A photograph of a modern hospital corridor with large windows and a group of healthcare professionals in white coats. The corridor is bright and clean, with a white ceiling and light-colored walls. A group of about seven people in white coats are sitting on a bench on the left side of the corridor, looking towards the right. One person in a white coat is standing on the right side, leaning on a counter. The floor is a light blue color. The overall atmosphere is professional and calm.

Design for enhancing the trust of chronic patients in teleconsultation

Master Thesis

Shuxian QIAN

MSc Strategic Product Design

Executive Summary

Under the influence of COVID-19, teleconsultation has been applied widely by hospitals and clinics. The value of teleconsultation for the management of chronic diseases is being explored as well. It is widely proved that building a trustworthy relationship between doctors and patients is the key point for long-term care. However, in the new context of teleconsultation, the interaction between patient and doctor has changed dramatically. The expansion of physical distance and the involvement of new technologies have affected the building of trust. Therefore, studying patient trust building in a digital context is crucial to implementing teleconsultation for the long-term management of chronic diseases in the future.

Through a contextual study of the challenges and opportunities in healthcare and technology, a future vision of teleconsultation was generated in the Understand stage (Chapter 2) as the background for implementing the trust design. A literature review was then conducted for an in-depth understanding of patient trust in teleconsultation, identifying the characteristics, consequences, and predictors of trust.

At the end of this chapter, a distinction was made between trust attitudes and trust behaviors. The pathways by which trust attitudes influence the three focused patient behaviors (ITU, Continuity, and Adherence) were demonstrated through a conceptual framework explaining the scenario in which trust attitudes and behaviors are consistent.

The reasons for the inconsistency of trust attitudes and behaviors were explored in the Explore stage (Chapter 3) through qualitative research. Four patient archetypes were first classified according to whether patients' attitudes and behaviors were consistent. The trust-related attitudinal and behavioral characteristics of each archetype and the respective needs were then elucidated through interviews to address the scenario of inconsistency.

In addition, combining the findings of the theoretical study in Chapter 2 and the user interview insights in Chapter 3, five categories of factors that promote patient trust were identified. Considering the design feasibility and value in teleconsultation, the focus scope for the design of this project was positioned.

In the Design stage (Chapter 4), the findings from the research resulted in six design strategies to help designers design for patient trust. The six strategies were further discussed and categorized along three dimensions: the covered influencing factors, the implementation stage corresponded with patient behavior phases, and the value priority for four patient archetypes.

In the Deliver stage of the project (Chapter 5), patients and designers were invited to evaluate both the research outcomes and the design strategies. Ultimately, all research outcomes and final design strategies on trust were presented on an online website to provide design guidance and inspiration for future trust designers.

August 2022
Master thesis - Strategic Product Design
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01 INTRODUCTION

This chapter introduces the background and relevance of the subject of this graduation project. First, the joint project 'Consulting Room 2030' is introduced at the beginning to give an idea of where the graduation project started. Then the initial project scope and goal are given as the basis for the first phase of the research. In the end, the approach of this project is presented.

01 - 1 Consultation Room 2030

The 'Consulting Room 2030' is a joint project of the Delft University of Technology, Erasmus Medical Center, and Erasmus School of Health Policy & Management to explore how the future of healthcare will change in the coming years with the intervention of digital technologies ("Spreekkamer 2030 |", 2022).

Background

In the traditional healthcare context, interactions between doctors and patients usually occur in physical consultation rooms, including GPs' offices, hospitals, emergency rooms, etc. However, since the introduction of computers, many new technologies have been applied in the consultation room, such as voice input, internet consultations, intelligent chatbots, etc. With the proliferation of these new technologies, healthcare is transforming from a system where information is exchanged primarily through human interaction to one that is dominated by information technology centered on the digital environment.

Meanwhile, more and more hospitals and clinics are adopting remote consultation under the influence of COVID-19. The importance and potential of teleconsultation are receiving increasing attention.

More than that, teleconsultation is also being applied widely in the management of chronic diseases (Nouri, Khoong, Lyles & Karliner, 2020). How teleconsultation can be integrated into the current healthcare system is a question worthy of consideration and exploration by healthcare practitioners.

Aim

Therefore, how to incorporate digitization into the consultation room of the future to make healthcare better is the question that Consulting Room 2030 wants to address.

The objective of this joint project is to improve healthcare starting with the consulting room, providing efficient and effective care for patients from a human-centered perspective, as well as helping doctors to be productive and optimize their working experience.

The project of Consultation Room 2030 aims to facilitate cross-disciplinary collaboration to develop, test, and integrate digital technologies to empower both patients and healthcare providers, enhance the preparation of medical consultations and support direct doctor-patient contacts in the future.

01 - 2 Assignment Introduction

Project Objectives

In 2007, the Institute for Healthcare Improvement (IHI) developed a framework to define the three aims a successful healthcare system needs to pursue, which is called the Triple Aim (Berwick, Nolan & Whittington, 2008). The three objectives are improving the patient experience of care, improving the health of populations, and reducing the per capita costs of healthcare (see figure 1.1).

In addition to Covid-19-related care, the new health system integrating digital technology has also adopted teleconsultation for the management of chronic diseases at a remarkable rate (Nouri, Khoong, Lyles & Karliner, 2020). Teleconsultation, as a key initiative, opens up new opportunities to achieve the Triple Aim, especially in the long-term care of chronic diseases.

In the traditional context, irregular face-to-face consulting between patients and healthcare providers can lead to fragmented care. However, teleconsultation combined with timely transmission of patient health data improves the care experience by increasing care continuity and patient engagement, which is particularly essential for long-term care of chronic diseases at home (Edwards, 2016). The effectiveness of the care and the health outcome improves accordingly.

Meanwhile, the virtual platform enables the provision of home care without traditional physical facilities which leads to a decrease in capita cost for patients with chronic conditions. In this way, teleconsultation enables better, more effective, and cost-efficient care for chronic patients, which ultimately benefits both patients and healthcare providers.

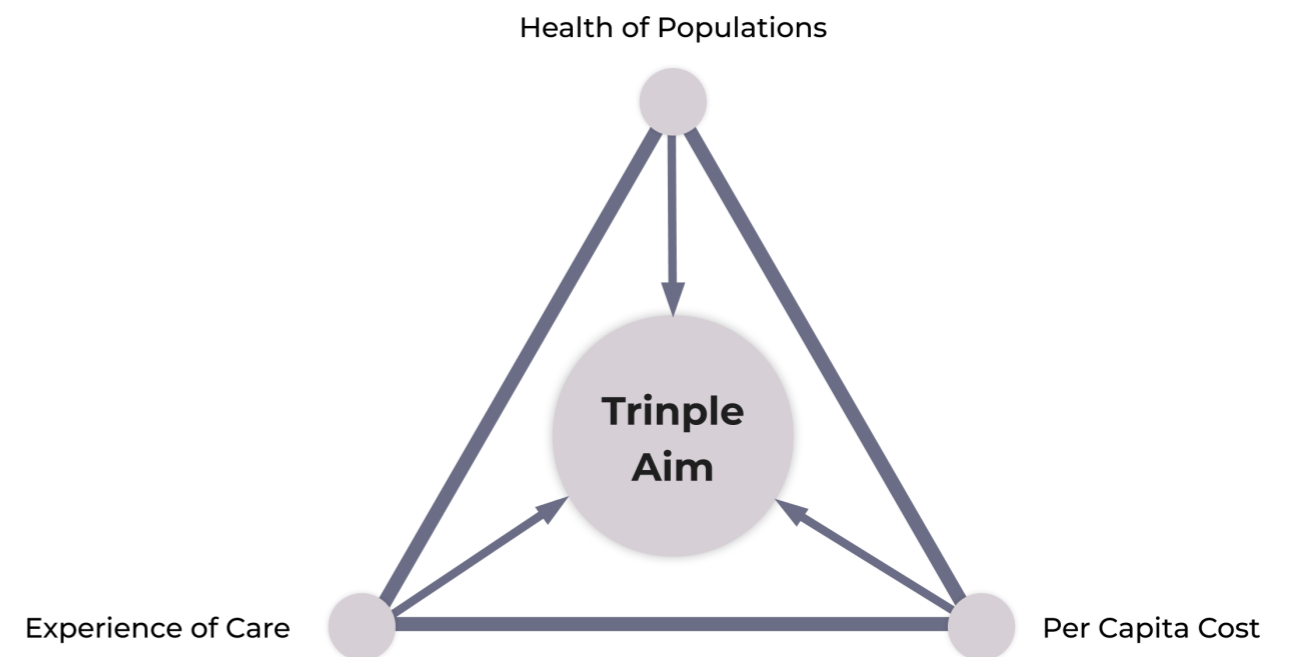


Figure 1.1: The IHI Triple Aim (Berwick, Nolan & Whittington, 2008)

However, the new healthcare system with teleconsultation also poses pressing challenges to achieving the Triple Aim. The most intuitive change is in the doctor-patient relationship which can directly affect patient experience and the quality of care in consulting. As one of the most complex interpersonal relationships, the doctor-patient relationship requires close cooperation toward the same goal (Onor & Misan, 2005). In the new context of teleconsultation, the increased physical distance and the absence of direct contact dramatically diminish the relationship between patients and healthcare providers.

To provide patients with high quality of care and great experience, a healthy doctor-patient relationship is required. It has been proved in the traditional healthcare domain that trust has long been recognized as one of the essential components and fundamental parts of building a doctor-patient relationship (Rolfe, Cash-Gibson, Car, Sheikh & McKinstry, 2014). Trust is also the most important psychological factor that influences online behaviors (Pavlou & Gefen, 2004) when it comes to the digital environment. In teleconsultation, patient trust in digital technology can also influence the patient experience and health outcomes.

Therefore, building trust becomes the key point in this project for the successful implementation and long-term operation of telemedicine. Understanding what determines patient trust and how it influences their behavior in teleconsultation is crucial to achieving the Triple Aim.

This project aims to explore the causes and the effects of chronic patient trust in healthcare providers in a digital context from different dimensions and perspectives and propose design opportunities and strategies based on a future vision of teleconsultation. This way, designers, healthcare providers, and others who are involved in building the healthcare system will have an entry point for teleconsultation innovations in order to establish a better care experience and promote patients' well-being in the future.

Therefore, the following **design challenge** is framed in this project:

*How can **designers and healthcare providers committed to future digital healthcare be supported to strengthen the trust of chronic patients in HCPs under the teleconsultation context, to provide a better patient experience and high quality of care?***

Concept Identification



- Design objects

Designers, healthcare providers, and other people who commit to building the future digital healthcare system.



- End users

Patients with chronic diseases requiring long-term care support without life-threatening conditions.



- Trust

Trust in this project represents the patient's subjective trust attitude, which is a kind of people's mindset, including both the initial trust and long-term trust over the care journey.

- Healthcare providers (HCPs)

HCPs in this project represent the direct providers of services for patients with chronic diseases in teleconsultation:



1) Physicians who are the care providers, such as GP, nurses, and specialists;



2) Digital mediums which are the vehicle of digital service, like the e-platform or other mediums, including the digital technology it uses.

What is Teleconsultation?

Definition

The concept of 'teleconsultation' is introduced when envisaging the consultation room in the future scenario.

From Medical Subject Headings, teleconsultation is defined as 'Consultation by remote telecommunications, generally for the purpose of diagnosis or treatment of a patient at a site remote from the patient or primary physician' (Deldar, Bahaadinbeigy & Tara, 2016). It aims to diagnose or provide treatment between two or more geographically separated healthcare providers or between healthcare providers and patients.

In this graduation project, teleconsultation is the patient experience that takes place from the preparation for a consultation to the end of the communication with healthcare providers. It is mediated through non-face-to-face forms of information communication such as messaging, fax, phone call, and video call (see figure 1.2). Teleconsultations can be with GPs, nurses, specialists, and all other healthcare providers who offer medical services.

Development

COVID-19 has accelerated the development of telemedicine worldwide, but there are still wide disparities in the level of development between countries and regions (Bhaskar et al., 2020).

In Europe, the overall development level of teleconsultation is not very high even after COVID-19. A regulatory framework to achieve full coverage in Europe is far from being achieved due to the lack of harmonized medical liability and regulations (Raposo, 2016).

Globally, health insurance in the United States now covers eligible telemedicine due to the impact of the pandemic, encouraging people to use remote consultation. In Asia, Singapore leads the way in terms of the penetration of telemedicine. And in China, the number of users of telemedicine is increasing dramatically. Online medical platforms such as Good Doctor and Ali Health are growing rapidly.

Example

Amazon Care is a program in the US that provides users with access to health professionals over video chat and text (see figure 1.3 and figure 1.4).

Once a user signs up, they can chat with a clinician over text or a video call and get medical advice for a diagnosis. If the doctor thinks the patient needs further check-ups, a nurse will be sent to the patient's home for a consultation.

Figure 1.3: A patient is sending text for teleconsultation by Amazon Care

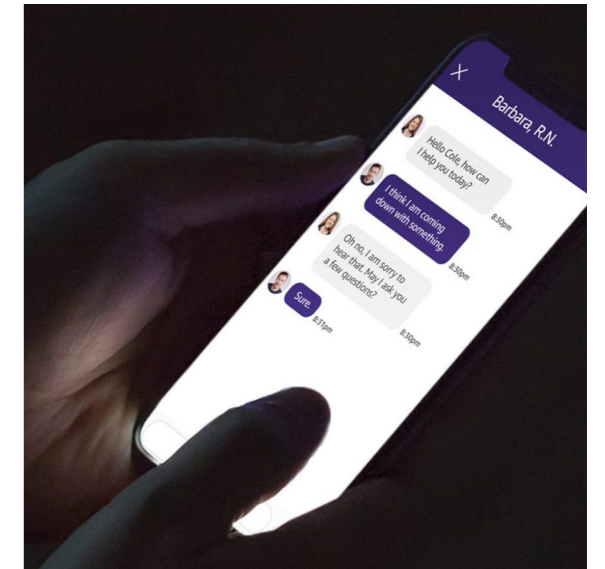


Figure 1.4: The user interfaces of Amazon Care

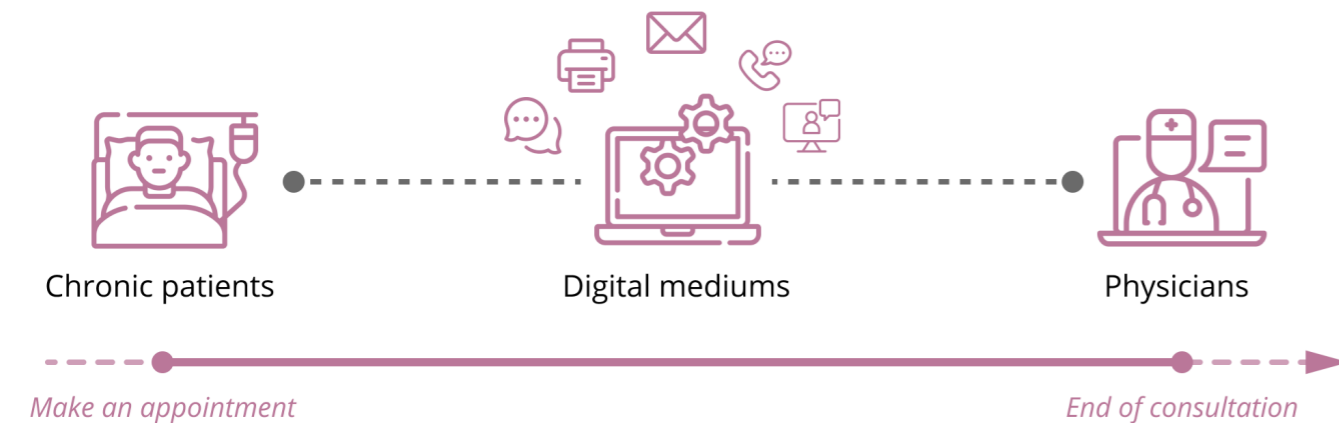


Figure 1.2: Visualization of teleconsultation

01 - 3 Approach

The goal of this project is to build a general understanding and framework for patient trust and to provide guidance for the design of trust in teleconsultation.

As the previous research on patient trust is scattered across different disciplines such as healthcare, psychology, and marketing, a research-oriented project was conducted with a literature review of previous studies combined with an in-depth exploration of qualitative research as the primary methodologies to generate insights and guide the final design strategies in this graduation project.

Overall, my personal approach to this project is inspired by the double diamond design method (see figure 1.5). The main phases described in this model are Discover, Define, Develop and Deliver. According to the goal of this project, the adjusted approach focuses more on discovery and definition sessions. In the 'Develop and Design' phases, a design guideline will be generated and evaluated to show how to design for patient trust based on the insights from the previous research.

This leads to the personal approach for this project visualized in figure 1.6.

The first phase of '**Understand**' focuses on desk research and literature review, to gain an initial understanding of patient trust, the current healthcare context, and the development of teleconsultation. The scope and the focus of this project will be further clarified. This part concludes with a framework for understanding patient trust and inspires in-depth research.

The second phase is '**Explore**', in which the qualitative research methods are adopted to explore the touch points which eliminate distrust and enhance trust. A future vision is also delivered combined with the insights from these two phases.

The subsequent phase '**Design**' probes design possibilities and generates design strategies. And the last phase '**Deliver**' evaluates the design outcomes and delivers a final guideline for future designers and healthcare providers, in which all the insights come together.

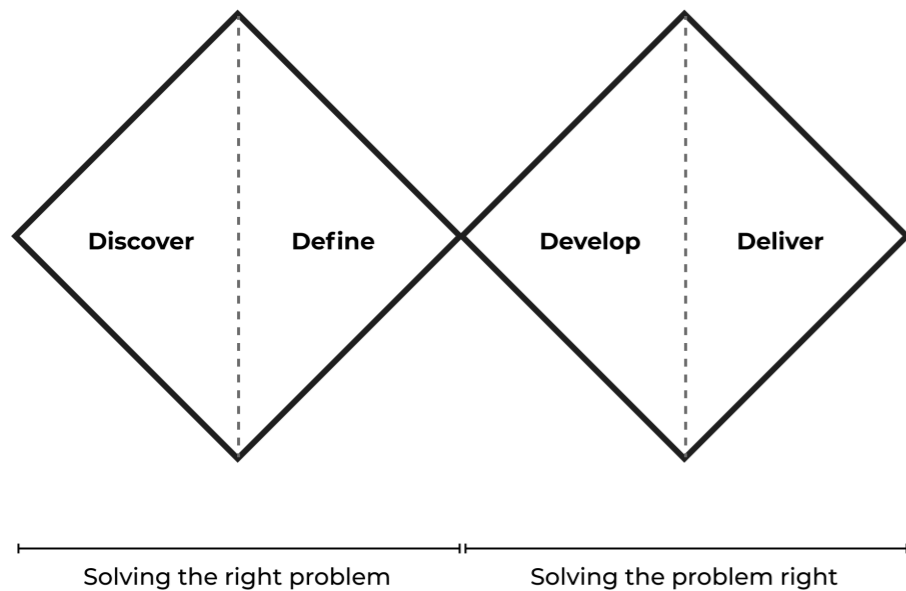


Figure 1.5: Double Diamond Design Method

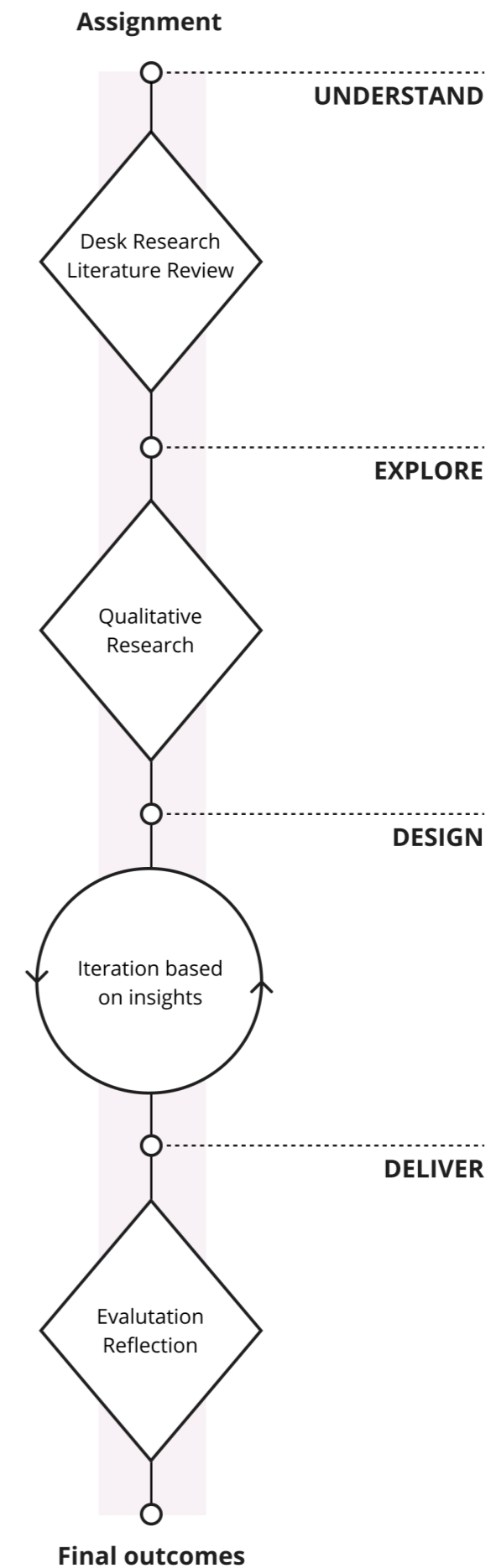


Figure 1.6: Visual Representation of My Personal Approach

02 UNDERSTAND

This chapter creates a theoretical understanding of the subjects within this thesis. Starting from the Netherlands and then looking globally, it begins with the research of the current healthcare situation and the development of digital health to clarify the opportunities and challenges of teleconsultation implementation. Followed by a literature review to academically explain patient trust with answers to three main research questions. At the end of this chapter, a gap is presented that needs to be bridged by further research.

