and the way it operates, are visualised in figure 63. A detailed description and a simplified version will be provided in the next section.

Figure 63: Strategy flowchart to increase address validation strength and certainty regarding PostNL consumers
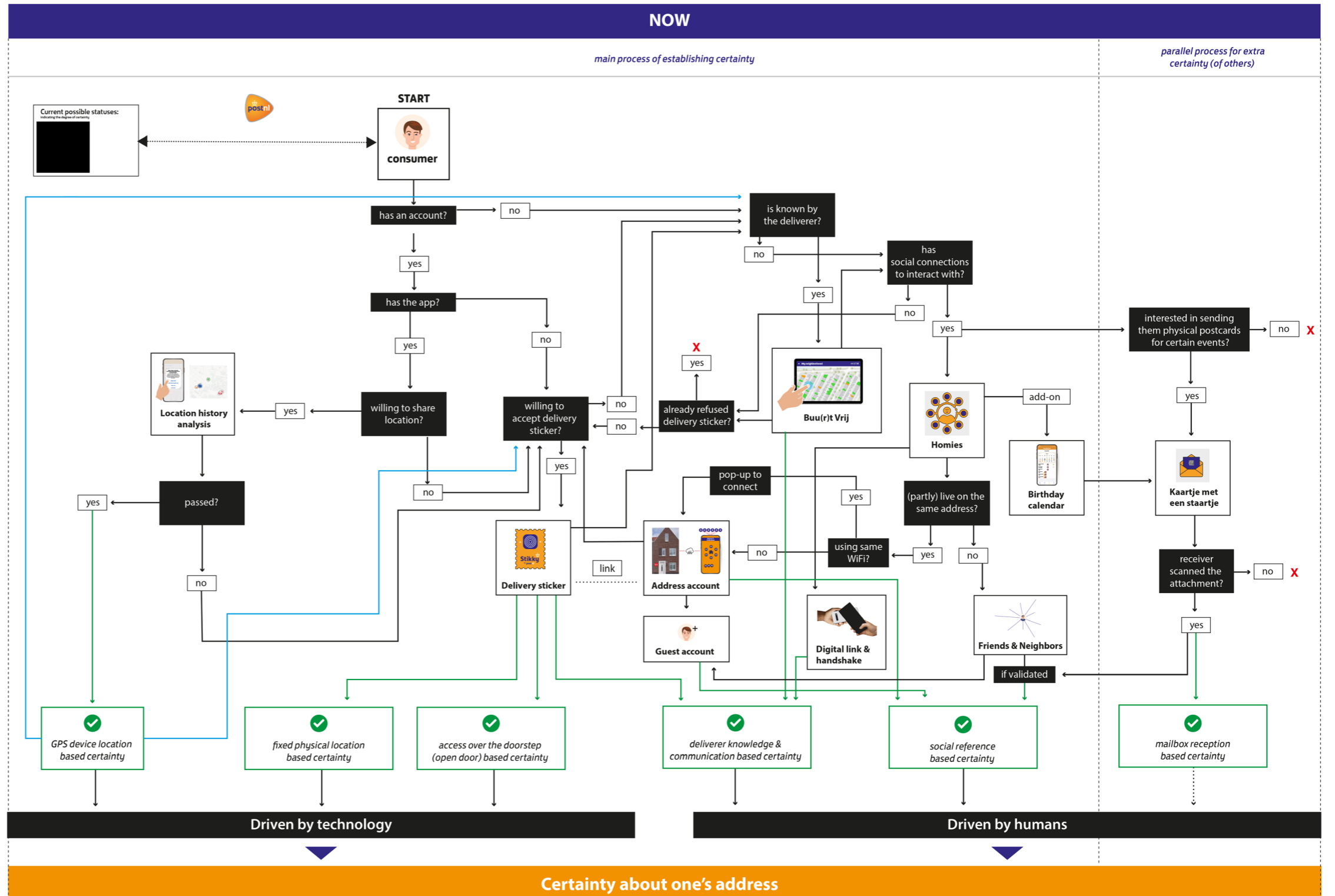
7.5.1 How does it work?

Since the address validation flowchart might be difficult to understand at first, also simplified version was created (see figure xx). This shows which steps are taken and in which order. Furthermore, it shows the difference in effort needed by a legitimate consumer and a fraudster.

1) The first step in the address validation system is the location history analysis. Consumers that are already in possession of the PostNL will get a notification with the possibility to turn on their GPS location. This GPS data would be stored on a consumer's device only, after which only the conclusion of a 60 day-data analysis will be sent back to PostNL. This will provide a GPS-location-based certainty. The only thing the consumer would have to do is accepting the location data sharing pop-up and continue living his or her life. A fraudster would need to simulate having a device at a location that is not his for a significant amount of time. The first step will already increase the number of validations.

2) Then, the system will proceed to the next step, which would be Buu(r)t Vrij. Here the deliverer has the authority to validate people of which he is sure they have righteous access to an address. This might lead to newly added certainties concerning consumers that are not willing to share their location. For consumers that are willing to participate in this, this

step only strengthens their already captured certainty, namely that of deliverer knowledge. The consumer does not have to do anything for it. However, a fraudster would have to bribe the deliverer, cooperate with him, or would be the deliverer itself. Although fraudulent deliveres only make a very small percentage of all deliverers, leading to the least certainty compared to the other steps.

3) Therefore, a third step in the system is based on social connections. A consumer can add people to his account that he can authorize and communicate with. If the first two steps are not successfully executed due to the lack of willingness to share a location or not being known the deliverer, this does not mean that the consumer is not legitimate. By having a link with validated neighbors or validating housemates and being confirmed by them, there is a new degree of certainty, namely that of social connections. If a consumer successfully went through the previous two steps already, completing this step only strengthens his validation.

4) In parallel with the other steps and possible at any moment in the address validation system, there is 'Kaartje met een Staartje'. This provides the same certainty as the MyMail letter, which is the certainty of access to the mailbox of a specific address. Since this is happening passively in the background and based on data, for the consumer it is just a matter of sending,

receiving, and scanning postcards. A fraudulent person has to create and pay for sending a postcard via a fake account in the app. Gain access to the mailbox of the receiving address and scan the QR-code of the post-item. That is if he is even aware of this validation method.

5) The final step in the address validation system is the offering of Stikky which provides two certainties. Namely the certainty of a person having access over the threshold of a specific address and a a package being delivered over the threshold of that specific address. For a legitimate consumer, this only means receiving Stikky and pasting it on the doorframe of his or her own address. A fraudster needs to try to become in possession of a specific Stikky, gain access to an address that is not his, stick it in this doorpost and be there at the moment of activation.

The more layers the consumer successfully goes through, the more certainty and thus the stronger the validation. In consideration with PostNL, the decision should be made which actions consumers are allowed to take with which degree of overall certainty.

7.5.2 The address validation dashboard

Currently, the validation data is just a collection of letters and numbers. However, to make all this data that is generated by the system more tangible, the idea of an address validation dashboard was born (see figure 65).

This dashboard provides an overview of the overall validation statuses all over the country and is able toozoom in on province-, municipality-, city-, neighborhood- and PC4-level. At a later stage, it might also be possible to zoom in on the individual address level.

In this dashboard, the data can be filtered by checking and unchecking different boxes concerning the different types of validation or sorted according to one's own wishes (such as timespans). This would make the data understandable and inspiring to act upon for multiple departments within PostNL, among which security, design, and business. They might for example spot interesting areas more quickly and anticipate on it (e.g. invest in appointing a fixed deliverer in a neighborhood with a low degree of validation or quickly spot frequent areas of fraud and act upon it). Furthermore, insight into address and area activity might provide opportunities for personalization.
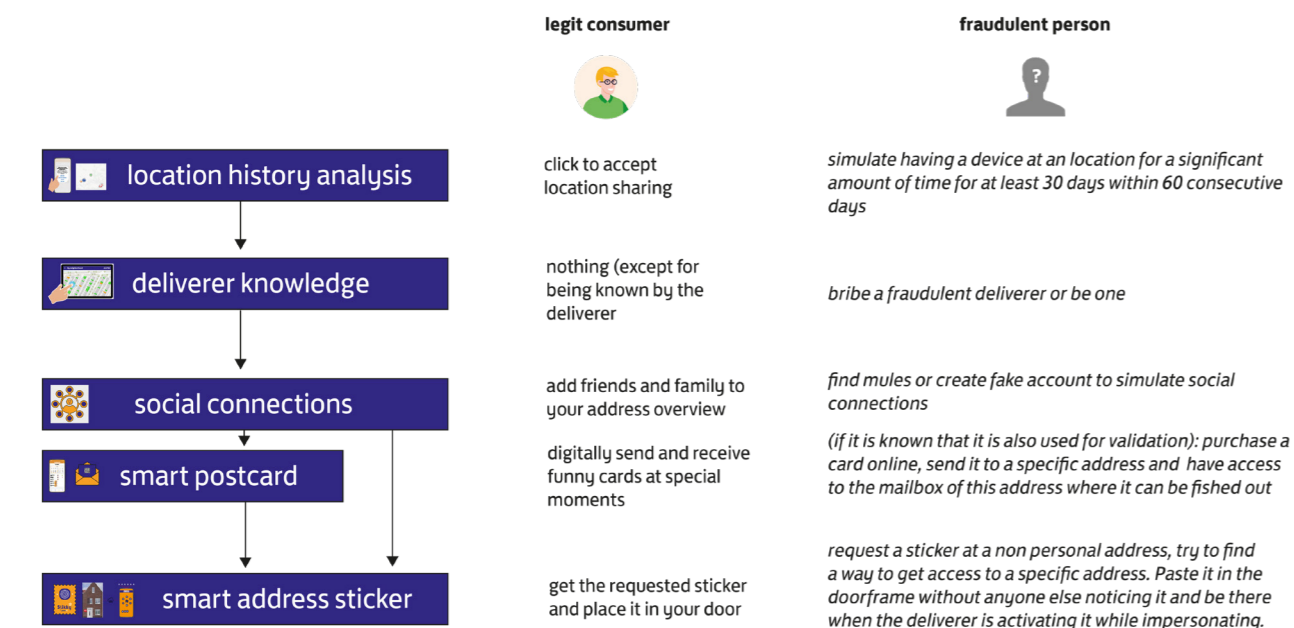
Figure 64: Simplified version of the strategy flowchart to establish address certainty.

Figure 65: Example of the address validation dashboard

7.6 Design focus: Stikky

It would be impossible to work out this whole address validation system within the time frame of the graduation assignment. Since there is still the intention to come up with a solution that has been worked out very concretely, the focus from now on is mainly on Stikky, the smart delivery sticker. The reason for this is:

• It is the 'digital fingerprint' of an address, with each Stikky having an individual unique code that can be traced back.
• It is a solution for two prioritized problems: identity/package fraud (which is increasing quickly) but also the disputed delivery (which counts for the highest amount of complaints and also is a shared painpoint).
• It can be implemented directly. The threshold is low as well as the costs. As soon as it is attached to an address house, a consumer can use it to validate oneself.
• It meets the set requirements regarding security, certainty, privacy and user convenience.
• It provides significant added value for the consumer as well as PostNL.
• It is simple, smart and you can do it together, which makes it a strategic fit according to the 'Oranje Kompas'.

• It works for people that do not have the PostNL app as well as people that do not have the app. The only thing a person needs if he also wants to have an overview is a PostNL account.

Furthermore, other parts of the concept can already be integrated into the existing flow, such as the 'Location History Analysis', 'Buu(r)t Vrij' & 'Kaartje met en Staartje'. Therefore this part also requires the most elaboration.

Figure 66: Impression of Stikky

Chapter 7 - Key takeaways

• The total amount of concepts was validated by means of evaluation sessions with several consumers and PostNL employees from the involved departments.
• For a solution to be effective and attractive enough for implementation, it will need to survive going through a cycle that can be divided into three phases:

1) The first loop includes security (*'how much does it increase current reliability?'* and *'how safe is the solution itself?'*), privacy (*'is it legally possible?'* and *'do consumers think it is worth it?'*) and user convenience (*'is it user-friendly and are the required steps easy to perform?'*). Only after a balance is found between these factors, there is potential that the solution will be effective and that it is possible to go to the next stage.
2) Now it needs to be made sure that consumers, as well as other involved parties, understand how the design itself works and why it is necessary. This will require a strong communication strategy. Furthermore, the design should be accessible for everyone in order to act independently and to increase the quickness of validation.
3) The third step is about costs. Here the consideration will be made if the costs justify the effect and if it is worth paying for: for PostNL as well as the consumer. Thereby it is important to focus not only on the solution itself but also on all stages of further development and implementation processes.

• Consumers again indicate that data & privacy are quite important to them and the closer and more personal something is, the higher the threshold to share it, especially with a company. However, their perceived relevance of the supposed added value of submitting or sharing data also plays an important role. Therefore, solving shared pain point or fulfilling shared needs

• Concerning desirability, there is a strong dilemma between security and user convenience. The higher the sensitivity of a system, the more false errors will occur, which will lead to more frustrated users. The lower the sensitivity of a system, the more opportunity there is for fraud and the lower the quality of the data. Since validation systems will always have errors, it was tried to get clearance on which margin of error PostNL is willing to accept. Unfortunately, this was not found as this is strongly connected with the associated costs. Thereby it would even be possible to settle for an option with a lower validation having low costs instead of an option with higher certainty and much higher costs.

• All 18 concepts described in chapter 6 were judged on the criteria listed in that chapter by making use of an ordinal method, namely a 'product profile'. After consultation with PostNL, it was decided to add weight to the criteria 'validation quickness' and 'time to market' and decrease the weight of the criteria 'privacy'.
• Based on the outcome of the evaluation of all concepts on the listed criteria, the most promising were selected and combinations between them were made. This resulted in four potential concepts with a different angle to establishing address validation: 'Kaartje met een Staartje', 'Homies', 'Stikky' and 'Buu(r)t Vrij'. Evaluation sessions with consumers utilizing user scenarios showed a clear preference for 'Kaartje met een Staartje' and 'Stikky' due to their uniqueness, 'fun' elements, and convenience.
• It was decided to also add the GPS location analysis since PostNL still considers this very interesting enough for further research. Next to that, during the evaluation sessions, certain consumers seemed to be perfectly fine with it due to its convenience and quickness. However, getting it through privacy will be a challenge.
• All five concepts come with different types of certainty with regard to address validation. These are respectively: mailbox-reception-based certainty, social connections & reference-based certainty, fixed physical location based-certainty, deliverer knowledge-based certainty and GPS dynamic location based-certainty.

• There is no one size fits all solution for validating all consumers. Therefore, the actual final concept exists out of a multilayered system in which all five sub-concepts with the different types of certainty with regard to address validation are integrated. These certainties are driven by technology, by the human factor, or by a combination of both. The more layers a consumer goes through, the higher the obtained certainty. In the ideal case, a consumer is fully validated by succesfully going through all of these layers.
• The starting point for the address validation system is to create as much certainty as possible (by raising the threshold for fraudsters) while requiring the least effort from the consumer.
• To make all the different kinds of validation data quickly understandable and beneficial for multiple departments within PostNL, an address validation dashboard is suggested that provides a visual overview of the corresponding certainties. Actions could be take accordingly, such as assigning an experienced and fixed deliver to an area with a low degree of address validation, connecting neighbors in highly validated areas, or setting up new PostNL points at strategic locations.

• It was decided to focus on Stikky for further development since it is also a solution for an important shared pain point (the disputed delivery) and also requires the most elaboration as it is a quite new concept. Furthermore, it already scores well on convenience, safety and privacy.

08

Final design focus: Stikky

This part will zoom in on the chosen focus regarding the final address validation system described in the previous chapter, namely Stikky. Also, a more concrete and in-detail elaboration of its most interesting elements will be provided.

08. FINAL DESIGN FOCUS: STIKKY

8.1 About Stikky

To elaborate on the design of Stikky, the use is made of the 5W1H-method.

What is Stikky?
Stikky is a small sticker with an integrated NFC chip that can be stuck on your doorpost. The NFC technology makes it possible to scan this sticker with a mobile device that has this same technology (which nowadays are almost all phones). When it is activated by the deliverer, an address account will be created for this address (a digital version of your physical address). The validation is only established after this activation by the deliverer.

The sticker can already be placed on the doorpost of an address. The consumer does not necessarily have to perform any actions with it yet. It can already be used by the deliverer. Therefore, the consumer also does not necessarily have to have an account to obtain more certainty. However, when it is already there, the threshold for the consumer to also make use of the other benefits it provides, might be lower.

As one of the previously listed requirements stated that as much as possible use should be made of current resources of PostNL to keep the implementation time short and business costs low. Therefore, the handheld that is already being used by the deliverers should

also work with Stikky. This 'Panasonic TougPad FZ-N1' has a lot of functions, some of which are not being used currently such as: the front & back cameras, Bluetooth and most important for Stikky: the NFC connection. In appendix K an overview can be found of all specifications. Next to that, also from a consumer perspective, it is feasible since most of these consumer phones also have an NFC chip in their smartphone. In appendix L an overview can be found of all compatible devices.

Why?
When you zoom in closer on Stikky during the user moment, something interesting can be seen: a triangle of certainty. (see figure xx). This is the main reason why Stikky adds value.

Both the consumer and the deliverer can perform a validated action through Stikky. For the consumer, this is proving that he has righteous access to an address as it links this digital consumer (account) to a physical address. Since the deliverer can only scan Stikky if the door is open, this deliverer can prove that he has delivered a package over the threshold of an address. Furthermore, when a consumer is validated using Stikky, this allows for the possibility to establish a two-sided confirmation connection between addressee and deliverer through a digital handshake.

Figure 68: Stikky's place in the context

Figure 67: Stikky: 'the digital fingerprint of your address'
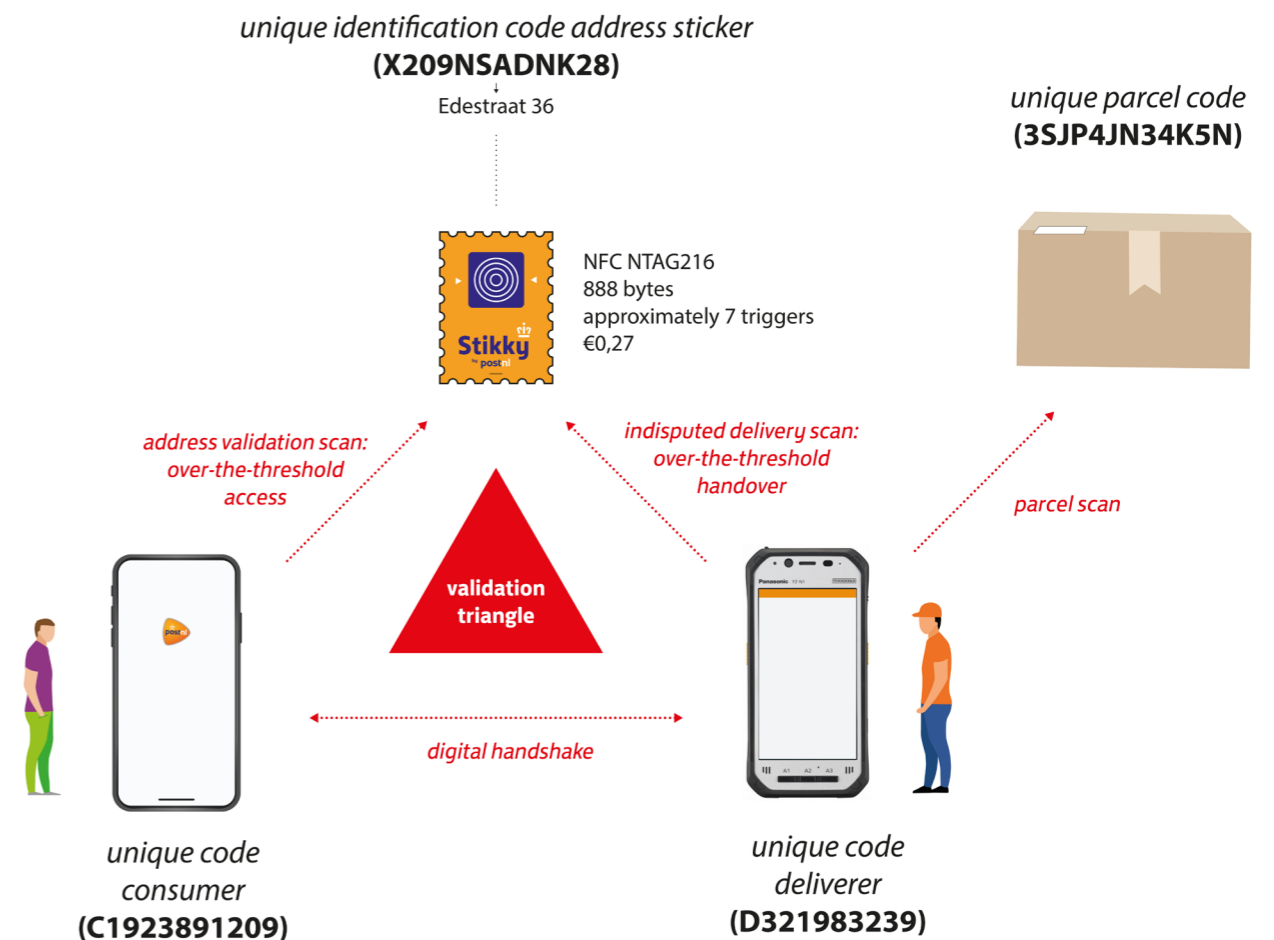
Figure 69: The triangle of connected certainty

Where?

As can be seen in figure 70, Stikky can be placed in multiple places on the doorframe, on the lock side, or on the hinge side (which has the same security effect but might be less disturbing visually). The exact place could be decided upon by the consumer himself or in consultation with the deliverer. The only important requirement is that it is not visible when the door is closed. In the Netherlands, the doors have standard sizes. These sizes for exterior (front) doors start at 38mm, other common sizes are 54 or 67 millimeters. (Verdouw; Deurmarkt.com, 2021) Therefore Stikky can only have this dimension as a maximum.

Who?

With regard to who is placing Stikky, there are three possible options:

Consumer
In case the consumer places Stikky, there is no extra time involved for the deliverer. However, the deliverer is dependent on where the consumer places it. Therefore it could be placed too low, too high, or in a wrong way.

PostNL (the deliverer):
When the deliverer places Stikky, he can use the momentum of the delivery together with the consumer. However, in this case the deliverer has to perform an extra task which results in this person losing valuable time. Furthermore, there needs to be a guarantee that it is actually placed at an address to exclude a fraud opportunity for fraudulent drivers.

External independent party (e.g. Eneco)
In a third scenario, an additional third party could be involved that is neutral and has no interest in taking advantage of the situation. However, this would bring extra costs with it and would be difficult to implement in the current processes.

When?

As explained in the previous section, Stikky can be placed during a moment of delivery. In case a consumer is not at home during the day, a one-time-free evening delivery could be offered and scheduled with this consumer. In this way, Stikky can still be placed together and be activated directly by the deliverer. An alternative way is to do it in the same way as is done with MyMail, namely by receiving it as a postal item in your mailbox.

Thereby the Track & Trace code (that is occasionally being checked) can function as a communication channel where consumers can be nudged to submit a request for a Stikky.
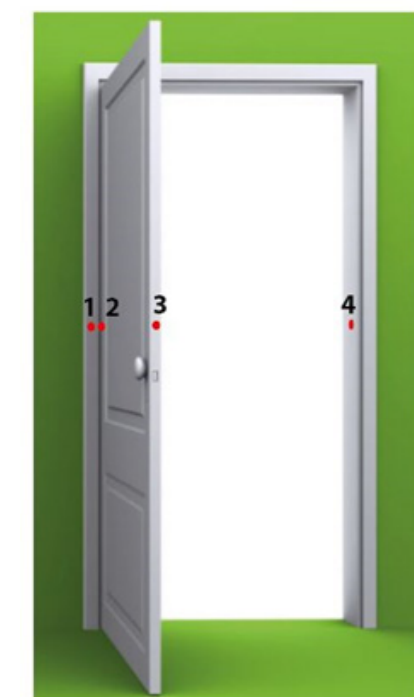
Figure 70: Stikky: Where, Who and When
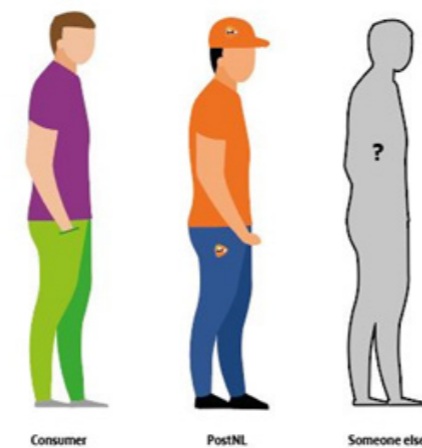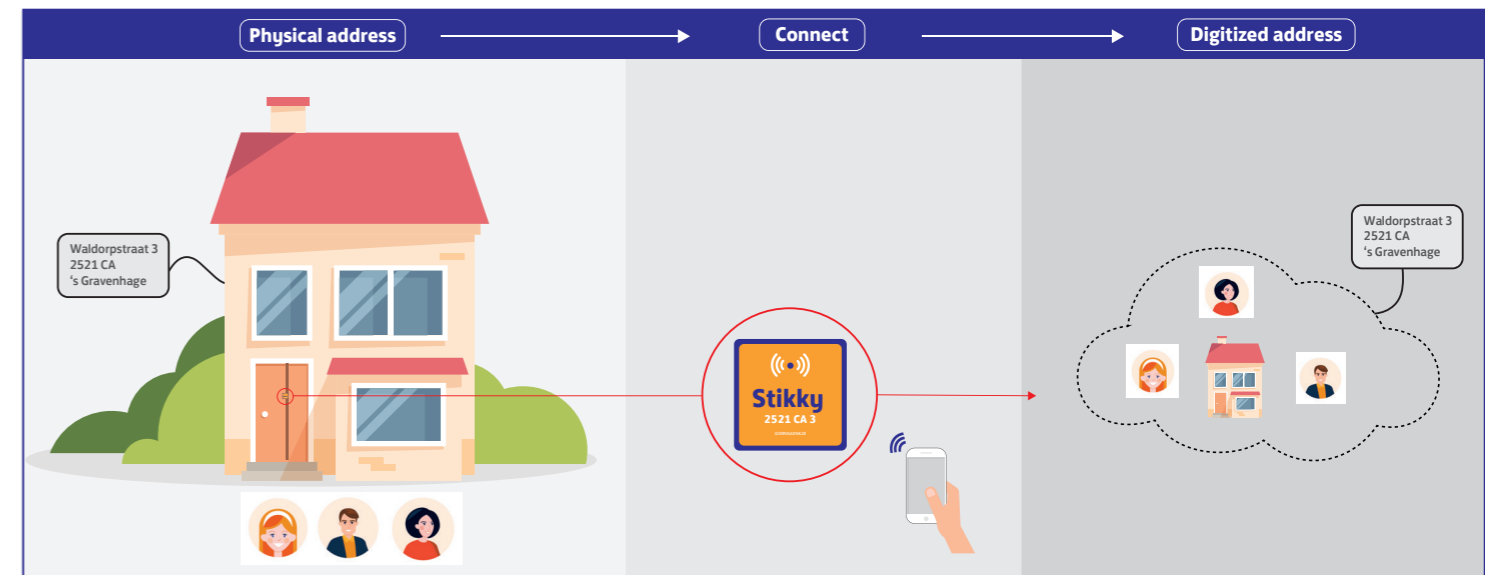
Figure 71: Connecting to your digitized address by scanning Stikky in your physical address
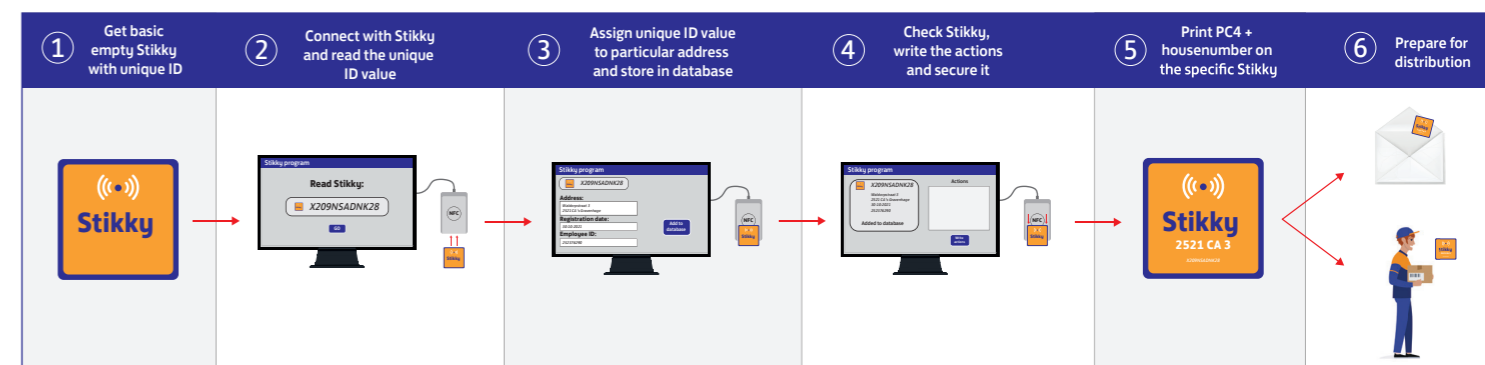
Figure 72: The process of preparing a Stikky for use

How?

Stikky contains a unique identification code and a link that refers to a 'digital address account' (see figure 71). This is the digitized version of the physical address where Stikky is stuck in the doorframe. Consumers can register themselves at this digital address account by scanning Stikky and thereby they prove that they have access to this physical address. In this way, it is possible to link a digital consumer account to a physical address.

The identification code of a Stikky is used to link it to the corresponding physical address. This is done already during the initial activation at the depot where this link is entered into the database (see figure 72). In this database, it is possible to see to which physical address Stiky belongs, the consumer accounts that have connected with this Stikky, the date it is registered in the system and the employee number of the one that has registered and activated the Stikky (see figure 73).