02 - 1 Contextual Understanding

Health Challenge

In 2018, 'Rijksinstituut voor Volksgezondheid en Milieu' (RIVM) and Royal HaskoningDHV (RHDHV) released a report called Public Health Foresight Studies about the future of the Dutch healthcare system (National Institute for Public Health and the Environment, 2018). Later in 2020, this report was updated according to the situation of COVID-19. According to the report, several challenges and future trends in healthcare are revealed.

- A Future of Chronic Diseases

As a result of population growth and aging and the effect of COVID-19, the percentage of people registered with GPs with one or more chronic conditions increases from 57% in 2018 to 60% in 2040 (see figure x.x). Meanwhile, the number of people with multiple chronic diseases also increases in the future (see figure 2.1).

Not only in the Netherlands, 63% of all deaths worldwide are also from chronic conditions (WHO, 2020). Patients with chronic conditions suffer from long-lasting effects of the disease which may even develop with time. They are at the risk of temporary remission and relapse of the disease even longer periods of their lives (Dennis & Scott, 2007).

In short, the long-term treatment and care of chronic diseases will be a significant issue in the future of healthcare. Reducing the negative impact of chronic diseases on quality of life and improving the sense of well-being is of paramount importance.

Health Trends

- Remote care

Remote care has been a strong focus for some time now, which has accelerated rapidly due to the pandemic. Digital media made it possible to provide remote care, especially for patients with chronic diseases.

- Self management at home

The importance of self-management in healthcare has already been acknowledged. The role of patients in relation to their own health changed. A clear overview is needed of the care-related needs, skills, and health competencies of patients.

- Regional cooperation

Home care was under pressure which has been intensified by the pandemic. As a result, local and regional cooperation is being intensified to provide the necessary care to support patient self-management.



In 2015, 50 percent of Dutch people had at least one chronic disease; in 2040 this will be 54 percent

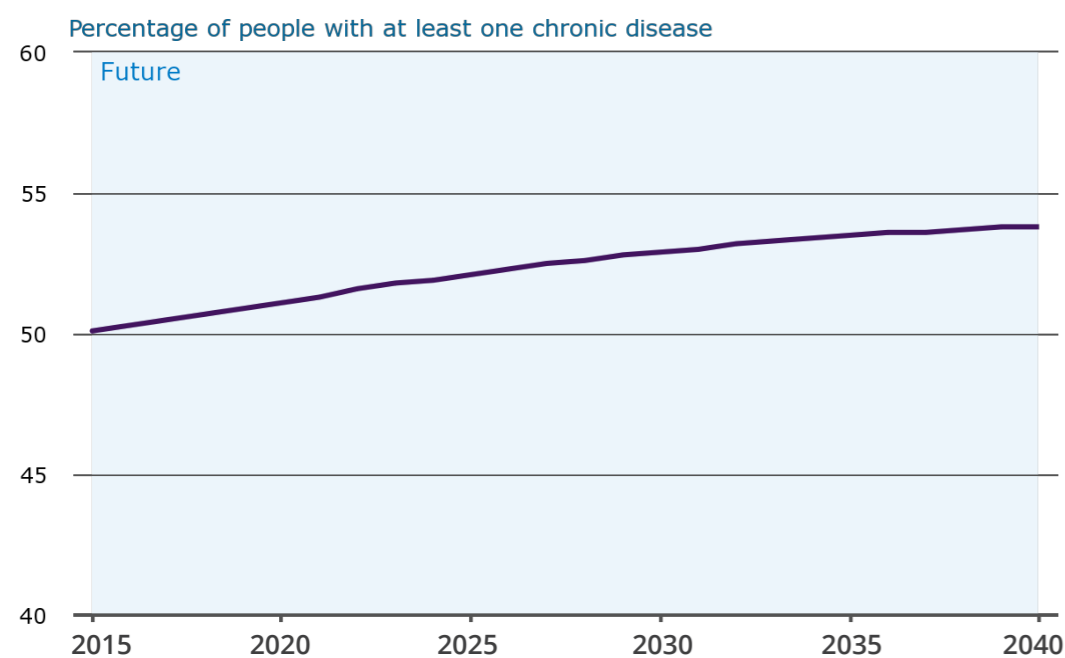


Figure 2.1: The increasing numbers of chronic patients in Netherlands (RIVM, 2020)

Technology Trends

- Virtual care

There was a dramatic increase in the use of virtual care last year, with as many as 64% of global healthcare leaders investing heavily in it (Philips, 2022). Healthcare providers are increasingly turning to remote patient monitoring and virtual visits in order to maximize access to care, provide more convenient experiences and reduce the strain on scarce hospital resources.



- Wearables for patient health tracking

Health technology innovations such as wearables and health-tracking apps are enabling people especially with chronic diseases to better engage with providers, access more care overall, and get the resources they need to stay informed while taking more preventative healthcare measures.

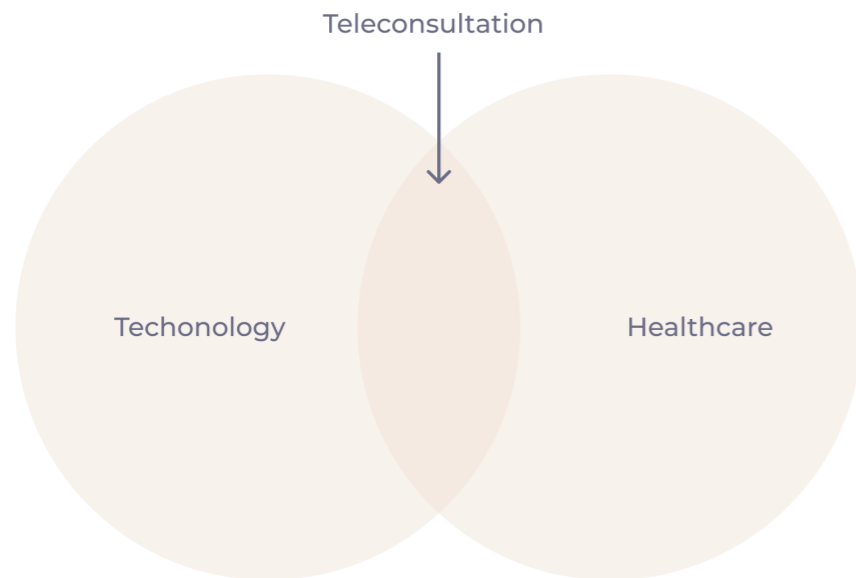


Figure 2.2: Visualisation of the scope of the teleconsultation

SWOT Analysis of Teleconsultation

Desktop research was conducted to get an overview of the current context for the implementation of teleconsultation, which is relevant to both the technology and healthcare domain (see figure 2.2).

A SWOT analysis based on the challenges and trends (see figure 2.3) illustrates the strengths

and weaknesses of current teleconsultation, as well as the opportunities and threats it faces. The strengths and weaknesses help to understand teleconsultation better. The opportunities and threats including healthcare challenges and technology trends point the way to the future of teleconsultation.

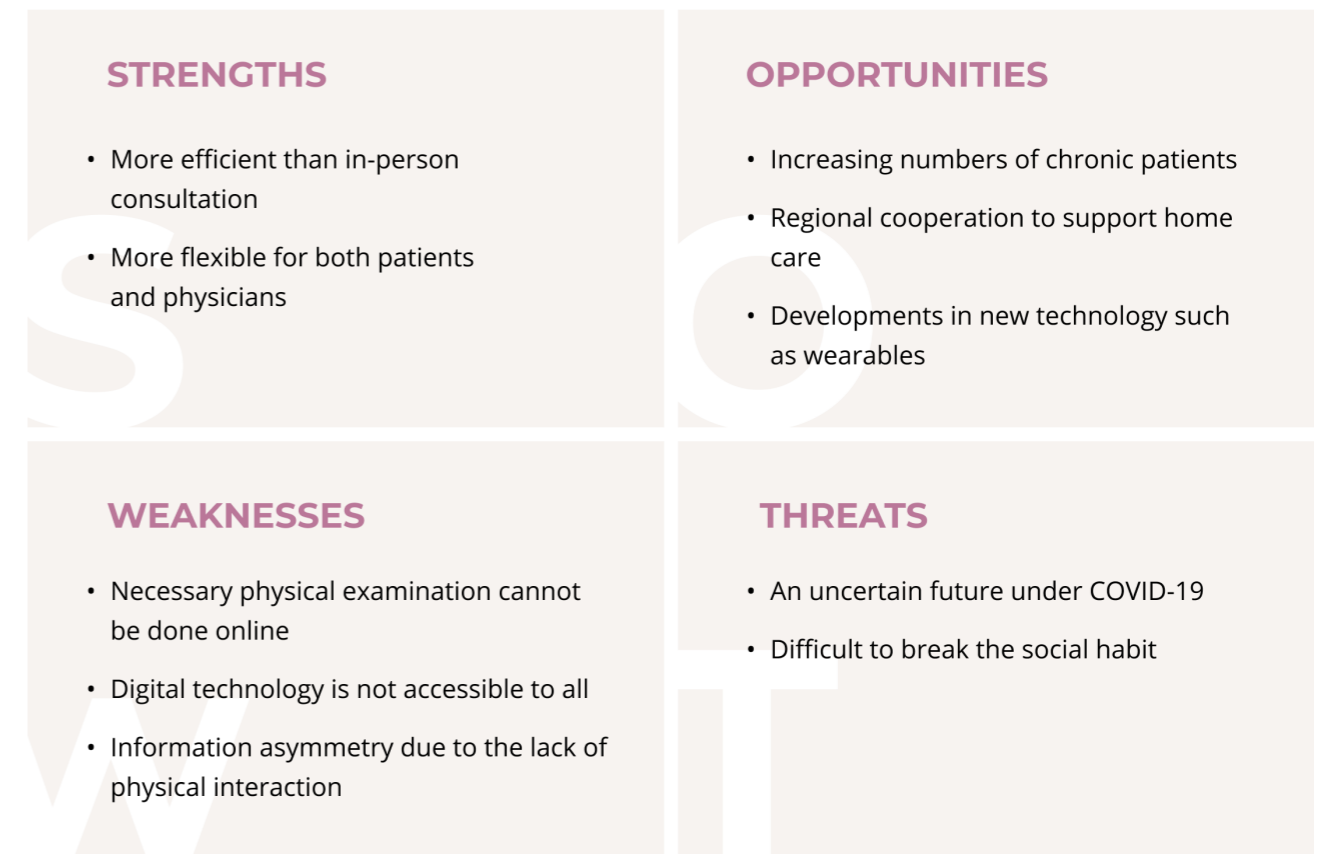


Figure 2.3: The SWOT analysis of teleconsultation

The future vision of teleconsultation

To design for patients in teleconsultation, it is important to consider the needs and developments in a future scenario. An analysis of current states, developments and trends to get an idea of future directions in line is an effective way to stay relevant within the context (Simonse, 2017). Therefore, a future vision of teleconsultation is described based on the SWOT analysis.

“A future vision is an expression of a desired future where it provides a strategic reference point for actionable innovations.” (Simonse, 2017). It is an expression of the desired future that describes the ultimate goal. Therefore, it equips a leap into the future context in which value wishes are captured.

Interpretation of the future vision

Long term process

From the previous analysis, teleconsultation will become a reliable means of treatment and management of chronic diseases in the future. Rather than one single experience, teleconsultation will turn into a long-term, systematic process with multiple stakeholders involved.

A hybrid consultation system

As some physical examinations remain unavoidable, future teleconsultation will take a hybrid online and offline model with support from local cooperation in the community. Meanwhile, the implementation of emerging technologies in the healthcare domain will support this hybrid model. For example, doctors can monitor patient health remotely by wearable devices.

- Offline consultation

Regional; Physical checking; Urgent problem solving; Low-frequency

- Online consultation

Remote, Daily health monitoring, 24h support

“ For patients who require long-term consultations for the treatment and care of chronic diseases, the future teleconsultation is a hybrid consultation model combining multiple digital technologies and community collaboration that provides efficient, convenient, and personalized care plans and healthcare support in daily life. ”

Conclusion of contextual understanding

The great potential of teleconsultation for the long-term management of chronic diseases has been demonstrated through context research.

A future vision of teleconsultation was constructed in the end by analyzing the challenges and trends in healthcare and technology through the SWOT analysis method, which provided a scenario for design for trust.



02 - 2 Literature Review

Research Questions

After the contextual understanding of teleconsultation, three research questions (RQ) about patient trust were identified for literature review:

RQ1. Understanding

What is patient trust in HCP in teleconsultation?

RQ2. Consequences

How does trust affect patient behaviors in teleconsultation?

RQ3. Predictors

What affects patient trust in HCP in teleconsultation?

By answering these three questions, the definition, consequences, and predictors of patient trust under the teleconsultation context in this project are identified. A complete conceptual framework about patient trust is formulated as a conclusion of the theoretical research to identify the existing gap and inspire design later.(see figure 2.4).

Research Methods

- Search Strategy

There is a wealth of research on trust in various fields such as healthcare, psychology, and technology. As this project aims to explore the characteristics of patient trust in a teleconsultation scenario, the scoping review approach was adopted to further narrow the scope of the project, clarify the conceptual boundaries of the topic, and identify gaps in existing research (Grant & Booth, 2009).

After the initial research of the healthcare context, the keywords of this project were described from three perspectives (i.e. trust, teleconsultation, and chronic disease). Articles were selected by searching the Web Of Science database up to February. 11th, 2022, with dates listed in descending order. The search strategy is shown in table 2.1. Considering that the term 'teleconsultation' has many synonymous alternatives, it was split into the term 'digital health' (or telemedicine, or telehealth, or e-health), and the term 'consult'. Meanwhile, 'chronic disease' was searched as an additional term to see if the topic could be further narrowed.

- Selection Strategy

This project starts with the Dutch healthcare system as an example, extending to the global healthcare system in the future. Therefore, the selection was made in the order of priority of the Netherlands, Europe, and other countries according to the location of study in the articles.

The resulting abstracts were all assessed in the first round of selection. After reading the article in detail, the second round of screening was carried out. In the end, 15 articles were selected.

Focus	AND study area	AND target group	
influence trust	digital health OR telemedicine OR telehealth OR ehealth	AND consult*	---
trust	digital health OR telemedicine OR telehealth OR ehealth	AND consult*	chronic
trust	digital health OR telemedicine OR telehealth OR ehealth	---	chronic
trust	---	AND consult*	chronic
trust	teleconsultation	---	---

Table 2.1: Search terms

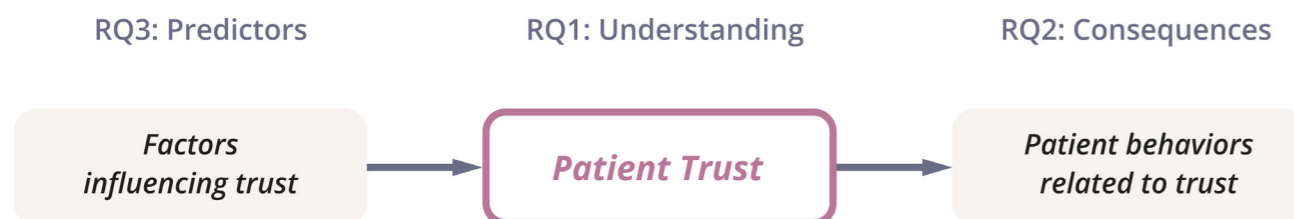


Figure 2.4: The conceptual framework for patient trust for the research part of this project

RQ1 Result - What is Patient Trust in HCP in teleconsultation?

Based on the descriptions of patient trust from studies in different disciplines, the answer to RQ1 ultimately clarifies the definitions, dimensions, and characteristics of patient trust in the telemedicine context in this project, making the abstract concept of trust more tangible and setting the stage for the approach of 'Explore' in the next chapter.

Definition

There is a large number of studies that defines trust in a similar way. In terms of the theoretical definition, trust is the acceptance of a vulnerable situation in which the truster believes that the trustee will act in the truster's best interests (Hall et al., 2001; Thom et al., 1999; Thom, Hall & Pawlson, 2004).

However, previous research on trust in healthcare or psychology has tended to equate trustees with doctors or physicians, who are the healthcare service providers. When discussing technology-related trust, the digital information system has been studied as the trustee (Wu, Zhao, Zhu, Tan & Zheng, 2011).

In the context of teleconsultation, doctors provide healthcare services to patients with the support of digital platforms. Doctors and digital information systems are clearly inseparable. Therefore, patient trust in this graduation project is defined as **patients' willingness to believe or have faith in the online healthcare providers which includes both physicians (i.e. GP, nurses, specialists, etc.) and digital media (i.e. digital technology and tools)** (Dogra et al., 2022). In the following study, trust in doctors, as well as trust in the digital media that provides teleconsultation services, will be studied simultaneously.

Dimensions

Trust not only has objects but also has different dimensions within the same object.

In healthcare, Hall (2001) defined trust into five dimensions: Fidelity, Competence, Honesty, Confidentiality, and Global trust. Dogra (2022) thought trust can be created by enhancing physicians' competence, logic, empathy, and reliability. In terms of trust in technology, Bhattacharjee defined the user's trust in the e-service providers' reliability, integrity, dependability, and ability to deliver on expectations (Bhattacharjee, 2002).

Even if the domain and object in which the trust is located are different, analysis of these dimensions can reveal similarities between them. This project ultimately adopted the definition from the Trusting-Beliefs model (McKnight, Choudhury & Kacmar, 2002) which is often used in the health context (see figure 2.5). Patient trust in online healthcare providers is distributed across three dimensions: competence, integrity, and benevolence.

As mentioned in the previous session, the online healthcare provider in this project refers to both the physicians (person) and the digital media (digital technology and tool). The trust dimensions in the teleconsultation context are as follows:

- Competence

The physicians' ability to diagnose, treat, and care effectively for chronic diseases, and the efficiency and effectiveness of the digital media that provides the service of teleconsultation.

- Benevolence

The level of care that physicians provide to the patients in the whole care experience in teleconsultation.

- Integrity

The honesty in fulfilling physicians' promises.

The purpose of understanding the dimensions of patient trust is to take trust as a multi-dimensional construct rather than a general patient trust, which can help measure and assess the factors influencing patient trust.

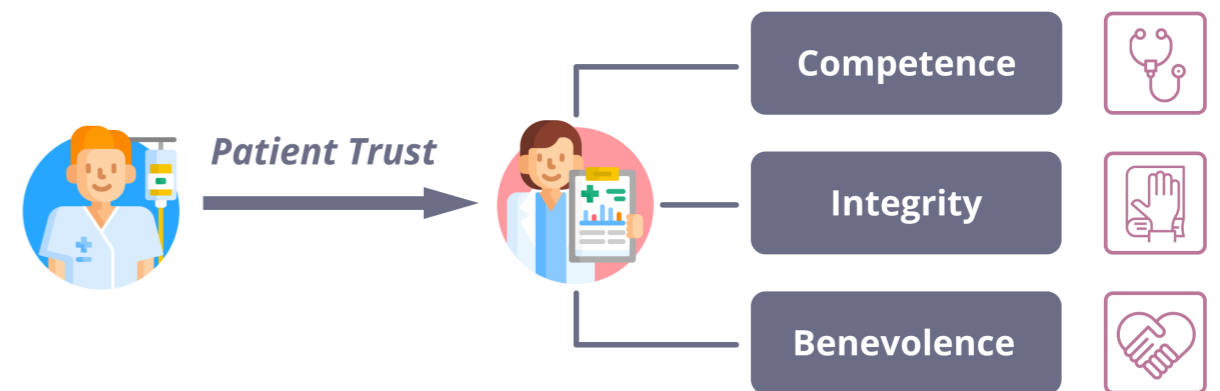


Figure 2.5: Patient Trusting-Beliefs concept based on McKnight, Choudhury, and Kacmar (2002)

Characteristics

Trust is widely defined as a kind of user belief (Baudier et al., 2021). And it is necessary to note the distinction between trusting behaviors and trusting attitudes. In most cases, trusting behavior is the result of trusting attitudes. However, there are specific scenarios in which trusting behaviors may indicate the possibility of trust, but they do not constitute trust itself, which is fundamentally an attitude.