Figure 73: Impression of the Stikky database

8.2 User scenarios

In this section, the three main scenarios will be demonstrated from the perspective of the consumer. This will help understand how the design works.

Scenario 1: Proof of delivery over the threshold (scan by the deliverer)

You expect a package today and consult the Track & Trace code. It says here that your package has been delivered (see figure 74). This is strange because you have not yet received the package at all.

You have heard of Stikky and now decide to try it out. From now on you can choose whether you want a package to be delivered to you with extra security. The delivery person can now not just mark your package as 'delivered' without having scanned the sticker in your door frame. This way you don't have to worry that a package will be wrongly indicated as 'delivered' in the Track & Trace. In addition, other people cannot impersonate you and receive a package outside that has your address on it.

Figure 74: A confused consumer

Figure 75: A satisfied and reassured consumer

Scenario 2: Proof of righteous access to an address

Not only the delivery person but also the consumer can connect to a Stikky at an address. In the future, you may have to prove that you belong to a certain address to use certain services (such as changing your delivery, accepting 18+ shipments with identification, authorizing others, etc.).

By scanning the Stikky via the app on your phone (at any time), you as a consumer can digitally register and/or confirm this address. You do this by keeping your phone close to the sticker. This could be possible with or without the app. The advantage of already having the app is that you do not have to log in first.

Of course, it should only be possible if you are already at the address or able to open the door. In other words: if you have lawful access to this address. This could be the case if you live there or have access with the knowledge and permission of at least one of the residents. Getting a notification everytime when someone registers, can provide a secure overview.
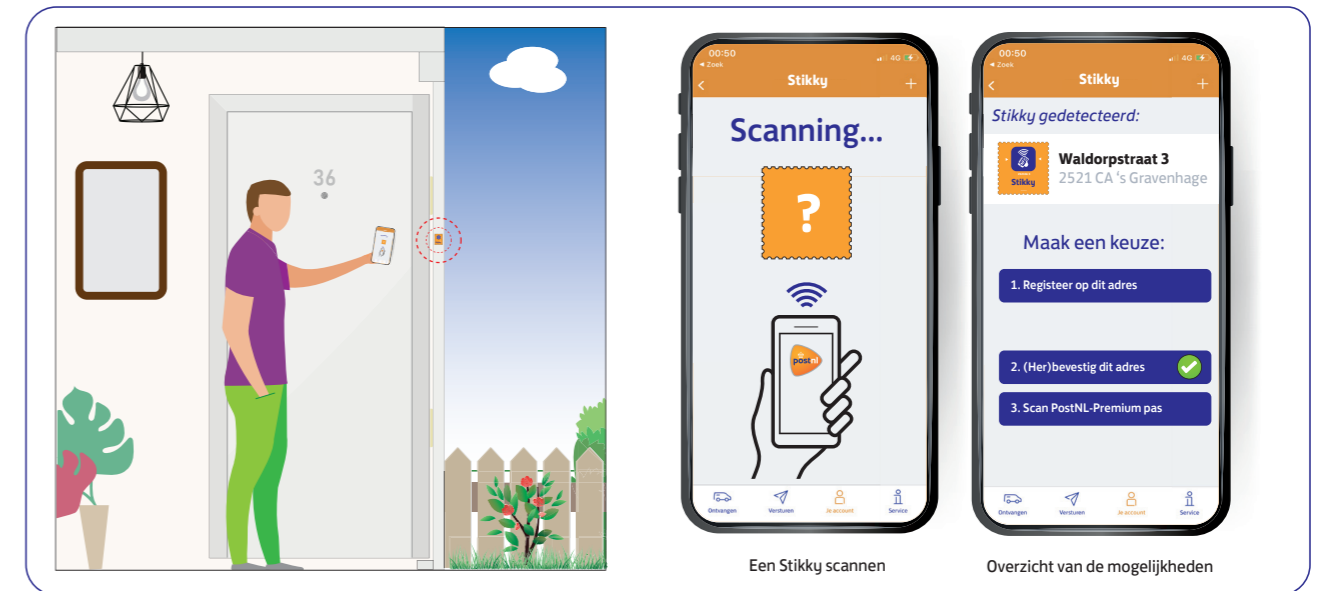
Figure 76: A consumer scanning the Stikky in his doorpost

Once you scan a Stikky, there are two main options possible:

1: Register yourself at the corresponding address.
You can choose this option if you want to add yourself to a specific digitized address for the first time. After being asked if this is indeed your intent, scan Stikky again to confirm. The other registered participants will receive a notification that you have registered. Now someone with fraudulent intentions cannot do this anonymously.

2: Confirm yourself at this address.
You choose this option when your validation (almost) expires and your specified address must therefore be reconfirmed. Compare it to a kind of annual 'APK'. With this, you can demonstrate that (after e.g. a year) you still have access to this address (e.g. people that have moved). In this case, also other registered persons will receive a notification that you have registered. For example, someone with fraudulent intentions cannot do this anonymously.

Figure 77: Registering or (re)confirming an address
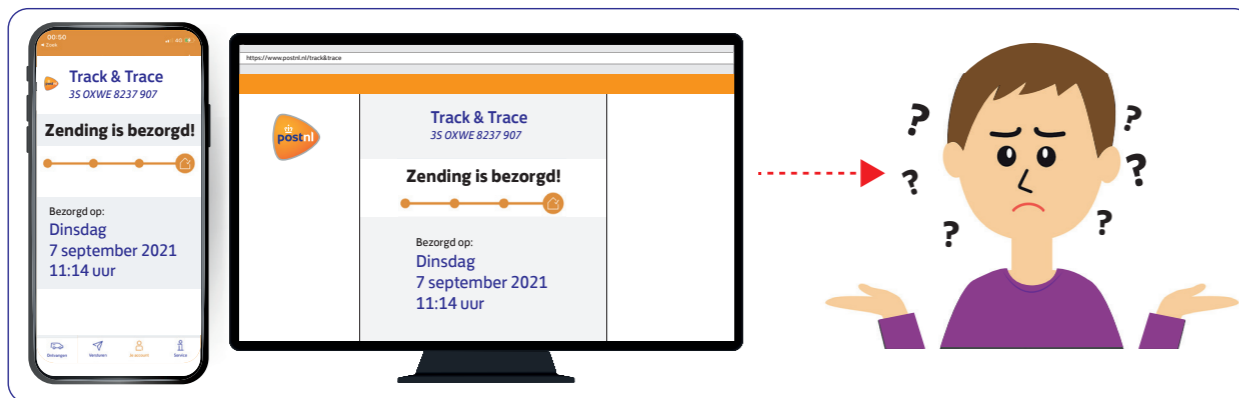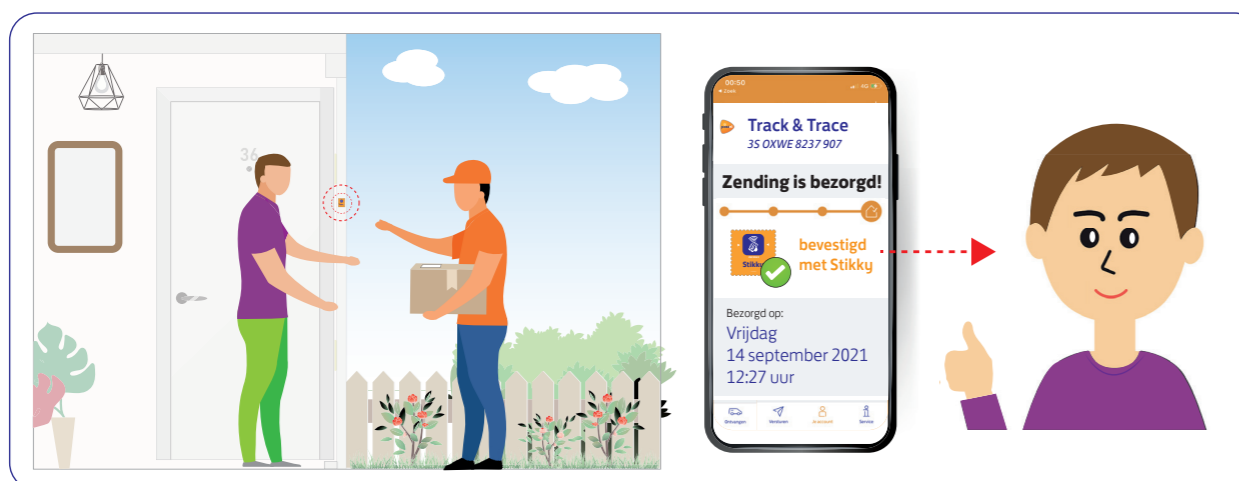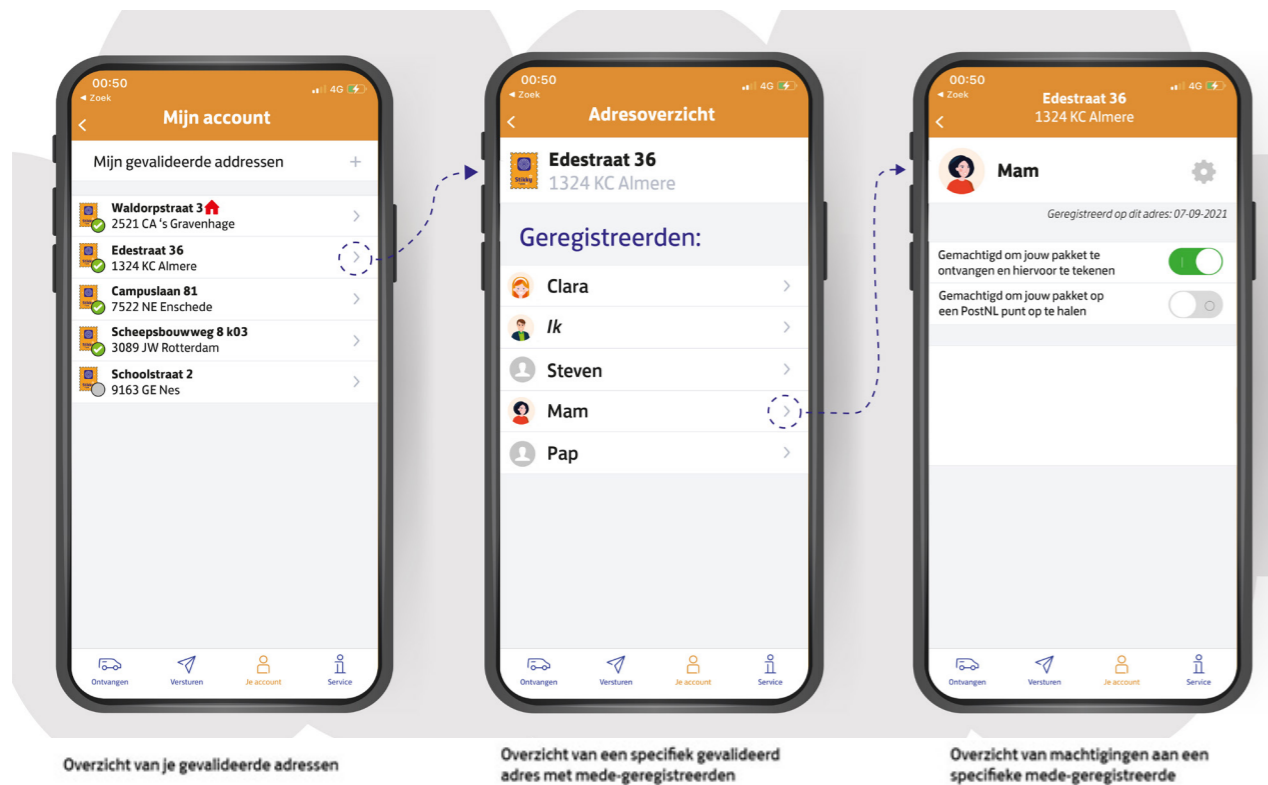
Figure 78: Exploring the possibilities of an address account of one of the Stikky-validated addresses.

Once a consumer is registered at an address via Stikky, this person can see this confirmed registration in his digital address overview. His other 'Stikky-validated' addresses can also be found here.

For each validated address you can see who is 'Stikky-registered' at it. In this way, you can easily and quickly see whether there are any unauthorized people registered at your address or not (e.g. due to chat tricks at the door or the previous residents of an address). If this is the case, you can submit a 'reset request' or request confirmation.

You can also grant authorizations to co-registered persons at each of your Stikky-validated addresses. This way they can sign on your behalf for a package or pick it up on behalf of you at a PostNL point. Since both you and PostNL can see who has validated themselves at your address utilizing a Stikky, fraud can be recognized and prevented earlier. Also, you can be informed earlier about the progress of a shipment as your account and can now more easily be linked to your package. This can be done for each of your addresses:
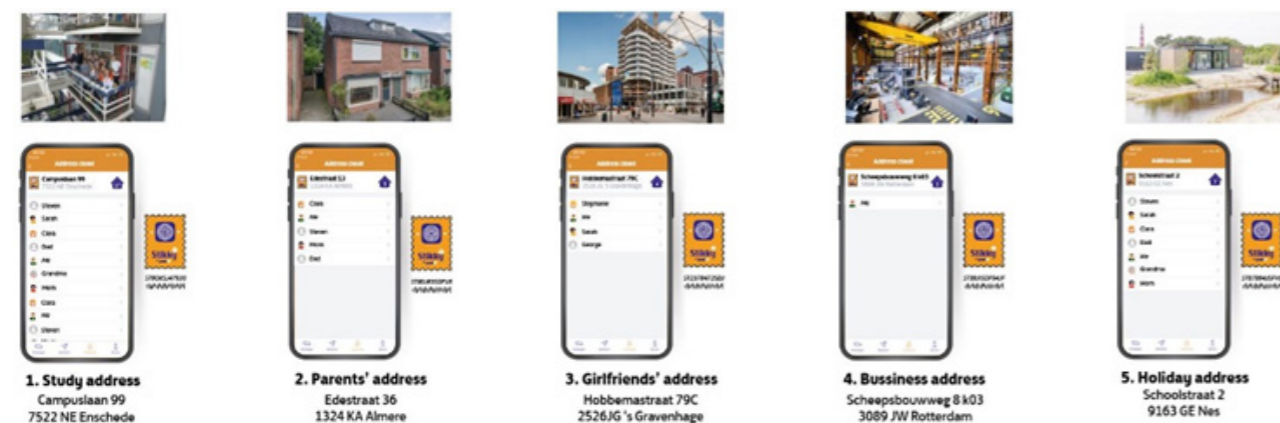
Figure 79: Overview for each of the Stikky-validated addresses

Scenario 3: Proof of handover to the right person

Now that your address has been digitally verified and possibly also any other certainties (such as name and age), it is possible to perform actions with your phone using its NFC connection, and also outside of your home.

You can think of signing for receipt of a package (for yourself or someone else) by placing your phone against the handheld of the deliverer. In addition, you can also identify yourself for a delivery that requires identification.

Furthermore, you can now easily, quickly, and safely pick up a package at the PostNL point for yourself or for someone that has authorized you via the Stikky's address account. Eventually, you could also connect with other people in this way, such as e.g. your neighbors to establish a (not too personal) communication line. Here which you can indicate when you are able to pick up your package at their place or when they can pick up theirs at your place

Figure 80: A digital handshake between deliverer and consumer

Figure 81: Overview of the MVP

8.3 Validating the design

This part will discuss the evaluation of the design from both a PostNL perspective and the perspective of the consumer. Firstly, several employees out of different departments and from varying hierarchical layers were consulted. Based on this, Stikky will be further developed in another iteration to improve its desirability, feasibility and viability.

8.3.1 Internal validation: within PostNL

The deliverers
Since the deliverers will play a crucial role with regard to Stikky's success, they were consulted during the process to gain insights from a practical perspective.

In consultation with one of the process managers and looking towards the limited amount of time the deliverers were available (just before their ride), the decision was made to facilitate a thirty-minute session with two different groups, just before the start of their workday. One group existed out of CAO'ers (permanent employees that are covered by the collective labor agreement), while the other one existed out of subcontractors (self-employed workers). Since these groups have different working conditions and interests, it is essential to keep both their stances towards Stikky into account. Both groups existed out of three employees and the one with subcontractors was accompanied by someone from the planning desk to assist with possible language barriers.

Figure 82: Impression of the validation session with deliverers

The purpose of the test with the deliverers was not to test mock-ups or visuals, since this is not a graphic design project, but it rather served as visual support during the focus on the strategic value of the design.

Starting with a short introduction and presentation, the concept was discussed in detail with the focus groups. After the sessions, contact details were exchanged, making it able to possibly share new thoughts that may come up later. Furthermore, already during the preliminary talk scheduled with one of the process managers when scheduling the session, it was discussed that the week after the sessions, one deliverer of each group would be joined to test the new developments made based on the session. Also, it would be an opportunity to get more in-depth feedback about certain elements of the design and ask questions in practice. Therefore this session also functions as a moment to plant a seed into the mind of the deliverers, making them (unconsciously) think about the idea and process it during their work. Furthermore, possibly also 'real consumers' could be consulted. How these consumers look towards Stikky, can be found in the next chapter.

The following insights emerged out of the sessions with the deliverers:
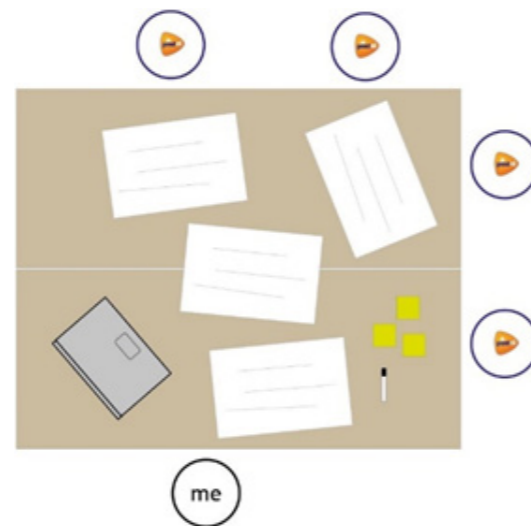
• **Building trust takes time.** Deliverers feel that appreciated by consumers and notice that it is possible to **build up credit** with them. This however takes time and at a certain point can also express itself in **trust**. A deliverer mentioned that he has the key to the door of some people in his neighborhood, so he can deliver a package in the house himself if necessary. Another deliverer even has a consumer's debit card that he uses to do groceries for her.

• A deliverer simply wants to **get rid of his packages**. Currently, all deliverers have 'small post offices' in their delivery area. They indicate that this is often someone like an 'eighty-year-old grandmother' that is always at home and who is fine with it. Consumers **simply want their package**, without too much fuss about it. A deliverer might also have certain **mutual agreements** with the consumer concerning **convenience**. For example, delivering a package to an addressee's family member that lives in the same neighbourhood in case the actual addressee is not home at the delivery moment. This is convenient since this addressee does not have to wait another day or does not have to go all the way to the post office.

"So suppose the addressee is not at home, then I just deliver it to his niece who lives 3 blocks away and click on 'delivered at home'."

"Although this is indeed not true, it is most convenient for us to do so and the consumer also appreciates it."

• Deliverers think some of those mutual agreements are now no longer feasible with Stikky, which might also result in **losing the 'human aspect'**. They consider this important and think it should not be forgotten, but still added at some point if possible.

"With this system, I can't lose my parcels if the recipient is not at home. Unless all houses have such a sticker, but otherwise it will be difficult."

• **Deliverers want to have and maintain a good relationship with the consumers** and believe that therefore they must still be able to lose their packages. Otherwise, the consumers will suffer from it, and in the end PostNL as well, as there will be more complaints to the sender about PostNL's poor service. If this happens too often, it is not good for PostNL's business.

It needs to be made sure that the consumer does not become **dissatisfied** with the service and that it should not disturb the deliverer's good relationship with the recipient. This is necessary to keep their work **efficient and enjoyable**.

• There is also doubt about **who benefits** from Stikky.

"This is mainly convenient for 'the people above', the seniors in the office so that they can satisfy the sender. But not necessarily for us and the consumer."

"We have a different customer than PostNL. For them it is the sender. For us, it is the one who receives the package."

• There is a big **difference between devised solutions and practice.** Deliverers indicate that there is a **very large gray area** in which they work. However, as long as **no complaints** come in from consumers, there is no problem, it's all fine. Thereby, they indicate that in principle, PostNL always believes the driver first.

"Will strictly following the rules actually make the consumer experience better?

"If you precisely adhere to the rules, you will turn back to the post office with at least a half-full van."

• What deliverers find most positive about Stikky is that it provides **more certainty and safety**. Also, it is much faster and safer than doing things manually (e.g. filling in a (bar)code). Currently, are made mistakes from time to time due to entering a number incorrectly (e.g. a house number or ID number), which is human. An advantage of this system is that the expected **margin of error is smaller**.

• **NFC** is found a smart option since one has to be very close for it, unlike a **QR code** that can just be **copied and distributed**. That is not secure at all since there are quite a lot of delivery guys who often **take pictures** of everything for convenience. Deliverers think it is also interesting if it could be **combined with the HVO** control measure so that it saves time.

• This **time** is considered the **most valuable** aspect for deliverers. Having 160 stops a day

and saving 20 seconds every stop will save an hour at the end of the day. **Checking identification** was found to be the most annoying and time-consuming task (which can sometimes take up to 5 minutes of waiting). If that could be done faster with Stikky, that would be great. So **speed** is important for the deliverers, in particular for the self-employed ones. However, they are afraid that it might result in PostNL saying that they can do the job a lot faster now that it is much easier. Therefore they are afraid that the **fees per stop** will decrease and so the eventual price of the route will go down.

Stikky must be **simple**, the recipient must **understand** it. All the deliverers have occasionally experienced that a consumer became angry with them because of **misunderstandings**. Sometimes the recipient doesn't even know who is delivering the package. **Communication** might be another challenge. Deliverers state that it has now been stated in the **T&T link** for 2 years that identification is required for a receipt but in practice, it seems like people don't read it at all.

"If people have to search for it, they won't. People are lazy and they don't read."

• Deliverers also **recognize their responsibility**. Sometimes when the door of an address is already open (without seeing a consumer nearby), they deliberately don't deliver the package (inside) since that is proof that they have been there. In case things are missing or stolen, they will not be considered suspects.

Next to the people that will deal with Stikky in the practical context, also **other departments** in the main office were consulted that are of significant importance for the implementation of Stikky. This led to the following insights:

Concerning **privacy**, Stikky performs quite well since there is no additional sensitive or special personal data used. Therefore a DPIA high risk processing analysis would not be necessary. Important however is that the consumer has to want it, so it does not enter the 'justified interest' process, which is much more complicated. With the consent of the consumer, implementation is much easier to perform and explain.

Design also recommends leaving it as an option and not obliging it to people. Therefore

the focus should be on the positive sides for these consumers so that they intrinsically want to have it.

"It sounds interesting from a strategic perspective, but we need to make sure that the consumer really wants it too".

They also recommend making sure that people do not get power over other people concerning the address account to prevent possible negative impact on hierarchical relations.

Another nice addition would be to integrate a special recognizable sound whenever Stikky is scanned. This could lead to a new unique PostNL association, comparable to the typical sounds of scanning an Albert Heijn bonus card or checking in with an OV-chip card.

Finally, it could be worthwhile to look at making sure that Stikky breaks or becomes defective whenever taken off, so it can not be used afterwards.

Security is enthusiastic about NFC in the doorframe since it can provide proof that one has actually been at a certain location, in contrast to QR codes that can be easily distributed. Also, it prevents deliverers from doing their jobs in way that they are not supposed to. However, they state that as soon as you give someone a power that they can abuse, you are essentially giving them 'a commodity that can be sold to commit fraud with'. Therefore, security's main concern is making sure that Stikky is actually placed in the house by the person responsible for handing it out and activating it. Hence, they recommend Stikky being placed by a neutral third party (e.g. an energy supplier such as Eneco).

Business recommends using it as an additional service. Also, they wonder what the possibilities are of linking a white label to it. In this way, it can also be used by other parties that would like to make use of the benefits that Stikky provides. In fact, it would enable PostNL to 'sell security' or rent it to other stakeholders and LSPs so it serves a holistic purpose. Compare it to Tikkie, which is developed by ABN AMRO Group but can also be used by consumers and in processes of other banks such as ING, Rabobank, etc.

8.3.2 Iteration based on internal validation

Since the deliverers were concerned that it could be more difficult to get rid of packages that require a Stikky scan (due to the probability of not everyone having a Stikky in their doorpost), a new iteration was done. To stimulate the adaption and use of Stikky for consumers and their neighbours, a new option was added for the consumer next to the already existing options, namely:

The PostNL-Plus card.
When you register at an address utilizing Stikky (and acquire a validation status), a personal 'PostNL Plus pass' is generated simultaneously (see figure 83). This pass can be used by scanning Stikky in case you receive a parcel for yourself or any of your neighbors. Do you do this within a certain time (e.g. 24 hours) after delivery? Then you will receive 'Plus points'. You can exchange these in the e-shop for vouchers with great promotions or discounts. N.B. To prevent misuse, you do not receive any points if you eventually return the package in its entirety, something that is also used by retailer H&M.

Another option that could make it more interesting would be to enable payments at the door through Stikky. Making it possible to save the receipts (as is possible with the Jumbo pass), proof of guarantee, or having an overview of invoices, are all options that could add value.

What makes the Plus card also interesting for PostNL is that it confirms a consumer having access to an address every time this consumer scans it. Therefore PostNL has the certainty that a consumer still had access to a specific address at the last time this scan was executed. This could be compared with the visible 'last seen status' on Whatsapp (see figure 84).
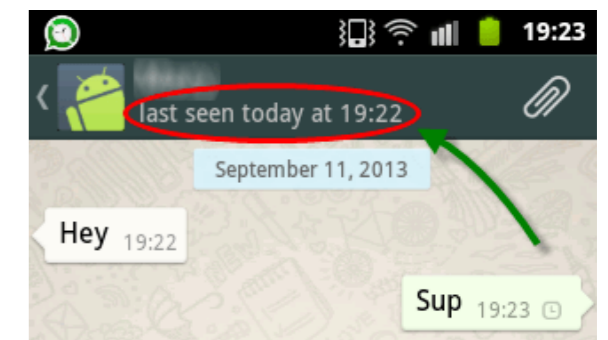
Figure 84: Example of the last seen status on Whatsapp
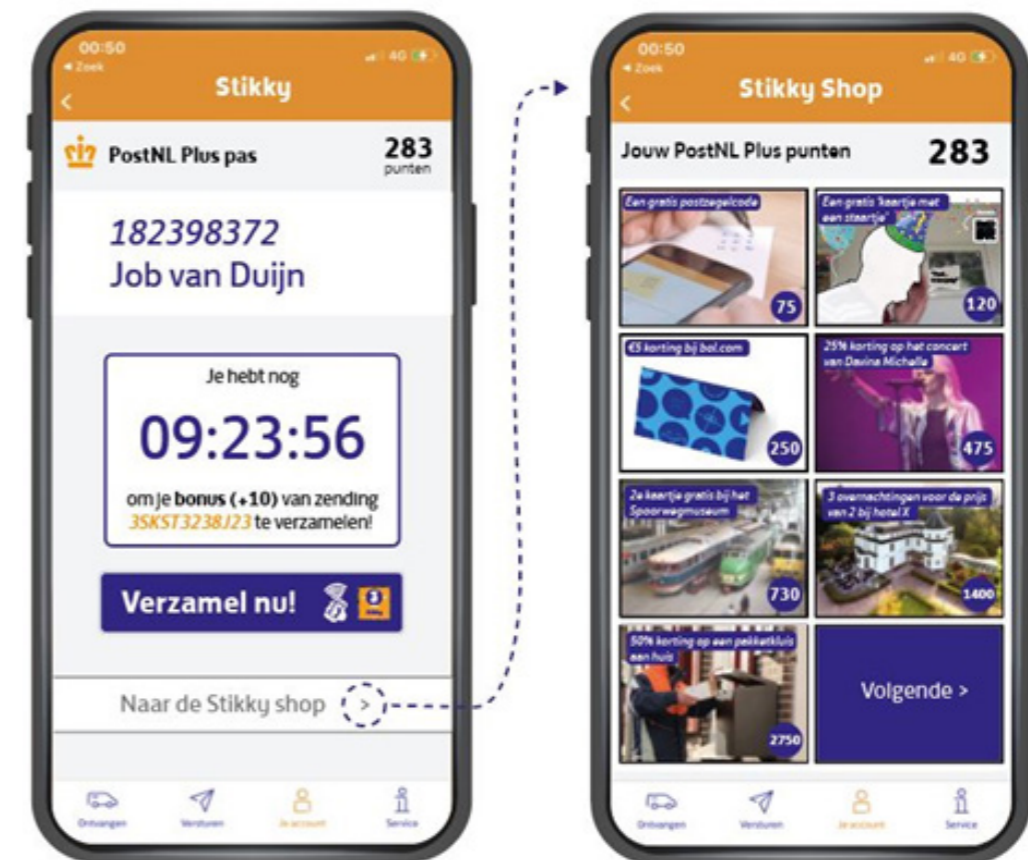
Figure 83: Scanning your PostNL-Plus pass and exploring the Stikky shop

8.3.2 External validation: the consumers

Online survey
During the final validation sessions with consumers, the design elements of Stikky (including the last iteration as described in the previous section) were discussed. The goal of these sessions was to obtain final proof that it is desirable from a consumer perspective too.

In the first instance, a survey was created for online distribution to validate this design on a larger scale. However, after finishing this survey it felt like too much of the idea might be given away if it would be put on the internet. To prevent the design from being thrown out in the wild with the risk of being copied, the choice was made to create a more abstract version of this survey, without compromising the actual idea. The results provided the following insights:

Open-door certainty
With Stikky, the Track & Trace code can no longer incorrectly state that a package has been 'delivered (at home)'. Questionnaire results indicated that 78,1% of respondents find it annoying if a package is delivered in front of the the door or in the garden without knowledge or permission. Therefore, the majority would like to have black and white proof that their door was actually opened at the time of delivery. The same counts for doors of neigbours when they have accepted someone else's package (together with forwarding the house number).