For example, in a teleconsultation scenario, chronic patients exhibit trusting behavior in consistently using the e-platform to consult with GP, but it is possible that the patients are influenced by external factors such as COVID-19 restrictions that make them resort to

the online consultation. They are distrustful of teleconsultation in terms of trusting attitudes.

When trust attitudes and behaviors are considered separately, it's perniciously difficult to quantify trust attitude itself (Thom, Hall & Pawlson, 2004). The aim of this project is to enhance patient trust attitudes, so it is necessary to understand how to assess and measure the level of trust attitude in teleconsultation. Meanwhile, understanding the **consistency** of patient trusting behaviors and attitudes in teleconsultation and the causes and scenarios that lead to **inconsistency** can contribute to broaden the inclusiveness of the final design (see figure 2.6).

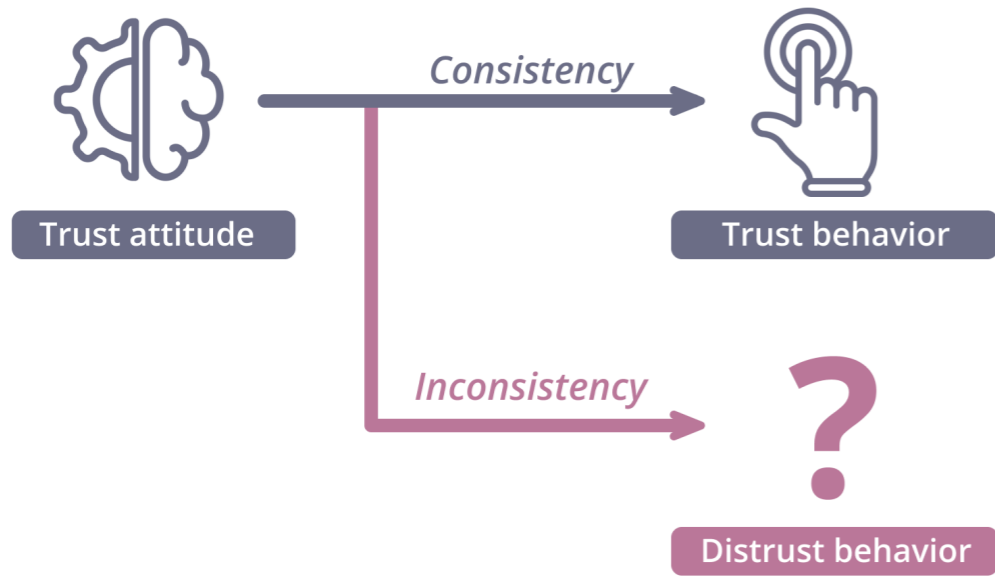


Figure 2.6: The consistency and inconsistency of trust attitude and behavior

How to Measure Trust?

Based on the literature review, the Trust in Physician Scale (TPS) is the most widely used scale to measure people's trust attitude in healthcare (e.g. Anderson & Dedrick, 1990; Thom et al., 1999; Zhao et al., 2016), with eleven items to rated from one to five (see figure 2.7).

Analysis of the TPS reveals that trust attitude can be measured by understanding patients' perception of the three dimensions (see figure x.x) of trust which is mentioned in the previous session. The details show in figure 2.8.

In conclusion, the level of patient trust attitude in teleconsultation will be constructed in this project through patients' perceptions of the competence, benevolence, and integrity of online healthcare providers, rather than directly equating trust-related behaviours with trusting attitudes.

Below are some statements referring to your primary care provider. Please rate how much you agree or disagree with each statement. Response choices range from "strongly disagree" to "strongly agree".
 En la siguiente tabla se presentan varias frases con referencia a su médico de cabecera. Por favor indique que tan de acuerdo o en desacuerdo está con lo que dice cada una de las frases. Las respuestas varían desde "muy en desacuerdo" hasta "muy de acuerdo".

	Strongly Disagree Muy en Desacuerdo 1	Disagree En Desacuerdo 2	Neutral Neutral 3	Agree De Acuerdo 4	Strongly Agree Muy en Acuerdo 5
1. I doubt that my doctor really cares about me as a person. Dudo que mi doctor(a) realmente se preocupe de mí como persona.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. My doctor is usually considerate of my needs and puts them first. Mi doctor(a) generalmente se preocupa por mis necesidades y las pone por delante.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I trust my doctor so much I always try to follow his/her advice. Yo confío tanto en mi doctor(a) que siempre trato de seguir sus consejos.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. If my doctor tells me something is so, then it must be true. Si mi doctor(a) me dice que las cosas son de una manera, entonces, debe ser verdad.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I sometimes distrust my doctor's opinion and would like a second. A veces desconfío de la opinión de mi doctor(a) y me gustaría tener una segunda opinión.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I trust my doctor's judgements about my medical care. Confío en el juicio de mi doctor(a) con respecto a mi cuidado médico.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Strongly Disagree Muy en Desacuerdo 1	Disagree En Desacuerdo 2	Neutral Neutral 3	Agree De Acuerdo 4	Strongly Agree Muy en Acuerdo 5
7. I feel my doctor does not do everything he/she should for my medical care. Siento que mi doctor(a) no hace todo lo que debería hacer con respecto a mi cuidado médico.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I trust my doctor to put my medical needs above all other considerations when treating my medical problems. Confío en que mi doctor(a) ponga mis necesidades médicas por encima de cualquier otra consideración a la hora de tratar mis problemas médicos.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. My doctor is a real expert in taking care of medical problems like mine. Mi doctor(a) es un(a) verdadero(a) experto(a) tratando problemas médicos como el mío.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. I trust my doctor to tell me if a mistake was made about my treatment. Confío en que mi doctor(a) me avisaría si hubiere ocurrido algún error relacionado a mi tratamiento.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. I sometimes worry that my doctor may not keep the information we discuss totally private. A veces me preocupa que mi doctor(a) no mantenga completamente privada la información compartida durante nuestra conversación.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 2.7: The Trust in Physician Scale (Anderson & Dedrick, 1990)

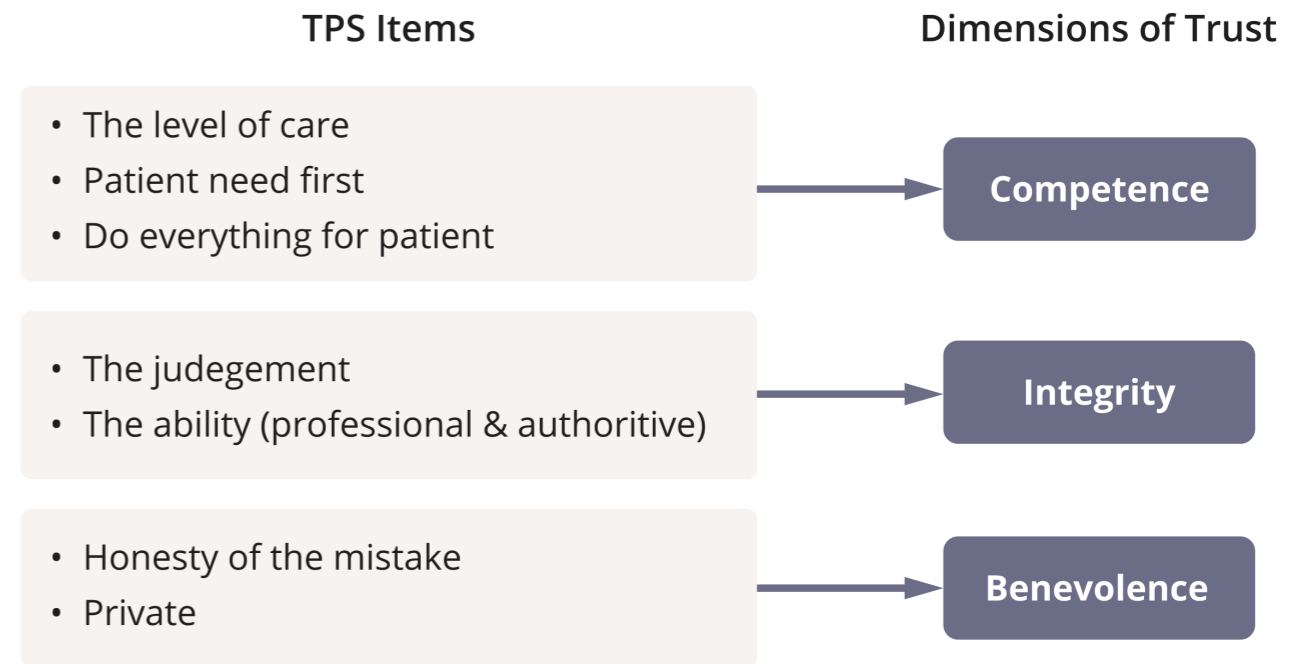


Figure 2.8: The analysis of the TPS

Result RQ2 - How Does Trust Affect Patient Behavior?

It has been indicated by many studies that there is a positive relationship between trust and behavioral intentions (Dogra et al., 2022). By answering RQ2, the behavioral consequences of patient trust in teleconsultation were explored in the context of a positive correlation between trust attitudes and trust behaviors. The **consistency** of trust attitudes and behaviors demonstrates the value of enhancing patient trust in teleconsultation, that is, promoting patient health behaviors for better treatment outcomes and experiences.

As mentioned in the previous chapter, in the teleconsultation context, patient trust in healthcare providers is divided into trust in physicians and trust in the digital media. Therefore, trust affects patients' health behavior (Gopichandran & Chetlapalli, 2015) as well as their online behavior (Pavlou & Gefen, 2004).



Healthcare Behavioral Consequences

Previous studies have explored the relationship between trust and health behaviors.

Some of the impacts occur in the interaction of the patients and physicians. Patients who have a sense of trust have a better relationship with their doctors. For example, trust in physicians correlates positively with few disputes, not changing physicians, not seeking second opinions from others, and willingness to refer the physician to others (Thom, et al., 1999; Hall et al., 2001; Hall, et al., 2002).

Trust is also positively associated with the patient's behavior in the treatment process. For example, patient adherence to treatment (see figure 2.9) is much higher in people with trust (Thom, et al., 1999; Gopichandran & Chetlapalli, 2015). Trust can also have a placebo effect, increasing self-reported health results and well-being (Hall, et al., 2002; Gopichandran & Chetlapalli, 2015).

In conclusion, where trusting attitudes are consistent with behaviors, trust positively correlates with continuity with physicians, patient adherence, and satisfaction with treatment.



Figure 2.9: An example of healthcare behavior

Technology-related Behavioral Consequences

Compared with an in-person consultation, when people communicate with a doctor through teleconsultation, they are not only a recipient of treatment but also a user of technology. Their trust in teleconsultation technology can influence behavior at different stages of use.

Many studies prove that trust affects people's intention to accept technology and final adoption behavior (see figure 2.10) by Technology Acceptance Model (TAM) (Venkatesh & Davis, 1996). But trust not only plays a critical role in the early adoption phase but also has a significant effect on the continued use of service during post-adoption (Kang, Shin, & Kong, 2016; Shin, Lee & Hwang, 2017).

Especially for chronic patients, their follow-up and health management require longer-term teleconsultation services. The impact of trust on the continuance of use is crucial.



Figure 2.10: An example of technology behavior

Gap

To provide patients with better teleconsultation experience and health outcomes, this project focuses on both healthcare behaviors and technology-related behaviors. However, the impact of trust on healthcare and technology-related behaviors is not simply superimposed. From the previous study, there is a lack of integration of overview to understand how trust affects patient behaviors in teleconsultation.

To bridge this gap, this project proposed a theoretical framework to describe the impact of patient long-term trust in teleconsultation on patient behavior, combined with the previous research from different disciplines.

Focused Patient Behaviors

Before answering how trust influences patient behavior, it is important to first clarify what behaviors are significantly influenced by trust in teleconsultation. This project ultimately focused on three patient behaviors including both health and technology-related behaviors, that were most relevant to the impact of trust in the teleconsultation context:

- Intention to use (ITU)

People intend to use teleconsultation to treat chronic diseases. It's positively correlated with adoption which is a behavior change.

- Continuity with online HCPs (Continuity)

Patients are willing to keep a long-term relationship with the same online healthcare providers (i.e. physicians and digital media).

- Adherence to treatment (Adherence)

Patients actively take prescribed medication, follow a diet, or execute lifestyle changes, that correspond with agreed recommendations from HCPs (World Health Organization, 2003).

According to the Transtheoretical Model (TTM) (Prochaska & Norcross, 2014) which shows five stages of people's behavior change (see figure 2.11), ITU corresponds to the third stage of the behavior, which is the *Preparation* stage. After that, people decided to adopt teleconsultation. And the next stage is known as *Action*, which is the behavior of people initially using teleconsultation. Continuity then corresponds to the last behavioral stage *Maintenance* in TTM, which presents people continuously using teleconsultation as a way of chronic disease care over time. Therefore, **ITU** and **Continuity** can be understood as the two successive usage phases of teleconsultation.

The prerequisite for adherence is that the patient and the healthcare providers agree on the treatment decision (Ahmed & Aslani, 2013). Therefore, **Adherence** begins at the moment when the patient makes a decision. It occurs at all behavioral stages of the use of teleconsultation, including ITU and Continuity. Figure 2.12 shows these three trust-related behaviors on the experience journey.

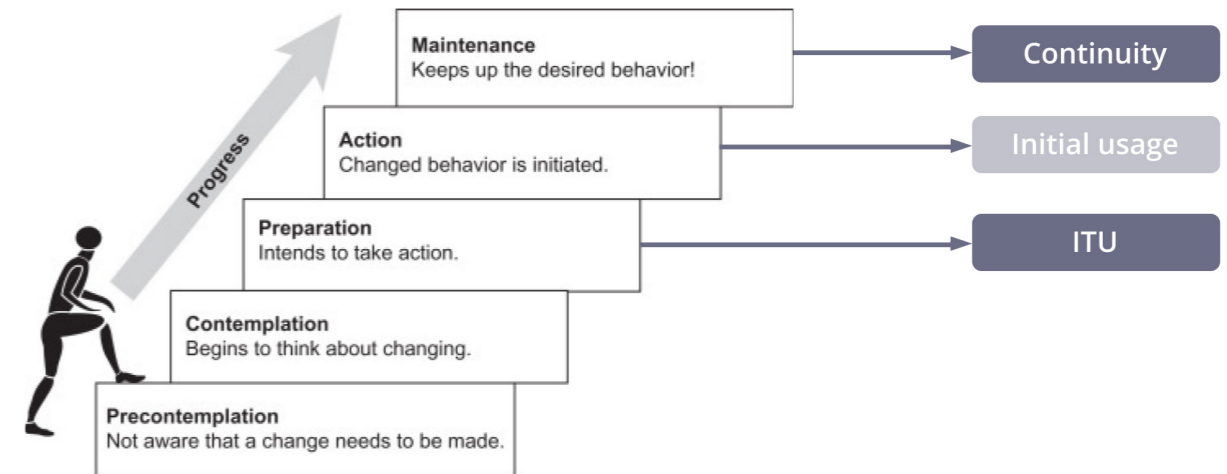


Figure 2.11: Adapted Transtheoretical Model (Prochaska & Norcross, 2014) with patient behavior in teleconsultation

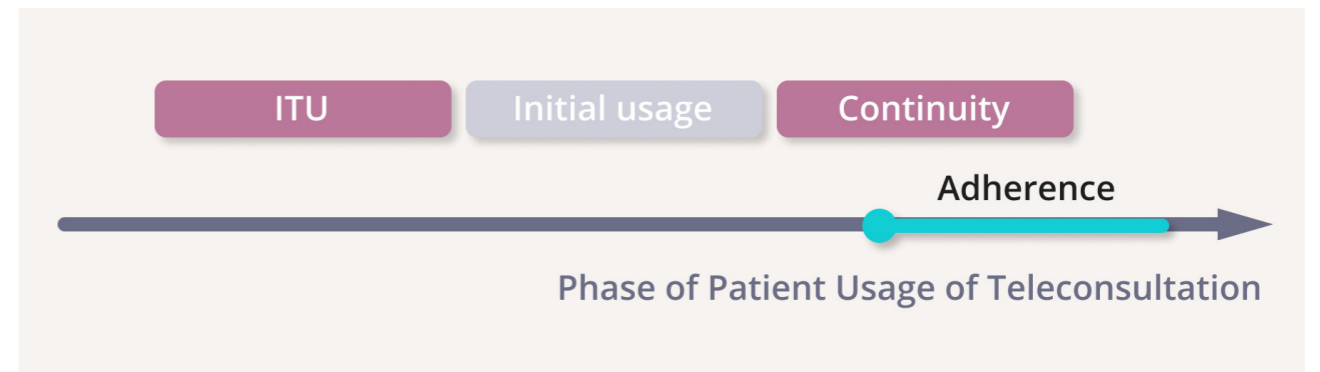
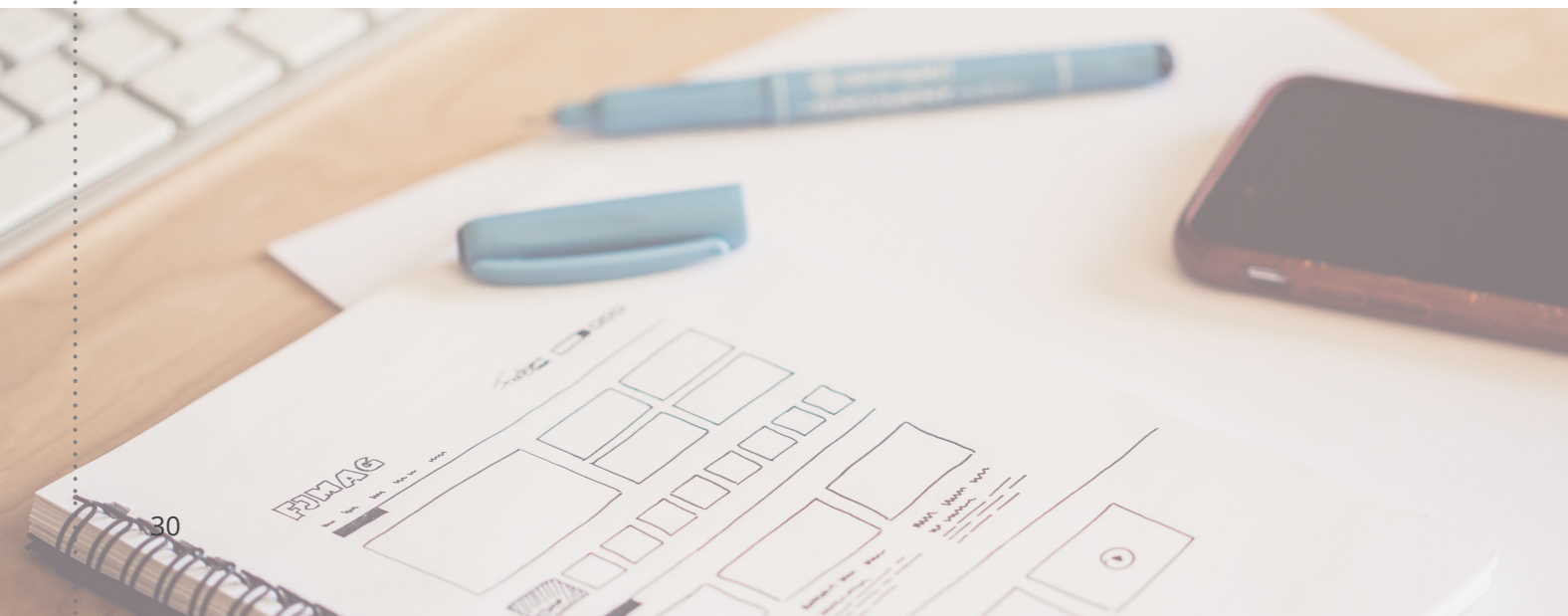


Figure 2.12: The visualization of three patient behaviors on the experience journey in teleconsultation



Theoretical framework: How Does Trust Affect Patient Behaviors in Teleconsultation?