"Yes, because then I am 100% sure whether it is the delivery service or not"

"Yes that would be nice, prevents misunderstandings between you and the sender, between the sender and the delivery service, and between you and the delivery service."

Interest in collecting points when accepting a package
With regards to collecting points when engaging in a successfully executed logistic event, opinions are divided. Approximately half of the respondents indicated to be more willing and comfortable taking packages for their neighbors in this case since they do it anyways and now they get at least something in return.

"Yes, then at least I 'earn' something with it."

"Yep, but not very much more. Rather that you think: 'oh nice, some extra points' instead of 'oh they ordered something again..'"

Furthermore, it also makes frequent orderers feel less guilty about others accepting their packages:

Personally, I always feel like I'm a nuisance to the neighbors when they accept another package for me, so I'd appreciate it if they could get something in return."

Other participants indicated that they just want to help their neighbors without the needing to have anything in return, or are that they are not sensitive to loyalty programs.

Address account overview
A digital overview of who can order and receive packages at an address is considered a convenient solution for preventing fraud with one's address details

"Yes, that's how I know that I and my family are the only ones who can order from this address."

'Yes, it makes you feel safe"

"Yes, then you can act quickly if something does not seem right."

Authorizing others
With regard to authorizing others to sign for and accept a package as well as authorizing others to pick up parcels for them (without a physical ID) at the PostNL point, most participants indicate that this has no added value for them and that they would prefer to pick it up themselves. However, for consumers that are not able to do this due to e.g. work, it might provide an outcome:

"Yes, if a parcel point is open at times that are impossible for me, it would be possible for me to send someone else."

Important, however, is that it is possible to remain in control over both these authorizations:

"Yes if there is the option to change those permissions I would be fine with it."

Consumer validation preferences
As already described in chapter 4.4, 36,4% of respondents are willing to annually confirm their address to an LSP, against 38,2% that is not. 25,2% have a neutral attitude. In order to find out what consumers' preferences are with regard to the way of validating, respondents were allowed to indicate their preferences in the survey. This made it possible to compare the final product (Stikky) with other alternatives desired by PostNL. The responses could be provided using a five point Likert scale ranging from 1 (totally disagree) to 5 (totally agree).

As can be seen in figure 85, a description of what Stikky entails was preferred above the alternatives, even without giving too many details about it. Upon completing the survey, several respondents asked about the product out of curiosity. After me elaborating on it and them understanding Stikky better, they indicated that with the new information, they would have filled in the survey differently, in favor of Stikky. They also stated that if they knew it would be in the form of Stikky, they would have no objection against it.
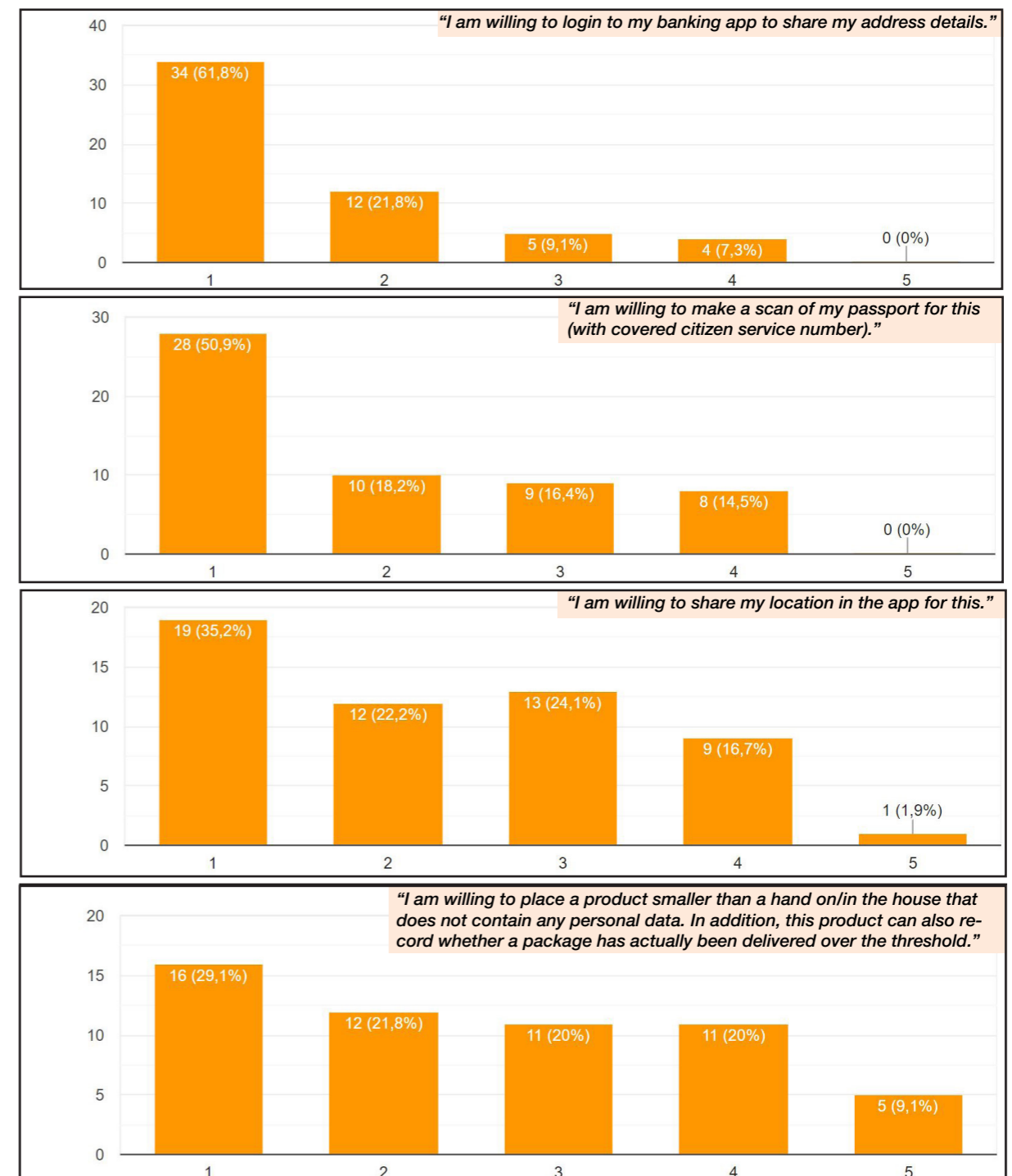
Figure 85: Consumers' validation preferences

User interviews

To still get feedback on the actual concept, it was decided to take the user scenarios of chapter 8.2 and use them as a basis for closely discussing them with consumers.

Surprisingly, in the first instance, consumers are most reactive to the physical appearance of the sticker and its visual design.

"It attracts quite some attention, it's the first thing you see when you open the door."

"I already know that my wife would not like to have a full orange sticker on our grey door-frame, but the hinge side might work"

Next to that, consumers have some concerns about privacy. However, when emphasizing the fact that no personal data can be found on the sticker and that it only contains a number and a digital link, consumers feel more at ease. Also, there are some worries about security:

"Can't it be hacked?"

"What if my door is open and an unwanted person registers at my address?"

A password system that can lock Stikky might serve as a solution. Furthermore, consumers wonder what will happen if Stikky turns out not to work anymore and what actions they will need to take. Therefore, also plan B in case of malfunctioning will need to be developed.

Also, the already frequently mentioned point of being in context with multiple LSPs is mentioned again:

"I would rather have such a sticker for DHL since they always drop parcels here in the building without consent."

Finally, consumers hope that it will not be a trend of something new that will become too much:

"I don't want to put all kinds of stickers on my door frame later, then I will soon lose the overview. But 1 sticker in itself would be possible."

All points mentioned above will need to be taken into account in Stikky's next design iteration to improve the overall design.

Asking people at their front door

Once more the deliverer was accompanied during his workday to test Stikky in a real context. The intention behind this was to get in contact with actual addressees, to probe a bit and ask them for feedback.

After the deliverer asked the addressees if they were okay with me asking them a few questions and them agreeing upon it, a short one-minute pitch about Stikky and its added value was given. In total, nine participants have been approached in this way.

Unfortunately, the responses from consumers were not very extensive. This might be because they were quite surprised with me suddenly confronting them and asking questions. Also, they do not know me as well as their deliverer.

Furthermore, there was not a lot of time for them to process the information and discuss it. The deliverer was on a tight schedule and did not have that much time to wait.

However, the first impressions indicated that none of these participants seemed to have a clear objection against the introduction of Stikky.

"If that makes it easier, why not?'

Some participants even thought it was a working prototype and showed the willingness to already adopt.

"Yes fine, stick it on!"

One participant indicated that she would necessarily request it right now since she already has a lot of trust in the deliverer.

"The deliverer that I have right now is very nice, but if he would go away, I might request one."

However, this trust in the deliverer could also be used as a strategic asset, corresponding with the formulated vision in chapter 5. Therefore it is important that the deliverer also really believes in it in order to function as an ambassador and stimulate consumer adoption.

The next pages show an overview of how Stikky will look like and be used in a real context.
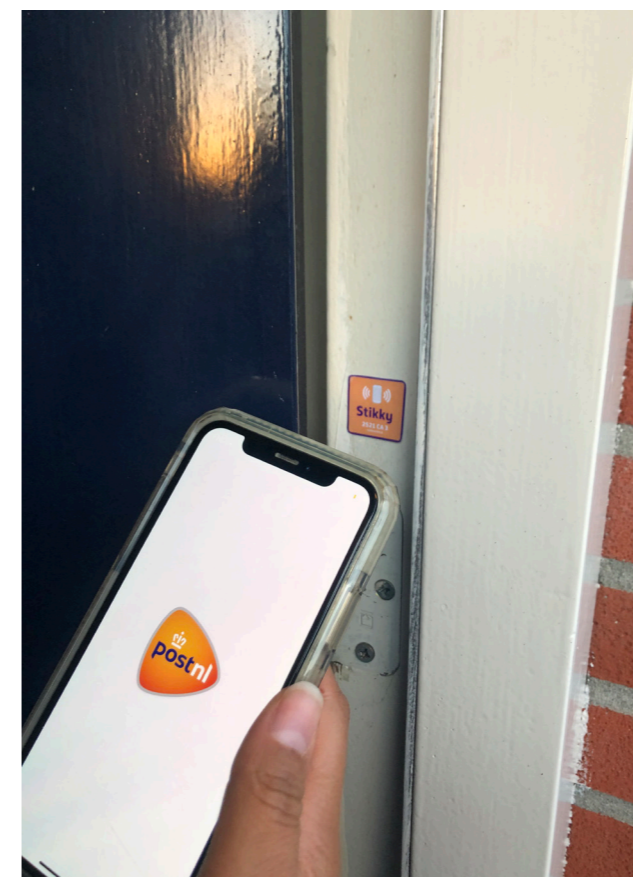
Figure 86: User test set-up
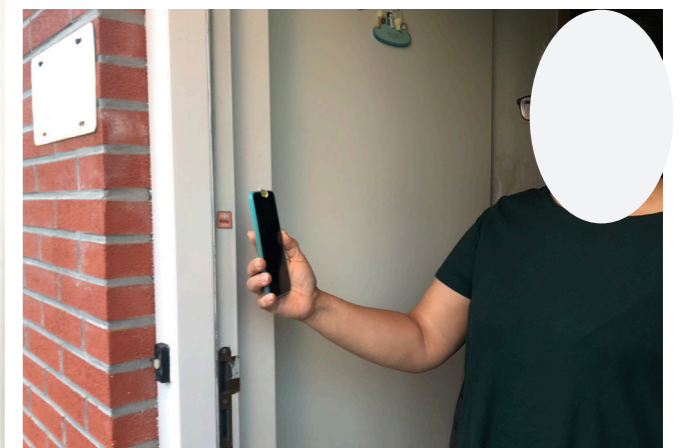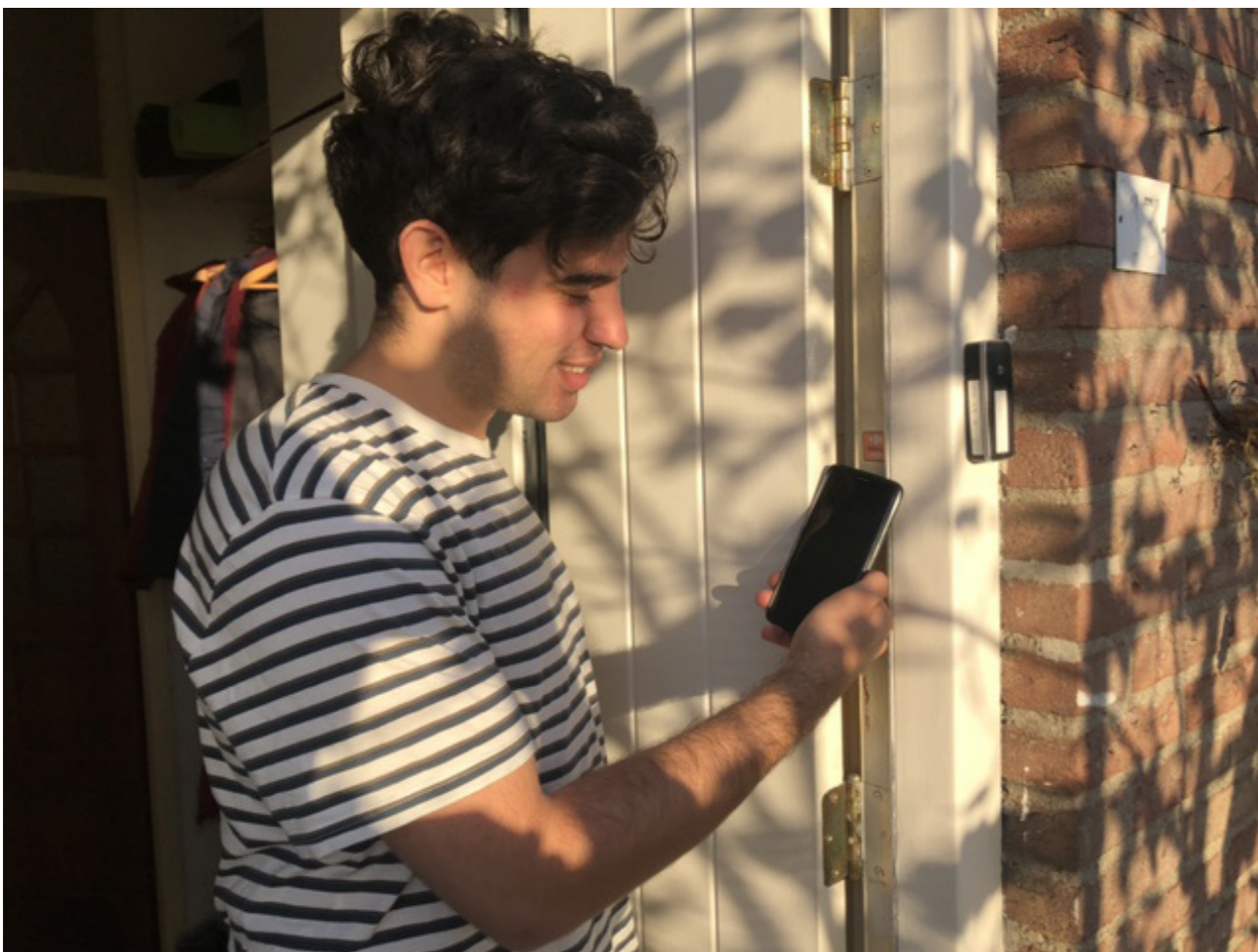
Figure 87: Stikky applied in the real context.

8.4 Innovation adoption

Since building up a reliable digital relationship might take quite a long time and the actions taken to establish this might be perceived differently depending on the consumer, it is necessary to know more about these different types of consumers. This will help in targeting the group with the most potential regarding accepting and engaging with Stikky. Next to that, it will also help to find a promising starting point for the implementation strategy from where the acceptance range can be extended slowly.

8.4.1 Segmentation

To get these insights, three different types of segmentation will be discussed below:

Demographic-based
The demographic segmentation which is based on the trend research (in chapter 2) and consumer research (chapter 4)) suggests that it would be interesting to focus on people between 20-35 years old since these people move most, order most online, and pay most afterwards. Furthermore, it was found that the higher the address density in a certain area, the less overview there is, and thus the more susceptible this area is for fraud. Therefore, especially that live in areas with low social cohesion within the top 10 cities largest cities in the Netherlands are targeted.

Need-based
Based on questioning 1020 consumers, Post-NL's was able to distinguish between four types of consumers, classified according to their needs. By gaining insights into these needs, the context of the consumers as well as what motivates their actions becomes clearer. The needs on which these segments differ most, are the way they deal with change and the need for support:

• *The cautious one* wants support and guidance in new developments.
• *The steadfast one* prefers to stay with the old familiar.
• *The substantiated one* wants to be able to properly weigh decisions against all arguments.
• *The curious one* wants to be stimulated in the field of innovation.

Figure 88: Innovation adoption curve of PostNL consumers

This needs-based segmentation provides a clear insight on which group would be most interesting to target first. The most interesting group to focus on is therefore clearly is the segment of the curious one since they might already have an intrinsic interest and positive attitude towards new technologies and changes. The substantiated segment will follow shortly after, seeing that it works and that there are enough valid reasons for them to adopt the new service. Later on, the cautious segment will notice that everything is going well with others and believe that it is safe to use and accept the innovation. In the end, the steadfast one will see the benefits more and more of the implemented service and might also accept it as one of the latest.

Attitude-based
In the 'Privacy Monitor 2021', a research conducted by the DDMA (Data-Driven Marketing Association) among more than a 1000 respondents in The Netherlands, insights have been gained about their attitude towards privacy and data. Based on this, three segments were identified:

• *Sceptics (20%)* are quite concerned about their online privacy and unwilling to share their data. More than half this segment is 55+, while the amount of people between 18-34 has been increasing.
• *Pragmatists (37%)* are quite concerned but reasonably willing to share their data if, for example, they get better service in return. The older people are, the more pragmatic.
• *Unconcerned (43%)* don't worry about sharing their data. This group is more or less evenly distributed in terms of age.
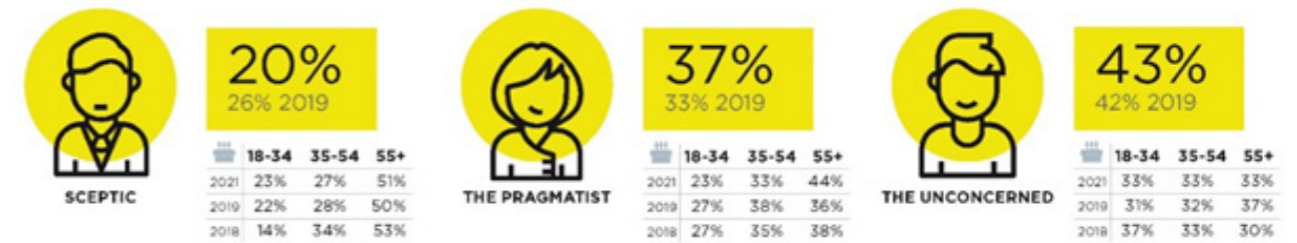
Figure 89: Gender distribution of participants, retrieved from the DDMA (2021)

Figure 89 provides an overview of the composition of these segments and their development over time. It is remarkable to see that the research gives the impression that people tend to be less sceptic towards the use of their data over the years. This might feel counterintuitive considering recent scandals (take Cambridge Analytica for example) and the increase of digital crime (as explained in chapter 3).

8.4.2 Innovation adoption study

To have better understanding about how new innovations such as Stikky are adopted by these consumer segments, literature about innovation adoption was consulted.

Rogers' diffusion of innovation theory (1983) focuses on how, why, and at what rate new technology and ideas spread. He argues that diffusion is the process by which an innovation is communicated over time among consumers. According to Rogers (1983), the spread of a new idea is influenced by five main factors, namely: the innovation itself, the adopters, communication channels, time, and the current social system.

The adopters could be divided into five categories, according to the willingness to take risks with regard to new innovations, namely:

1) Innovators, 2) Early adopters, 3) Early majority, 4) Late majority and 5) Laggards.

Moore (1991) argues that for innovation adoption, the focus should be on one group at a time. Thereby each group should be used as a base for going to the next group. It was found that this is most challenging with making the transition from the early adopters (visionaries) to the early majority (pragmatists). This phenomenon is also known as 'crossing the chasm' (Moore, 1991) (see figure 90).

Within the rate of adoption, there is a point at which an innovation reaches critical mass Rogers, 1983): a sufficient number of adopters of a new idea, technology, or innovation in a social system so that the rate of adoption becomes self-sustaining and creates further growth, also known as the 'bandwagon effect'.

Concerning consumers' willingness and ability to adopt an innovation, this depends on a five-step decision-making process (see figure 91). Thereby, Rogers (2003) states that an individual first goes through the awareness process, which could spark interest, leading to the seeking of more information. Then the advantages and disadvantages are weighed and the decision is made to accept or reject the innovation. When accepting and implementing the innovation, the usefulness is evaluated and there is a reflection on having made the right decision. As a result, the consumer will decide to keep using the innovation or not.

Figure 90: Crossing the chasm in the technology adoption life cycle
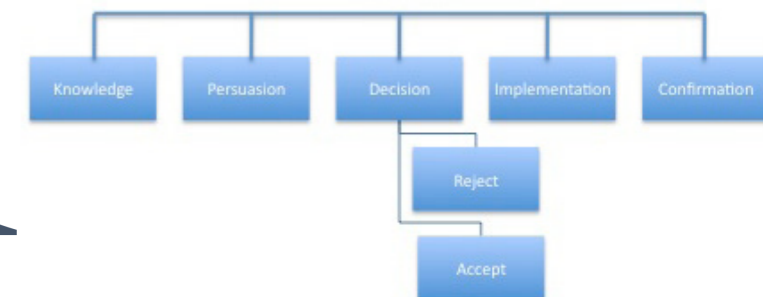
Figure 91: The five stages of the innovation-decision process.

8.5 Stakeholder Value Flow

According to Clathworthy (2014) service designers are interested in the value exchange as part of any offering and aim to ensure a strong value ecology, thereby focusing on the customer experience. The adoption of Stikky also depends on all involved stakeholders. To demonstrate the exchange of value between these stakeholders in case of a successful implementation, a value flow model was created (see figure 92).

With Stikky, PostNL can offer a more reliable logistic service since it can prove that a door was open during a delivery moment. Next to that, it can also connect the address of the door to the consumer that has registered himself at this address. Due to this increase in reliability, PostNL can ask for a higher price for this service. Next to that, PostNL and the consumer offer a mutual certainty to each other. The consumer can prove that he (and his account) have righteous access to a specific address while PostNL can check if a parcel was delivered over the threshold.

Because people that live at the same address can also register themselves to their digitized address. This makes it possible for them to authorize each other for certain actions that make their lives more convenient. Examples could be signing packages for each other or collecting each other's parcels at a PostNL point.

Neighbours are valuable for PostNL since they make it possible for deliverers to get rid of their package close to the intended delivery place. These neighbors, in turn, provide value to the actual addressees by making it possible for them to quickly get hold of their package in case they are not home during a delivery moment themselves. Since many of these consumers frequently accept packages for each other (e.g. to help make each other's lives easier), also social value is exchanged between the both of them. Furthermore, the ability to collect points when accepting a package makes it in some cases even more attractive for neighbors to accept parcels. Since these points can only be collected by scanning Stikky, they simultaneously provide more certainty to PostNL about the delivery and their addresses-connection.
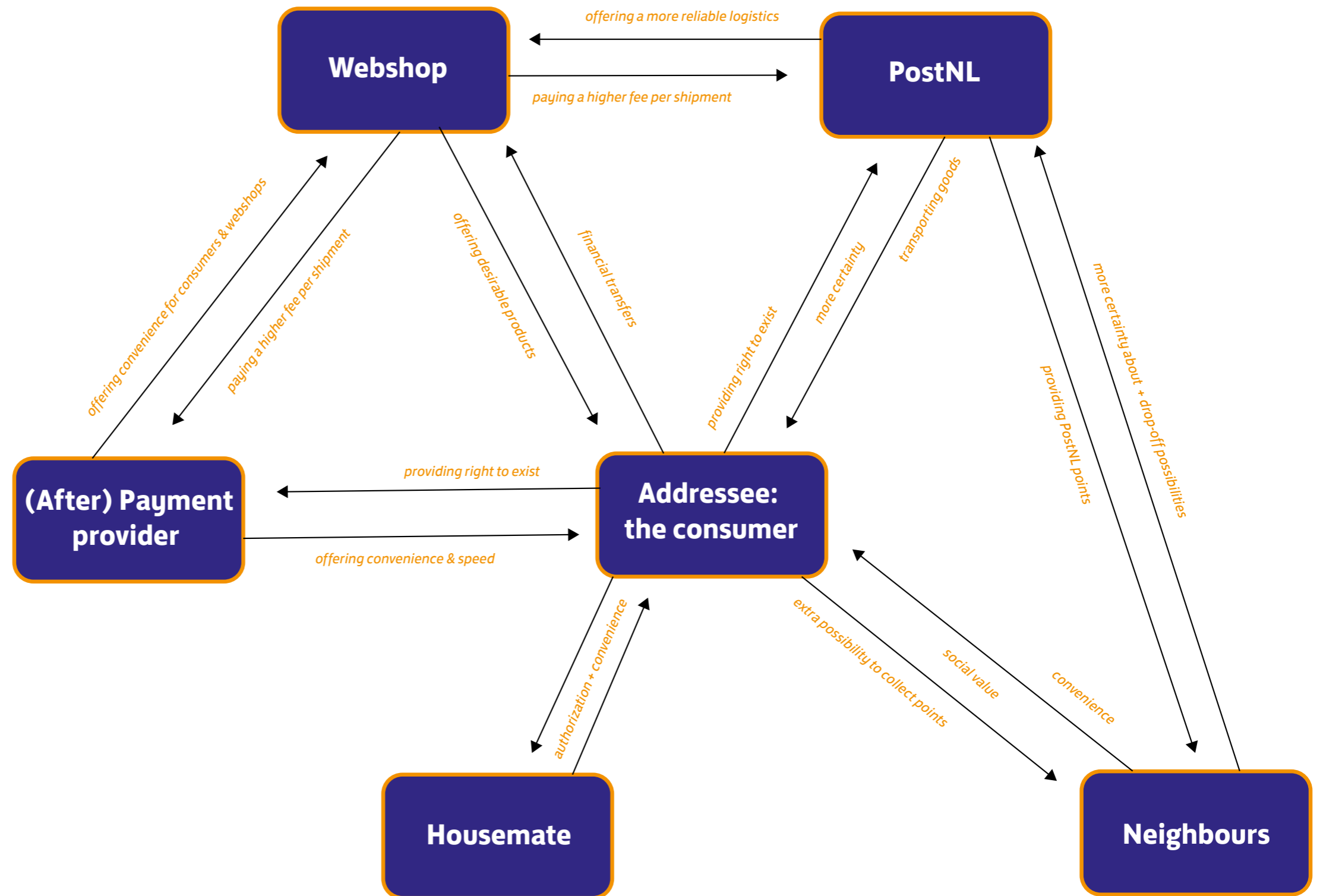
Figure 92: Stakeholder value flow model concerning Stikky

Chapter 8 - Key takeaways

• Stikky is a small NFC sticker that can be stuck in the doorframe of an address and contains a unique identification code and a digital link to the digitized version of this physical address: 'the address account'. When the door is closed, Stikky is not visible and not usable.
• With NFC compatible devices (which include almost all current smartphones and the handheld of the deliverer), Stikky can be scanned after which several actions with regard to certainty can be performed. This results in a so-called 'triangle of certainty': connecting consumer, address and parcel (delivery).
• Stikky can be requested on the website, via the app or the T&T page. After this request is processed by PostNL, consumers can receive their Stikky in their mailbox or receive and have it installed directly by the deliverer at the same moment their package is handed over.

• With a Stikky in the doorpost of an address, consumers can digitally register themselves on this specific address. Since this can only be done with an open door, by scanning Stikky they prove that they have access over the threshold of this address. In other words: validate this address. Next to that, they can also (re)confirm having access to this address, making it a dynamic type of validation. After completing, the specific address account is added to their "Stikky-validated addresses". Each address account also has an overview of all other consumers that are registered to the address in order to keep it transparent and safe for all.
• Consumers registered at an address can authorize each other to perform actions on behalf of themselves. This can be done in the 'address overview' of each of their "Stikky-validated addresses". Finally, after being registered at an address, 'digital handshakes' are possible with the deliverer, other consumers (housemates and neighbours) or at PostNL points.
• With Stikky in the doorpost, deliverers can prove a delivery over the threshold of an address since it is only possible to scan Stikky when the door of this address is open.

• Deliverers play an important role with in the implementation and success of Stikky. When discussing Stikky with these deliverers, a couple of things became clear. Firstly, they indicate having developed reliable relationships with their consumers, but that the building of trust takes time. They are afraid that Stikky might make it more difficult for them to get rid of their package (which also results in more inconvenience for consumers) and might disrupt their relationships with them. They indicate that this will ultimately have a negative impact on the PostNL company itself. It should not be made more difficult for the consumer to get in touch with their package and they should be able to understand changes in order to accept them.
• As time is a deliverer's most valuable asset, they do appreciate the fact that Stikky is able to quickly establish certainty. However, they indicate that there is a large 'grey area' in which they operate and wonder if precisely adhering to the rules will actually improve consumer satisfaction instead of using their intuition and 'the human factor'.

• As Stikky does not contain any sensitive (personal) data, it is quite feasible and desirable from a privacy perspective. Also concerning security, the NFC element is quite desirable as it can only be used if one is very close physically, compared to QR codes that can be copied and distributed easily. However, it needs to be made absolutely sure that Stikky actually ends up in the doorframe and stays there. Therefore it should be carefully handled who gets what kind of power as this power can be considered 'a commodity that can be sold to commit fraud with'. Next to that, other people that live at an address and are responsible for it should be aware of what happens at their address. Luckily, Stikky's address overview does exactly this.
• Important also is that consumers should be willing to adopt Stikky themselves instead of obliging it. Therefore the focus should be especially on the positive sides and added value for them. Next to that, it should be prevented that people get power over others with regard to validation as this might disrupt existing social relations. With regard to business, Stikky can also be offered as an additional service to senders (such as webshops) as it provides more certainty about a 'successful' delivery.

• To stimulate consumer adoption and collect more data, another iteration was done which resulted in a loyalty concept that includes a PostNL Plus/Premium pass. Scanning Stikky with this pass within 24 hours after accepting a package for themselves or their neighbors enables consumers to collect points. In this way, PostNL can obtain Stikky-scan data more frequently which also updates and increases the address reliability.

• The first short test sessions with users in the real context led to the impression that consumers are not necessarily very impressed with Stikky in the first instance. However, they also seem to have no clear objection against adopting it when being asked in person to do so. Major points of attention include privacy ('which data is shared?') and security ('how to protect it?'). Furthermore, Stikky's working principle is preferred above alternatives such as submitting passport pictures, sharing GPS data, and using your bank account data.

• Consumers in the Netherlands seem to become less sceptic about the use of data for improving consumer service, which is interesting. Furthermore, important for innovation adoption is to start focusing on a small group first and then expand this focus with one new group at the time. Starting with the curious group and then slowly expending to the substantiated group might establish reaching the critical mass and creating a bandwagon-effect for adoption.

• When looking at the bigger picture, Stikky has a positive impact on the way all involved stakeholders exchange value. With regard to PostNL, this entails being able to offer a more reliable logistics service while simultaneously obtaining more certainty concerning the receiving consumers.

09

Implementation

This part is about putting it into practice and will discuss how the design will be implemented. For who and by who. Thereby, the short-term implementation plan as well as the long-term design roadmap will be explained.

9. IMPLEMENTATION STRATEGY

9.1 Long term: the design roadmap

9.1.1 Approach

A design roadmap has been created to provide PostNL with guidelines on how to act in the coming years regarding Stikky and the subject of address validation. Such a design roadmap is defined as 'a visual portray of design innovation elements plotted on a timeline' (Simonse, 2017).

During the creation of this roadmap, use was made of the 'futures technique' for the 'Three Horizons model' that includes three parallel scenarios based upon three different life cycles of strategic business innovation (Simonse, 2017). The first one is an enhancement of the current product or service, while the second horizon is all about the creation of user-centered value. The third horizon entails a disruptive innovation with a new value proposition that is able to replace the system of the first scenario.
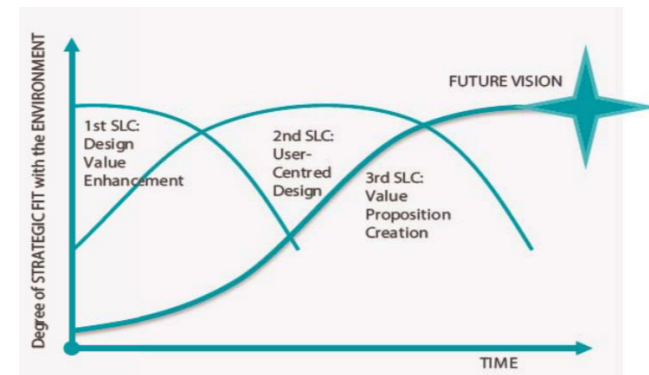
Figure 93: Strategic Life Cycles model of Three Horizons (Simonse & Hultink, 2017)

The underlying vision for this roadmap is a combination of the vision statement described in chapter 5 and the current vision statement of PostNL and yields:

"Being the people's favorite deliver by digitally translating trust into a reliable connecting service between the physical and digital world."

Focus

1 Collect & Connect	2 Detect & Protect	3 Expect & Direct
October 2021	October 2023	October 2025

Product-Service-Systems

| Stikky and the address validation system | Reliable eID for PostNL's entire ecosystem | eCommerce ID for online transactions |

Target Audiences

Tech savvy consumers	Busy lifestyle consumers	Online shoppers in general
Frequent orderers in top 10 cities	Average frequent orderers	Occasional orderers
Top 5 business consumers	Large webshops	Small & medium webshop owners

User Needs & Values

- Privacy & Certainty
- Feeling safe & Being in control
- Flexibility
- Convenience
- Speed & Simplicity

Business models

- **Additional service with more certainty:** Since the new service provides more certainty about the addressee and his address, it is worth more. Therefore a higher price can be asked from customers.
- **In-app purchases:** Extra income can be generated with the app. Not only due to the possibility of redeeming points for vouchers, but the increase of app usage in general might lead to more conversion.

- **A freemium model:** Enable the possibility for consumers to upgrade their free eID to a premium version with even more options and functions.
- **Identity as a Service (SaaS):** Sell 'certainty' to third parties by making it possible for consumers to identify themselves at certain places with t their PostNL eID.

- **Platform integration:** Make it possible for consumers to log in to platforms such as 'Marktplaats' or create an own interal C2C trade platform.
- **Enabling quick check-outs:** Offer a service to webshops in which they can integrate a PostNL quick checkout by logging in and paying with their PostNL account.

Technologies

- GPS & QR-code scanning
- NFC - pairing
- Multi Factor authentication
- Biometrics

138   139

9.1.2 The three horizons of digital certainty

Horizon 1: Connect & Collect (2021)
This first horizon is all about connecting with the consumers. All kinds of different connections are made with the consumers, physically as well as digitally. These physical connections are established during for example moments of interactions with the deliverers and by receiving physical mail and packages.

However, perhaps more interesting are the connections that are made in the digital spectrum. These are the moments that consumers scan Stikky in their doorframe and connect to their digitized address(es). During these digital connections, data points are created that link a certain consumer account to one or more addresses. This collection of data forms the base of building up a source identity with a strong self-established address attribute.

Although the main product-service system is **Stikky**, also the other elements of the address validation system as described in chapter 7 are taken along in this horizon.

The target audiences in this stage are the tech-savvy consumers that are interested in new innovations and eager to adopt them. Furthermore, the frequent orderers are a group that already has frequent interaction moments with PostNL and are therefore easy to reach. Another interesting group in this stage is that of consumers that have had complaints about the reliability of PostNL's service. Stikky might give them more assurance due to it solving one of their pain points. Furthermore, the top clients are approached for adoption to make impact quickly and on a large scale.

Horizon 2: Reflect & Protect (2023)
In this second horizon, the goal is to reflect on the quantity of the obtained data and judge the quality of it after a certain period of time. This reflection can be done by employees by analysing the status of the address validation dashboard as described in chapter 7, but also technologies such as advanced Artificial Intelligence algorithms that can detect patterns might help with this.

Since there is a high probability that a certain group of consumers has already built up sufficient certainty to acquire a validation status for his account, this person is eligible to transform this into a digital identity: **e-ID**. This eID can be used across all touchpoints within PostNL.

This brings us to the second main focus of this horizon: 'protect'. With this eID, the consumer is in control of his own data and can prove who he or she is in a digital environment. A multi-factor authentication method prevents easy access by unauthorized people. Furthermore, this also protects PostNL by decreasing the chance to become a victim of fraud themself or unconsciously facilitating it.

An interesting business model in this stage could be the introduction of a PostNL premium account or a subscription model. Since there is already sufficient certainty about a consumer with an eID, this person qualifies for more flexibility.

Horizon 3: Expect & Direct (2025)
In the third horizon, the e-ID now has several built in certainties and is ready for the next step, a disruptive innovation that would be in the form of an **e-commerce ID**. It enables consumers to not have to remember their log-in details for every website they use since they are now able to log in at countless places with their PostNL account. This makes things even more convenient and quick for these consumers.

With the acquired data PostNL can already expect certain events and behaviour, which creates the opportunity for very personalized offerings and services. Thereby they can proactively direct these processes.

9.2 Short term: the implementation plan

Now that the long-term strategy is clear, it is now time to focus on the short term. In other words: how does Stikky get from this report to its destined place on the doorpost?

To make this clear, a step-by-step guide is created that should guide PostNL in putting the design into practice. Thereby it should be noted that it is important to start low-threshold and gradually expand.

1) After the epic is approved by the epic owner, the first step that needs to be taken is the **forming of a team** or business unit that will continue working on the project. This team will need to consist of employees with different expertise and from different departments. At least Security, IT, UX, Operations en Business need to be involved. Furthermore, a person needs to be found that is willing to be responsible for the project and can be assigned as the product owner.

2) After forming the team, a **first design sprint** will be held in order to create the first iteration on the MVP (minimum viable product). By programming the main functions and building the prioritized features it is now possible to invite a pool of consumers and deliverers and evaluate Stikky in an internal test setting.

3) Based on the outcome of the test, a **second design sprint** will be held and the MVP (minimum viable product) will be improved accordingly.

4) At this moment it is time to **test Stikky in the real context for the first time**. Depots in the Randstad are approached and asked for deliverers that are enthusiastic and willing to be the first to experiment with the new innovation. Furthermore, frequent ordering consumers are approached that are willing to try out Stikky for a period of thirty days.

5) Now that Stikky has been tested for a longer period and in the real context, a **third design sprint** is held by the team.

6) Scale up the testing and assign a pilot location in the Randstad, a promising PC-4. Furthermore, a fakedoor-test could be integrated into the T&T screen to have insight into consumers' interest.

7) Now that Stikky is almost ready for implementation, it is time to **train the deliverers** at the depots on how to perform their new tasks. Simultaneously, an employee from the marketing department supports making the promotion plan during the **fourth design sprint**.

8) Launching the marketing campaign. After this step, Stikky is ready to be introduced to the market, starting with the implementation in the top 10 largest cities in the Netherlands.

Figure 95: Short-term implementation plan

START
01-11-2021

1 — Forming the team

2 — First design sprint & in house testing

3 — Second design sprint

4 — Real context testing

5 — Third design sprint

6 — Scale up & assign pilot

7 — Fourth design sprint & training deliverers

8 — Launching Marketing campaign

LAUNCH
01-05-2022
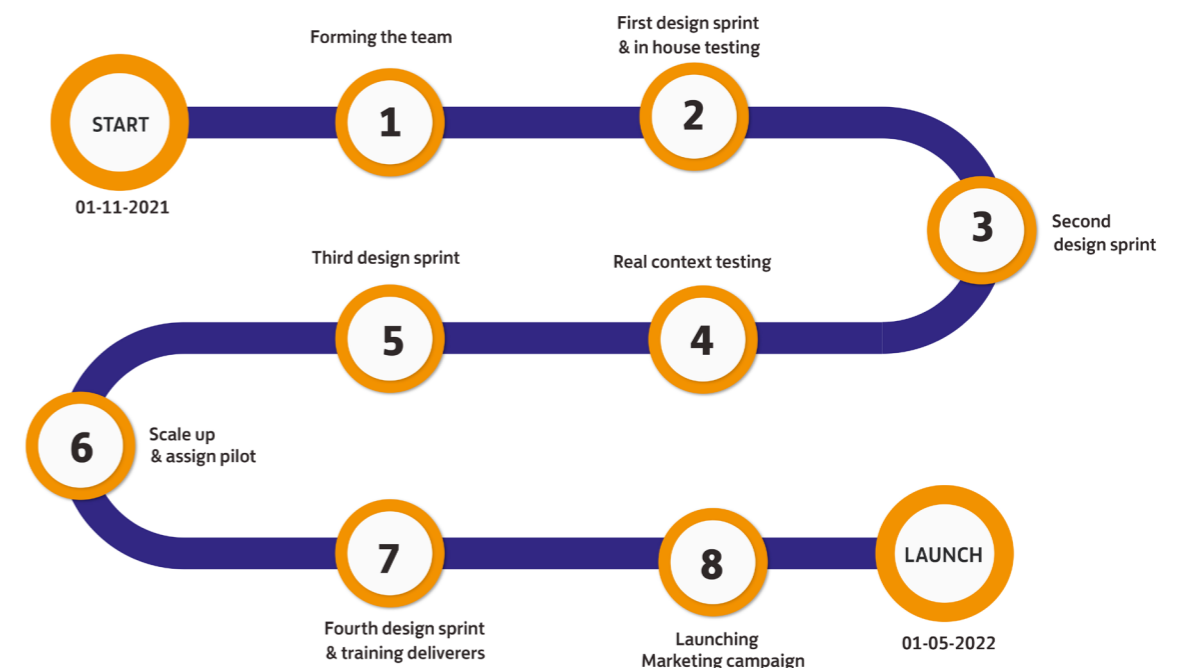
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Concluding the project

This chapter will elaborate on the outcome of the project by providing an answer to the initial research question and reframed problem statemen. Next to that it will describe the experienced limitations and points of discussion. Finally, it will also provide recommendations for further research.

10. PROJECT CONCLUSION

10.1 Conclusion

The initial goal of this project was to find a way to establish a reliable digital relationship with PostNL's consumer. This relationship should be mutual as both parties experience an increase in uncertainty with regard to assuming each other's identity in online channels. Therefore, the first important step to digital reliability is knowing who one is actually dealing with.

Digital identities that can exist out of multiple attributes that define an 'online user' are able to establish this. Concerning improved parcel matching and decreasing fraud, the person and/or address attributes are considered most suitable and valuable. Although consumers do see PostNL as a reliable party, they are not interested in validating themselves and do not directly see the necessity of it. Especially (digitally) sharing share sensitive personal information (e.g. ID picture) is seen as a no-go. Address validation on the other hand shows more willingness from consumers, as long as it also provides significant added value to them.

Due to an LSP's (large-scale) complexity and the enormous amount of consumers they serve, there is no one size fits all solution for address validation. As a result, a multilayered address validation system has been designed that is able to establish (five) different types of address certainty, based on technology or the human factor, and each covering a different group and type of consumers.

One of these layers has been picked out for further development, namely Stikky. This has shown high potential since it contributes to solving two of PostNL's main security priorities, provides demonstrable added value for consumers protects one's privacy, and is seen as the most disrupting layer.

Stikky can link a digital consumer or physical object to a fixed physical location. This is done by an NFC sticker in the doorframe that can be linked to a cloud solution in the form of an address account. Stikky solves the problem of not knowing for sure if someone is real or if an alleged event really happened.

Interesting target groups that qualify for this are:

• *frequent orderers and consumers that live at a frequent ordering address*. This (20%) group is accountable for more than half of the total package volume. Next to that, their frequent service encounter with PostNL, makes them easy to reach out to.
• *digitally savvy millennials living in densely populated areas*. This group is already interested in technology and knows how to deal with it. Next to that, they are most relevant concerning fraud.
• *worried consumers*. This group is very likely to have already experienced an unpleasant event and are therefore looking for a way to obtain more certainty.

During the user validation sessions, the importance of trust in relationships was demonstrated once again. Convenient with Stikky is that it is possible to make use of both sides of the 'trust'-spectrum. It was found that when consumers trust their deliverers, they would not necessarily request Stikky themselves. However, when the deliverer asks if they are okay with placing a Stikky in the doorframe, they seem to not have any objection to it, since they trust the deliverer and the process. Therefore it is of major importance that these deliverers embrace Stikky so they can also serve as ambassadors. On the other hand, if consumers lack trust in the logistics service process, they might be more willing to request Stikky themselves as it makes them feel more in control by taking away their uncertainty.

Furthermore, Stikky makes use of PostNL's unique strategic advantage of being in almost every street in The Netherlands every day in front of an open door and having interactions with consumers. It would be a waste of resources to not utilize this. By using the momentum of delivery, consumer and deliverer can connect physically and together 'install' Stikky. Therefore, with regard to Stikky, an offensive strategy should be executed. Since the link to one's physical address(es) still seems to be missing with digital identities, this will allow PostNL to be the first and become a trendsetter within the field of logistics services.

To find out where Stikky stands concerning the sweet spot of innovation, the main aspects concerning desirability, viability, and feasibility will be highlighted:

Desirability *(do we want to do it?)*
When looking at desirability, Stikky performs well for both PostNL and the consumer. Stikky can deliver proof to both PostNL and the consumer that a package has really been delivered (since the door was open) and is not 'dumped' somewhere. Therefore it offers consumers peace of mind. Next to that, it enables them to register and confirm themselves at an address. As a result, they can perform certain actions (such as connecting, authorizing, and using the digital handshake) more quickly and easily which makes engaging in logistic processes more convenient for them. Besides, by collecting points during package handovers, a group of consumers also shows to be more willing to accept packages for others. Furthermore, Stikky is only visible when the door is open, so it will not visually bother consumers. Finally, it contains no sensitive personal information which safeguards one's privacy.

With Stikky PostNL can quickly see who is responsible in case of irregularities. This is important since the 'disputed delivery' counts for the highest amount of complaints. Furthermore, to prevent fraud and improve parcel matching, Stikky makes it possible to obtain evidence from consumers that they have righteous access to an address (with knowledge and consent of these addressee(s)).

Viability *(should we do it?)*
Several aspects also make Stikky attractive from a business perspective. Firstly, the increased certainty that comes with Stikky could be offered in the form of an additional service. Thereby PostNL can ask for a higher price from senders in return for the increased reliability. Next to that, by establishing more certainty about a consumer and its address, PostNL can improve parcel matching due to the possibility of connecting to the right consumer more quickly as well as notifying them. The higher FTR this results in, saves unnecessary time and costs (for failed delivery attempts) and a higher consumer satisfaction. More happy consumers lead to fewer complaints about PostNL's service to the sender, which will make it a more attractive LSP for these senders.

Furthermore, since Stikky enables PostNL itself to generate the validation, PostNL will be able to build up its own internal source identity database which makes it less dependent on others. Not only does this save costs but also allows for valuable long-term knowledge due to the dynamic aspect. The self-obtained validation data related to both logistics and consumers can provide new insights that might result in improving matters such as efficiency, security, and personalization. As Stikky also stimulates the utilization of digital channels (such as the app), these are made more relevant, attractive, and purposeful for users. As a result, this will lead to more online traffic which can result in a possible higher hit rate.

Material-wise, the investments for Stikky are low. Most investments have to be done in building the digital address account. However, this only requires an addition to the already existing consumer account. Finally, viability does not only relate to financial gains. Literature has shown that trust can be considered an important intangible asset that can make a difference in service markets.

Feasibility *(can we do it?)*
Stikky and the address account can directly be implemented with current technologies and resources. The NFC technology that Stikky is based on is increasingly being adopted and understood (e.g. during contactless payments). Nowadays it is integrated into almost every smartphone or handheld (including that of the deliverer). Next to the fact that deliverers can be found daily and in almost every street, the already 6 million+ user accounts provide a solid foundation for implementation. Building the address account system will be the main challenge but should be feasible to be launched within six months. Very convenient is the fact that only one person of an address will need to adopt Stikky in to create an address account and be linked to a physical address. This also makes it more accessible for others with access to this address to utilize the system.

10.2 Discussion & Limitations

During this project, several limitations were experienced as well as points of discussion:

First of all, since PostNL is a very Dutch company, almost all communication during the project was done in Dutch, with employees as well as with consumers. As a result, due to translation purposes, certain quotes or memos might be interpreted differently as intended. Furthermore, the consumer findings of this research are based on a sample of participants that might be considered small. Therefore, they may not be generalizable for all consumers within the chosen groups, especially when considering that almost everyone in the Netherlands is a consumer of PostNL. Although several potential target groups were found for Stikky and other elements of the address validation system, due to the lack of time to process the overflow of data, these target groups have not yet been quantified more in detail and of size. The same counts for defining the most interesting focus areas.

For Stikky, security is a crucial issue. It needs to be absolutely sure that Stikky is placed within the doorframe and stays there over time as this element creates the address validation certainty. Stickers that break upon removal could provide a solution but social engineering will always be a risk. This is also one of the reasons why deliverers play an important role concerning a successful implementation of Stikky. Especially since they indicate that their work includes a large grey area and wonder if consumer service actually will improve if everything is done according to the rules. Therefore, there should also be value in it for them (e.g. saving time), so they will believe in the concept and can function as ambassadors. To make sure that they perform all necessary actions in a good way, they need to be prepared. Designing a training and a step-by-step guide might establish this.

Due to time issues, Stikky has not been tested with actual logistics-related events nor has the implementation plan been validated internally. Organizing meetings with e.g. solution architects can lead to new insights and iterations concerning the feasibility of the plan.

Finally, COVID has also played a role during the duration of the project. Not only was it not possible to work at the main office, which prevented the occurrence of spontaneous discussions and elaborations in 'real life'. It also changed several of PostNL's processes and protocols with regard to safety (e.g. HVO deliverers that an sign for the packages themselves).

10.3 Recommendations & further research

Although the base for Stikky and the address validation have already been set, there are certain areas that might be interesting for further research. Therefore following recommendations and suggestions for further research are done:

• **Test Stikky more extensively in practice**: in multiple contexts and various situations. This can lead to new interesting insights concerning privacy, security, and user convenience. To do this, first, a digital version of the design should be built for it to be tested over a longer period. Also, the environment in which Stikky will be placed makes a difference since the situation in a village with only detached houses will be very different from flats in a dense city. Furthermore, after thoroughly testing also a more detailed target audience could be defined.

• **Consider additional functions and features that can add extra value**. A digital link in the doorpost, as well as address certainty, could be valuable for multiple purposes. Research into new possibilities could lead to new business models that add value to a wide variety of stakeholders. Think about being able to use your Stikky validation at places that require certainty about one's address (e.g. checking in at hotels, being picked up by a taxi, ordering food online). Furthermore, perhaps consumers that often receive 18+ shipments or other shipments that require an ID-check, could link it to the address account to experience more convenience if they are willing to submit this. The possibilities of a digital handshake could be researched further (including the possibility to connect with others by means of 'smart device pairing'). Also, it would be interesting to find out how Stikky could be applied to other types of addresses, besides 'home addresses' (e.g. 'work'- or 'holiday'-related addresses) and what extra value it brings.

• As was found during the innovation adaption research, a critical mass needs to be reached in order for Stikky's diffusion to be self-sustaining. **Calculating the critical mass** by using the threshold model could already provide a direction for setting goals. To already gain insight into consumers' interests, an option would be to integrate a fake-door test in the T&T link. Furthermore, it is highly recommended to **engage with consumers** by actively seeking feedback. A possibility to do this quickly and on a large scale is for example active Facebook group 'PostNL klachten' that currently has 7000+ members divided all over the country.

• Further **research** could also be conducted into the **adoption of home invasive service products**. It would be interesting to find out how consumers deal with smart products that are required to be placed in their homes. This also includes **smart home system**s such as Amazon's 'Alexa' and 'Google Nest', which during the trend research were found to be increasingly adopted by consumers. Exploring the future possibilities of these systems might lead to insights that could contribute to improving Stikky's design or even add a new dimension to the address validation system.

• **Look at the potential of collaborating**. Consumers often indicate that they are dealing with multiple LSPs and therefore they expect no significant overall change when only one of those LSPs takes action. However, they also do not want to do the same thing every time for all of them. Reaching out to other stakeholders in the delivery context such as webshops (including major clients such as bol.com), payment providers (e.g. Afterpay, Klara) and even competitors (e.g. DHL, UPS) could result in collaborations that might lead to an overall solution that is way more effective and efficient for everyone involved. Offering a multifunctional Stikky that can also be used with other LSP could increase consumers' willingness to adopt it. If this turns out to be impossible, Stikky might also be introduced as a 'white label product' that can be purchased or rented by other parties.

• **Develop the business case** for Stikky. Since reliability increases, a higher price can be asked from sending parties when making use of Stikky as an additional service. The exact price of this service still needs to be determined, as well as the calculation of the return on investment. Al- though material-wise it is very cheap, research still needs to be done for the total investments (including development and implementation). This also includes the size of the business unit that will work and the amount of time they will do so.

• **Develop the communication strategy and promotion plan**. As consumers do not seem to understand why they would need to validate at first, a clear communication strategy could help. Thereby the focus can be put on the additional value, security, and privacy aspects. Also, a marketing plan needs to be developed to promote Stikky. Several possibilities for this marketing campaign could be: advertisements on national television, appearing as a guest on a talk show, adding an information folder with every delivery, sending e-mails, or placing visuals on the T&T-page. The marketing department could contribute to the setting up of a campaign and decide on the most suitable method(s).

• **Keep it safe & effective**. Technologies evolve and become more understandable and accessible to consumers over time. Also, fraudsters tend to be more creative than one would expect. To make sure that Stikky keeps performing well in the longer term, it is necessary to keep in close contact with security and constantly look for the latest 'fraud trends'. This will enable Stikky's team to be aware of the latest (digital) safety developments and respond to new threats as soon as possible. Furthermore, insight into how many people do commit fraud might provide a guideline for determining the acceptable margin of error over time.

• **Determine success**. Since it might be difficult to determine the success of the address validation system due to the presence of multiple different variables, especially with regard to Stikky, the following KPIs could be used: *Amount of (new) validations and complaints, App usage frequency, Consumer satisfaction, etc.* Every quarter the results of these KPIs could be evaluated by the team, compared to the goals that are set beforehand after which actions can be taken when and where necessary. Also important is finding and appointing someone willing to take responsibility and take the lead. This person should inspire and be able to overcome employees resistance to change.

10.4 Personal reflection

Results

Looking back at the final result, I have to say that I am quite satisfied with the outcome. I believe that Stikky is an innovative solution to the current problem of a lack of identity certainty within the logistics service industry, without invading one's privacy. Next to that, I believe it is appealing from a strategic perspective, being desirable, viable, feasible, and a strategic fit for PostNL. Furthermore I think I kept close to the initial assignment. Thereby, delivering the address validation system with different levels of certainty was something that PostNL was very interested in.

Process

Doing an individual project with this complexity during COVID was quite a challenge. Especially in the beginning, I needed to find my way within the assignment and put in the necessary efforts to understand the topic of digital identities. Thereby I needed to regularly switch between different levels of abstraction, varying from quite abstract to very concrete. For the project, different design methods and techniques were used that were learned during the master track.

The ideation phase went really well, both the individual and the collective parts. I got to apply my creative skills which evoked multiple enthusiastic reactions. During the project, I have been closely engaged with stakeholders from different hierarchical layers, both within and outside the company. I experienced how much could be learned from practice by immersing myself in the actual environment and talking to people in that environment.

However, there are some things that I would have done differently. Due to the intrinsic interest in the topic, I felt like I had been too deep in the project at certain times, forgetting that it was actually my graduation project. Especially in the end, I found myself being too enthusiastic about working out the final design which went a bit at the expense of documenting prior actions. More realistic planning and setting boundaries would certainly have contributed positively to the duration of the project. Furthermore, I used a quite practical approach, which could have been supported by literature a bit more frequently.

Competences & ambitions

Before kicking off the project, I listed down the following personal competencies and ambitions:

- *Visually communicating: being able to quickly and clearly sketch ideas & findings.*
- *Strategic thinking: showing that I am able to make decisions that will influence long-term success with strong argumentation.*
- *Managing the complexity: Dealing with complex problems while keeping the overview and taking the interests and goals of all stakeholders into account.*

With regard to the visual communication, I think did a good job. Not only does the report have multiple visuals, but also during the process many visualizations were used during discussions and evaluation sessions. Although this was through (physically) sketching, the digital illustrations instead were very useful. It was hard to manage the complexity at certain points, but in the end, I believe that the final solution adds value to all involved stakeholders. This also shows some competence in strategic thinking.

Furthermore, I also indicated that my goal was to deliver a design that could actually be implemented by PostNL. Soon I will have a meeting together with the involved departments to discuss this, something I am looking forward to.

Figure 96: Delivery completed!

11

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12

Appendices

Insights Physical 2: PostNL parcel point

In the Netherlands, there are over 4000 PostNL points were consumers can make use of the services PostNL provides, such as sending or picking up parcels. These PostNL points are mainly located in retail locations and supermarkets.

Since this is an important touchpoint, an appointment was made with a retailer in Delft with a PostNL point (that handles about 80 packages per day). Not only because it is important being a last step of a package joutney, but also because it is n location where fraud increases as a result of digital uncertainty. After visiting this retailer, observing the context and interviewing the responsible store owner, the following insights were gained:

• One of the major reasons for retailers to start a PostNL point is to generate more traffic: a higher influx of consumers who may also buy other products from the store.

• The fees have dropped a lot over the years (due to the perceived dominant position of PostNL) so financially it does not yield much. Therefore the desire is to help the customer as quickly as possible. There is a separate counter for this, but all customers are helped in order, with the same priority.

• Finds it annonying to have to answer for all logistic-related problems. Sometimes quite a lot of mistakes are made (earlier) in the process, but the customer only sees and comes to us, so sees us as responsible for the package."They always come to us to complain if something went wrong in the entire journey".

• Surprised to which extent people are used to convenience nowadays. Often they just assume that returning a package is free and that almost everything has already been arranged for them Sometimes people want to return a package, but then do not

have a freepost number and have to pay for it. Then you hear them say "Oh I won't order here anymore". Nowadays it is also too easy to order clothes online and return them afterwards. I estimate that here about half of it goes back. Furthermore, people sometimes don't even know how many packages they're coming for to pick up.

• Consumers sometimes come unprepared to a PostNL point. They can then be absolutely convinced that a package is at this PostNL point, while they can not prove it with anything (e.g. a T&T-code) to support that. It sometimes seems that a consumer does not receive or read a notification while their package already delivered at the PostNL point. A package that is not collected after a week, is sent back to the sorting center. So when they come a few weeks later to pick it up, that week is over and of course it is no longer there.

• Two types of shipments are delivered: collection point packages and non-home packages. Sometimes it is a bit unclear what belongs where. Sometimes the packages received by the deliverer end up behind the counter in/at the shipping cart. Twice had the experience that a package was missing and there was no retail-scan performed by the deliverer for these packages. Coincidentally both times these packages contained a mobile phone. You do receive a receipt after the deliverer drops of the packages, but in practice this proof of delivery is not really checked.

• Believes that deliverers often (9 out of 10 times) directly deliver large and heavy packages to a PostNL point instead of trying to deliver them at addresses on e.g. the 9th floor of a building.

• As a first control factor, the collector is asked for the name and address of his package. This is followd by a quick check whether someone's photo matches the person at the counter. However, it is certainly still susceptible to fraud. In

principle, anyone with a valid ID can pick up a package.