To understand the ways in which patient trust in teleconsultation influences the three behaviors (see figure 2.13), two behavior change models and one cognitive theory were referenced.

From a healthcare perspective, the *Theory of Planned Behavior (TPB)* (Ajzen, 1985) is widely used as the basis when studying health behavior change (see figure 2.14). It reveals that people's attitude towards the behavior, subjective norm (an individual's perception about the behavior, which is influenced by others in society), and perceived behavioral control (an individual's perceived ease or difficulty of performing the behavior) will affect their intention, which precedes and guides behaviors.

In this project, perceived behavioral control can be equated with the patient's expectation of performing the health behaviors (adherence) in teleconsultation. The subjective norm is the social identity of a patient. They influence ITU along with the trust attitude.

Derived from the TPB, the *Technology Acceptance Model (TAM)* (Davis, 1989) can further corroborate how trust from a technology perspective affects behaviors (see figure 2.15). It explains that people's perception of technology affects their intention to use it.

Furthermore, the *Expectation Confirmation Theory (ECT)* (Oliver, 1980) directly explains how trust affects people's Continuity behavior. It explains that trust in both the early-usage and late-usage stages significantly affects satisfaction (Shin, Lee & Hwang, 2017). And people's intention of continuity is positively affected by satisfaction. That is, trust at different usage stages indirectly affects patient behavior of continuity by influencing satisfaction.

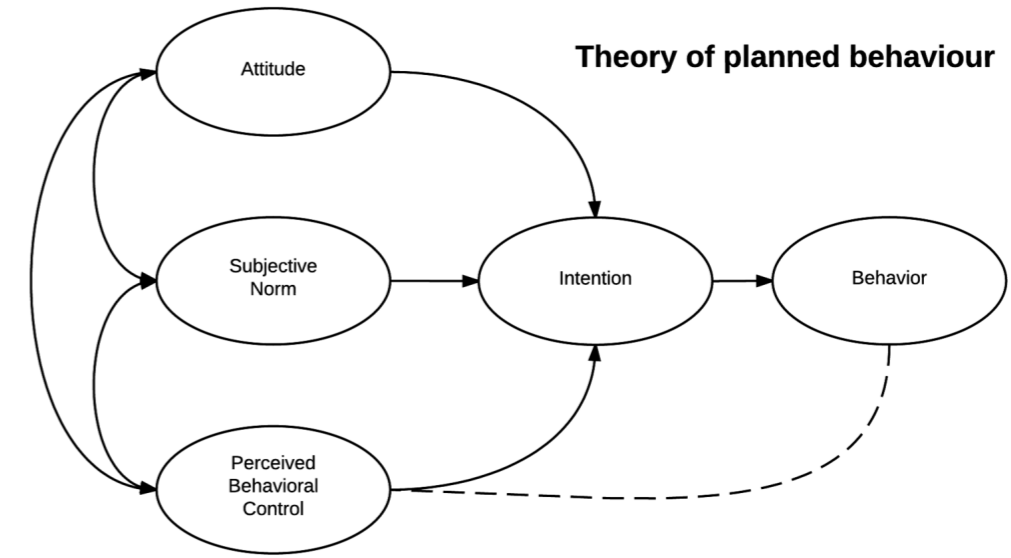


Figure 2.14: The model of TPB (Ajzen, 1985)

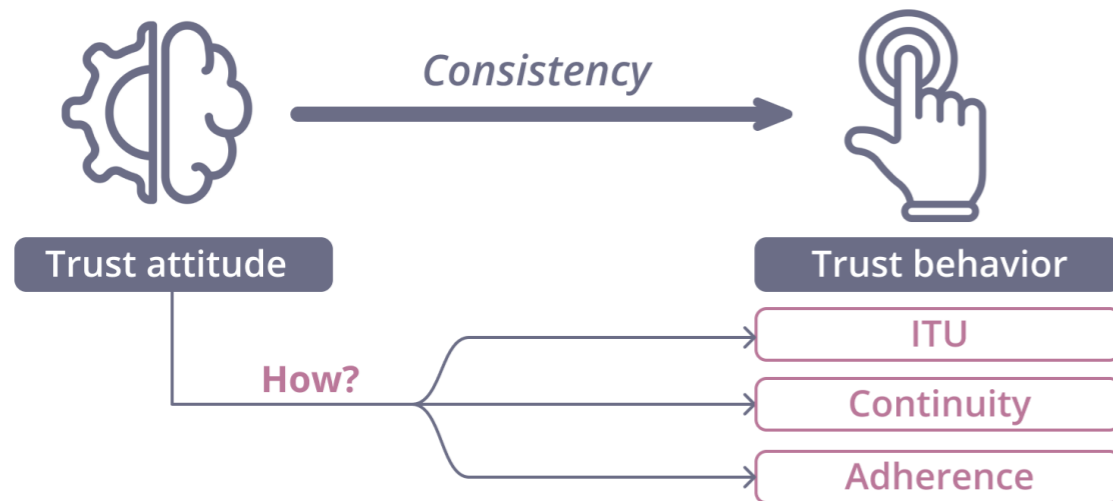


Figure 2.13: How does trust affect three focused patient behaviors?

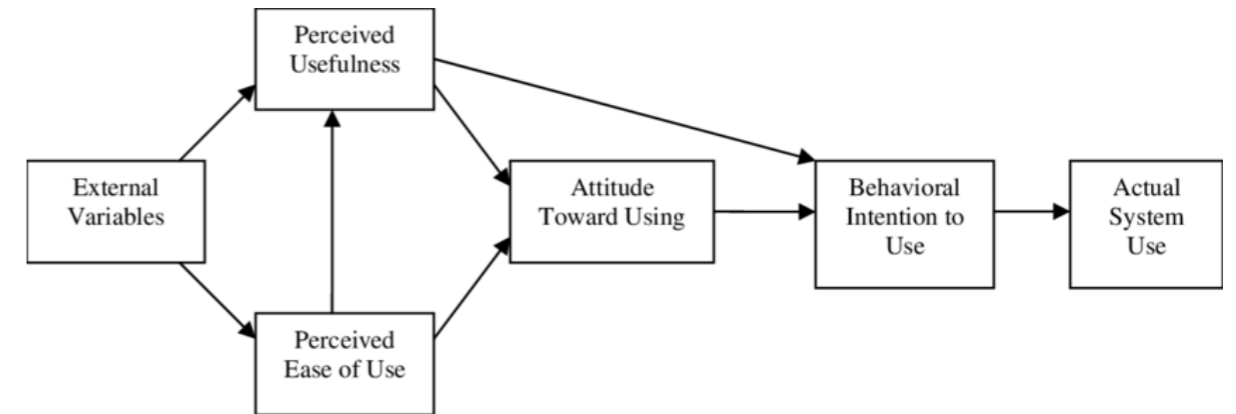


Figure 2.15: The Technology Acceptance Model (Davis, 1989)

Based on these models and theories, a simplified framework explaining how trust affects patient behaviors in teleconsultation is generated (see figure 2.16).

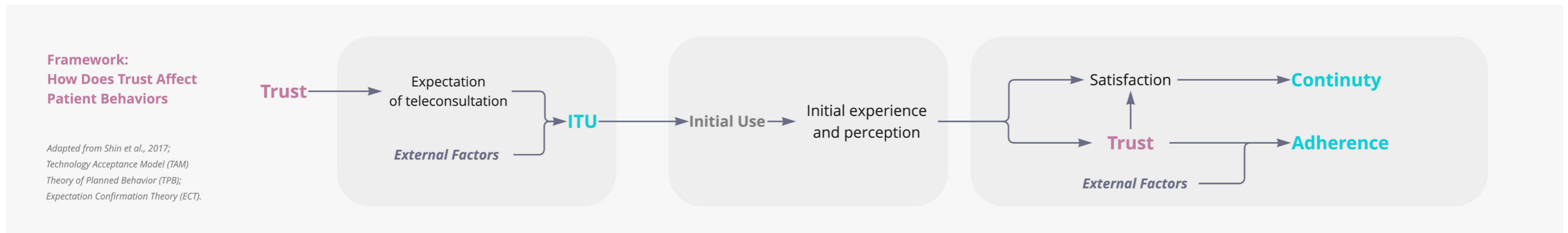
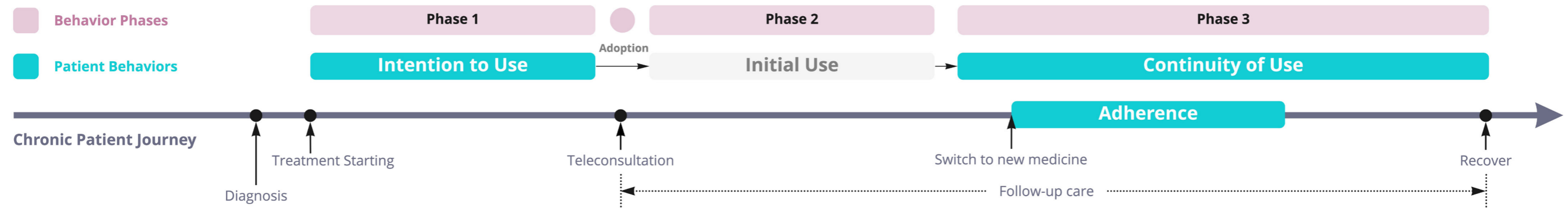
In this integrated framework with the behavioral stages of teleconsultation, patient trust first affects the patient's expectation of teleconsultation and thus their intention to use it. In the next behavioral phase, the patient's initial teleconsultation experience affects satisfaction and reshapes their trust in HCPs, which in turn affects their willingness to continue the teleconsultation. At the same time, the reshaped trust can directly influence the behavior of patient adherence.

Conclusion of RQ2 Result

In summary, the framework demonstrates the relationship between attitudes and behaviors in healthcare and technology when trusting attitudes and behaviors are positively correlated, explaining how trust in teleconsultation influences the three patient behaviors that are the focus of this project.

The next chapter will explore scenarios where trust attitudes and behaviors are inconsistent, proposing design strategies to promote trust behaviors and strengthen trust attitudes.

Meanwhile, it has been possible to see initially the reasons for the inconsistency of trust attitudes and trust behavior. In each behavioral phase, in addition to trust attitude, some **external factors** such as the subjective norm and the patient characteristics also influence patient behaviors.



**Framework:
How Does Trust Affect
Patient Behaviors**

Adapted from Shin et al., 2017;
Technology Acceptance Model (TAM)
Theory of Planned Behavior (TPB);
Expectation Confirmation Theory (ECT).

Figure 2.16: The framework that explains how trust affects three patient behaviors in teleconsultatio

Result RQ3 - What Affects Patient Trust during Teleconsultation?

Understanding what influences people's trust can help healthcare providers and designers who are engaged in optimizing healthcare systems to eliminate distrust and enhance patient trust to achieve the Triple Aim.

A literature study was first conducted to collate the factors affecting trust in the healthcare domain as mentioned in eight articles. And the factors affecting trust in digital technology were collected from another three articles.

After sifting and sorting the data, the following table (see table 2.2) is obtained. Factors that influence trust in HCPs in teleconsultation are divided into four categories: **Patient attributes**, **Physician attributes**, **Technology attributes**, and **Social effects** (see figure 2.17).

- Patient attributes

Patients' own characteristics, including the patient's demography (i.e. age, sex, education level, income level, and location), patient personality, patient capability including health literacy and technical literacy, previous healthcare experience, and patient involvement which refers to the extent to which patients actively participate in treatment and care.

- Physician attributes

Physicians' characteristics, including physicians' performance, the relationship between doctors and patients, and the patient power that physicians give to, which correlates with patient involvement in the patient attributes.

- Technology attributes

Technology performance such as the reputation of the digital technology, the performance of the digital tools, and cost-effectiveness of use.

- Social effects

Social effects including subjective norms and the characteristics of other stakeholders such as the health insurance.



Figure 2.17: Visualization of four categories of influencing factors

Conclusion of RQ3 Result

From the literature review, patient attributes, in particular their demography, have been already extensively studied and discussed by quantitative studies. However, there is not much research on technology-related factors influencing trust.

It is more valuable to focus on emerging factors in teleconsultation. These factors have either been little studied in previous research, such as those related to technology, or play a new role in

the new context of telehealth.

To gain more insights into these factors influencing trust, qualitative research was conducted, and the next chapter will introduce the process and the results in detail.

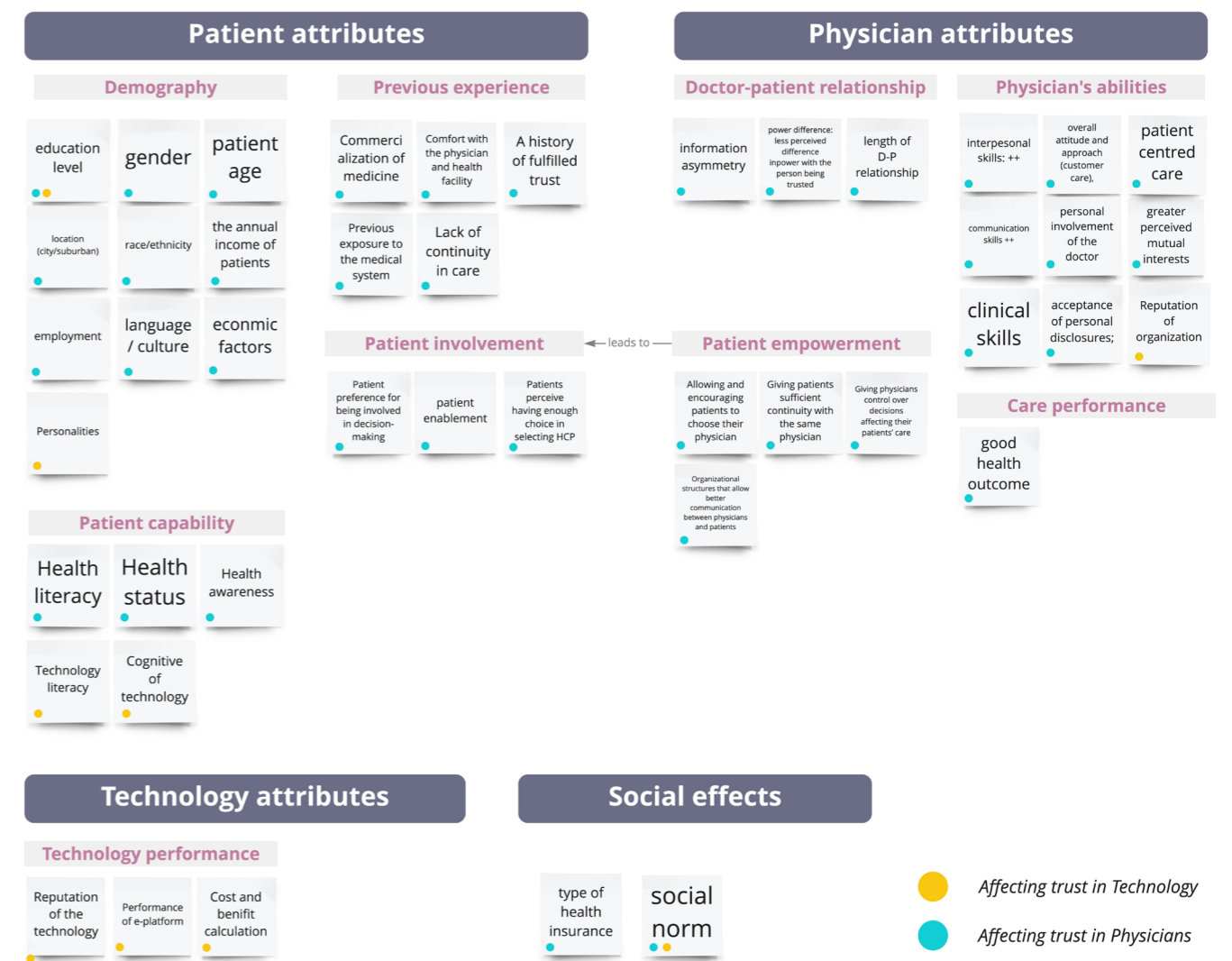


Table 2.2: Four categories of factors affecting trust in HCP based on literature

Conclusion

The theoretical framework (see figure 2.18) of this project was articulated through the exploration and answering of three research questions.

RQ1 about trust itself was explored to understand the definition, dimensions, and characteristics of trust, and clarify the difference between trust attitudes and trust behaviors.

The answers to RQ2, behavioral consequences of trust, identified three patient behaviors in teleconsultation that this project focused on and constructed a framework for how trust influences these behaviors according to the behavior phases in teleconsultation. Scenarios where trust attitudes and behaviors are consistent were clarified here. Meanwhile, inconsistency in attitudes and behaviors was presented in the framework, leaving an unsolved question for further research to follow.

RQ3 explored the factors that influence trust, resulting in four categories of influencing factors as a basis for the following design. A gap was identified in the end. There was a lack of research on emerging factors in teleconsultation both considering healthcare and technology. This gap will also be addressed in the next chapter.

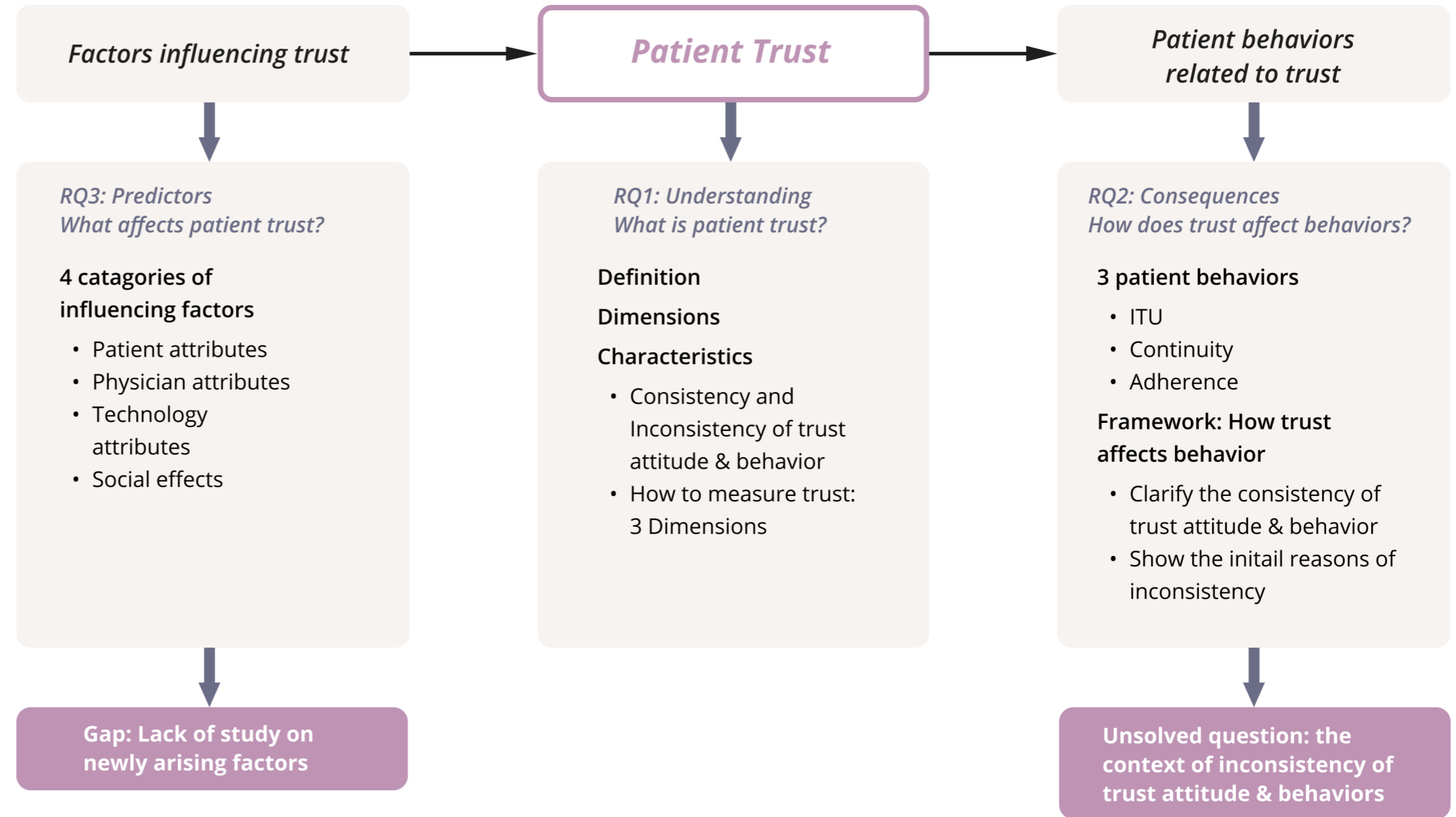


Figure 2.18: Visualization of the structure of the literature review

03 EXPLORE

Through literature review, the previous chapter pointed out that there is a lack of in-depth research on newly arising influencing factors in teleconsultation. Meanwhile, the scenarios of the inconsistency of trust attitudes and behaviors still need to be explored.

To answer these unsolved questions, qualitative research was conducted in this chapter that aims to uncover the missed factors that influence trust. Semi-structured interviews were conducted with chronic patients and healthcare experts. The findings were translated into five categories of trust facilitators and four patient archetypes with trust-related needs classified according to the consistency of trusting behaviors and attitudes. These insights provide a solid base for the final design.

03 - 1 Research Goal

In the previous chapter, the answer to RQ3, what factors influence trust, revealed that the technology-related factors have not been studied in depth yet. There is still a lack of research to explore patient trust in the new context of teleconsultation.

Therefore, generative research was conducted to help develop a deeper understanding of users in order to find opportunities for solutions and innovation (Estes, 2020). The research question for in-depth generative research is as follows based on the gap of RQ3:

RQ4. Emerging predictors

What are the emerging factors that influence patient trust in teleconsultation?

The answer to RQ2, how trust affects patient behaviors, in the last chapter, illustrates through a framework how trust attitudes influence patients' three behaviors (ITU, Continuity, Adherence) at each usage phase, given that trusting attitudes and behaviors are consistent.

However, trusting attitudes and behaviors are not entirely consistent which was discussed in the previous chapter. For healthcare providers and designers, understanding the specific contexts and reasons for inconsistency of trust attitudes and behaviors can help them cope with the various scenarios in teleconsultation to promote their health behaviors, in order to broaden the inclusiveness of the final design. Therefore, the approach of patient archetype was adopted for this project to demonstrate four scenarios where trust attitudes and behaviors are consistent and inconsistent.

Patient Archetypes: Trust Attitude & Behavior

Patient archetype is the method to help designers visualize the same kinds of insights based on patient research data: they are representations of audience clusters, capturing major areas of overlap in user behaviors, attitudes, motivations, pain points, and goals (Laubheimer, 2022).

In order to elucidate the different situations in which patients trust attitudes and behaviors that are consistent or inconsistent, an axis of patient archetypes was identified first (see figure 3.1).

The horizontal axis represents the extent to which people hold trust attitudes. The vertical axis represents the level of the patient's trust-related behavior, such as adherence. Four patient archetypes were identified based on their level of trust attitudes and behaviors:

Consistency of trust attitude and behavior

Archetype 1

High level of trust attitude and high level of trust behaviors;

Archetype 2

Low level of trust attitude and low level of trust behaviors.

Inconsistency of trust attitude and behavior

Archetype 3

High level of trust attitude but low level of trust behaviors;

Archetype 4

Low level of trust attitude but high level of trust behaviors;

In contrast to persona which presents a specific human character with their demographics, the patient archetypes are identified primarily by their defined behavioral and attitudinal characteristics related to trust in this project. (Laubheimer, 2022). Designers can design products or strategies that correspond to the needs and expectations of different patient archetypes to promote trust in teleconsultation. Thus, RQ5 is as follows:

RQ5. Patients needs based on archetypes

What are the trust-related needs and expectation of each patient archetype?

The following interviews continued to clarify the characteristics of these four patient archetypes, identify their behavior motivations, and clarify their needs and expectations, in order to ultimately generate design opportunities and strategies for each archetype.

By answering these two questions, the gap and unsolved questions left in the literature review were filled. Meanwhile, insights were also generated for the design in the next chapter.

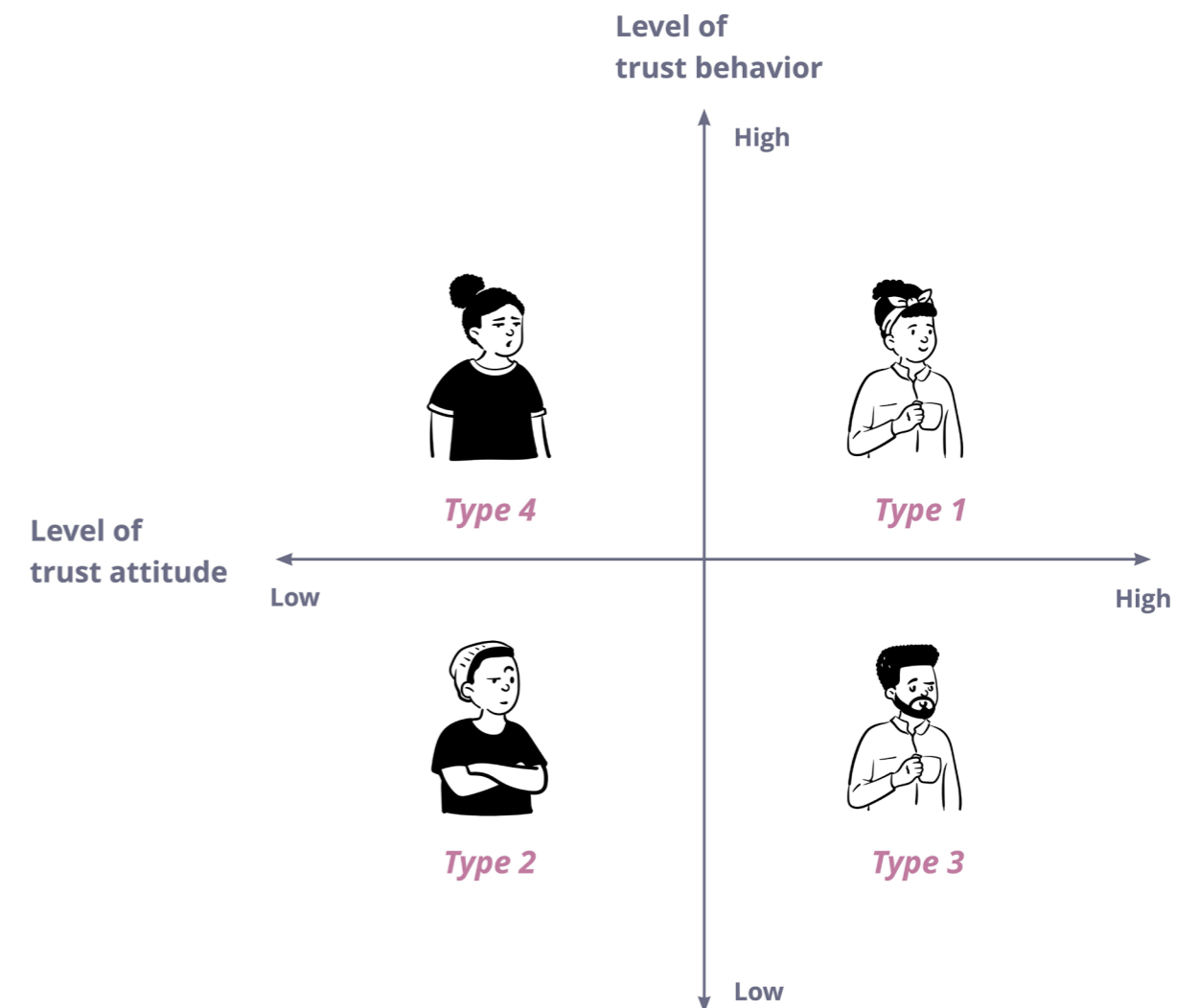


Figure 3.1: The axis of four patient archetypes based on the consistency of trust attitude and trust behavior

03 - 2 Research Method

The generative research was executed based on the contextmapping method (see figure 3.2).

Contextmapping is an approach to design in which designers inform and inspire themselves by clearly defining the roles and aims of users and stakeholders, and eliciting deeper needs (Sanders & Stappers, 2014). According to the

research objective of this project, the research method for this part includes the following three steps:

- Recruiting
- Sensitizing
- Semi-structured interview

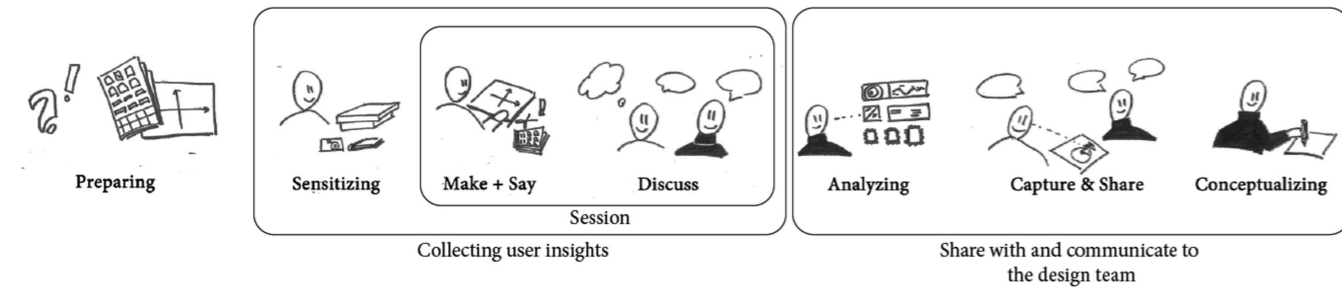


Figure 3.2: The methods of generative research based on the contextmapping

Recruiting

Trust is an interpersonal belief between patients and physicians. Thus, both patients and physicians or other healthcare experts were reached out for interviews, and insights into the research questions were analyzed together from two perspectives to understand trust in teleconsultation.

A convenience sampling strategy (e.g., the researcher's personal network) was used to target participants.

Patient recruitment

Patients with chronic diseases who are having or had more than two months of treatment or care and had teleconsultation experience were needed for the interview. Due to the objective constraints of this project, the age of the

participants is first chosen to be adults between 20 to 40 years old with basic digital skills.

Patients with chronic diseases who are having or had more than two months of treatment or care and had teleconsultation experience were needed for the interview. Due to the objective constraints of this project, the age of the participants is first chosen to be adults between 20 to 40 years old with basic digital skills.

By posting the recruitment poster (see figure 3.3) on social media, a total of nine patient respondents that matched the selection requirements were found. The participants for this semi-structured interview are introduced in an overview below (see table 3.1).

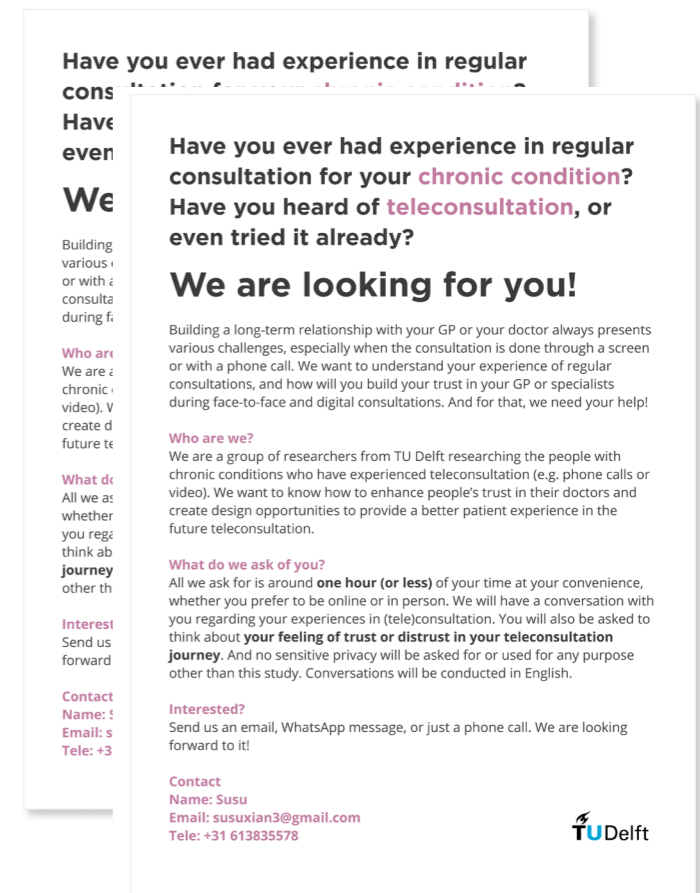


Figure 3.3: Patient recruitment poster

Number	Age	Gender	Occupation	Location	Way of teleconsultation	Duration
1	28	Female	Designer	Italy	Phone call; email	2 years
2	33	Male	Designer	Netherlands	Phone call; text message	All life
3	24	Female	MSc student	China	Mobile application; text	3 months
4	26	Female	MSc student	China	Mobile application; text	More than 1 month
5	24	Female	MSc graduate	Singapore	Text with image; audio	3 months
6	25	Female	BSc graduate	China	Phone call; text	1 month
7	25	Female	Teacher	China	Text message with images	9 months
8	26	Female	Designer	China	Text message	20 months
9	23	Female	Medical graduate	China	Text message	More than 10 years

Table 3.1: Patient participants that are interviewed

Expert recruitment

Doctors including GPs, specialists, and nurses with teleconsultation experience, as well as experts such as designers and researchers who are studying teleconsultation were recruited.

A total of four expert participants were found in the end. The interviewees for the expert interview are introduced in an overview below (see table 3.2).

Number	Gender	Location	Occupation
1	Female	Netherlands	Design professor in chronic disease and behavior change
2	Male	Netherlands	Professor autonomous ageing
3	Male	Netherlands	Founder of a GP clinic; expert in teleconsultation
4	Male	Netherlands	Owner of an e-service provider company; specialist eHealth;

Table 3.2: Expert participants that are interviewed

Sensitizing

People are often not aware of their everyday experiences and what exactly is meaningful to them. Sensitizing can make people sensitive to their previous experiences and feeling before the interviews and have the benefit to find out their true needs and wishes (Sanders & Stappers, 2014).

A small questionnaire (see figure 3.4) with a consent form is sent to all patient participants three days before the interview, including questions about their basic personal information, treatment of chronic diseases, and the use of teleconsultation.

The questionnaire collected basic information about the participants to assist in the interviews later. It also helped the participants to recall their use of teleconsultation for chronic disease treatment.

Basic Information Form

ABOUT YOU

Name:
Gender:
Age:
Highest level of education:

ABOUT CARE

Chronic disease:
Current health status:
Place of consultation:
Duration of care:
The way of teleconsultation:

Figure 3.4: Sensitizing material for patients

Semi-structured interviews

Semi-structured interviews were conducted with chronic patients and healthcare experts in teleconsultation. Two interview scripts with three themes each were created separately for the patient interview and the expert interview.

A small questionnaire with a consent form is sent to all patient participants three days before the interview, including questions about their basic personal information, treatment of chronic diseases, and the use of teleconsultation.

The questionnaire collected basic information about the participants to assist in the interviews later. It also helped the participants to recall their use of teleconsultation for chronic disease treatment.

Patient interview set-up

The patient interview guideline has three themes for 40 to 50 mins. See the detailed script in Appendix.

- Theme 1

Chronic disease treatment experience

- Theme 2

Teleconsultation experience

- Theme 3

Patient trust in HCP in teleconsultation

In Theme 1, participants begin by reviewing their complete chronic disease treatment and care journey, including duration, location, consultation status, health status, stakeholders, etc. It can help participants prepare to recall the details of the consultation later.

In Theme 2, participants are asked to describe in detail the most impressive or most recent teleconsultation experience, from the appointment prior to the consultation to the medication after the consultation. It also touches upon the problems that patients encountered in teleconsultation, their feelings and opinions, and the vision for the future of teleconsultation. In this theme, participants will then describe the three main patient behaviors identified in the previous chapter: ITU, Continuity, Adherence, and the reasons for these behaviors.

Based on the way of measuring trust attitudes summarised from the literature in the previous chapter (see xxx), participants in the last theme will describe the competence, benevolence, and integrity of the HCPs as a way of measuring their level of trust at different behavior stages in teleconsultation. Meanwhile, The reasons behind the trusting attitude and how they cope with distrust will also be covered.

Combining the answers to the three themes, participants' levels of trust attitudes and behaviors are identified. Their current problems, motivations, needs, and expectations in teleconsultation are also tapped.

Expert interview set-up

The expert interview guideline also has three themes for 30 to 40 mins. See the detailed script in Appendix.

- **Theme 1:** Teleconsultation perception
- **Theme 2:** Factors affecting patient trust
- **Theme 3:** Coping with distrust

What is different for experts than for patients is that they know more about the subject of teleconsultation or trust in teleconsultation. Therefore, in Theme 1, the participants are not asked to recall a specific consultation, but to tell their general perception of teleconsultation, the scenarios they use, etc. Theme 2 and 3 cover their understanding of patient trust and how they cope with distrust.

The expert interview complements the patient interview by providing a side-by-side understanding of the factors affecting patient trust from the doctor's or researcher's perspective.

Execution

Due to the Covid-19 and other objective constraints, only 3 interviews were conducted face-to-face, the others were conducted online via Zoom meetings or Wechat video call (see figure 3.5 and figure 3.6). All the participants signed a consent form giving permission to record the session in audio or video format.

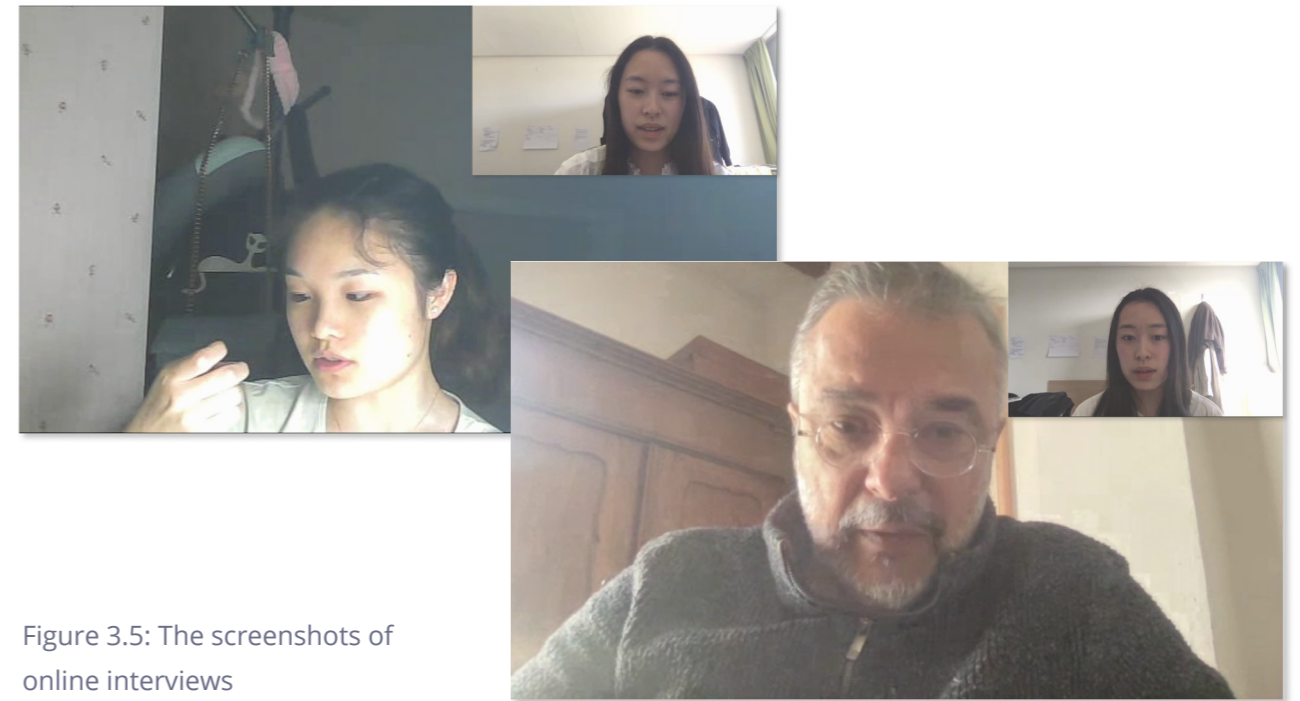


Figure 3.5: The screenshots of online interviews



Figure 3.6: The face-to-face interview

03 - 3 Analysis of Results

In the book Convivial Toolbox: Generative Research for the Front End of Design, the DIKW scheme (Ackoff, 1989) distinguishing levels of sense-making was used to guide data analysis (see figure 3.7). Based on the model, the gathered original data were interpreted to search for the information patterns and then clustered into the knowledge. Figure 3.8 shows the approach of analysis.