• The identification method preferred by PostNL point is scanning the QR-code of one's driving license QR code scanning because it is by far the quickest way. The store owner indicated that he had no idea what kind of information is being stored. Very occasionally there are people asking why this is necessary and what is happening with the data. However, after communicating that it is for control- and safety purposes, understanding was shown quickly withour further questions.

Out of curiosity this was tried by myself. After scanning the QR-code on a driver license, it was found that it only contains the document number which can also be found on the front. Although it is a unique number, it is not easily trackable to a person. PostNL cannot directly trace this to a person, but can pass on this number to the competent authorities, such as the police.However, the security department indicated that due to the understaffing in the police, this will end up as a low priority. They only take action if a name and birthdate can be submitted.

Unlike other competitors such as DHL UPS, PostNL does not (yet) work with private individuals in the form of 'neighbourhood package points'.

Visiting one of these neighbourhood points led to the insight that the motivation for people to start such a neighborhoud points are:
• Earning some extra money
• Doing something for the neighbourhood, and contributing to society
• Social contact with neighbors

Also it was stated very clear that a clearer communication between deliverer and ultimate recipient was highly desired since the lack of this have led to several heated discussions in the past.

Figure xx: Example of a neighbourhood package point
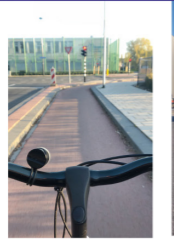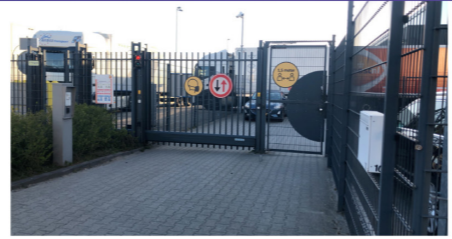
Physical 3: Mailboxes
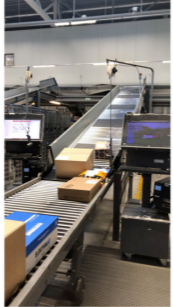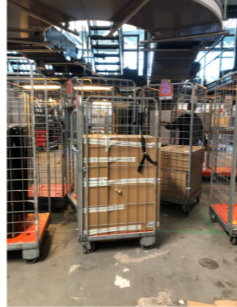
Figure xx: The well-known orange mailbox

These orange mailboxes are destined for sending mail post and can be found Due to the decrease in mail volume, the amount of mailboxes has almost halved from 19.000 in 2016 to currently just over 10.000. According to the Postwet 2009, people living in residential areas with more than 5,000 inhabitants must be able to find a letterbox within a radius of 1 km. Outside residential areas with more than 5,000 inhabitants, there must be a street mailbox intended for the public within a radius of 2.5 km.
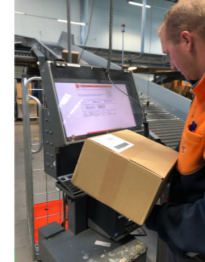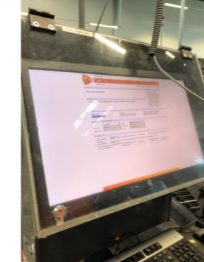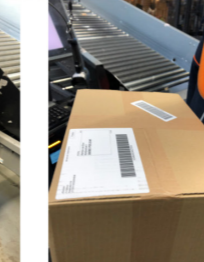
AT THE DEPOT

Going to the depot

07.10 Leaving home early in the morning.

07.17 Biking towards the PostNL depot.

07.24 Arriving at the depot which is located on an industrial estate just outside Delft. The enormous logo and all the vans make it clear where I have to be.

07.25 Standing in front of the security gate, calling one of the provided numbers of procesmanagers and waiting to be picked up.

07.33 Reading the rules and regulations of the depot.

07.35 Parking the bike in the designated spot in the employee parking area.

07.37 Entering the depot and walking between all kind of automatic systems and belts towards the spot of the deliverer that I will be joining.
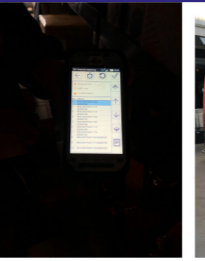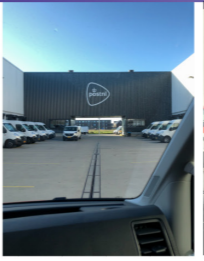
Loading the van

07.37 Arriving at the spot of my assigned deliverer, gate 28. This gate is also connected to the cargo area of the delivery van.

07.38 In front of the van, the supply system can be found. Packages destined for the deliverer are automatically disposed into the deliverer area from a higher located belt.

07.38 The packages have different dimensions and can be scanned and placed directly in the car by the deliverer.

07.40 Packages with dimensions that are not suitable for the automatic belt or ones that encounter problems, are brought in cages to the deliverer by runners.

07.42 All kinds of different packages keep coming off the belt.

07.45 The deliverer organizes the van according to his own preferencedes. Some shelves are reserved for webshopretours, PostNL points and early scheduled deliveries.

07.52 Once the van is almost full, the bigger and heavier packages are placed inside the van. They will stand in the way of the walkway when doing it earlier.

Using the support computer

07.53 In case something goes wrong (e.g. a barcode is unreadable), the support computer can be used.

07.54 By typing in the code on the label, the package can be recognized by the computer.

07.54 By typing in the code on the label, the package can be recognized by the computer and a solution can be provided.

07.54 The barcode will be printed out again from a printer below the computer.

07.54 This new sticker-barcode can be attached to the package, enabling it to be scanned by the deliverer.

Leaving the depot

07.59 Once all the parcels are in the van, a last check will be performed in order for the packages to stay in place and not fly into all kind of directions (leading to possible damages). Packages that will be delivered in the beginning of the route, are placed close to the chairs.

08.00 Checking the delivery route, making possible changes in sequence and sending out the final confirmation of delivery timeslots to the consumer. 86 stops today.

08.00 Driving a few meters forward to detach the vab from the loading gate.

08.00 Entering the depot again via the open gate.

08.01 Cleaning and up the loading area, leaving it tidy.

08.02 Closing the back doors and boarding the delivery van again.

08.03 Getting ready to leave and starting the engine.

08.04 Driving away from the loading area towards the exit of the depot.

08.05 Leaving the depot by driving through the exit gate.

ON THE ROAD

First stop: PostNL point

08.29 | 08.29 | 08.31 | 08.32 | 08.33 | 08.33

Parking the van next to the supermarket with the PostNL point and open te back door to get to the packages.

Taking a shopping cart from the supermarket and load it with packages destined for the pick-up point.

Once the shopping cart is fully loaded, driving it to the PostNL point in the supermarkt.

Handing over the packages one by one to the employee behind the desk of the PostNL point.

The barcodes of all these packages are scanned by this employee.

After the last package is handed over, the service employee will print out a physical confirmation of all delivered packages (including all the 3S-codes and the total amount of packages). The deliverer can compare this with the information on his digital device and check if everything went well.

Delivering the first package

08.38 | 08.38 | 08.39

When getting the package out of the van and walking to the door, the barcode of the package is scanned with the handheld.

A list of options is displayed to the deliverer: 'home', 'agreed place', 'neighbors', 'not-at-home' and 'deviation'.

When the receiver is at home, the 'home' option will be clicked and the 'finish-flag' (right top) will be clicked: successful delivery!

Receiver is unreachable

08.52 | 08.53

If the receiver is not at home, it will be offered to a neighbour (if available) to keep it for the receiver. A 'not-at-home' note will be scanned with the handheld, so the parcel and paper are digitally linked and the receiver will have digital insight into the process /parcel.

On the 'not-at-home' note, the name of the receiver, the date of the delivery attempt and the housenumber of the receiving neighbour will be written. Shortly after, the note will be shoved into the letterbox.

Pickup & deliver parcels from and to the packagepoint

09.04 | 09.04 | 09.09 | 09.11 | 09.12 | 09.12 | 09.13 | 09.13 | 09.13 | 09.14

At another PostNL point the packages there that are meant to be sent, are picked up by deliverer and are driven in a trolley towards the van.

The deliverer grabs the packages (scans them?) and put them in the desired spot in the van.

When empty, this same trolley will be used to load in the packages destined for the PostNL point and driven to the counter.

The device with scanner is set for receiving.

The employee of the store scans the packages one by one and puts them in a desired (free) place in the corner.

Other customers in the retail store also need and demand the attention of the employee.

Noticing this, the deliverer helps with organizing and placing the packages in order to reduce the load on the store employee. Sometimes he even helps with scanning them, although it is not quite the way it is supposed to goy

After transferring the last parcel, the confirmation receipt is printed by the PostNL-point employee and given to the deliverer.

The receipt will be compared with the digital overview, signed by the PostNL point employee and kept safely by the deliverer.

There are still packages delivered from prior days that need to be picked up. After 7 days, the deliverer will take them along back to the depot.

Delivery to a mutually agreed place (box)

09.40 | 09.41 | 09.41 | 09.41 | 09.42

Quite a heavy package that needs to be delivered, but it seems that the residents are not home. They also do not have any close neighbors or a digitally agreed place.

The residents of the house put a tiny note below the doorbell asking PostNL deliverers to put parcels in the (adjacent) basket.

Following the instructions and trying to put the heavy parcel into the basket.

Encountering a problem: the parcel fits in the basket, but the lid does not close..

The parcel in the basket is visible from outside, but the instructions of the residents are followed. Who's responsibility is it if something goes wrong?

Pick up package (contract) and delivery of heavy packages

10.06 | 10.12 | 10.12 | 10.13 | 10.14

Picking up a parcel from a company PostNL has a pick-up contract with.

Heading towards the sidedoor to easily get the large and heavy packages out of the delivery van.

Scanning the delivery consisting out of multiple packages. First one package, then again all packages.

Loading the packages on a handtruck, making them easier to get to the designated delivery place.

Driving the handtruck.

Delivery to mutually agreed place

10.24 | 10.24

Several receivers already have boxes or lockers where mail or packages can be delivered safely, such as the displayed 'logixbox'

A smart mechanical system makes sure that parcels that are put inside the box automatically fall down when the handle closes. The packages end up at the bottom of the box and packages are impossible to get by others without a key.

Jammed mailbox

10.40

Some 'mailbox packages' barely fit through the opening of the mailbox. As a result some delivers put extra power to push it through, leading to a jammed mailbox. Although this is considered 'a succesful delivery' by the deliverer, it can cause problems for later deliverers (other packages, mail or 'not-at-home note'

Delivery to a mutually agreed place (garden)
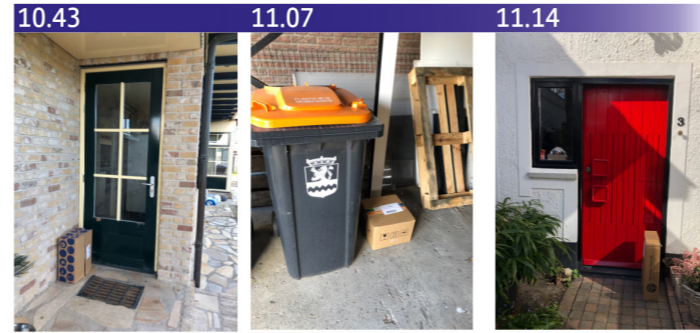
10.43 | 11.07 | 11.14

Oral agreement: if not home, walking around the house and put it next to the back door.

Oral agreement: entering the shed and placing the package next to the black trash can.

Oral agreement: if not home, walking around the house and put it next to the back door.

A unique delivery
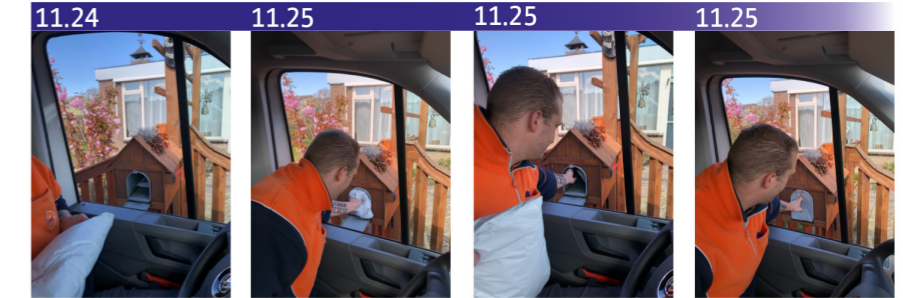
11.24 | 11.25 | 11.25 | 11.25

Sometimes mailboxes have a perfect height and location; you do not even have to get out of the van.

Putting the first package in the mailbox.

Putting the second package in the mailbox.

Closing the lid of the mailbox.

Deliver webshop retours & flat delivery
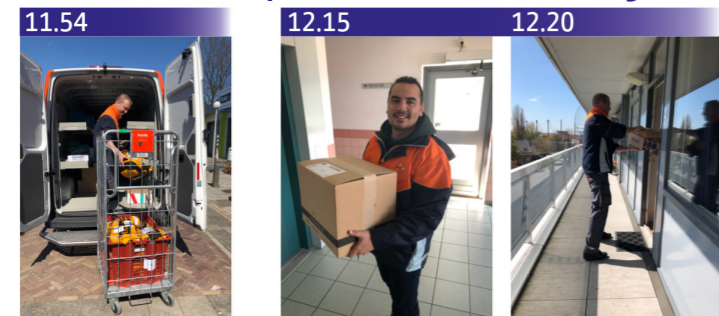
11.54 | 12.15 | 12.20

Collecting all the retours for the physical warehouse of a webshop: picking up a trolley from the location, scanning all the packages one by one, driving the fully loaded trolley back inside and leaving it there. (no scan by the webshop to confirm reception??)

Waiting on the elevator to get us to the third floor while holding quite a heavy parcel.

Ringing the doorbell and delivering a parcel to one of the residents of the flat.

Drop off at PostNL point
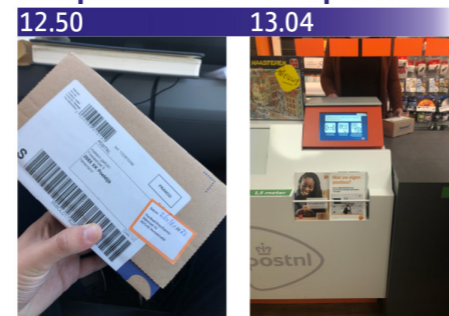
12.50 | 13.04

After driving another extra round (in order to still deliver the packages after an unsuccesful first try), one package was left. This one could also not be left with any neighbours. Sticker with the date an details of the PostNL point is also attached.

The package is brought to an assigned PostNL pick-up point where the person that was not home can pick it up.

Visiting the carwash

13.31 | 13.35 | 13.36

Visiting the carwash company that PostNL has a collaboration with. In a few minutes the delivery van shines again. Doing this approximately once a month makes sure it looks clean, neat and thus representable for PostNL.

Enjoying the sun while noticing my tired legs due to all the walking, lifting, stepping in and stepping out of the van.

Capturing this moment with the deliverer :)

Fill in 'end of day'- checklist
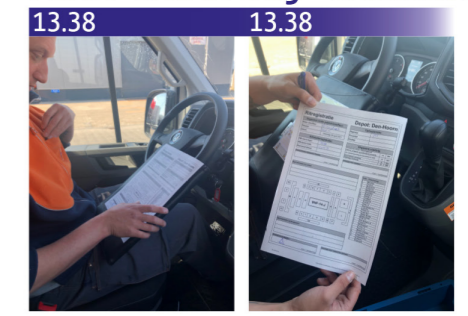
13.38 | 13.38

At the end of the ride, the map with the registration form is taken.

On this form all the details of the day are filled in (e.g. name, ride number, amount of kilometers drived, time of the ride and possible damage to the car)

Arriving back at the depot

13.51 | 13.51 | 13.51

Arriving at the entrace of the depot and verifying to get through security.

Entering the depot area again.

Driving the van towards the same area as where the loading took place in the morning, in order to deliver the picked-up packages that need to be send to a receiver.

Handing over outgoing packages & discuss irregularities

13.54 | 13.54 | 13.55 | 13.56

The packages that need to be sent to a receiver are placed on the rail, waiting to be picked up by runners.

The desk clerk checks with the deliverer for irregularities (indicated by the system API such as e.g. unscanned or undelivered parcels). After clarification from the deliverer, this will be solved/notified in the API.

Runners are taking the packages (to be send) from the rail, placing them into a trolley.

Saying goodbye to the desk clerk and returning the empty delivery van to the parking area.

Parking & Submitting checklist and document map

13.58 | 13.59 | 13.59

Parking the delivery van in the designated parking place for the deliverer. This is adapted to the schedule of the other deliverers.

Walking from the parked van towards the entrance of the depot.

Entering the depot again, Handing over the map with today's documents over to the administration office (damage forms,

Going home

14.01 | 14.04 | 14.09

Walking through the hallway towards the canteen, also making a sanitary stop.

Finishing the day with a drink and a chat with colleagues in the canteen before heading towards the exit.

Leaving the depot and biking back home.

INSIGHTS (START) AT THE DEPOT

• Being on time is very important for the deliverer, since any delay might also influence the delivery time. Therefore they should be able to independently arrive at the depot. Also, since the packages keep coming of a belt, it might cause a congestion on the belt when they are not being taken off on time.

• The deliverer does not have an influence on the amount of packages that has to be delivered that day, they are provided by an and divided by an automatic system.

• Monday is often a relatively quit day for deliverers, since a lot of companies/webshops are closed on Sundays (and/or Saturday). They therefore send their packages on Monday, which makes Tuesday often the busiest day for deliverers.

• During early deliveries (till approx 09:30) people need more time to take over the package from the deliverer. This is e.g. due to (finding a key to open) a door that is still locked, people that are still in the bedroom/bathroom or need. Therefore, if possible, the deliverer prefers to go to the pick-up points first.

• Just before departing from the depot, the deliverer confirms and sends out the definitive 'delivery time-slot expectation'. If something goes wrong here (e.g. a timeslot still in the wrong place on the scheduled list), it will cause a mismatch with the receiver's expectation: also negatively affecting their perceived reliability of PostNL.

• By organizing the van themselves, deliverers know exactly what package they need to pick from where at which moment.

• Being able to scan the label of a package is essential to ensure a quick, easy process for the deliverer and reliable digital registration. If scanning is impossible due to a damaged label or a malfunctioning system, the deliverer has to improvise something digital, which slows down the process and can make it less reliable.

INSIGHTS ON THE ROAD

• Deliverers have their own personal ways to make their job easier and go faster. Thereby they sometimes make use of external attributes present and approach things beneficial to their own personal convenience and wishes.

• Digitally, the deliverers have a delivery timeslot of two hours and approximately 5 minutes per stop. In practice, deliverers can do on average 30-40 stops per hour.

• When it is raining, the water on the screen makes it difficult to operate the handheld. Especially when receivers are not home, several actions need to be carried out on the handheld by deliverers that can be frustrating.

• People do not (yet) fill in the digital 'agreed place' option, when not at home at the delivery moment, but rather make physical agreements with the deliverer (e.g. to a home adress of the owner of a company adress or somewehere in the garden. Some people do not even stay home for it anymore. Regarding to the 'responsibility' aspect, this can lead to problems: there is no 'black-on-white' agreement. Consumers can deny having received the package or even deny making the agreement in first place. Deliverers can also say that they delivered a package, while this might not always be the case.

• The deliverer gives people the benefit people concerning oral agreements. If something goes wrong, or when a complaint is issued, he will from then on just hand over their parcels to the pick-up point when the receivers are not home. It is there that they can pick it up themselves at a later time.

• The route is not always the same, the deliverer can switch the sequence. Also, deliverers can make agreements with each other about some adresses.

• During the lockdown, a lot of people were at home making it easier for the deliverer to handover packages. Now they have to get used again to more and more people not being at home. Also due to COVID a few (temporary) adjustments have been made in e.g. signing for a parcel (people can just say out the last 3 numbers of their ID.

• Sometimes employees of PostNL package points are quite busy, so deliverers also perform the tasks of the package point employees. Although this might prevent loss of time for the deliverers, it is not supposed to be this way. Being the only person involved can easier lead to mistakes and/or misbehaviour.

• Confirmation receipt of amount of packages delivered to a PostNL point can easily be compared to the amount on the digital handheld.

• After hearing the word 'PostNL' when the doorbell has sounded, receivers immediately just open the door/give acces to the complex, showing a lot of trust in PostNL from consumers.

• Deliverer aims to 'drive 100%', which means that all packages are delivered within the earlier confirmed timeslots. Therefore it is really important that this list is actual, adopted to current traffic circumstances and matching with the driver's expectations, intentions and individual planning.

• If a deliverer is behind schedule concerning the indicated timeslot of a certain adress, an orange (0-30 min.) or a red (>30 min.) clock will be shown in the list, in front of that particular adress.

• There are two main categories of deliverers , having different interests: PostNL employees and 'delivery entrepreneurs'. The first ones have a fixed salary, more certainty and it is not a big deal if they can't get rid of the parcels. Therefore they do not necessarily ring a lot of doorbells when a receiver is not home. The second group however is paid per package & address. Therefore they benefit far more from a 'succesful' delivery and packages not ending up at a PostNL point in the end.

• Sometimes deliverers drive an extra round after they passed all adresses on their list of the day, trying to still deliver the remaining parcels.

• When a mistake is made on the handheld (e.g. entering 'not-at-home' too early), a correction can be made. However, if you make too many corrections, you can get notified of this by one the supervisors/procesmanagers.

• The deliverer saw a new icon/picture that he did not know yet (iDin logo). After explaining, he did agree with it being more convenient. Informing the operating personnel about changes earlier will leave them with less confusion.

• Consumers and (fixed) deliverers might know each other very well and even have a kind of personal connection. Deliverers knows a lot about the people in the neighborhood, what they like, who they are close with and what their cars look like (indication if they are home or not).

• Although the time to walk from front door to the next one is relatively short within flats, the walking time from the van is relatively long. Also, you can only take that many packages with you each time. Fortunately, ot of people can take packages from each other. Un-fortunatley, there is no indication on for example what floor the adresses are located (Budbee does have this?).

• Webshops such as bol.com; zalando, wehkamp are perceived as the most frequent senders by this particular deliverer.

• People that start working as a deliverer often don't have a fixed route yet, but work in different delivery areas. At a later time, they often get a fixed route if they prefer one.

• When a deliverer is on a holiday or does not work that day, every time another different deliver takes over the route. Whenever this person screws up things or does not adhere to the agreements made between the fixed deliverer and the consumer (which he might not know anything about), this can sometimes disrupt the relationship (and trust) between the consumer and fixed deliverer. Because consumers are often not aware of this temporaral change of deliverer, they think it is their fixed deliverer that is doing these things and hold him accountable.

INSIGHTS (BACK) AT THE DEPOT

• Parcels to be sent to a receiver are transferred back to the depot by the same deliverers that left there at the start of the shift. There they will be processes immideately.

• The desk clerk can see in the system if there is something wrong or if there are any unsolved issues when a deliverer arrives back at the depot and ask him/her for an explation. It is also this desk clerk that can note this down and finally formally end the ride.

• If a complaint is issued by a consumer, the deliverer also gets it in detail, so he is able to defend himself.

• All the registration documents of daily rides are handed in the administration office. They are kept here and can be viewed by the employees working there at any moment (in the future).

• All cars have an assigned spot in order to ensure a smooth start and end of each workday, preventing cars that are stuck and having to wait on each other.

Online buying behaviour

• 78 percent of people aged 12 years or older said they bought something online. That equates to 11.5 million online shoppers in the Netherlands. Of these, 9.4 million said that they had made online purchases in the past three months prior to the survey. (E-commerce News, 2018)

• E-shopping most popular among 25- to 45-year-olds. Online shoppers aged 12 and older were the most likely to purchase clothing or sporting goods (55 percent), travel and vacations (52 percent) and event tickets (47 percent) in 2019. Ordering meals from a restaurant, fast food chain or an organization that delivers meals was done by 35 percent. The largest growth can be seen in the categories of foodstuffs, cosmetics or cleaning and household goods and appliances. The share of Dutch people who buy these goods online has more than doubled in four years. Of all goods and services purchased online, sales of movies or music and event tickets have increased the least (CBS, 2020)

• Especially 25 to 45 year olds like to buy via the internet; in 2019, 92 percent of them bought goods or services online. The growth was greatest among the over-65s. In 2019, 63 percent of 65 to 74-year-olds shopped online, up from 45 percent four years earlier. Of the over-75s, 30 percent made online purchases, compared to 17 percent in 2015. Not only are more and more people making online purchases, the purchase amount has also increased in recent years. (CBS, 2020)

• Half of the Dutch who shopped online in 2019 have complaints. In 2015, 40 percent had complaints with online purchases. Late delivery of the ordered products is the most frequently mentioned complaint; a third complained about this. Technical problems with ordering or paying (14 percent) and receiving wrong or damaged goods (13 percent) were the second and third most cited complaints (CBS, 2020)

• About 2.2 million Dutch people did not buy anything online in the year prior to the survey. 80 percent preferred to visit a store, for example to see the product in person. Nearly 3 in 10 were concerned about security and privacy and did not want to give out credit card or personal information. More than a quarter said they do not know how online shopping works. (CBS, 2020)

• Not paying directly at e-commerce companies is becoming increasingly popular in the Netherlands. Today, a third of consumers (36%) regularly pay for online purchases afterwards. Postpay is especially popular in the 25 to 45 age group, because 43 percent of this population group sometimes uses this payment method. This is also the group that buys online most often, with 24 percent doing so at least once a week. On average for all Dutch people this is 15 percent. (Ruigrok, 2020)

• iDEAL remains the most popular payment ethod in the digital domain in the Netherlands for the time being. 93 percent of online shoppers mainly settle orders this way. Credit cards are occasionally used by 28 percent for such purchases. (Ruigrok, 2020)

• "The corona crisis has further boosted the increase in the use of postpay in online stores. With the enormous increase in the number of online purchases since the outbreak of the corona virus, the number of payments afterwards has also risen sharply." (Christer Sjökvist, chief insights analyst at payment provider AfterPay). (CustomerTalk, 2020)

• "In these financially less secure times, paying after receipt of the order is extra pleasant for consumers. They do not have to pay immediately, but can pay at a time that suits them better. In addition, consumers mainly use post-payment because it allows them to see and try on their order first. It is therefore not surprising that, especially in the fashion industry, payments are increasingly made in arrears." (Christer Sjökvist, chief insights analyst at payment provider AfterPay). (CustomerTalk, 2020)

Moving numbers & behaviour

• In 2018, 1.79 million inhabitants of the Netherlands moved, 5 percent less than in 2017. This puts an end to the upward trend that started in 2014. Especially people younger than 50 moved less. Statistics Netherlands (CBS) reports this on the basis of new figures.

• Young people live longer with their parents. In 2012, they were on average 22.8 years old when they left home, in 2017 this was 23.5 years. The shift was strongest among students, who started living independently in 2016 on average 1 year later than in 2012. This development seems to be related to the social loan system: students are living less in rooms. Working young people left home 0.7 years later. In addition, people in their twenties are living together less and less. More and more young people have a job, which is good for the wallet. On the other hand, buying or renting houses is also becoming more expensive. (CBS, 2019)

• The 20 to 30 year olds traditionally move the most. In this phase of life, young people often start living on their own, cohabitating and/or moving into their first owner-occupied home. In 2018, the number of relocations was again highest among people in their twenties, despite the decrease in recent years. In absolute terms, 24-year-olds changed homes the most, 65 thousand times (2018).

Webshops & eCommerce:

In 2019, 7.9 percent of companies sold (partly) through an online platform. In 2016 this was still 4.6 percent. In 2019, 1.9 percent of companies even sold exclusively through online platforms, so without using their own website or app. This is also more than in 2016 (1.3 percent). The share of companies that sold products or services via their own website or app in 2019 is more than twice as large as the share that sells via an online platform, i.e. 16.6 percent (12.6 percent in 2016).

Although some of the companies also sold through online platforms, the portion of the turnover that was achieved through sales through these platforms was small, less than 1 percent. The turnover from sales via their own website or app was many times greater (8.3 percent). By the end of 2021, more web shops than physical non-food stores.

After an extreme increase in retail sales of 6 percent in 2020, ING only expects a modest growth of 1.5 percent for 2021, largely due to the continued high growth of sales in the online segment of 25 percent. No growth is expected this year in physical food and non-food retail.

One in six stores disappeared in the past ten years, that is almost 14,000 fewer stores. The number of supermarkets did increase, while the number of non-food web stores rose from 12,500 to 63,000.

In 2020, the number of webshops grew by 28 percent and more than 1 percent of the physical non-food stores closed. Assuming that more than 1 percent of non-food stores will also close in 2021 and the growth rate of the number of web shops normalizes to approximately 10 percent, there will be more web shops than physical non-food stores by the end of this year. https://www.emerce.nl/nieuws/eind-2021-meer-webshops-fysieke-nonfood-winkels

POSTAL MARKET

• 2.02 billion national letterbox items were sent in 2020. This means that 7.18% less national letterbox mail was sent in 2020 than in 2019. The turnover achieved was €929 million, a decrease of 3.82% compared to 2019.

• Consumers sent 8% more postal items in 2020 than in 2019, namely 131.5 million items. This is a trend break from the volume declines of recent years and related to part of 2020, when significantly more mail was sent due to Covid-19. Consumer mail delivered a turnover of €134.2 million, an increase of 16.6% compared to 2019.The reduced interpersonal contact may be one of the reasons why the postal market suddenly saw an increase in the volume of consumer mail after years of decline. Particularly during the holidays, considerably more greeting cards were sent than in previous years.
• Of the total amount of national letterbox mail, 6.5% was sent by consumers, 0.9 percentage point more than last year. An average of 7.6 consumer mail items were sent per resident of the Netherlands

• The average turnover per item in 2020 for consumer mail increased by 8% to €1.02 per item.
• Business senders sent 1.89 billion mail items in 2020, 8.1% less than in 2019. The turnover achieved with these mail items is €794.9 million. This is a decrease of 6.6% compared to 2019. Turnover has therefore fallen less sharply in percentage than the volume.
• Since the acquisition of Sandd by PostNL, PostNL's market share in the transport of business mail has risen to above 90% based on both volume and turnover.