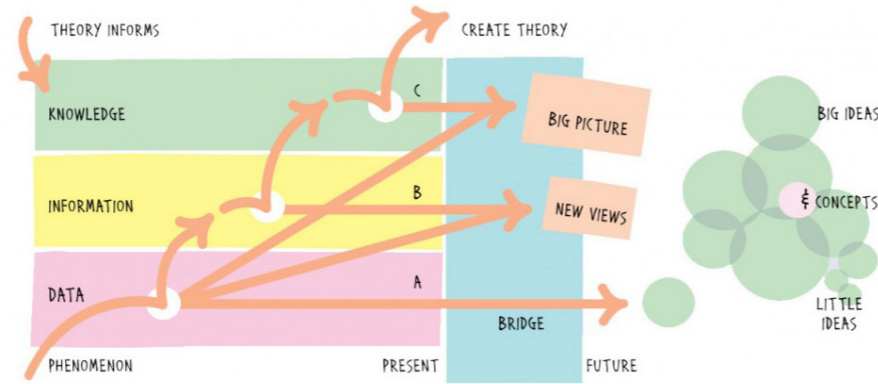


Figure 3.7: A variate model to guide analysis based on Ackoff's DIKW scheme

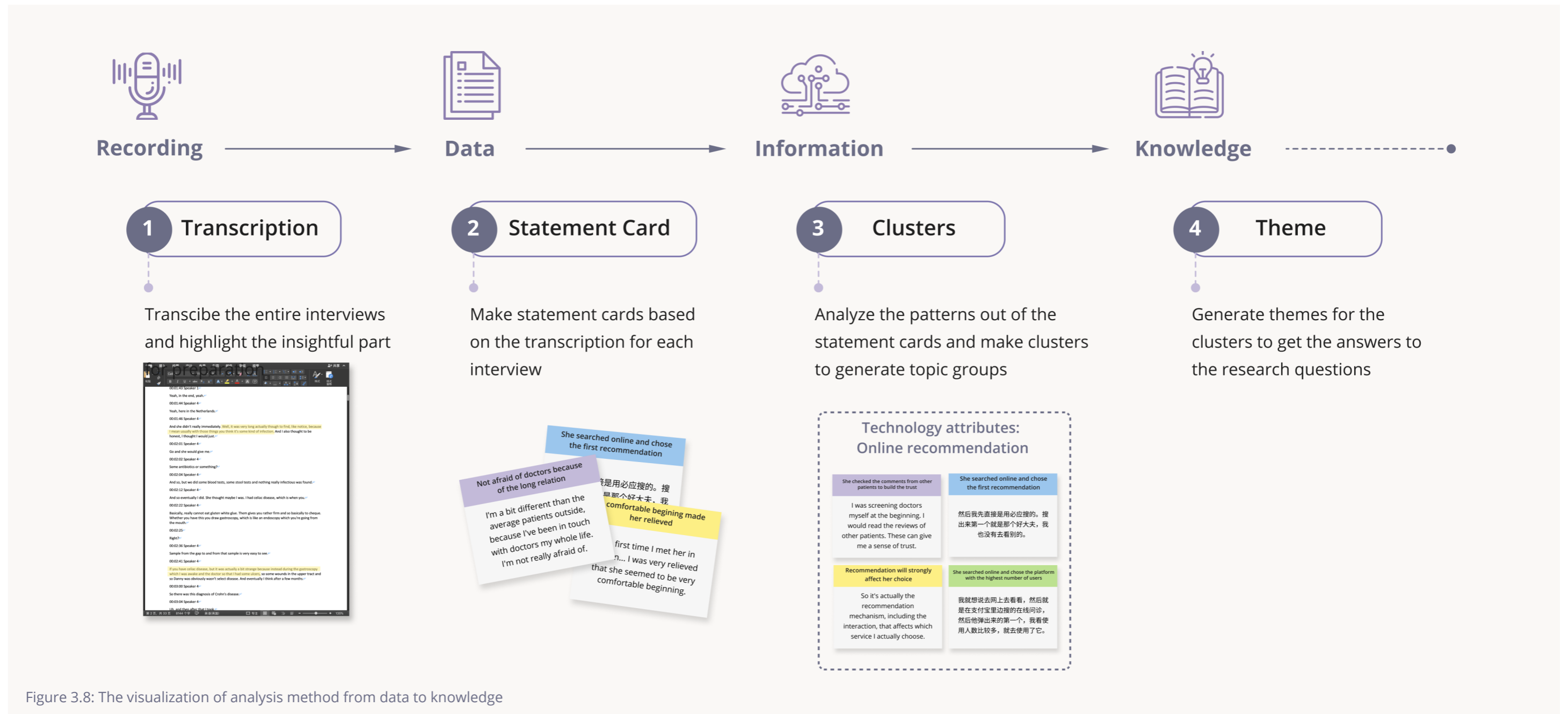


Figure 3.8: The visualization of analysis method from data to knowledge

From Recording to Data

All the interviews were recorded by video or audio and transcribed into text in the end. The interview transcript was read through and the important quotes were highlighted and noted initially in preparation for the analysis that follows.

From Data to Information

Statement cards were adopted for data analysis (see figure 3.9). The statement card contains two parts of the content. Each statement card records a significant quote that is relevant to the research question from the participant. A paraphrase is created based on the interpretation of the quote. Moreover, each participant is given a color to quickly retrace the data during the analysis.

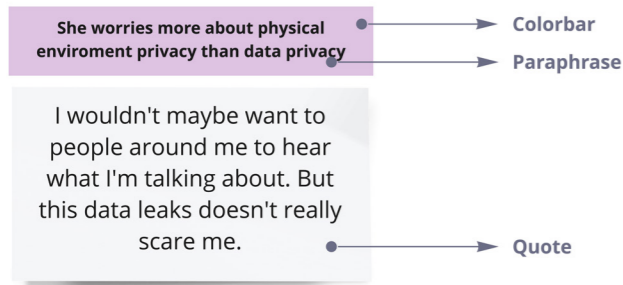


Figure 3.9: Statement card

From Information to Knowledge

In line with the goal of the generative research, the interviews will answer two main research questions. Therefore, there are two main directions for the analysis of information: 1) exploring the emerging trust influencing factors, and 2) clarifying the trust-related needs for four patient archetypes.

Analysis of RQ4: Emerging Influencing Factors

Initial clustering

The statement cards associated with the increased or decreased trust were categorized according to the patient behavior stages in the teleconsultation. At each behavior stage, the cards were then clustered according to the influencing factors (see figure 3.10). The red sticky notes represent factors that increase trust, and the blue ones represent factors that weaken trust. The initial clusters were obtained after this step.

Further clustering

In the literature review in the previous chapter, the factors affecting trust were grouped into four categories (see figure 3.11): Patient attributes, Physician attributes, Technology attributes, and Social effects. Based on these four categories, the initial clusters were analyzed and then categorized.

In conclusion, a fifth category, **Physical Environment**, was identified in addition to the four previously identified categories. The previous four categories of factors, particularly the factors of technology attributes, have also been summarized again (see figure x.x).

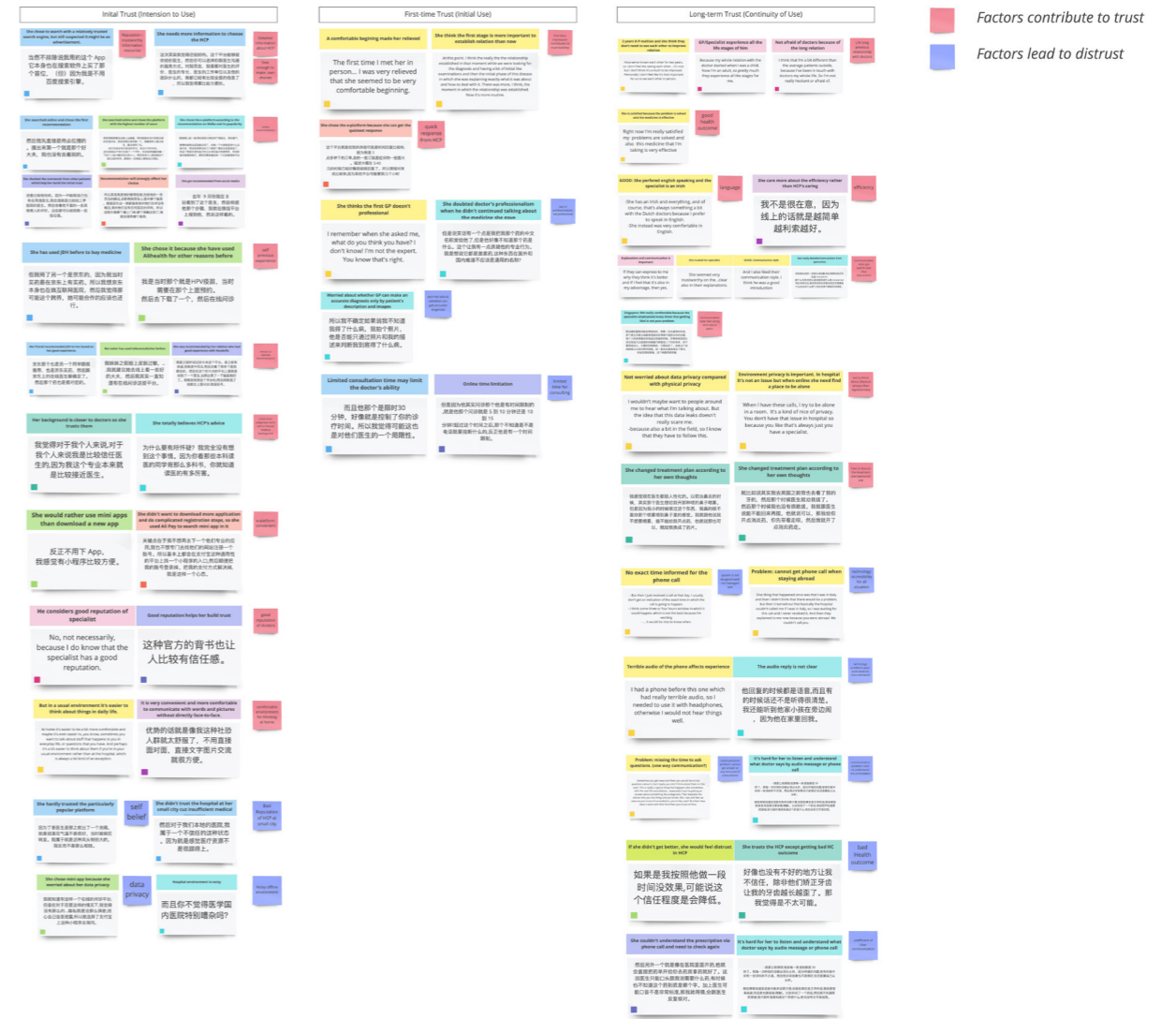


Figure 3.10: The result after Initial clustering

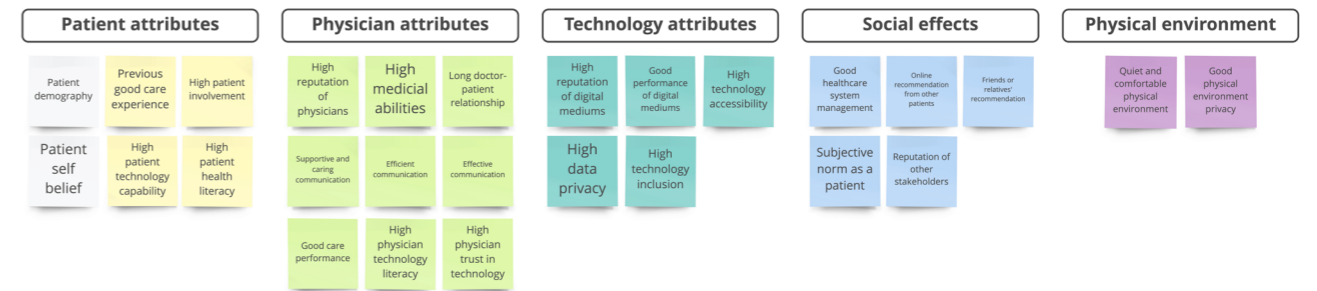


Figure 3.11: The result after further clustering with 5 categories

The five categories of influencing factors obtained include factors that are weakly relevant to this project. For instance, the patient demographic has already been repeatedly in the previous research. And the patient's exposure to the healthcare system is weakly associated with the teleconsultation context. These factors will not be covered by this project.

Therefore, two evaluation indicators were set to assess the influencing factors under five categories and filter out the most valuable ones for this project, which are **Design feasibility**, and **Value in teleconsultation**.

Design feasibility

- Whether the factors can be facilitated by means of design
- Whether the factors can be designed in this project

Value in teleconsultation

- Whether the factors are newly arising in teleconsultation context
- Whether the factors are lack of research from design perspective

Factors with high value in both two indicators will be considered for inclusion in the following design (see figure 3.12).

Design focused area

Patient involvement, healthcare providers' technology literacy, and trust are the most potential and valuable factors. Meanwhile, factors about communication style are easily optimized by means of design. On the other hand, the inclusiveness and accessibility of technology are important in promoting trust in the teleconsultation context, but they are not easy to enhance by design in this project due to objective limitations. All these factors will be the mainly focused opportunity area for design in this project.

Design opportunity area

Other factors, although not as valuable for this project, still have design potential and deserve to be noticed. The performance of digital media, for example, will not be primarily concerned as the ultimate goal of this project is not to undertake the interaction design for digital tools. Or the physical environment, which is also difficult to modify and optimize by specific design means.

However, there are two factors that should be focused on: subjective norms and the personal self belief. They cannot be changed by means of design, yet they can influence patient trust in telemedicine, creating situations where trust attitudes and trust behaviors are inconsistent. Therefore, these two factors will be considered through the classification of patient archetypes.

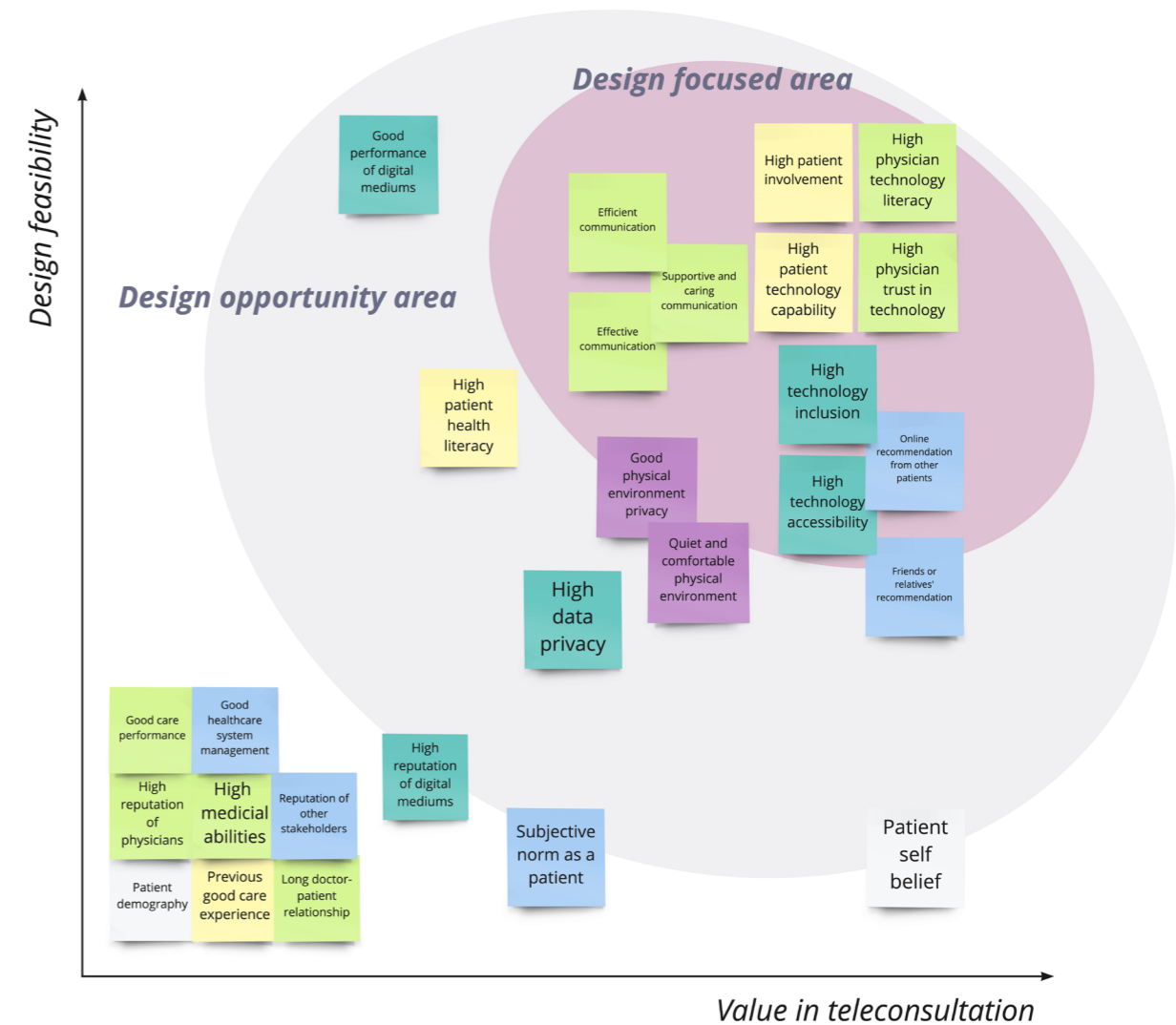


Figure 3.12: Comparison of influencing factors

Result RQ4: Emerging Influencing Factors

After analysis, five categories of influencing factors were filtered as the focus design points for designers (see figure 3.13): **Patient attributes**, **Physician attributes**, **Technology attributes**, **Social effects**, and **Physical environment** (see figure 3.14).



Figure 3.13: Visualization of five categories of influencing factors

Patient attributes

Patient attributes include characteristics that are relevant to the patient themselves. The high level of patient involvement in long-term care strengthens patient trust in their healthcare providers. It includes the willingness of patients to participate actively in their care, and the space given by HCPs for patients to involve in their care. Patient technology capability and health literacy also affects their trust in teleconsultation. Moreover, the personal cognition in red is a moderating factor that cannot be controlled but will increase or decrease trust as well.

Physician attributes

Physicians' communication style with patients is closely related to patient trust. In teleconsultation, efficient and effective communication that leads to good health outcomes promotes patient trust. A supportive and caring communication style can also promote patient trust. It is interesting to note that physicians' trust in teleconsultation and technology literacy can also indirectly affect patient trust by influencing, for example, doctor-patient communication.

Technology attributes

High technology accessibility and inclusiveness can enhance patient trust in teleconsultation. The efficient performance of digital media will also give patients the impression of trustworthiness. However, some patients think that technical privacy can affect their trust, while others are less concerned about privacy issues.

Social effects

Comments from online patients and friends or relatives around the patient can influence their trust, especially for those who are easily influenced. At the same time, the subjective norms of a patient also contribute to the construction of initial trust before patients adopt teleconsultation.

Physical Environment

The level of comfort and privacy of the physical environment affects patient experience of teleconsultation and indirectly their trust.

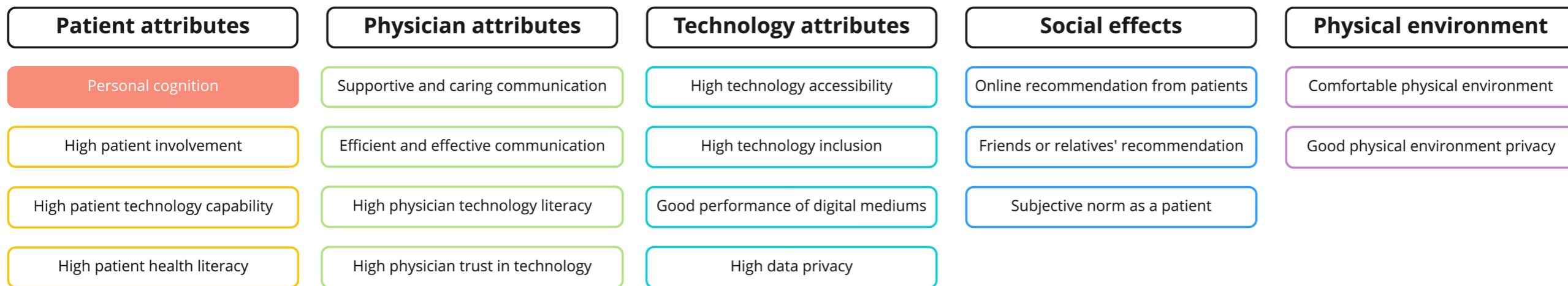


Figure 3.14: The updated framework of five categories of factors affecting trust in teleconsultation based on both literature and user research

Analysis of RQ5: Patient Needs Based on Archetypes

At the beginning of this chapter, four patient archetypes were identified based on whether trust attitude and trust behaviors are consistent. Through the interviews, the behavioral and attitudinal characteristics of these four patient archetypes were clarified. Their trust-related needs and expectations were refined in depth in the end.