Logistics trends package matker

• Parcel transport has grown in 2020, partly as a result of Covid-19. The volume grew by 34.8% to 778 million packages and the turnover by 27.2% to € 3.59 billion. Of this volume, 586.3 million parcels were delivered to a Dutch address.

• The volume of domestic parcel transport grew by 31.6% in 2020 to 524.5 million parcels. The turnover achieved with the transport of these parcels in 2020 increased by 29.6% to €1.97 billion

• The average turnover per package achieved with domestic package transport decreased in 2020 to €3.75 per package.

• In domestic parcel shipping, the B2C, B2B and C2X segments grew in 2020. Volume in the B2C segment grew 37.8% to 388.2 million packages and sales grew 40.9% to €1.33 billion. Volume in the B2B segment grew by 13.3% to 115.5 million packages and revenue by 5.8% to €520.9 million. Volume in the C2X segment grew 38.6% to 20.8 million packages and revenue grew 41.8% to €112.2 million.

• The volume of letterbox parcels with track and trace increased by 47.1% in 2020 to 42.4 million pieces. The turnover achieved with this increased by 45.7% to €100.9 million.

• Just like in previous years, PostNL is the largest carrier of domestic parcels. The market share decreased compared to 2019, to 55-60%. DHL Parcel's market share is increased, to 30-35%.

• The number of service points of the six parcel carriers in the Netherlands increased by 1,114 in 2020 to 10,698 service points.

• The volume of cross-border parcel transport increased by 41.9% in 2020 to 253.5 million parcels. The turnover generated by the transport of these parcels increased by 24.3% to €1.62 billion.

• In 2020, 191.7 million outgoing cross-border parcels were sent. This volume has increased by 50.2% compared to 2019. The turnover achieved with outgoing cross-border parcel transport increased by 26.6% to €1.34 billion.

The volume of incoming cross-border transport was 61.7 million parcels in 2020, an increase of 23.3% compared to 2019. The turnover achieved with the transport of these parcels increased by 14.6% compared to 2019 to € 286.7 million.

• PostNL, DPD and UPS all had a market share of 20-25% in 2020 based on volume of incoming cross-border parcel transport. Based on revenue, UPS has the largest market share at 40-45%.

• DHL Parcel has the largest market share based on volume of outgoing cross-border parcel transport with 30-35%. Also based on revenue, DHL Parcel had the largest market share with 20-25%

• Increase of parcel shipping: Parcel transport has grown in 2020, partly as a result of Covid-19. The volume grew by 34.8% to 778 million packages and turnover up 27.2% to € 3.59 billion. Of this volume are 586.3 million parcels delivered to a Dutch address.

• Increase in service points: The total number of service points, consisting of manned service points, parcel lockers, and other physical delivery locations, increased by 1,114 compared to a year ago. With an increase of 11.5% in 2020 PostNL still has the highest amount: 3.906 service points.

• Distance to service point: 63% of households have at least one service point or parcel safe within walking distance. There are, however, major differences between the parcel carriers. For example, 52% of the households have a PostNL service point within walking distance, while this applies to only 16% of the households with GLS.

• FTR for home deliveries: Of the packages ordered for home delivery, 94% of the packages were actually delivered at home. This is an increase of 2 percentage points compared to 2019. Of the packages ordered for home delivery, 3% were delivered to a service point. The remaining 3% was delivered to the neighbors. Thereby it is important to note the following. Due to the lockdown people were more at home. Next to that, it was found that the deliverers quite easy mark a package as 'delivered at home'.

• Self-service technologies such as ATMs, online banking and selfservice purchase and check-outs are increasingly being used by companies. Many customers appreciate the flexibility and time-saving benefits of self-service technologies, and companies benefit from opportunities for cost reduction and improved customer satisfaction and loyalty. Yet these benefits are accompanied by potential risk and trust issues that follow from automation and lack of human contact in the transaction processes.

Research topic
Reliable digital relationships

Main research question:
- *How can PostNL build a reliable digital relationship with its consumers?*

Checklist for start
- Questions, (Video)recorder, Pen, Paper, Informed Consent form
- Check if duration interview matches with schedule (approx 45 min)

Introductory script
Hi, my name is Ayyoeb and currently I am doing research on the logistic services industry. The purpose of this interview is to get to know more people's experience within this field and their attitude towards digital. You may withdraw from or interrupt this interview at any point. Furthermore, you are finding yourself in a safe area where there are no right or wrong answers. Is it ok if I tape this interview?

Perhaps we can start with you telling me something about yourself, your age, hobbies, where you live, what your house situation is etc.?

Subtopic 1: About logistics experiences (6 min)
Opening question: *Can you tell me something about the last time you sent or received a package?*
Follow-ups/probes:
- *How often do you engage in the logistic related event? (on average per week/month)*
- *Have you noticed any differences in the process over the years?*
- *Are there any other people involved in these logistic related events (such as family members, friends or other housemates)? How does that work out?*
- *Do you also accept packages for the neighbours? Or others?*
- **What do you think about their digital products and interfaces?**
- **What are the most negative experiences you have had? Or heard of? And what are the most positive ones?**
- **Have you ever had an unreliable feeling concerning a logistic related event?**
- **What would you do if something goes wrong? For example a missing package?**

Subtopic 2: Logistic service providers (8 min)
Opening question: *What logistic service providers do you know of?*
Follow-ups/probes:
- *Can you rank them from most favorite to least favorite? Can you elaborate?*
- **Which of the services that they offer do you like/use? Why?**
- *When would you be willing to pay more for a certain service?*
- **How would you describe your relationship with for example PostNL?**
- *What would you advise LSP's to do in order to improve their services?*

Subtopic 3: The digital environment (5 min)
Opening question: Follow-ups/probes: **On a scale from 1-10, how digitally savvy would you say you are?**
- **How often do you make use of (web) apps? Also for logistics? Why (not)?**
- *What do you like most about these apps? And what the least?*
- *What do you think of **push notifications? When/why would you enable/disable them?***
- *What would you change to make the (web)app better suited to your personal needs?*

> * show picture below of different companies and provide scenarios (comparing physical with digital service aspects) according to interviewee's picks (based on companies they have used and/or know best)*

* show picture below of different companies and provide scenarios (comparing physical with digital service aspects) according to interviewee's picks (based on companies they have used and/or know best)*

- **To what extent differs the digital experience from the physical experience to you?**
- **Same question, but now looking at the context of logistic service providers?**

Subtopic 4: Customer relationships (5 min)
Opening question: **Are there any companies/brands that you feel attached to?**
Follow-ups/probes:
- *Can you explain why?*
- *How would you like to communicate with a digital company?*
- **What values/properties are important for you in a (physical) reliable relationship? Why?**
- **To what extent would this change if this would be a digital relationship? And if it would be a company/brand instead of a person?**

Subtopic 5: Digital identity & Reliability (10 min)
Opening question: Follow-ups/probes: **Have you ever had to identify yourself? Digitally?**
- *How did that make you feel?*
- *How important is it for you to trust someone? And how important is it for you that someone else trusts you?*
- **Which companies do you think have a very good (digital) identification process?**
- **When do you find a company reliable?**
- *How would you let someone else know that you are actually you?*
- *Who would you trust earlier? A human or a machine/program? (with personal (sensitive information?)*
- *Concerning the reliability within logistic services: What efforts would you be willing to make in order to establish more certainty? For yourself*
- *If you would have to identify yourself, would you prefer to do it in a physical way? Digital? A combination?*
- **How do you look towards privacy and the use of personal data when using digital applications?**
- **How do you imagine a digital identity? Why do(n't) you think it will be useful? For what (not)?**

Checklist for closure
- Summary of interview
- Check if I missed important topic
- Ask if there is anything the interviewee would like to say/add
- Thank you and goodbye!

List of generic probes
- Pictures of touchpoints, physical as well as digital.

Transcribed interviews and codebook are available upon request.

Impression of the survey:

Complete survey can be found by typing in the following link:

https://docs.google.com/forms/d/e/1FAIpQLS-fDw1ElwZcOGNzdO-7myQxIj41wUNAoz_zF-HP4VZsv_B23d0Rg/viewform?fb-zx=-6019334286267936852

or by scanning the QR code below:

Results:

Results of the survey are available upon request.
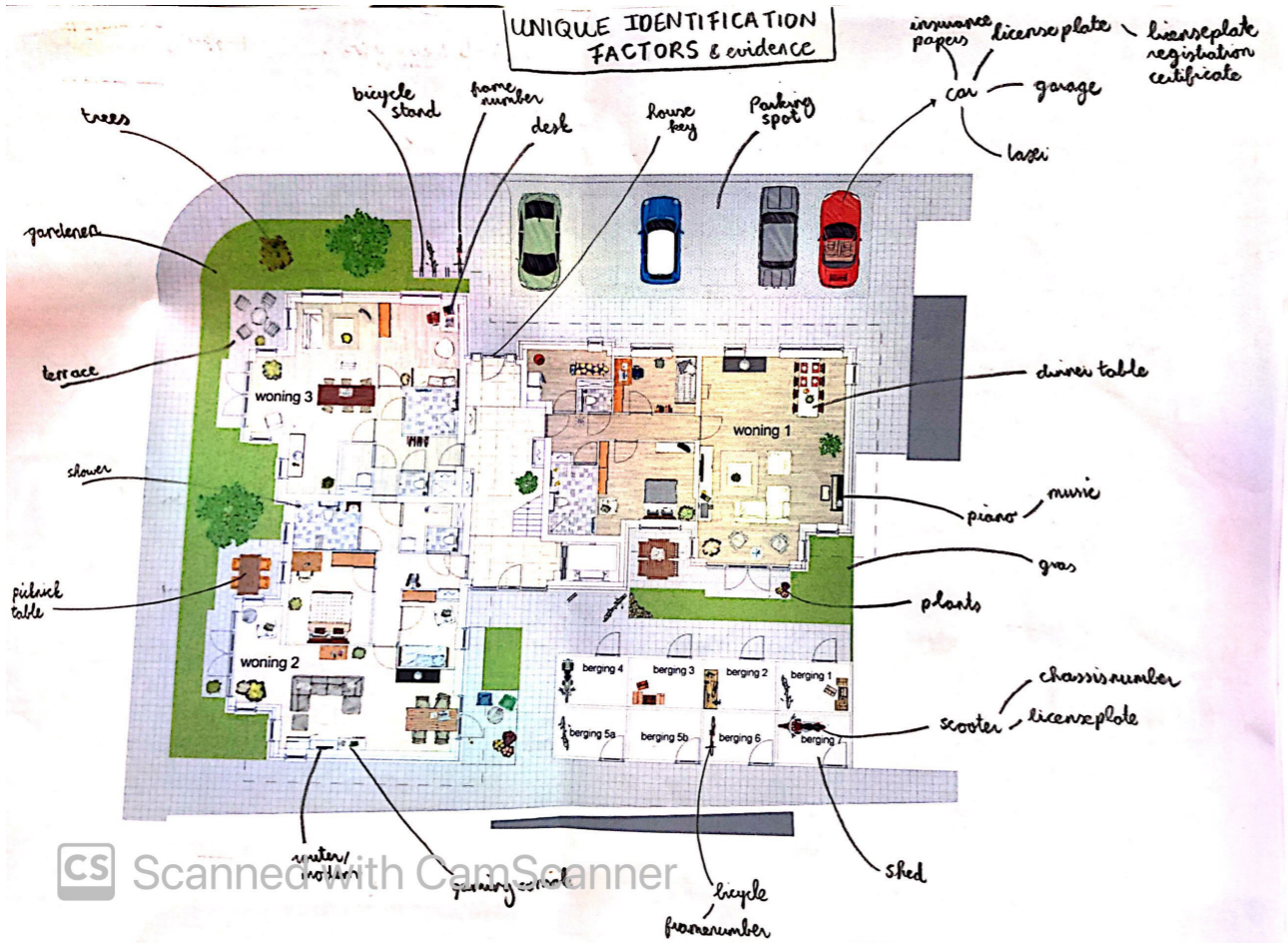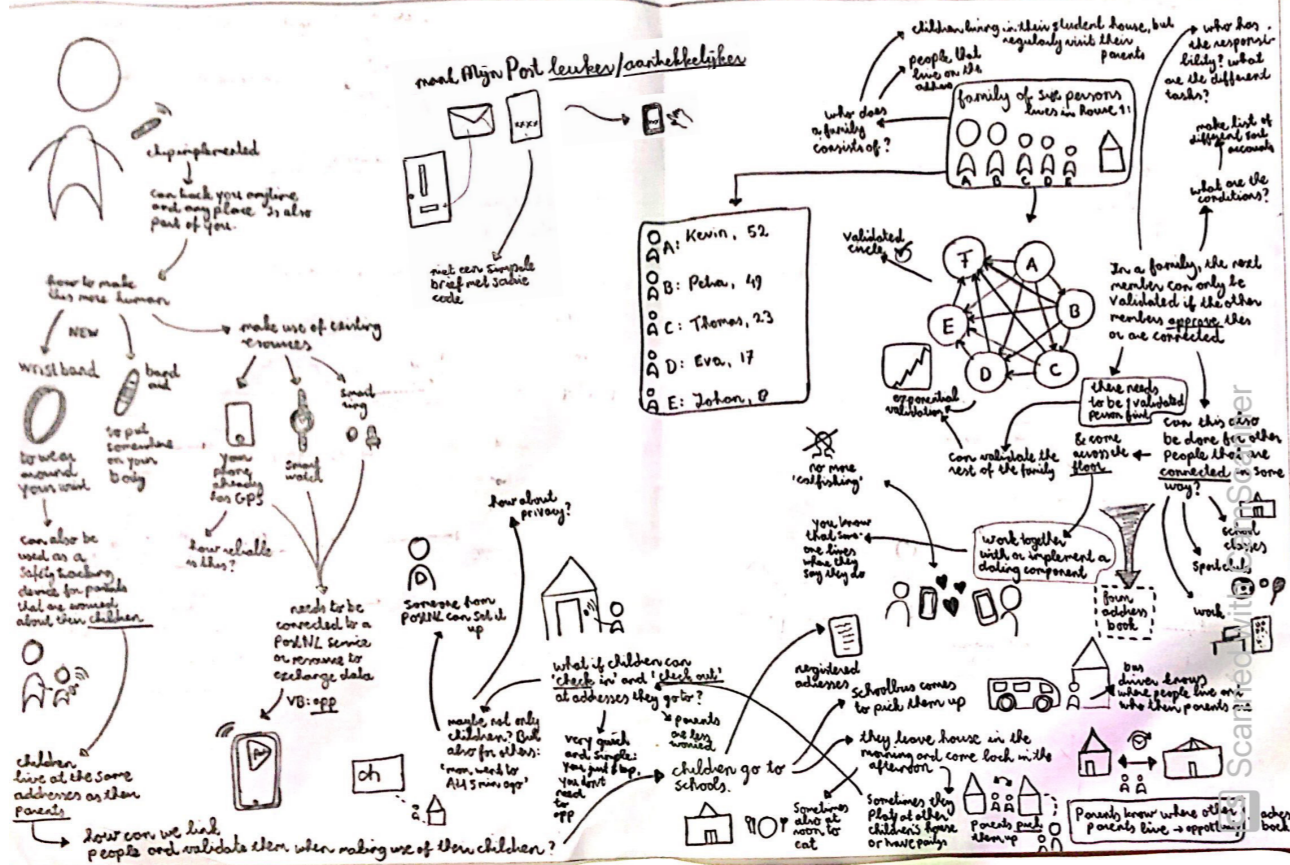
PLANNING

13:00 Introduction to topic
13:05 Warm up
13:10 Flower Associations
13:25 HKJ's

13:40 - 13:45 Break

13:45 - 14:00 Brainwriting

14:00 - 14:15 Clustering

14:15 - 14:20 Wrap-up
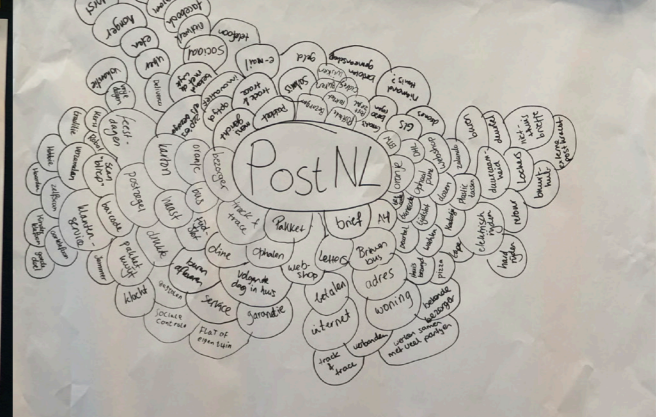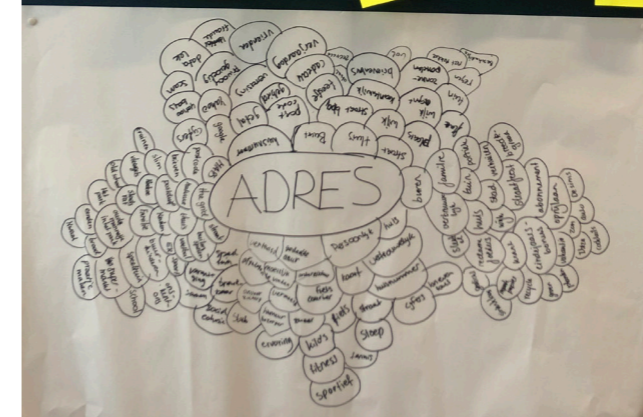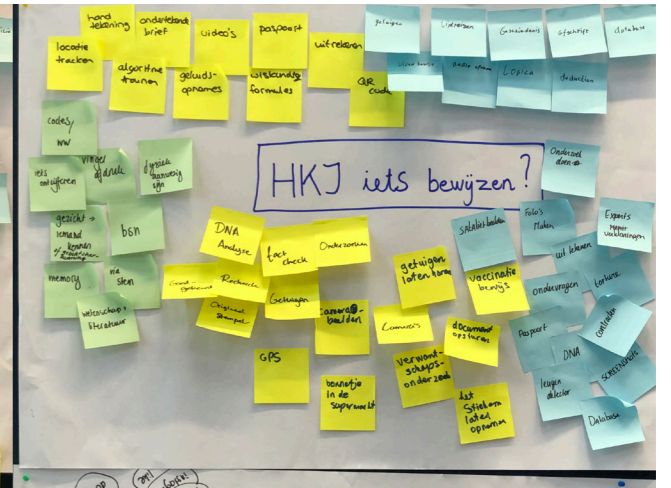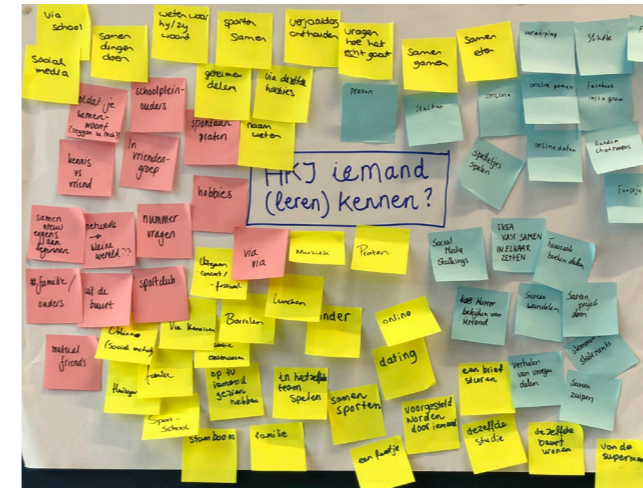
Omar (19) is a student at the TU Delft and lives together with 12 housemates in a student house at the JVB in Delft. Every now and then he orders something from bol.com.

Eva (27) just started her fulltime job and lives together with her boyfriend in an apartment in the center of Rotterdam. She is a frequent orderer: every week she receives at least one parcel.

Peter (73) lives alone in a senior home in suburb of Utrecht. Almost never orders online and does not have a PostNL account.

Carine (45) is married with Mark and together with their three children (17, 12 and 8) they live in a terraced house in Nijmegen. Parcels from all family members come in and she also regularly accepts parcels from the neighbours.

1. Using Wi-Fi to validate - *connecting your physical and digital address*

Idea
If one has righteous access to an address, they often also have access to the WiFi network of that particular address. So, being connected to a Wi-Fi network of a certain address also gives a degree of assurance that a person is linked to that addres (because they know the password), unless it is a hacker. Your IP- and MAC address can say a lot about your geographical environment.

Almost everyone has access to the internet at home (see data). For a working internet connection, a modem that connects with your internetprovider and a router that distributes the traffic to all your devices in house. In this way a connection is established between the service provider (eg T-Mobile or KPN) and the ultimate user. This uses certain data that can also help with: having more certainty about the users.

Interesting data
Of the inhabitants of the Netherlands aged 12 years or older, 3% indicated not having internet at home in 2019. That's about 453 thousand people. 97% does have internet. Two thirds (66 percent) of Dutch people aged 12 years or older who did not have internet access at home were 75 years or older, 23 percent were between the ages of 65 and 75.

In 2019, 88 percent of Dutch people were online every day. In 2014 that was still 79 percent. More than 95 percent of 12- to 55-year-olds and the highly educated used the internet every day. 44 percent of the over-75s are also daily on the web. (CBS, 2020)

75 plussers maken het minst gebruik van het internet, bestellen het minst online en hebben hoogstwaarschijnlijk ook
Aan de ene kant betekent dit dat er waarschijnlijk minder data van hen online te vinden is. Daarentegen zullen ze het digitale aspect minder goed begrijpen en er waarschijnlijk minder snel achterkomen als er iets niet klopt. Echter is het wel belangrijk dat hier naar gekeken wordt.

PMI
+ Almost everyone in the Netherlands (97%) has a WiFi connection at home, so a very large group could potentially be used for this method
+ not a linear one by one validation, but an exponential one will be much quicker.

- Consumers are scared that it is unsafe, since they also do other things online using their WiFi network, such as online banking.
- It is quite easy to change your IP-address (to a city of choice) when using a VPN or with dynamic addresses. MAC addresses could also be changed, but this requires a lot more expertise. However, this negatively influences the reliability of the system.
- Your IP-address could be intercepted by hackers, they could perform a man-in-the-middle attack and manipulate incoming an outcoming internet traffic.
- Privacywise it is not very desirable to track a lot of people

* Municipality of Enschede has gotten a €600.000 fine for illegitimate WiFi tracking

? How to link this digital address to a real physcial address?
? How can this MAC address easily be retrieved from a consumer's device? Could PostNL get one-time access to a house's internet connection?
? Do large households such as studenthouses often make use of the same Wi-Fi network and have the same IP adres?

IP-adres
This 'Internet Protocal'-address is a code assigned to your internetnet connection once you enter the internet. It works as if it were your home address, only then online. Thanks to your IP address, the websites you visit know where they are to send information to.

As shown in the example below, quite some interesting data can be obtained be obtained from this IP- address, such as your internetprovider, hostname, city, area code and more.

My home address / study address | My parents' address / former home address:

But how reliable is this? IP-addresses can be covered or changed. The easiest way to do this is by using a VPN (Virtual Private Network). Certain providers also make use of dynamic IP-addresses that change over time. If your IP-address is hidden, is that already a reason to doubt? Or does it require alternative validation? In any case it is strange if it turns out that you ordered a parcel from China. However it should be possible, perhaps with proof of residence/holiday address.

MAC adres
This stands for Media Access Control Address and handles the physical connection from computer to computer while IP-addresses handle the logical routeable connection from both computer to computer AND network to network. It is a unique number linked to a device on a given network

The MAC address of any device is positioned behind the router is not sent beyond it, so it cannot be used to track you over the internet. The router uses it internally in order to identify the local computers. This MAC address can be only traced on the network that it is currently connected: a device at home can see the MAC addresses of other devices that are at home because they are on the same network.

Furthermore, a MAC address does not really say something about one's personal identity. Also, there is not really something that one can do once once one gets a hold of it.

How does it work?

Hoe kun je bewijzen dat je ergens toegang toe hebt aan de hand van je Wi-Fi gegevens? What can we do with Wi-Fi to validate addresses?

Mensen kunnen onbeperkt nieuw account aanmaken, met nieuw e-mail adres.. Hoe kunnen we dit voorkomen de hand van de Wi-Fi/internet gegevens (IP adres etc)

2. Collaboration with housing cooperations - *data for certainty*

Idea
Different organisations are in possession of various data about people, addresses and processes. If there is way to share them in an anonimous way, it could be valuable for multiple parties with regard to preventing fraud

Interesting data
mensen betalen maandelijks de huur -> er is iemand die het betaalt vanuit een werkende bankrekening. Naam en rekeningnummer bekend.

What are the shared interests?

Het aantal uitwonende studenten zal in collegejaar '20-'21 (367.200) verwacht aantal uitwonende studenten komt over acht jaar uit op 384.500 (trendprognose: 386.800).

Student houses with a campuscontract?
Studentenwoning-corporaties checken in het begin van het collegejaar bij de onderwijsinstellingen (bv de TU Delft) of een student die op een van hen adressen woont, ook nog steeds ingeschreven staat als student op de onderwijsinstelling.

Aan de hand daarvan wordt bepaald of de bewoner(s) en brief krijgt dat hij de woning binnen een bepaalde tijd moet verlaten of dat deze

Privacy statements

PMI
+
+
+
- Really complicated, you might lose overview of data
-
-
* Perhaps better to focus on only a few collaboration partners
* All parties will need to update their privacy statement

? Hoe weten deze woning corporaties of iemand nog steeds op een bepaald adres woont?

How does it work?

DataManager

There is a database

Dataplatform

Address		Date	Code	Category	Uploader
BlaBlastraat 24	4766LK Delft	24/07/2021	A7	Lifestyle	Klarna
BlaBlastraat 24	4766LK Delft	24/07/2021	A7	Housing	Klarna
BlaBlastraat 24	4766LK Delft	24/07/2021	A7	Housing	Klarna
BlaBlastraat 24	4766LK Delft	24/07/2021	A7	Education	Klarna
BlaBlastraat 24	4766LK Delft	24/07/2021	A7		Klarna
BlaBlastraat 24	4766LK Delft	24/07/2021	A7		Klarna
BlaBlastraat 24	4766LK Delft	24/07/2021	A7		Klarna
BlaBlastraat 24	4766LK Delft	24/07/2021	A7		Klarna
BlaBlastraat 24	4766LK Delft	24/07/2021	A7		Klarna
BlaBlastraat 24	4766LK Delft	24/07/2021	A7		Klarna
BlaBlastraat 24	4766LK Delft	24/07/2021	A7		Klarna
BlaBlastraat 24	4766LK Delft	24/07/2021	A7		Klarna
conflict					
BlaBlastraat 24	4766LK Delft	24/07/2021	A7	Lifestyle	Klarna
BlaBlastraat 24	4766LK Delft	24/07/2021	A7	Housing	Klarna
BlaBlastraat 24	4766LK Delft	24/07/2021	A7	Housing	Klarna

PostNL

Housing associations: funda, Ymere, VESTIA, EIGEN HAARD, DUWO

glazenwassers verbouwers Marktplaatsverkopers

House related services

Lifestyle: TU Delft, airbnb, bol.com, Klarna., Uber

Subscriptions: T-Mobile, Spotify, NETFLIX

3. Digital house key - *a new way of access*

Idea
If one has righteous access to an address, this person is often in possession of the house key to that address. If this can be digitized, we know which people have access to which address. Also, these key owners can also pass the keys to others on the same address (e.g. housemates, family members, close relatives and well-known trusted neighbours).

Physical house key: access to your physical address

Digital house key: access to your digitized address

Interesting data

How does it work?

① In the app, the key is placed in the frame of the camera and the algorithm scans the (unique pattern) of the key and analyzes it.

② The unique pattern of the key will be extracted and stored.

③ The unique pattern is thickened and anonymized. Based on this, a QR-)code is generated.

3x = ✓

④ The received QR code of the addressee will be scanned by the deliverer for confirmation. But, only if the person actually opens the door.

⑤ After three scans with the deliverer, you become a master key owner for this address.

PMI
+ Separately, a house key says nothing about your identity and thus ensures your personal privacy.
+ You always have them close with you, no matter where you are ,so you can use it anytime.
+ Bigger groups of people that live in the same household can be validated quicker.

- It feels really personal to 'give' your key to someone else, it is like you give the receiver access to your house.
- This does not solve parcel fraud if the deliverer is involved in the fraud and illegally validates himself on a certain address.
-
-

? How do you get people to do co-operate?
? How do you know that it happens when the door is open

Possible new business opportunity:
PostNL smart locks: make it also work on actual front doors. PostNL can install the locks,

It also provides data about when a door is opened. So you know for sure that an actual resident opened the door at the

Since PostNL is already busy with the implementation of parcel lockers, this could possibly be a next step?

DOM

Examples

Masterkey owner of a certain address
This person can also authorize others

Key owner of a certain address
The received QR code of the addressee will be scanned by the deliverer for confirmation. But, only if the Then you have the master(key)

Handing keys in & out
Digital keys kan be exchanged between people, just as with physical keys.

Overview of your keys
Here you can see all digital keys that you have, together with the corresponding registration date, address details, type of address and validation status. Next to that, you can also add and delete your keys here.

Overview keyholders on certain address
Here you can see all the other people that have a digital key to your address together with their registration date. This keeps it it transparent and fraud resistant. The key of people that do not have access to the anymore to the physical addresses, can also be removed here.

4. Smart Birthday cards - *special moments in your mailbox*

Idea
Instead of the boring MyMail letter where you have to wait for for at least three days, it could be made more joyful by combining it with a birthday card that people can send to each other.

MijnPost pictures

Interesting data
Use birthdays as a way to validate

share via WhatsApp

Received in mailbox -> Person has access to it: same
Type in code > scan (& pass on) code: same

Feedback that a person has read it.
Can only be read once (by 1 person)
Valid for max 7 days?

Possible to enable (push) notifications, or reminders, a few days before

Geboortekaartje = automatisch inscannen voor opslaan van datum
Daarnaast zorgt het ook voor adresvalidatie, aangezien de geaddresseerde het kaartje fysiek in de brievenbus ontvangt en naar de app/account wordt doorverwezen bij het scannen

How does it work?
Share birthday and address or manually add it.
you also know which account sends it, because it is made online/in the app

when scanning the QR code, the PostNL app gets opened

New business model:
Offer strip cards that you could top up in combination with a digital birthday calendar. In this way one would not easily forget birthdays anymore, while at the sam e

It goes almost automatically for the sender, while it feels really personal for the receiver.

Choose your strip card:

3x	5x	10x
€ 9,95	€ 14,95	€ 24,95

Possibly also introduce subscriptions:

PMI
+ It builds upon an existing service, while also providing more value for the consumer.
+ It is profitable and can lead to additional earnings.
+ Building stronger social connections and realising more special moments by making it easier to do some thing special for each other.

-
-
-

* It could be interesting angle to also establish age validation.
*

? How can you share it with eac
? How desirable is it to digitize the physical postcard and/or save the surprises?
? How to keep this stored data safe?

Sender

Verjaardagskalender
14 juli 2021

Overview birthday calendar

make use of the already existing flow for sending a postcard via the app.

pay for the service or use the already purchased credit card

Scanning the QR code on the card gives you a surprise in the app

Receiver

• **'thankyou' response message**
Make it possible to digitally thank the sender of the postcard. After the receiver scans the postcard, the sender will get a "thank you" -notification.

• **voice message**
Make it possible to generate a QR code from a recorded message. Now you can also physically hear the person speaking out their best wishes. This voice message can then also possibly stoed in the app.

• **extra picture or selfie**
Make it possible to receive an extra picture or selfie from the sender of the card. This can also be added to 'My Memories'.

• **save postcard**
Make it possible to save postcards in the app, so you will be able to still look back at them after a few years.

Overview of all your personal memories

My Memories
Saved postcards
16-08-2021
16-08-2021
03-02-2021
Saved pictures
Saved voice messages

Make it possible to save postcards in the app, you will be able to still look back at them after a few years.

Interesting data

Overview of all your personal memories

Idea

Connecting with the neighbours through a 'pickup request'. Can be used in first instance to just enhance transparency and communication over a delivery. Later on, after frequent connections are established between neighbours, it could be used as part of an address validation.

6.5 million accounts, but 0 interaction.. Involve neighbors!

Interesting data

How many parcels are delivered to the neighbours every day/year?

How does it work?

⑥ Sending 'pickup request' (optional)

Connext

Pickup request

You have indicated that you would like to have this parcel delivered at a neighbor, using a pickup request.

Select your neighbor:

246 247 248
249 250 251

"Hi! Would you perhaps be willing to accept my parcel? I'll pick it up as soon as possible!
Greetings, nr. 251"

Based on the data regarding prior neighbor deliveries or preferences set by the consumer, a pickup request could be sent to neighbors, asking if they would like to accept a parcel for the consumer. After accepting, this will be adjusted in the system of the deliverer.

① Update for Addressee

Connext

Your parcel is at number:

246

When are you planning on picking up the parcel?

Do 27 · Vr 28 · Za 29 · Zo 30 · Ma 31

Suggested timeslots:

do 27/5 19:00 - 20:00
vr 28/5 18:00 - 19:00
za 29/5 14:00 - 15:00

Once your parcel is delivered to your neighbor, you can indicate when you are planning to pick it up. In this way your neighbor does not have to wonder anymore when a parcel (that has already been laying in the hallway for a few days) is going to be picked up.

② Update Receiving Neighbor

Connext

You accepted a parcel for number:

251

When can the parcel be picked up at your place?

Do 27 · Vr 28 · Za 29 · Zo 30 · Ma 31

Suggested timeslots:

do 27/5 19:00 - 20:00
vr 28/5 18:00 - 19:00
za 29/5 14:00 - 15:00

The neigbor can indicate when the addressee could pick up the parcel

③ Agreed time slot

Connect

You are both available for transferring the parcel on:

Sa 9/5
19:00 - 20:00

change availability

Scan QR code to collect 'stamps'

Based on the data regarding prior neighbor deliveries or preferences set by the consumer, a pickup request could be sent to neighbors, asking if they would like to accept a parcel for the consumer. After accepting, this will be adjusted in the system of the deliverer.

④ Transmission confirmation

Connext

Transfer Completed!
+ 10 XP points

Your neigbor at 251 is eternally grateful!

Top Neighbors
1: 248
2: 246
3: 252

Based on the data regarding prior neighbor deliveries or preferences set by the consumer, a pickup request could be sent to neighbors, asking if they would like to accept a parcel for the consumer. After accepting, this will be adjusted in the system of the deliverer.

⑤ Points overview & 'shop'

Connext

Your Points

83 XP

Where would you like to use these for?

Send a birthday card to one of your top neigbors — 20 XP
1x free shipping on a parcel within NL — 75 XP
50% discount on a parcel safe at home — 500 XP

With the amount of points, various products and/or services could be purchased.

PMI

+ You are aware of when you can pick up your parcel or when someone else can pick up theirs. Holidays, few days not at home
+ Has a social value in connecting neighbors to each other
+ Takes away uncertainty.
+
-
-
-
>
>

? Kan PostNL zien hoe vaak je een pakketje voor de buren hebt aangenomen en zij voor jou? Na 3x heen en weer misschien als suggestie geven?

Idea

The deliverer has a lot of knowledge about his neighborhood and the people that live in it. If this knowledge could be digitized, PostNL would have a lot of new interesting data about it consumers, also providing more certainty about them.

Interesting data

How does it work?

◀ My neighborhood   rit 5738

❶ The deliverer gets a map showing all the addresses of his fixed route. Possibly also the delivery addresses of the day. On the map he can indicate which addresses areknown by him .

🟩 I know who lives on this address   ⬜ I don't know who lives on this address
🟥 This house is empty   🟧 The person on this address is going to move / has recently moved

❷ The deliverer recognizes the name and corresponding address and scans the shipping label on the parcel.

❸ When a deliverer has delivered many parcels to a certain addressee, he knows that this name-address combination belongs to this physical person. He can indicate that it is a known person for him.

❹ Based on the 3S code, the e-mail address and eventually the user account can be retrieved. The consumer receives notification in the app with request from the deliverer to be linked and can choose to accept it.

❺ Consumer gets notification in

Screen deliverer   Screen consumer   Screen deliverer   Screen consumer

what if righteous people use other names/aliases?

PMI

+ The deliverer knows a lot about a neighborhood and the people that live there.
+ Consumers do not have to put in effort to
+
- Deliverers that are involved in fraud can falsely validate fellow fraudsters.
- The deliverer has to perform more actions and it increases the burden for this person
- Can not lay all the responsibility in the hands of the deliverer
>
>

? Which deliverers do you give the responsibility? What requirements are set for these people? When do you know (residents of) an area? E.g. Fixed area deliverer for 2+ years.
? How often do you need to perform this action? Once a year, quarter, week? And when?
?

"de bezorger is echt m'n mattie"

Idea

Drones can get anywhere really quick, at any time and are able to objectively validate you. In this case you can pick a convenient time yourself when you would like to be validated. You are not limited to only the 9 - 17 hours.

Interesting data

kijk op drones van mensen?

Idee: PostNL glazenwassers, scannen RFID code van pakket achter de deur van het raam!

plak RFID code op pakketje of brief? papierbak of iets?

papierpak of pakketje voor/in de buurt van het raam of tuin (met een RFID) code & detect it! (lig in het huis!) dan weet je dat het pakketje echt in dat huis bij die persoon hoort.

zelfs als ze het niet thuis laten bezorgen

https://www.uscog.gov/sites/default/files/document-library-files/2016/RARC_WP-17-001.pdf

How does it work?

❶ A parcel from an e-commerce party that needs to be delivered on an address that is not yet validated, is separated

❷ Information and data about the PostNL account that ordered the parcel will be coded and stored on a sticky RFID.

❸ The sticky RFID will be attached to the corresponding parcel. This can be done by PostNL or the e-commerce party involved.

❹ After delivery, the parcel can be placed in front or close to the windows.

❺ Attach an RFID reader that can read up to 12m

❻ This RFID reader & writer components will be attached to a PostNL drone.

❼ Prepare for take off

❽ The drone takes off

❾ Make contact with parcel that is already in someone's home. Or validate a person from behind a window

View from drone

The parcel with RFID sticker can easily be detected by the drone.   path

PMI

+ It is exciting and makes people curious
+ It is convenient, since
+ It is objective, it can not psychological be manipulated
- If there are too many trees or other obstacles, locations might be unreachable
- They can be intercepted easily
- people are not ready for it?
>
>
>
?

Idea

We can find and think of new ways, but with the 2.3 million validated accounts we have now, what if we can reach everyone? And validate them?

How does it work?

Als we op alle adressen in ieder geval 1 gevalideerd persoon hebben, kunnen we eventueel vanaf daar verder met de medebewoners.

Minder persoonlijk, maar zeker wel handig

Connect online with different social groups that you are in.

Interesting data

❷ Connect consumers with each other
An established secured network

Invite people to your PostNL group.

Like WhatsApp?

Connect consumers with each other
An established secured network

They say "you're only 3 connections away from Obama/Trump)

My Network   **8 connections**

Person A   Person B   Person C   Person E   Person D

PMI

>
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>

?

Idea

Place trackable/scannable sticker on parcels, that can be scanned by both the deliverer and the receiver, so you have a two sided confirmation.

Ofcourse, proof can be requested in the form of sending a number or photo. However, NFC pairingmightbeaninterestingopportunity. IntegratingthistechnologyinPostNL'stouchpointsmakesitpossibletoquicklyandeasilyretrievethenecessarydesireddata.

When you scan the parcel, you can get a link to:
- payment
- invoice
- prove of warranty

Interesting data

Zoveel apparaten hebben een NFC scanner tegenwoordig -> horloge/telefoon etc.

Indication of the capacity and memory:

Webaddress: 19 bytes,
Phone number: 16 bytes,
E-mail & subject: 84 bytes,
Business card: 153 bytes,
Trigger (WiFi on and start application): 118 bytes.

How does it work?

There are different types of smart stickers that could be used, all having a different memory size, different functions and ofcourse cost price. Most interesting are the NFC tags & UHD RFID tags.

There stickers can be attached to the parcel, right next to the shipping label that contains the addressee and the address.

There stickers can be attached to the parcel, right next to the shipping label that contains the addressee and the address.

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Other possibilities

Letter with coded e-mail link

Integrate a digital association such as a (coded) e-mail address with mail, so a person can be validated using mail data, without ordering parcels. Since physical and digital can now be combined, a reliable link to someone's account can be established

For deliveries preference 'agreed place', it is

afgesproken plek
RFID herkenner

PMI
+
+
+

-
- Could be susceptible to fraud, since everyone is able to stick a fraudulent sticker on it, when given the opportunity to do so.

* Maybe only for high risk/important shipments.

?

Idea

By tracking someone's location for a certain amount of time, locations of interest can be found, one of which probablyhas to be the address that someone has righteous acces to.

Consumer gets pop-up when opening the app

Easy to adapt the (privacy) settings on your device

We zien dat je je vaak op deze locatie bevindt. Wil je deze toevoegen aan je adressen?

Overview of validated address(es) (& locations) based on the data-driven approach

Interesting data

How does it work?

❶ ❷ ❹ ❸

Bron: paper Sout Korea

❶ Retrieve location data
For a duration of approximately 60 days, the user's current location will be recorded every minute. This will result in a point with a coordinate and a timestamp displayed on a map.

❷ Long-duration check
Clusters are formed based on areas where the user stays for a long period of time. A first cluster is generated with all the coordinates while the user stays within a certain distance (space threshold s) from the reference point. When the user is out of the current cluster, a new cluster is generated and a new reference point is elected. If the user stays at a cluster for more than a certain time (time threshold t), the cluster becomes the LOI. On the contrary, if the user leaves a cluster before t, the cluster is eliminated. Location data in eliminated clustersare also removed as noises. The two thresholds, s and t, directly affect the clustering results and could be identified via experiments.

❸ High-density check
This procedure consists of two parts: density-based clustering and high-density check. It considers that LOIs are locations with high density, that is, they have denser location data than other places. A local density is calculated as the number of neighbors divided by the number of original location data. After density-based clustering, the procedure checks the density of each merged cluster. The density of each cluster is calculated by dividing the number of location data included in the cluster by the total number of original location data. Clusters that do not satisfy the density threshold d are eliminated from candidate address clusters. The remaining clusters are used as the input in the next procedure.

❹ Consistency check
This procedure discovers the places that consistently satisfy the above two conditions. In other words, the procedure discovers the locations where the user stays for many days among the places remaining after the second procedure is complete. A threshold of 0.5 (50%) means that the user has spent at least 30/60 at this address (cluster).

Can we minimize the amount of (location) data that will be collected?
Maybe also interesting is to combine it with an alarm clock. The place where you set this (just before sleeping) and snooze it or turn it off is often when you are in or close to your bed. Since

PMI
+ It is quite reliable in terms of precisions, since most consumers have their phone almost always with them. Sending the location of this device every minute, gives a good indication where this user spends most of his time (including the addresses he has righteous access to).
+ It does not require a lot of effort from the consumer as well as from PostNL.

- People might have the feeling that they are being watched the whole time, possibly leading to a decrease in perception of freedom. So, privacy wise this might not be really desirable.
- In closely densed areas such as flats, it is it is impossible to deduce where someone lives with the GPS.

* Only works with people that have (and use) the app? What is this percentage?
* What is the boundary of what is possible regarding privacy?

? How often do people receive the 'allow location'-notification? If they don't directly access it
? How many people are willing to share their location (for at least 60 days)? What percentage?
? What are other benefits and extra value can PostNL

Idea
A sticker on or close to your front door where people can reach you without having all your personal contact details. It can be used by deliverer, neigbors and others. Since each sticker is tied to an address, only the resident has the authorisation to validate a parcel upon delivery.

How does it work?
By attaching a

- Proof that parcel is delivered at home (max 3 sec. betweens scanning home and parcel)
- Check in & out point for children that are visiting friends ton otice their parents ('1 tap is quicker than whatsapp')
- Be able to get in contact with residents of a certainaddress without sharing personal contact information

Default communication messages   Linking your personal door tag

Other people that do not have access to the house, can scan it. This might be convenient for communication means (such as with neigbors or others), but not necessarily from a security perspective. One could for example still pretend to live behind a certain door, damage the sticker, manipulate it or secretly replace it. Next to that, one might argue about how visually appealing such a sticker on your frontdoor actually is.

One way that solves both these problems, is as follows:

When the door is closed, you can not see/ use the sticker, only when the door is opened. The doorpost sticker is still accessible from outside.

Deliverer   Consumer

By placing the smart sticker on the thickness of the door or the jamb, other people can not easily get access to it. Only a person that finds itself in the house or has a key to it can open the door.
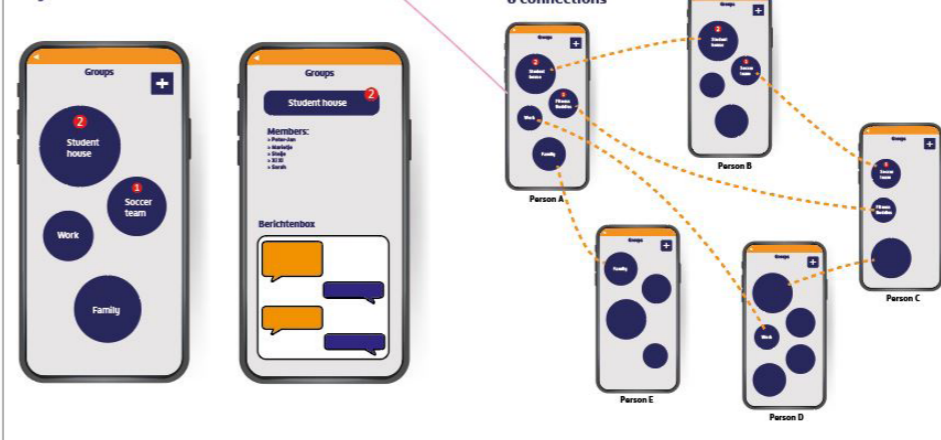
Not only is this a two sided confirmation that is a solution for the 'disputed delivery' problem from the consumer side. Since it is also tied to a place now, it is also a solution from the (fraudulent) deliverer side.

It is simply not possible to complete a delivery if the door is not open. This potentially raises the threshold for fraudulent consumers (and deliverers).

This could be a solution for the disputed delivery problem. Also, the more often a consumer (and deliverer) scans the sticker, the more you know that a person finds himself in that particular place.

It is simply not possible to complete a delivery if the door is not open. This potentially raises the threshold for fraudulent consumers (and deliverers).

It is simply not possible to complete a delivery if the door is not open. This potentially raises the threshold for fraudulent consumers (and deliverers).

Interesting data

When registering to a certain address

Each sticker has the properties of the physical address stored on so you can not use it for another address.

only standard messages

Messages left at the door

Berichten kunnen achterlaten via de sticker. Kunnen alleen geopend en gelezen worden in de PostNL app.

ff snel scannen
'ik heb je pakketje, kun je hem morgenavond ophalen?'
Once you have a validated account,

kinderpostzegels

deurmaten standaardmaten NL

PMI
+ It is convenient and easy to do
+ Feels like it is not really invading your privacy regarding to your identity. You do not have to scan your passport or provide that much personal details, only link you
+ It is not bothering you visually, you can only see it when the door is open.
+ It is quite safe, you can only scan it when the door is open. So deliverers and receivers can not do something when the door is closed

- Extra added task for the deliverer, they have to
- It might feel unnecessary to place a sticker in/on your house and also like it might invade your personal space.
-

* Possibly also integrateble into a smart digital doorbell.
* The extra time necessary to perform this extra action, could be compensated with saving time in other parts!

? How to know for sure that a smart door sticker is placed correctly? And who is going to install the sticker? The deliverer or the consumer itself?
? How long does the sticker have to be there?

Idea
Participating in a short challenge on social media where you show that you open your frontdoor and say anything. This proves that you have access to a certain address, while this validation method is fun to do and can spread fast by nominating others.

Interesting data

How does it work?

Deur op slot -> veiligheid
bedankje pakketbezorger
zelf als pakketbezorger iets doen
Dansje ofzo
etc..

#OpenDeur   #IkHebJeDoor   #PakketChallenge   #BezorgTopper

tas ophangen -> geslaagd!
hoeveel per jaar?
over paar jaar zijn ze 18!

Ice bucket
Wc-rol
etc.

Ice bucket challenge etc:

I nominate ..

PMI
+ It is fun to do and look at
-
-

- Privacy
-
-
*
*
?

13. Children & elementary schools

Idea
Primary school children are not yet very mobile, but are often dependent on their parents. However, they spend time at each other's houses now and then where their parents pick them up or drive them home. This means that these parents (need to) know where other parents and their children live. What if we can make an overview for parents with addresses of their children's classmates? Also with a benefit for the school itself.

How does it work?
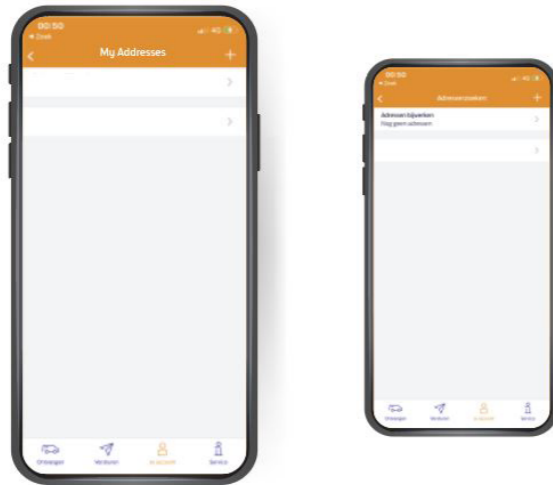
During their time at the elementary school, children can also often be found together besides only at school. For example they have lunch together at home at noon, they play together after school and go to each other's birthday parties. Ofcourse their parents would like to know where they are. Not only because of security reasons, but also to know where they have to pick their children up.

Interesting data

PMI
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- •
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- -
- -
- •
- •

? How to launch this?
? How to make sure that parents will actually use it?

---

14. 'Het PostNL spel' - *Gamificate to validate*
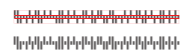
Idea
Approaching it from a gamification angle where you for example have to decipher your own validation code. It can also be divided into multiple parts to simulate a kind of 'escape room' experience.

How does it work?

Gamification

of eerst general code?
targeten? maar naar wie dan? en waarom?
Escape room
Het PostNL spel

● Bezorger
Family member
Go to the nearest PostNL point & scan this code, what is the response?
● Sort parcels to the right house, within Bundler given time

maak het een puzzel maak het leuk, spannend, een uitdaging om je te valideren

puzzle piece

② Brief / Pakketje

"*wat is jouw adres ?*"

⑤ PostNL punt   secret code of the deliverer

Edestraat #

You escaped and unlocked PostNL Pro!

① Introduction
Het PostNL spel
Can you make it in time?
Frank Janssen
Start!
KIX code

① KIX code
2. Crack the KIX
At the depot, there a parcel for you but unfortunately the table has been damaged.
The only thing that is still readable, is the KIX-code.
Decipher the KIX-code, "wat is jouw adres ?"

3. Crack the KIX Point
KIX Alphabet:

① The deliverer
2. Secret message
The deliverer has a secret message for you, say the codeword "pistdut" an he will give it to you!
Decipher the KIX-code, "wat is jouw adres ?"

③ PostNL point
3. PostNL Point
At the depot, there a parcel for you but unfortunately the table has been damaged.
At the depot, there a parcel for you but unfortunately the table has been damaged.

④ The
4. The
KIX code

⑤ Witnesses
5. At the court
You need two people to vouch for you!
Connect to two fellow accounts!
Decipher the KIX-code, "wat is jouw adres ?"

5. At the court

⑥ Neighbor
6. Secret message
At the depot, there a parcel for you but unfortunately the table has been damaged.
Decipher the KIX-code, "wat is jouw adres ?"

② Final
You made it!
Congratulations! You now have a PostNL Pro status.

PMI
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- •
- ?

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15. Digital link with deliverer

Idea
Create a more personal bond with the deliverer. By knowing more about him, it might be easier to share also more about yourself. Next to that,
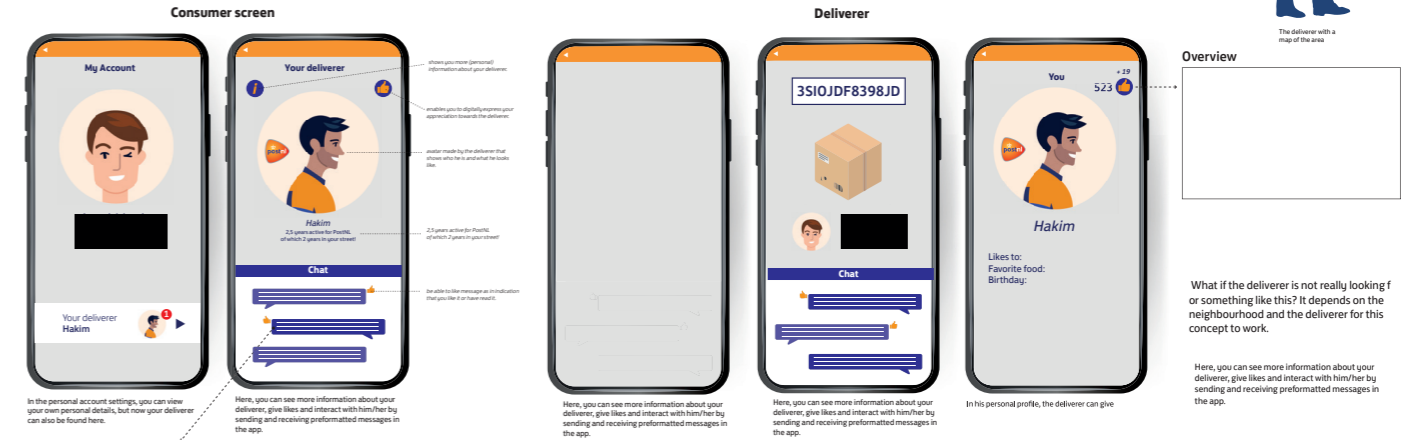
How does it work?
When logging in to your account, online or in the app, there is a new option where you could

Interesting data
Creating a more personal bond, allows for easier sharing -> look for it in the data
Communicate directly with your deliverer, but not too personal

unique advantage Enable also deliverer's location when you share your own location

The deliverer with a map of the area

Consumer screen

My Account
Hakim
Your deliverer Hakim

Your deliverer
Hakim

Chat

Deliverer

3SIOJDF8398JD

You   +19
523
Hakim
Likes to:
Favorite food:
Birthday:

Chat

Overview

What if the deliverer is not really looking for something like this? It depends on the neighbourhood and the deliverer for this concept to work.

Here, you can see more information about your deliverer, give likes and interact with him/her by sending and receiving preformatted messages in the app.

In the personal account settings, you can view your own personal details, but now your deliverer can also be found here.

Here, you can see more information about your deliverer, give likes and interact with him/her by sending and receiving preformatted messages in the app.

Here, you can see more information about your deliverer, give likes and interact with him/her by sending and receiving preformatted messages in the app.

Here, you can see more information about your deliverer, give likes and interact with him/her by sending and receiving preformatted messages in the app.

In his personal profile, the deliverer can give

Examples of preformatted messages

From consumer to deliverer:

Thank you so much for your effort today! — The goal of the preformatted messages is that it ensures that the conversations are being kept related to the delivery

I am away for a minutes, sorry if I just miss you, brb! — The goal of the preformatted messages is that it ensures that the conversations are being kept related to the delivery

Unfortunately, I won't be home at the scheduled delivery time 😕 — The goal of the preformatted messages is that it ensures that the conversations are being kept related to the delivery

The goal of the preformatted messages is that it ensures that the conversations are being kept related to the delivery and are not going to lead a life on its own. Furthermore, it also puts PostNL in the position to decide and control what can be said and what not. This eliminates behaviour such as insulting, negative comments and. Later on it could be

From deliverer to consumer

I'll be there in approximately 5 minutes! — The goal of the preformatted messages is that it ensures that the conversations are being kept related to the delivery

Please have your identification ready :) — The goal of the preformatted messages is that it ensures that the conversations are being kept related to the delivery

Unfortunately, I am not going to make the scheduled time ! — The goal of the preformatted messages is that it ensures that the conversations are being kept related to the delivery

The goal of the preformatted messages is that it ensures that the conversations are being kept related to the delivery and are not going to lead a life on its own. Furthermore, it also puts PostNL in the position to decide and control what can be said and what not. This eliminates behaviour such as insulting, negative comments and. Later on it could be

PMI
- +
- +
- +
- -
- -
- •
- •

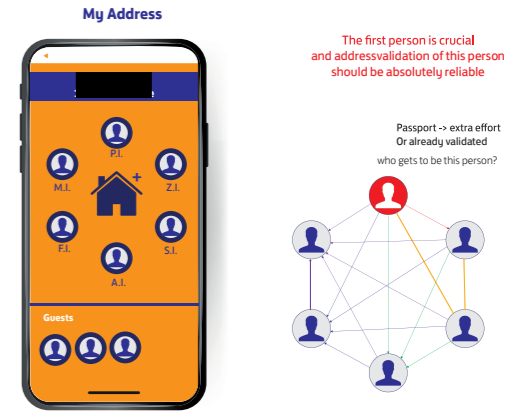? What if the deliverer is not really looking for something like this? It depends on the neighborhood and the deliverer for this concept to work.
?

---

16. Address account

Idea
Introduce an account that is tied to a address and is exclusively accessible for residents of that particular address

How does it work?

My Address

My Address
H.J.
M.I.   Z.I.
F.I.   S.I.
A.I.
Guests

The first person is crucial and addressvalidation of this person should be absolutely reliable

Passport -> extra effort
Or already validated
who gets to be this person?

Introduces an account that is tied to an address and is exclusively accessible for residents of that particular address
An elderly couple lives here
An elderly couple lives here
A young couple lives here with their newborn baby. They make use of one single PostNL account
A middle-aged couple lives here with their studying daughter. Their other three sons regula

9 10   11   12 13

PMI
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- •
- -
- -
- •
- •
- ?

Idea

Make it possible for the 6.2 million accounts to find each other and connect on a digital platform. It can also be done on a small scale where you can see interesting things in and close to your neighborhood.

what about own platform?

How does it work?

You need to register in a PostNL punt in your postal area? Or at the deliverer

connect strangers to each other?

Sell things?

Help with things?

Buurtpreventie?

https://www.mijnpostnl.nl/mijn

Welcome Ayyoeb,

Updates ▶	My Account & Addresses ▶	Connections

My Neighborhoods

PostNL & Shop

Marketplace

PMI
- •
- •
- •
- -
- -
- -
- •
- •
- ?

Updates	Help	Sell things & services to each other	Know	PostNL
	help each other	'heitje voor een karweitje'	get to know each other	keep link with PostNL
		aardbeien		The deliverer can also introduce himself here, as well as the PostNL point. Sell things

Interesting data

A lot of new interesting (behavioral) data can be collected from the consumer while at the same time provide great value to them.
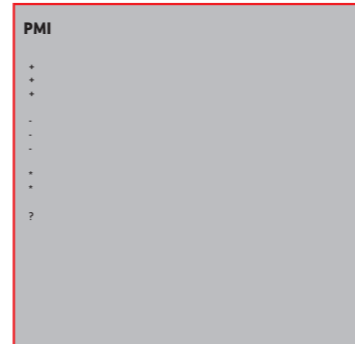
Idea

Enable interactions such as pairing with PostNL touchpoints using smart with dCreate a more personal bond with the deliverer. By knowing more about him, it might be easier to share also more about yourself.

AH bonus card

Scannable bonuscard

Interesting data

• Worldwide end-user spending on wearable devices will total $81.5 billion in 2021, an 18.1% increase from $69 billion in 2020, according to the latest forecast from Gartner, Inc. The rise in remote work and increased interest in health monitoring during the COVID-19 pandemic was a significant factor driving market growth.