Clustering

The statement cards in which participants described their trust attitudes and behaviors in the teleconsultation were categorized into the previous axis. Patients' trust attitudes were measured from low to high through three dimensions of trust mentioned in the Understanding chapter before. Patients' trust-related behaviors, focusing on ITU, Continuity, and Adherence, were mapped on a scale from low to high on the vertical axis (see figure x.x).

The cards were then clustered again, looking for the patterns out of the statement cards. Ultimately, the behavioral characteristics and their mindset associated with trust were clarified for each patient archetype (see figure 3.15).



Figure 3.15: The result after mapping the cards in the axis

Each patient archetype was ultimately defined in two terms (see figure 3.16):

The horizontal axis: level of trust attitude

- Critical

People who always arouse suspicion and even find fault with HCPs.

- Credulous

People who are easy to believe HCPs and even other people without any evidence.

The vertical axis: level of trust behavior

- Adherent

People who are willing to follow HCPs' advice when they need to make a decision or change

- Arbitrary

People who make a decision freely or behave at will according to their own feeling or experience

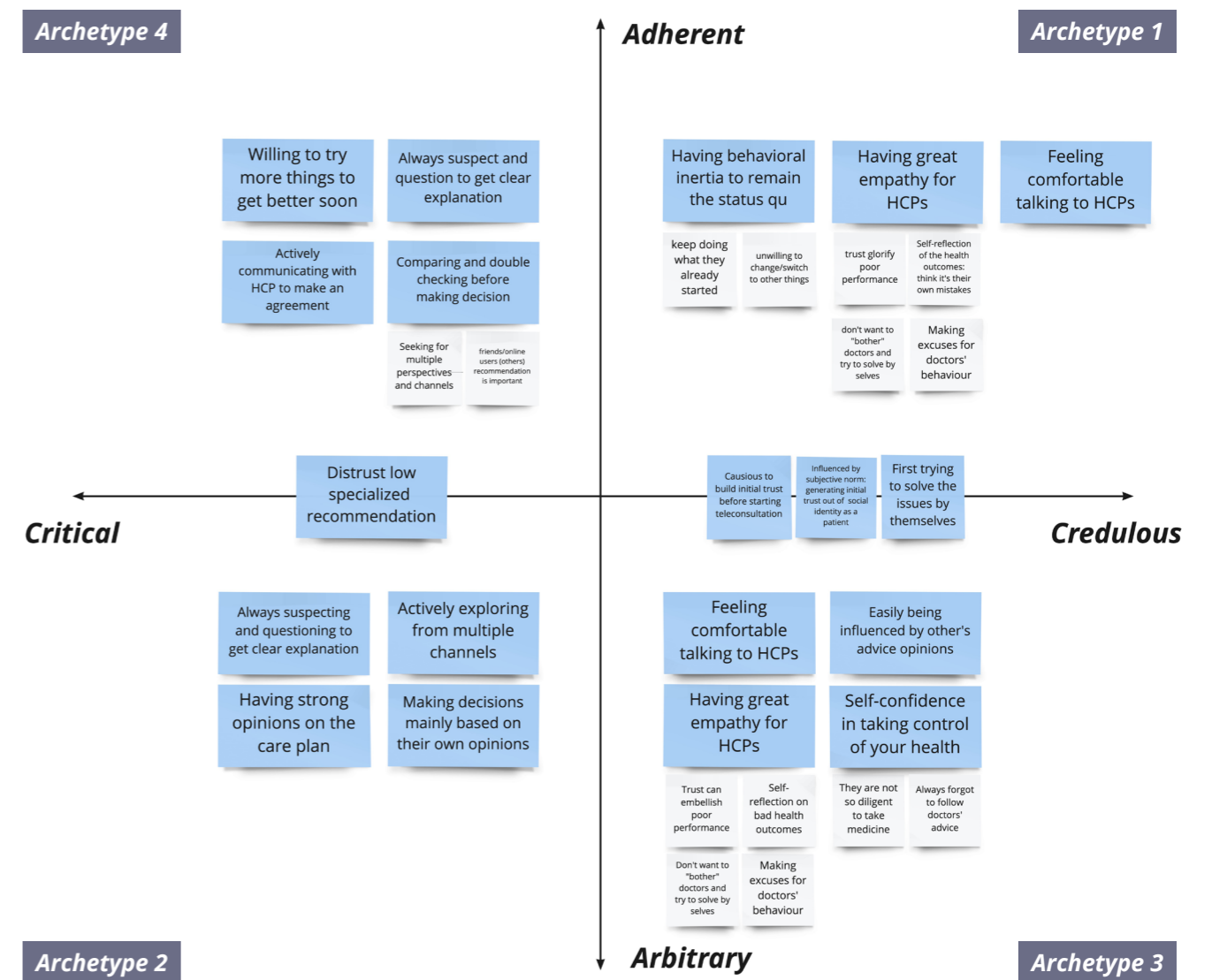


Figure 3.16: The patient archetype axis with their behavioral characteristics and mindset

Result RQ5: Patient Needs Based on Archetypes

Position Participants

Based on the interviews and analysis, nine patient participants were positioned on the patient archetype axis (see figure 3.17).

It is important to note that the attitudes and behavior of each participant are not always static and unchangeable during the teleconsultation journey. Their trust can be influenced by their experience and fluctuate up and down.

For instance, Participants 3N, 8C, and 9Q have high trust attitudes in most conditions. However, when it comes to less medical specialized or non-essential consultations, such as orthodontics, their trust attitudes towards the HCPs will decline and they will be critical and skeptical in the consultation. The archetype they belong to switches from Archetype 1 to Archetype 4.

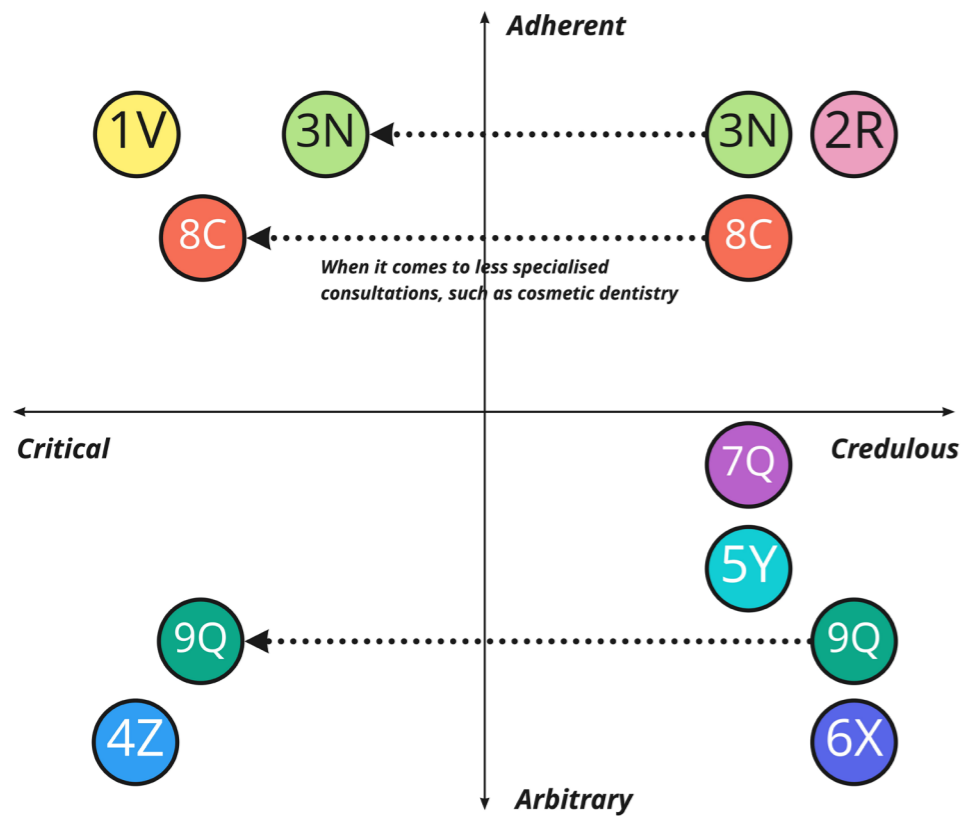


Figure 3.17: Patient positions on the archetype axis



Trust Attitude Level: Design value of Trust

McKnight, Cummings, and Chervany (1998) emphasized that trust during different stages is built on different factors. For instance, McKnight in 2002 defined initial trust as trust in an unfamiliar object. When patients have no prior interaction with the HCPs, they build the initial

trust based on the second-hand information or indirect experience.

Therefore, It is important for designers or healthcare providers to understand at what stage it is most valuable to promote trust. The

interviews revealed that patients could be divided into two groups according to the level of trust attitudes. When designing for these two groups, designers need to focus on different behavior stages (see figure 3.18).

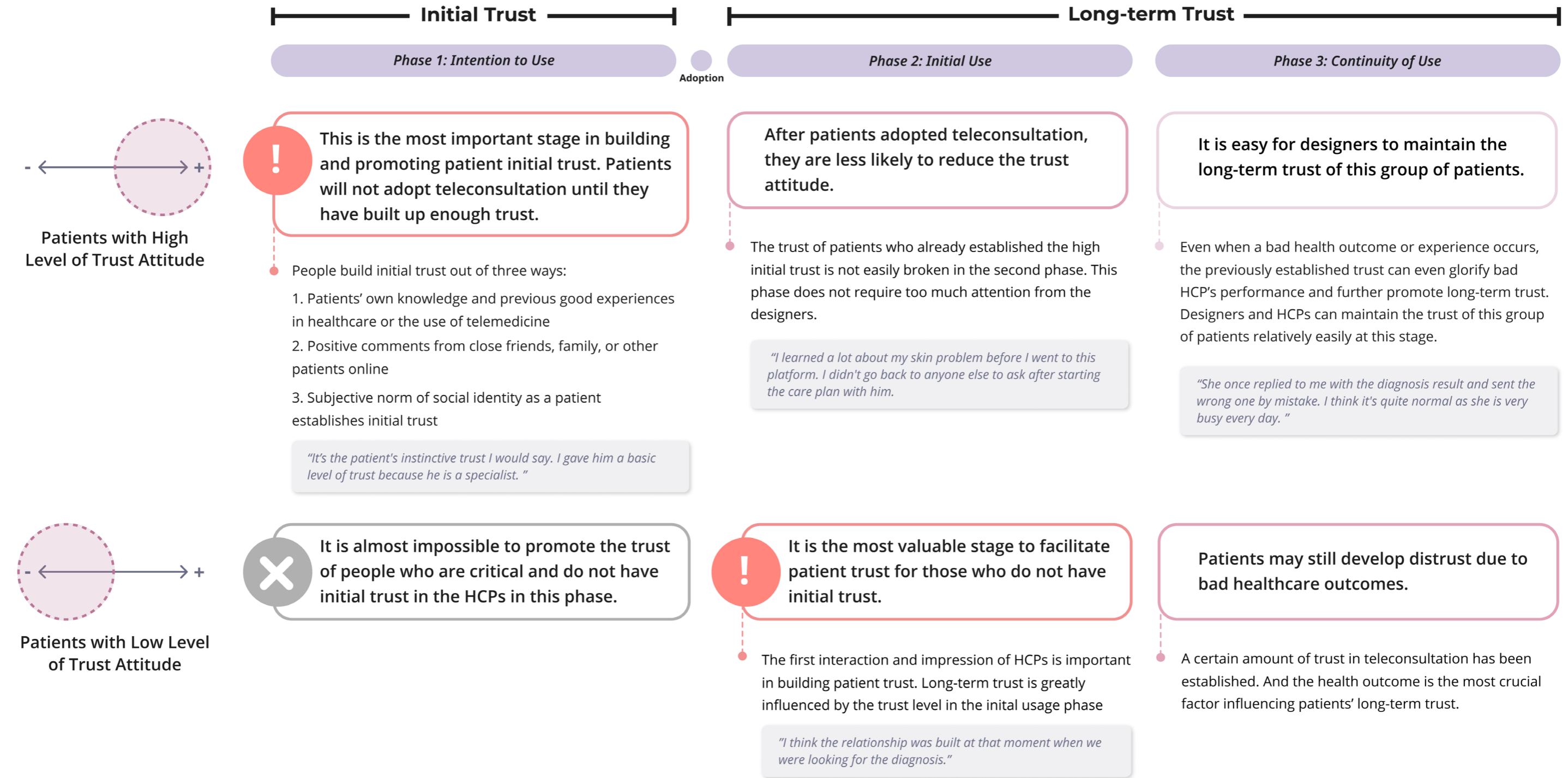


Figure 3.18: The design value of trust promotion at different behavior phases in teleconsultation

Patient Archetypes with Their Needs

After analysis, patterns of mindset and behavioral characteristics were identified for each archetype. For each type of patient, their trust needs and the factors that promote trust vary from person to person.

Through further analysis, the most important trust influencing factors from the five categories for each archetype were mapped to the corresponding behavioral phases.

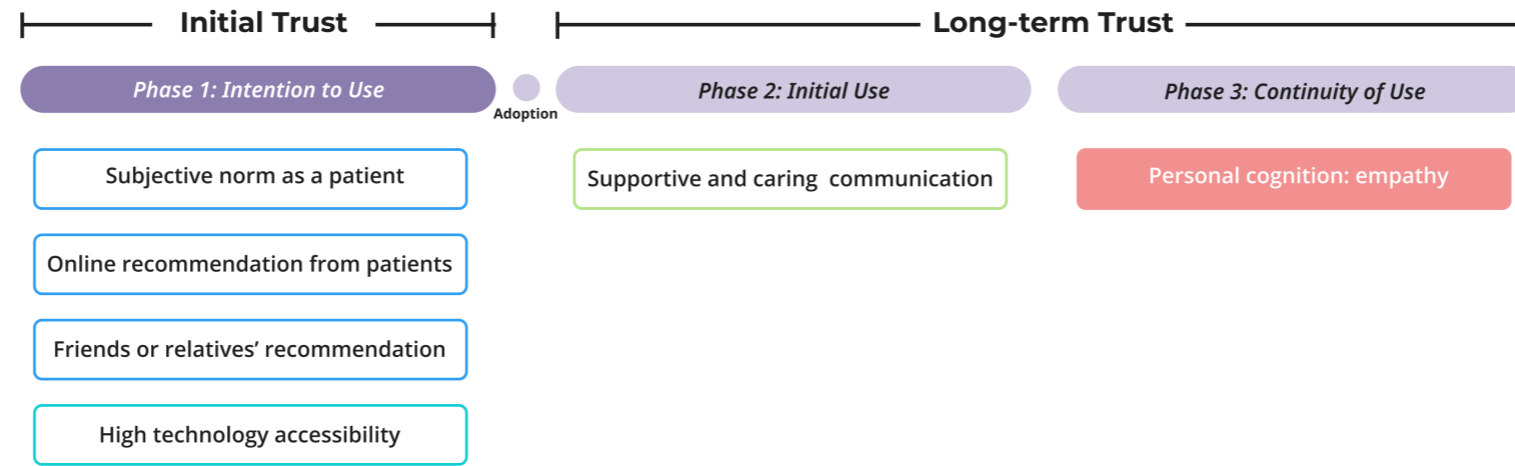
Archetype 1: Patients with a high level of trust attitude and a high level of trust behavior



"I feel really open to my specialist, especially sometimes I would rather tell them things that I would not tell my parents."

- **Credulous**
- **Adherent**

- Feel really comfortable talking to physicians
- Have great empathy for healthcare providers
- Have behavioral inertia to remain the status quo
- Be cautious especially before consultation



Characteristics

Patient archetype 1 has high trust in their doctors in most situations. They are willing to share their own experience and feeling with HCPs. Due to the trust from the patient's identity, sometimes they will make excuses for HCPs and **glorify their bad performance** in long term care, or even blame themselves for bad health outcomes out of empathy.

They have **behavioral inertia** that they prefer to maintain the status quo and are unwilling to break with tradition. This is why sometimes they keep the treatment even if they meet problems in teleconsultation.

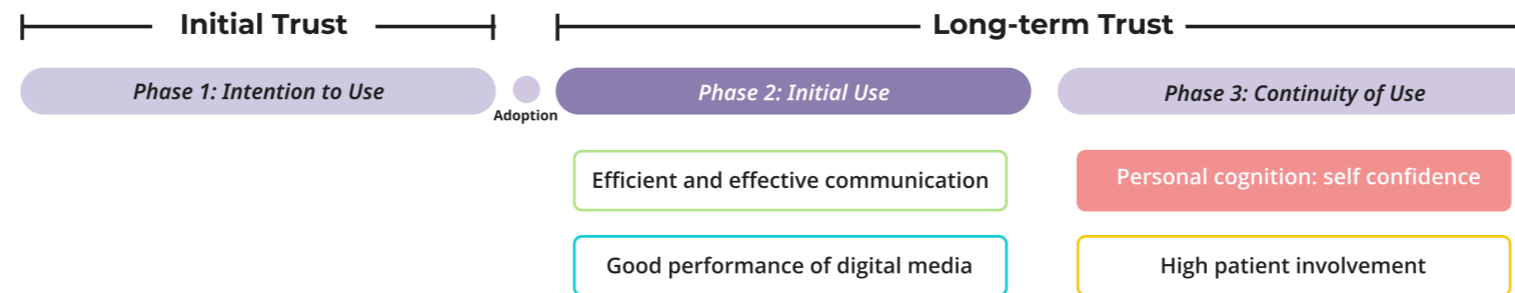
Archetype 2: Patients with a low level of trust attitude and a low level of trust behavior



"I would think it was a shortcut, but I don't believe this shortcut will take me to my real destination, so I will go back to see it again."

- **Critical**
- **Arbitrary**

- Always suspect and question physicians
- Have strong self opinions even don't know much
- Actively explore information from multiple channels
- Make decisions on their own after comparison



Characteristics

Patient archetype 2 is natural skeptics. They are quite critical of HCPs and always in doubt. So they prefer to look for information from multiple channels, such as online comments from other patients. However, they consider all sources of information, including the advice of doctors, as references for their own decision-making. Ultimately they **rely on their own perceptions and preference** to make decisions regardless of whether they are correct or not.

For this archetype, their trust behaviors are strongly influenced by their **personal cognition**. For example, one of the participants thinks that Chinese medicine is not as effective as Western medicine, so she doesn't take whatever her doctor prescribes.

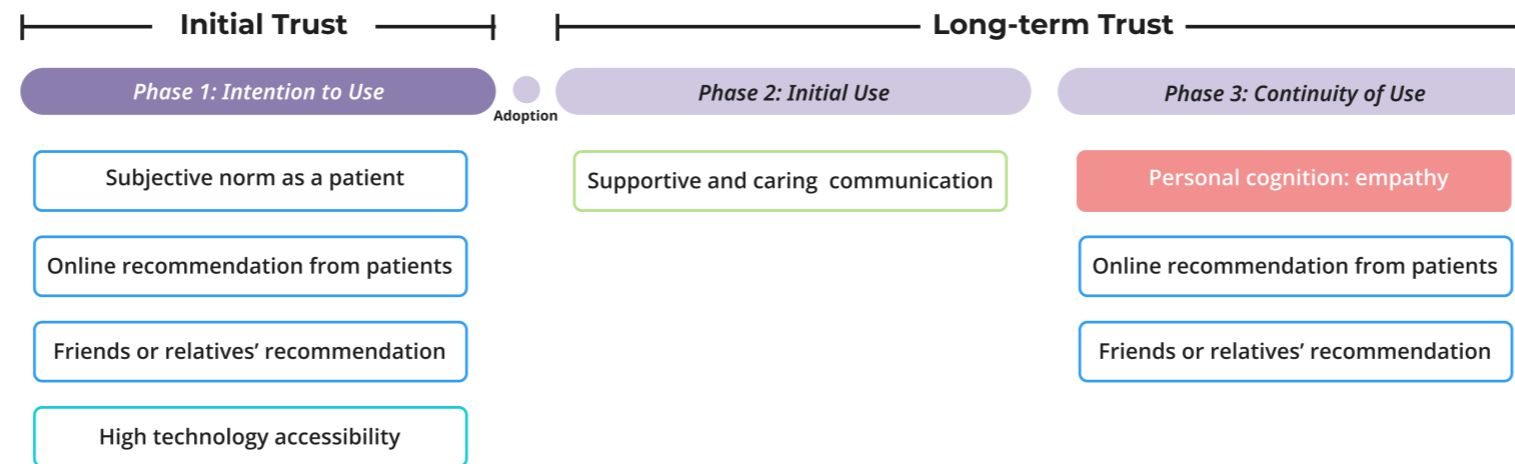
Archetype 3: Patients with a high level of trust attitude but a low level of trust behavior



"Mostly I don't take my medication because I'm really lazy and I often forget. The disease has been with me for too many years."