Worldwide Wearable Devices End-User Spending by Type, 2019-2022 (Millions of Dollars)

Device Type	2019	2020	2021	2022
Smartwatch	16,501	21,758	25,827	31,537
Wristband	5,101	4,987	4,906	4,477
Ear-worn	14,563	32,734	39,220	44,160
Head-mounted display	2,771	3,494	4,054	4,573
Smart clothing	1,203	1,411	1,329	2,160
Smart patches	3,800	4,090	5,863	7,150
Total	**44,194**	**68,905**	**81,498**	**93,858**

• Since this year June, more payments have been made contactless with a smartphone, smart watch or wearable (15% of all debit card payments) than by inserting a debit card into the payment terminal (14% of all debit card payments). In July, 86% of all debit card payments were contactless. Almost one in five of those contactless payments was made without a debit card (i.e. with a smartphone, smart watch or wearable). In the figure below, an upward trend can be spotted.

https://www.betaalvereniging.nl/actueel/nieuws/spmars-pasloos-pinnen/
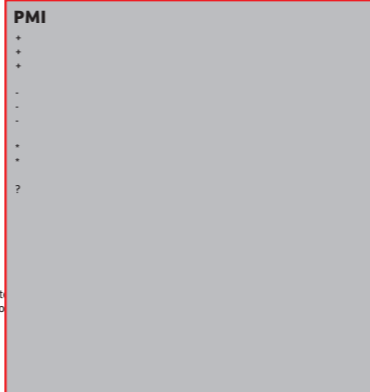
How does it work?

Perhaps also with neighbors

Every time you receive a parcel, your GPS turns on for a minute or so.

was this you?

zo snel mogelijk updaten als er iets niet klopt eigenlijk wil je het vantevoren al weten ipv op het moment supreme zelf voorkomen is beter dan genezen

Based on
Also PostNL pickup point or BPA
PostNL punt

PMI
- •
- •
- +
- -
- -
- •
- •
- ?

NFC pairing passport with deliverer, & also link to your account

First NFC your passport in the app
Second, deliverer NFC's passport in the front door.

Collect points, get personal surprises et
PostNL gets data about consumer/acco

NFC pairing passport with deliverer, & also link to your account

First NFC your passport in the app
Second, deliverer NFC's passport in the front door.

Ideas											Total score
1. Concept											+3
2. Concept											-3
3. Concept											+1
4. Concept											+9
5. Concept											+4
6. Concept											+6
7. Concept											-1
8. Concept											+6
9. Concept											+9
10. Concept											+4
11.											+4
12.											-3
13. Children & Schools											-1
14. Gamification											-1
15. Digital link											+3
16. Address account											+7
17. Digital platform											-2
18. Digital handshake											+7

strong potential   **mediocre potency**   **weak potency**

Scenario: Kaartje met een staartje

Sender

make use of the already existing flow for sending a postcard via the app:

add extra: smart suprise

Overview birthday calendar

pay for the service or use the already purchased credit card

delivery

Scanning the QR code on the card gives you a surprise in the app

Receiver

● **'thankyou' response message**
Make it possible to digitally thank the sender of the postcard. After the receiver scans the postcard, the sender will get a 'thank you!' - notification.

● **voice message**
Make it possible to generate a QR code from a recorded message. Now you can also physically hear the person speaking out their best wishes. This voice message can then also possibly stoed in the app.

● **extra picture or selfie**
Make it possible to receive an extra picture or selfie from the sender of the card. This can also be added to 'My Memories'.

● **save postcard**
Make it possible to save postcards in the app, so you will be able to still look back at them after a few years.

Overview of all your personal memories

My Memories

Saved postcards
16-08-2021
16-08-2021
03-02-2021

Saved pictures
16/8/2021 16/8/2021 16/8/2021 16/8/2021
16/8/2021 16/8/2021

Saved voice messages
16-08-2021 23-07-2020 06-04-2021 16-08-2021

Make it possible to save postcards in the app, so you will be able to still look back at them after a few years.

validation

Overview of all your personal memories

Scenario 3: Stikky

Voor een bepaald gebied wordt er een smart adres sticker geïntroduceerd. Deze kan evt. ook al eerder aangevraagd worden.

De bezorger plaatst deze (samen met een bewoner) op de deurpost of kopse kant van de deur. Deze is pas zichtbaar en bruikbaar wanneer de deur open is.

Daarna wordt deze door de bezorger geactiveerd, waarna er een 'digitaal adres account' ontstaat. Hier kunnen mensen met toegang tot het adres zich op activeren.

Op deze manier is er een overzicht wie er digitaal tot welk adres behoren. Voor zowel PostNL als de bewoners van dat adres.

Het gebruik maken van hetzelfde netwerk zou eventueel ook een rol kunnen spelen in de extra confirmatie van medebewoners op een adres.

Bij een thuisbezorging kan de bezorger de sticker met NFC-chip of QR code scannen op de deur(post).

Dit kan alleen als de deur open is: er is dan dus sprake van een onbetwiste uitreiking.

De consument kan eventueel ook nog gevraagd worden om bevestiging, zoals bv bij een HVO. Zo ontstaat er een 2-zijdige bevestiging.

Hoe vaker er door de consument gescand wordt, hoe vaker deze zich dus op het adres bevindt en hier (waarschijnlijk) rechtmatig toegang toe heeft.

Op deze manier hebben zowel PostNL als de consument meer zekerheid!

Scenario 4: Buu(r)t Vrij

De eerste maandag van de maand heeft de bezorger zo'n 30 minuten toegang tot een pc of tablet. Voor of na zijn shift.

Hierop kan hij aangeven welke huizen hij 'kent'. Dat wil zeggen een adres waarvan hij met enige zekerheid weet wie er woont. D.m.v. bv vorige interacties.

Na de bezorgscan wordt door het systeem geanalyseerd of het adres zich bevindt in het overzicht met de al 'bekende' huizen.

Het pakket wordt afgeleverd door de bezorger op het aangegeven adres.

Nadat de bezorging is uitgereikt aan de geaddresseerde persoon, krijgt de bezorger een melding of dit 1 van de personen is die hij kent op het adres.

In de app of online krijgt de consument een melding in zijn account dat de bezorger een digitale uitnodigingslink heeft verstuurd en kan deze accepteren.

Zodra deze door de consument geaccepteerd is, ontstaat er een digitale link tussen de consument en bezorger. wat extra voordelen en opties met zich meebrengt.

Zo kun je bijvoorbeeld standaard berichten naar elkaar sturen op de dag van bezorging, zoals bv bedankjes, updates over verwachte aankomsttijden en geografische locatie.

Tijdens de bezorging kan door middel van een 'digital handshake' de bezorging tweezijdig worden bevestigd (HVO). Daarnaast kan het functioneren als een soort 'bonuskaart' voor de consument.

De bezorger heeft een overzicht van zijn buurt, de bewoners en andere interessante statistieken. Aan de hand van nieuwe data en inzichten, kunnen de diensten verbeterd worden.

Appendix K

Tablets » Panasonic » ToughPad FZ-N1 (FZ-N1CFCABZ3) » Zilver » Specs

Panasonic ToughPad FZ-N1 (FZ-N1CFCABZ3) Zilver

Gebruikers — Product beoordelen

Prijs — prijs volgen
Specificaties — 4,7" • 1280x720 • 16GB • Android 6.0

willen | hebben | vergelijken

Prijzen | Kenmerken | Reviews | Alternatieven | Vraag & Aanbod

Specificaties en productafbeeldingen

Verkrijgbaar sinds: 4 september 2018

Populaire specificaties

Besturingssysteem	Google Android 6.0
Resolutie	1280x720 (HD)
Schermdiagonaal	4,7"
Mobiel internet (3/4/5G)	Ja
Opslagcapaciteit	16GB
Werkgeheugen	2GB

+ Alles sluiten

Besturingssysteem

| Besturingssysteem | Google Android 6.0 |
| Serie besturingssysteem | Android 6 |

Beeldscherm

Schermdiagonaal	4,7"
Resolutie	1280x720 (HD)
Beeldverhouding	16:9
Dots per inch	312dpi
Touchscreentechniek	Capacitief
Multitouch	Ja

Camera

| Cameraresolutie | 8MP |
| Cameraresolutie (voor) | 5MP |

Prijsontwikkeling

— Minimum — Gemiddelde

(price chart: € 0 – € 2100, sep '18 – jan '2)

Processor / SoC

CPU/SoC	Qualcomm Snapdragon 801 (MSM8974-AB)
Aantal cores	4
Klokfrequentie	2,3GHz

Werkgeheugen

| Werkgeheugen | 2GB |

Opslag

Opslagtype	eMMC
Opslagcapaciteit	16GB
Geheugenkaart (mobiel)	microSD, microSDHC, microSDXC

Draadloze verbindingen

Verbinding (wlan)	802.11a, 802.11ac (Wi-Fi 5), 802.11b, 802.11g, 802.11n (Wi-Fi 4)
5GHz-ondersteuning	Ja
Verbinding (Bluetooth)	Bluetooth 4.1
Verbinding (3G/4G/5G)	2G - edge, 2G - gprs, 3G - hsdpa, 3G - hspa, 3G - hspa+, 3G - hsupa, 3G - umts, 4G - lte
GPS	Ja
Overige draadloze verbindingen	Near Field Communication (NFC)

Invloeden van buitenaf

| Invloeden van buitenaf | Schokbestendig, Vochtbestendig |

Overige specificaties

| Tablet extra's | Bewegingssensor |

Afmetingen

Lengte	74mm
Breedte	156mm
Diepte	16,3mm

Gewicht en kleur

| Kleur | Zilver |

Meer informatie

Product	Panasonic ToughPad FZ-N1 (FZ-N1CFCABZ3) Zilver
Categorie	Tablets
Merk	Panasonic
Serie	ToughPad FZ-N1
Tweakers ID	1239197
SKU	FZ-N1CFCABZ3

+ Alles sluiten

Verbeter productgegevens

Appendix L

Merk	Model	OS	MIFARE Classic® / 1k (M1K S50)	MIFARE Ultralight®	NTAG®
Acer	CloudMobile S500	Android	✓	✓	✓
Acer	Liquid E1	Android	✓	✓	✓
Acer	Liquid Express E320	Android	✓	✓	✓
Acer	Liquid Glow E330	Android	✓	✓	✓
Acer	Liquid S2	Android	✓	✓	✓
Alcatel	1x	Android	✗	✓	✓
Alcatel	3	Android	✗	✓	✓
Alcatel	3L	Android	✗	✓	✓
Alcatel	5	Android	✗	✓	✓
Alcatel	5V	Android	✗	✓	✓
Alcatel	A7	Android	✗	✓	✓
Alcatel	Idol 3	Android	✓	✓	✓
Apple	iPhone 6 / 6 Plus	iOS	✗	✗	✗
Apple	iPhone 6S / 6S Plus	iOS	✗	✗	✗
Apple	iPhone SE	iOS	✗	✗	✗
Apple	iPhone 7 / 7 Plus	iOS 13	Format	✓	✓
Apple	iPhone 8 / 8 Plus	iOS 13	Format	✓	✓
Apple	iPhone X	iOS 13	Format	✓	✓
Apple	iPhone Xs / Xs Max	iOS 13	Format	✓	✓
Apple	iPhone Xr	iOS 13	Format	✓	✓
Apple	iPhone 11, 11 Pro, 11 Pro Max	iOS 13	Format	✓	✓
Apple	iPhone 12, 12 Pro, 12 Pro Max, 12 Mini	iOS 14	Format	✓	✓
Asus	Padfone 2	Android	✓	✓	✓
Asus	Padfone Infinity	Android	✓	✓	✓
Asus	ROG Phone	Android	✗	✓	✓
Asus	ROG Phone 2	Android	✗	✓	✓
Asus	ROG Phone 3 / 3 strix	Android	✗	✓	✓
Asus	Zenfone 2	Android	✗	✓	✓
Asus	Zenfone 5	Android	✗	✓	✓
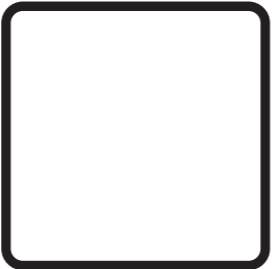
DESIGN FOR our future

4933

TUDelft

IDE Master Graduation

Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

🔴 **USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT**
Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME
Save this form according the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy".
Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !

family name	Ichaarine		Your master programme (only select the options that apply to you):
initials	A	given name Ayyoeb	IDE master(s): ( ) IPD ( ) Dfl (★) SPD
student number	4224922		2nd non-IDE master: _____
street & no.	.		individual programme: _____ - _____ (give date of approval)
zipcode & city	.		honours programme: (Honours Programme Master)
country	.		specialisation / annotation: (Medisign)
phone	.		(Tech. in Sustainable Design)
email	.		(Entrepeneurship)

SUPERVISORY TEAM **
Fill in the required data for the supervisory team members. Please check the instructions on the right !

** chair	Jan Schoormans	dept. / section:	MCR
** mentor	Pinar Cankurtaran	dept. / section:	MCR
2nd mentor	Nadine Kost		
	organisation: PostNL		
	city: Den Haag	country:	The Netherlands

comments (optional)

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a 🔴 motivation letter and c.v..

🔴 Second mentor only applies in case the assignment is hosted by an external organisation.

🔴 Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

Personal Project Brief - IDE Master Graduation

TUDelft

Building a reliable digital relationship with PostNL's customers _____ project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple.
Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 30 - 03- 2021 _____   23 - 08 - 2021 _____ end date

INTRODUCTION **
Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

This Master Graduation Project will be executed for PostNL, a Dutch postal company specialized in mail, parcels and e-commerce that operates in the Benelux and Italy. The increase of e-commerce companies, together with the current lockdown, has resulted in a peak of parcel deliveries. Last year (2020) PostNL delivered a record number of 337 million parcels with on the 20th of november an amount of over 1.6 million. However, with this growth in the quantity of parcels also the possibility of associated problems increases. Examples of these are: disappeared or damaged packages after delivery, people that falsely claim not having received a parcel & fraudsters that (using AfterPay) order and pick-up parcels from unsuspecting (signing) intermediaries, leaving them behind as victims (blaming PostNL).

Since it is often difficult to control who is right or wrong and responsible when something goes wrong (in the end of the delivery process and thereafter), a lot of these problems have to do with 'trust'. In this context, with trust is meant 'competence': being sure that the adressee of the parcel/mail and the actual recipient are the same person and that it is delivered the way it is supposed to (safe and seamless). Trust is valuable since it cannot be bought, takes long to build, can be quickly broken and is hard to restore. In addition, trust creates brand loyalty and makes people more willing to engage with this brand. PostNL has the ambition of becoming the people's favorite deliverer. Knowing their customers better in order to provide a service tailored to their specific needs (making it more transparent, flexible and certain) could contribute to achieving this. With digitization as an important part of PostNL's strategy, an amount of 6 million individual user accounts and 779 million visits on postnl.nl, the digital environment allows for more opportunities to interact with and get closer to the customer.

Therefore this project for PostNL's Business Development department will take a strategic approach and focus on how PostNL can build a digital relationship with its customers that is reliable for both. Considering themselves as a people business, it is important not to sacrifice the physical relationship, but rather make use of it and take it along in the digital transformation. Executing a strategy that establishes this reliable digital relationship might not only lead to short-term but also long-term advantages in - amongst others - the fields of new business models, customer satisfaction and anti-fraud.

Stakeholders:
- *Parties that are involved in sending mail & parcels* (webshops, companies and /or other institutions that offer products able to be afforded by customers, want those products to be delivered appropriately and to the right person/address)
- *Parties that are involved in receiving mail & parcels* (package points that are managed by local retailers or residents, serving as an intermediate station for the final receivers, conscious receivers who receive parcels that are ordered by themselves, unconscious receivers who receive parcels that they did not order themselves, people that pick up parcels received (and signed for) by someone else)
- *PostNL logistics personnel* (provides and facilitates the service that connects both parties mentioned above in order to ensure a smooth mail/package journey from the one to the other. Also strives to deliver optimal customer experience by informing on status/processes, answering questions and handling complaints).
- *PostNL security department* (prevent and tackle the occurence of illegal and criminal activities. In a bigger picture also Dutch police)

Main opportunities and limitations:
> Preferably should be able to be realised by PostNL itself (without the need of (products of) additional third parties)
> Should be implementable as soon as possible (<1 year)
> Costs should remain as low as possible in order to be viable from a business perspective
> The current pandemic might decrease opportunities for offline research and contact moments

space available for images / figures on next page

IDE TU Delft - E&SA Department /// Graduation project brief & study overview /// 2018-01 v30   Page 3 of 7

Initials & Name A _____ Ichaarine _____   Student number 4224922 _____

Title of Project Building a reliable digital relationship with PostNL's customers _____
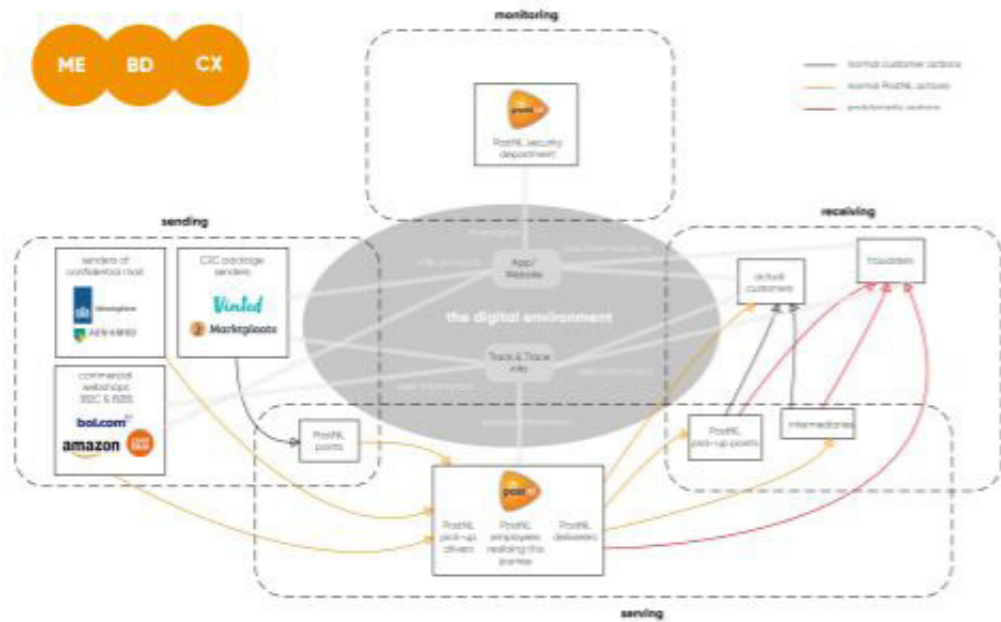
introduction (continued): space for images

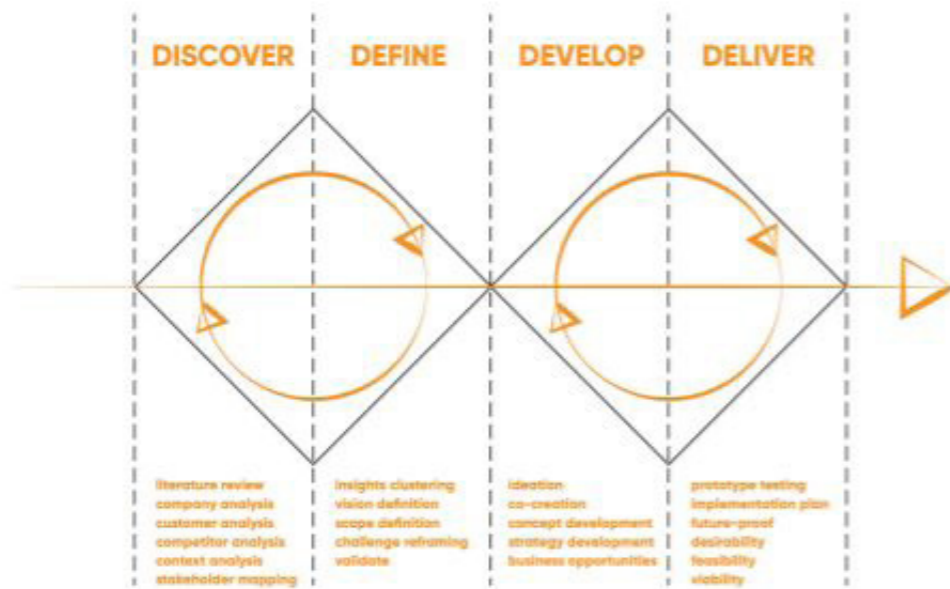image / figure 1:　First impression of (the relations between) involved stakeholders

image / figure 2:　Design Process and Approach

**PROBLEM DEFINITION **
Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

In order to better serve their customers in the digital transformation process, PostNL would like to build a mutually reliable digital relationship with its customers. Not being disappointed by each other and being able to count on each other is an important requirement in order to be able to trust each other. For PostNL this means: being sure the recipient of the package is the actual addressee. For customers increasingly demanding flexibility in their delivery preferences (where/when/how), this means: being ensured of a successful delivery (certainty).

The problem is that right now this is too often not the case: the amount of problematic shipments exceeds the set threshold. Next to an increase in unsatisfying and unsuccessful deliveries, it can be difficult sometimes to distinguish fraudulent from non-fraudulent shipments, which innocent customers unconsciously could become a victim of. Making it more difficult to take advantage of weaknesses in the current system (by applying the right validation techniques) could enable PostNL to more easily recognize and prevent misbehaviour & fraud. Also, customers might not always know what to do in case a PostNL (digital) touchpoint says otherwise than what they experience in reality. Due to the complexity, quantity and own personal interpretation of tasks in the performed processes, it is sometimes difficult to identify the responsible party in case something goes wrong.

As a result of these uncertain situations and confusion, customers might not know where they stand and lose trust in PostNL, leading to a disrupted relationship and possible future avoidance with this brand. Already existing initiatives might be perceived too difficult or not worth the effort (by both parties). The use of personal data (next to logistics) helps with the desire to offer personalized options. Although it might also be useful in contributing to a more transparent process, the privacy issue (and possible lack of confidence) that comes with it could be another obstacle.

In short, the problem is that the current digital ecosystem lacks the desired degree of knowledge and trust needed for this relationship. How can we design such a mutually reliable digital relationship with our current resources in order to better serve the customers, increase succesfull deliveries (to legitimite recipients) and reduce fraud?

**ASSIGNMENT **
State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

By actively involving customers and finding out their wishes, needs and concerns, reaching out to the different departments within PostNL and diving into interesting technologies, I will develop an innovative strategy for PostNL showing how they can build a reliable digital relationship with their customers. In addition to describing which steps must be taken, why and how, the attractiveness of associated potential new business opportunities will also be investigated in order to future-proof PostNL's competitive position.
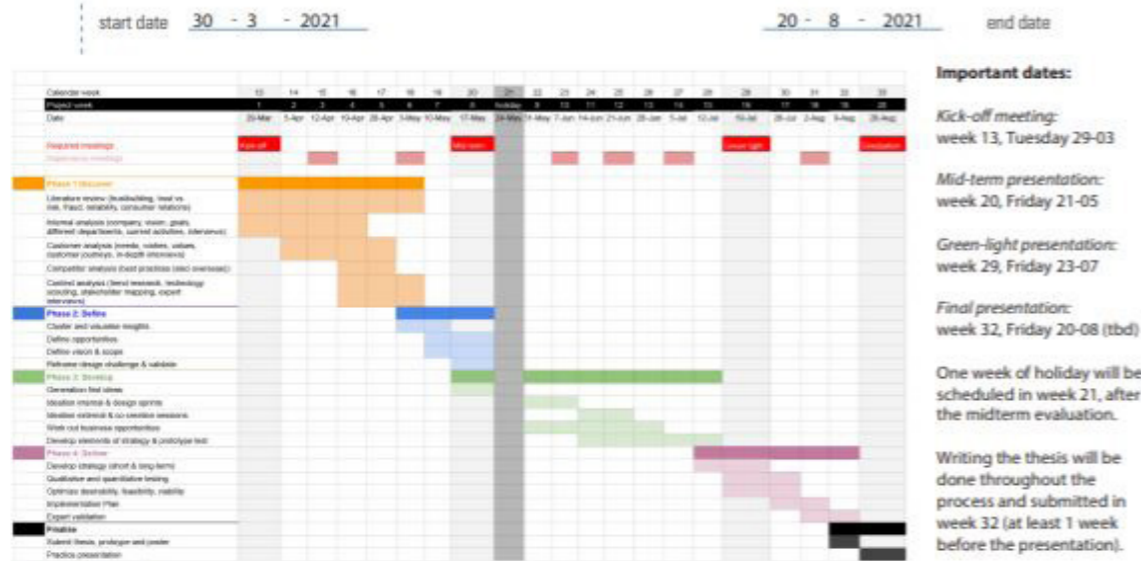
PostNL is looking for new ways to bridge the current reliability gap. There are various directions in the socio-technological domain that might provide (new) opportunities to do so, among which: social connections, new services, personal interactions, (digital) transparent communication, new technologies, validation techniques, education/ information and more. I will look at and develop the most promising one(s) after judged them on desirability, viability and feasibility.

Being perceived as a trustworthy brand is important for PostNL since customers might feel more comfortable in sharing their data, enabling PostNL to work more data-driven. Not only will this make predictions even more accurate, PostNL will also get to know their customers better, allowing for an increase in personalization opportunities: giving customers more flexibility, freedom and choices while making sure this is done in a safe and responsible manner. Next to that, reliability could result in more confident customers and decrease the load on customer service, enabling a more efficient use of resources. Furthermore, a reliable reputation might be extra attractive for webshops and partnerships in new markets such as complex shipments or combination deliveries (e.g. mobility/transportation of people or food). Last but not least, if customers are allowed in the future to choose their own deliverer at certain webshops, they will be more likely to choose PostNL.

In the end, all will need to be integrated into a strategy showing which steps need to be taken (and how) for both parties (PostNL and customer) to create mutual trust and build a long-term reliable digital relationship that both sides can benefit from.

PLANNING AND APPROACH **

start date   30 - 3 - 2021   20 - 8 - 2021   end date

Important dates:

Kick-off meeting:
week 13, Tuesday 29-03

Mid-term presentation:
week 20, Friday 21-05

Green-light presentation:
week 29, Friday 23-07

Final presentation:
week 32, Friday 20-08 (tbd)

One week of holiday will be scheduled in week 21, after the midterm evaluation.

Writing the thesis will be done throughout the process and submitted in week 32 (at least 1 week before the presentation).

Phase 1 - Discover:
First I will dive in the literature and review articles on trustbuilding, trust vs risk, misbehaviour, customer relations, customer engagement to find out what science tells about these topics and have a solid basic understanding about it. Thereafter, I will look at what the company is currently doing in order to have an overview of their current resources and allign the visions of the different departments, necessary and important for a succesfull implementation in a latter stage. Interviewing customers, contextmapping and will help reveal the values and needs of these people, exposing who are most in need of a reliable digital relationship and why. Next to that, it will also make clear what 'reliability & trust' actually means to them. Looking at the best practices of competitors (national as well as overseas) and other companies with good (reliable) digital customer relationships can service as an inspiration and help identify points that can be learned from. Furthermore a dive into the logistic service context (using a DESTEP analysis) will help in identifying what the trends are relevant and reveal the latest technologies, techniques and methods regarding validation.

Phase 2 - Define:
In this phase all the insights found the discover phase will be clustered and sorted according relevance. Based on this I will also set requirements for when something within this context can be considered 'reliable' and 'trustworthy'. Then a vision will be formulated and the challenge reframed. This will make it possible to focusing on the most promising direction(s) and serve as a starting point voor de development-phase.

Phase 3 - Develop:
Here I will develop ideas and concepts that can lead to a reliable (digital) relationship. I will do this by generating them myself as well as facilitating (internal & external) co-creation sessions. Next to that I will evaluate the associated business opportunities with experts and using Business Model Canvases. Furthermore, a start will be made with the strategy to establish the desired reliable digital relationship.

Phase 4 - Deliver:
Finalize the strategy, making it future-proof and improving it on desirability, viability and feasibility. By creating an implementation roadmap I will show which steps, when and how, will need to be executed for the strategy in order to be succesful.

MOTIVATION AND PERSONAL AMBITIONS

PostNL is a company that has always appealed to me (from a design perspective). Next to seeing it almost every day, the happy feeling you get when they ring the doorbell, it fascinates me that they can even become part of your social circle. I know that my parents are not the only ones that have a good connection with their deliverer: knowing for example his name, phone number and other personal things. So when the opportunity arose to participate in a brainstorm session for/with PostNL related to the topic of this Graduation, I signed up and was introduced to the subject. After still being interested in the topic I thought it would also be quite suitable for a Graduation Project in which I could put my acquired academic skills into practice for a large Dutch corporate.

Some competences that I want to prove/learn during this Graduation Project, are:
- Visually communicating: being able to quickly and clearly sketch ideas & findings.
- Strategic thinking: showing that I am able to make and decisions that will influence the long-term succes with strong argumentation.
- Managing the complexity: Dealing with with complex problems while keeping the overview and taking the interests and goals of all stakeholders into account.

Competences yet developed:
- Empathizing: Critically analyse & thoroughly understand different partiesby being closely involved in the real situation.
- Generating creative ideas: being able to quickly come up with a lot of different new and interesting ideas.
- Facilitating creative sessions: hosting and setting up an environment in which others can contribute.
- Rapid prototyping: using techniques such as 3D-printing, lasercutting, CNC-carving to simulate and test with users.

Furthermore I personally would like to know more about the technology side of digital safety, fighting fraud and positively impacting customer satisfaction. Tools and methods that I would like to experiment with during this project include context mapping, various new ways of creative facilitation and making more use of drawing tablets and programs.

Finally, with this project I am aiming for an outcome that can and will be implemented by PostNL, leading to an improved sutainable advantage.

FINAL COMMENTS

> Deliverables: A final report showing the process and outcome, a prototype demonstrating the solution, a final public presentation.