- **Credulous**
- **Arbitrary**

- Feel really comfortable talking to physicians
- Have great empathy for healthcare providers
- Have self confidence in taking control of their health
- Easily to be influenced by other's opinions



Characteristics

Patient archetype 3, like archetype 1, has high initial trust in HCPs. But they are also quite suggestible and can **easily be influenced** by the opinions of others, such as online comments or friends' advice. This is why they sometimes do not follow the doctor's advice even if they trust them. This group of patients are **not so diligent** about their care and have faith in their own health status, so some of the distrustful behavior is just because they forget the doctor's advice or are just too lazy to follow it.

Like archetype 1, they also have strong empathy for HCPs. Therefore they will sometimes ignore the problems in the treatment and self-reflect on the bad health outcomes.

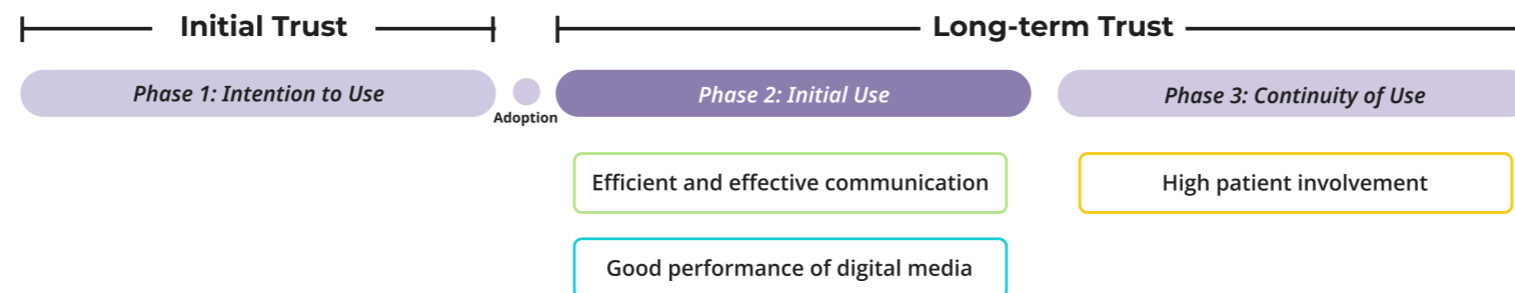
Archetype 4: Patients with a low level of trust attitude but still have a high level of trust behavior



"I am kind of a diligent patient. That way I follow what my doctor says, even if I have other suspicions."

- **Critical**
- **Adherent**

- Always suspect and question physicians
- Actively communicate to make an agreement
- Compare and double check before making decision
- Willing to try more things to get better soon



Characteristics

Patient archetype 4, like archetype 2, has a low level of trust in HCPs. They really care about their own health and are willing to expend any effort to get better as soon as possible. This is why although they are quite critical of HCPs, they are still willing to perform high adherence. Meanwhile, they will also **explore and learn** information through various channels and then choose the optimal solution rationally after comparing them.

Unlike Type 3, they **are proactive in communicating** their questions and concerns to the doctors in order to reach a final agreement when making decisions, rather than relying on their own opinions.

Conclusion

Based on the unresolved question and gap identified in the end of the previous chapter, this chapter first presented two research questions that require generative research to address, conducting nine patient interviews and four expert interviews in the end (see figure 3.19).

The answers to RQ4 filled in the gaps left by RQ3 in the previous chapter by reclustered the five categories of influencing factors and clarifying specific priorities for each category based on two indicators: design feasibility and value in teleconsultation.

The answer to RQ5 begins by clearly defining four patient archetypes based on whether trust attitudes and trust behaviors are consistent. Through the identification of patient archetypes, patients' trust beliefs, behavioral characteristics, and motivation were clarified.

Based on the findings in this chapter, design opportunities and strategies will be generated for designers to promote trust in teleconsultation. The next chapter will demonstrate how the insights gathered in this chapter can be used to assist designers in further trust-related design.

UNDERSTAND

Contextual understanding

Literature review

Unsolved questions

EXPLORE

Patient & Expert interviews

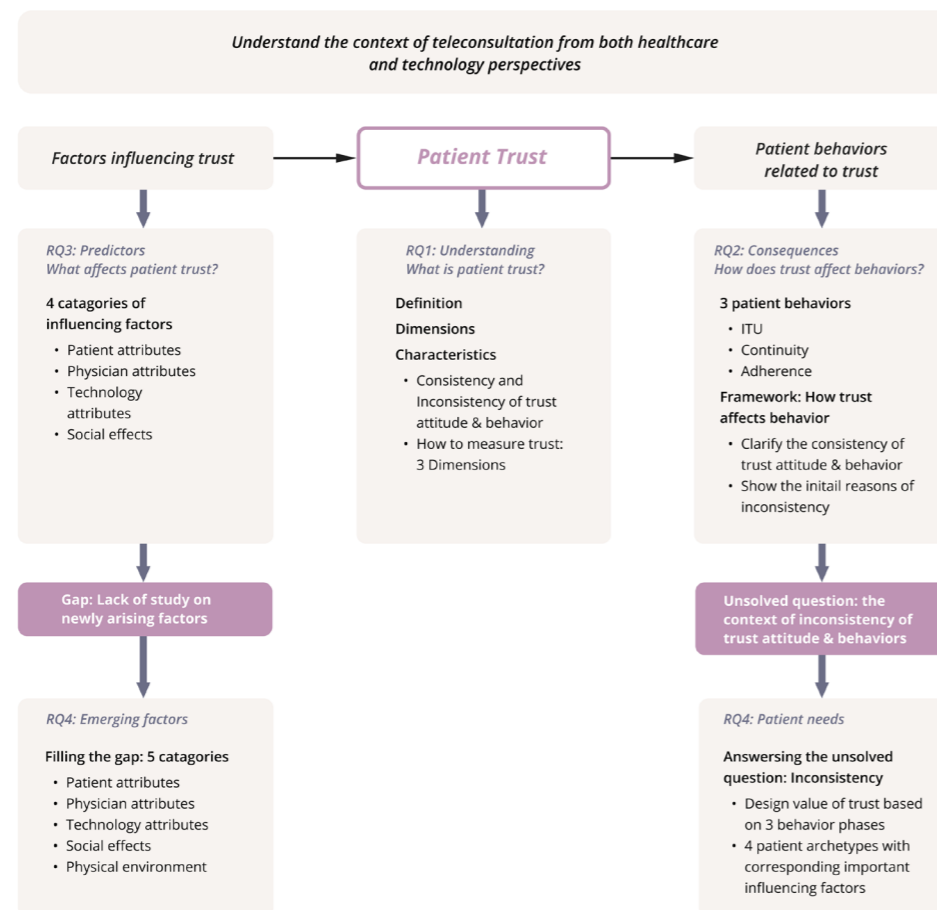


Figure 3.19: The research framework of this project



04 DESIGN

The gathered insights from the previous chapter were translated into six design strategy cards for future designers and HCPs by ideation. Each strategy card is clarified with a description of the design strategy, a detailed explanation, the addressed influencing factors from the five categories, and the initial inspiration for the design.

These design strategies were discussed and analyzed in terms of two other dimensions: the strategy implementation stages based on patient behavioral stages, and the value prioritization of the four patient archetypes.

04 - 1 Ideation

A brainstorming session was first executed to generate some ideas for promoting trust based on the five categories of influencing factors.

Ultimately, the sifting and merging of ideas resulted in six design strategies to promote patient trust in teleconsultation.

Ideas are then filtered according to the trust needs that are of greatest concern to each patient archetype, and the design feasibility and value (see figure 4.1).

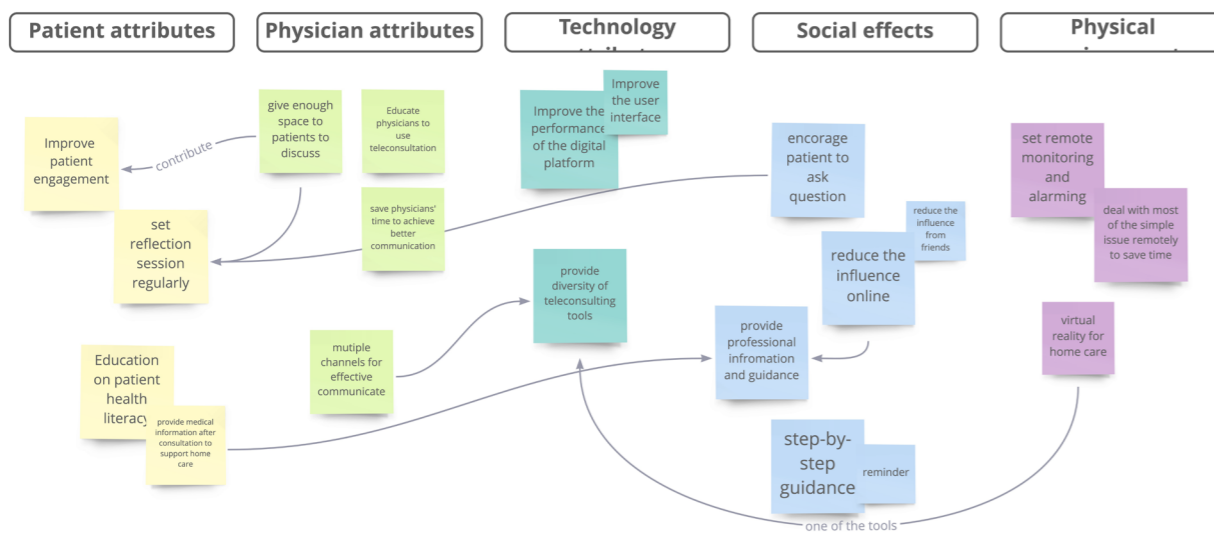


Figure 4.1: The brainstorming session



04 - 2 Design Strategy

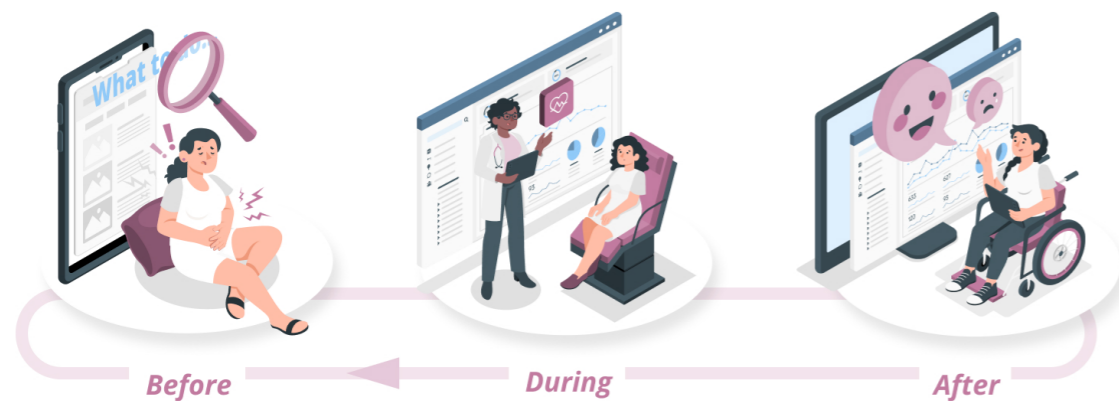
Healthcare coverage beyond consultation

Medical information cover before consultation

Helping patients with a pre-diagnosis and response to the disease condition prior to the consultation will improve communication during the consultation. Providing a detailed explanation of the consultation such as the physician's background and the features of the e-platform can also contribute to building the patient's initial trust.

Long-term self management in daily life

The care of chronic diseases is a long-term continuous process embedded in the patient's daily life. Patients are provided with guidance and tools for health self-management after consultation to support them in recording the health data and coping with simple conditions in their daily lives. Patient health data can also assist physicians in the next consultation, reducing their workload as well.



Direct promoted influencing factors

- 📱 Patient technology capability
 🗣️ Caring communication
- 📱 Patient health literacy
 🗣️ Effective communication

Design inspiration

- Health diary to record patient's feelings, health status
- An online website offering simple diagnostic guidance and basic coping methods

Education on patient health literacy

Chronic disease treatment requires the cooperation of both doctors and patients. It is therefore vital to improve patient health literacy. For patients who are keen to actively explore themselves, the accessibility to reliable medical information through professional sources can reduce the misleading of intricate suggestion.

Meanwhile, providing online health education and organizing regular health events can break down patients' previous biases and even misconceptions, increase patient trust in their healthcare providers and help them to carry out their daily health care.



Direct promoted influencing factors

- 📱 Personal cognition
 🗣️ Effective communication
- 📱 Patient health literacy
 🗣️ Online recommendation
- 📱 Patient involvement
 🗣️ Friends' recommendation

Design inspiration

- Online healthcare courses for patients
- Health-related forums or workshops organized by the community

Elicit patient questions and feedback

- **Encourage patients to ask questions and express negative emotions**





For some people in particular, the high level of trust that patients have in their doctors can lead them to hide their real feelings, excuse doctors' poor performance, or even blame themselves for the mistakes. Encouraging patients to express their thoughts, questions, and problems, especially negative feedback about care plans or even healthcare providers, can help doctors capture patients' real needs and adjust the care plan timely.

- **Provide sufficient space for communication**

Giving patients enough space to participate in the decision-making session in their treatment will help to create a personalized schedule that can better balance their life and chronic disease care over a long period of time.



Direct promoted influencing factors

- | | |
|---|---|
|  Patient involvement |  Caring communication |
|  Personal cognition |  Effective communication |

Design inspiration

- Regular reflection sessions to evaluate care and consultation in stages
- Co-creation session to discuss and create personalized care plan

Improve long-term patient engagement

Patient trust in their healthcare providers can sometimes lead to laxity and even negative responses to long periods of chronic diseases treatment and care. On the other hand, there are also patients who are overconfident about taking control of their health and are blindly optimistic about their health status. This can lead to them not following medical advice and even interrupting the care.

Therefore, patients need to be encouraged to actively participate in the long-term treatment process and to be reminded to actively comply with the agreed care plan.



Direct promoted influencing factors

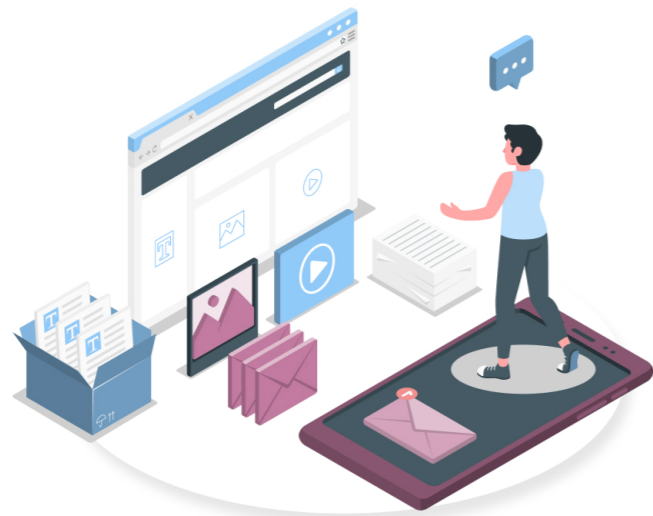
- | | |
|---|---|
|  Patient involvement |  Caring communication |
|  Personal cognition |  Effective communication |
|  Patient health literacy | |

Design inspiration






- Regular reminder tools to remind patients to take medication
- Step-by-step guidance to provide detailed instruction

Diversity of consulting channels

Multiple media can facilitate the collection and management of different types of health data in teleconsultation. For example, text messages can help patients visually understand unfamiliar medical terms. Pictures are used for the treatment of skin diseases. Audio facilitates communication between doctor and patient. Providing patients with a variety of consultation media and information channels to choose from according to the patient's personal situation can help to tailor the treatment plan. Moreover, it is worthwhile to think about the real role of different media and technologies used in healthcare in the future.



Direct promoted influencing factors

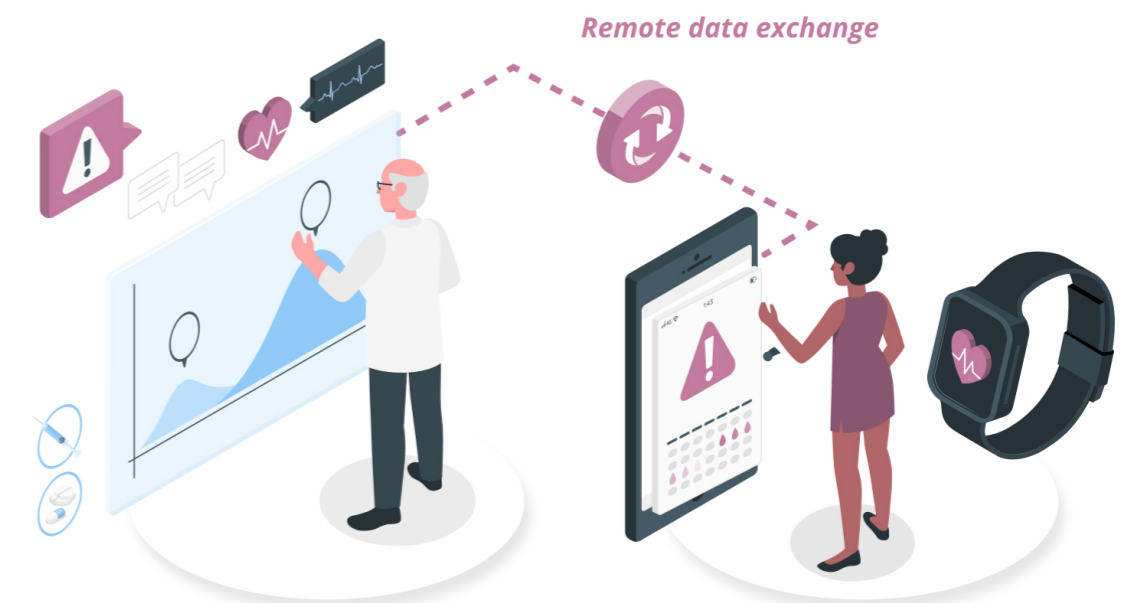
- | | |
|---|--|
|  Physician technology trust |  Technology accessibility |
|  Physician technology literacy |  Technology inclusion |
|  Comfortable environment | |

Design inspiration





- New technologies such as VR to provide immersive interaction
- Personalized care plan with a hybrid online and offline consultations

Medical remote monitoring and alarming

In a future where online and offline consultations are mixed, remote health monitoring can assist in managing patient health data and treating chronic diseases. Especially for patients who have strong opinions on health management and sometimes do not follow the medical advice, remote monitoring with health devices allows physicians to observe their conditions around the clock and receive timely health alerts through the monitoring system.



Direct promoted influencing factors

- | | |
|---|--|
|  Effective communication |  Technology inclusion |
|  Comfortable environment |  Technology performance |

Design inspiration

- Devices for daily self-monitoring with automatic alarm connected with GP
- Cooperation with community to respond to emergencies

Design Strategies based on the archetypes

Based on different trust-related needs, the six design strategies can be corresponded to four patient archetypes in order of value priority (see figure 4.2).

Archetype 1

The main problem of Archetype 1 is that they will hide problems and questions out of trust. Encouraging patients to give feedback can help them have a better experience. Meanwhile, as the key stage of trust building for this group of patients is Phase 1, before starting the teleconsultation, information coverage beyond teleconsultation will help them build initial trust.

Archetype 2

As patients of Archetype 2 behave on their own preferences and perceptions, it is important to improve their health literacy to help them make correct health decisions. In addition, wearable devices for remote monitoring can assist HCPs in tracking the health of patients beyond consultations without interfering with patients' daily lives.

Archetype 3

For Archetype 3, they tend to disobey medical advice because of self-confidence or interference from others. Therefore, reminding patients to carry out their care plan through detailed guidance can increase their involvement. At the same time, improving their health literacy will also reduce the interference of other non-professional information on the internet.

Archetype 4

For this type of patients, they are really critical and will actively participant in the care process. Therefore, it is effective to give them multiple channels of consultation to facilitate communication between doctors and patients, in order to set up personalized care plans.



Figure 4.2: Design strategies based on the archetypes

Design Strategies based on the three behavior phases

Based on the stage of implementation, the six design strategies can be mapped to the three patient behavioral phases of teleconsultation (see figure 4.3).

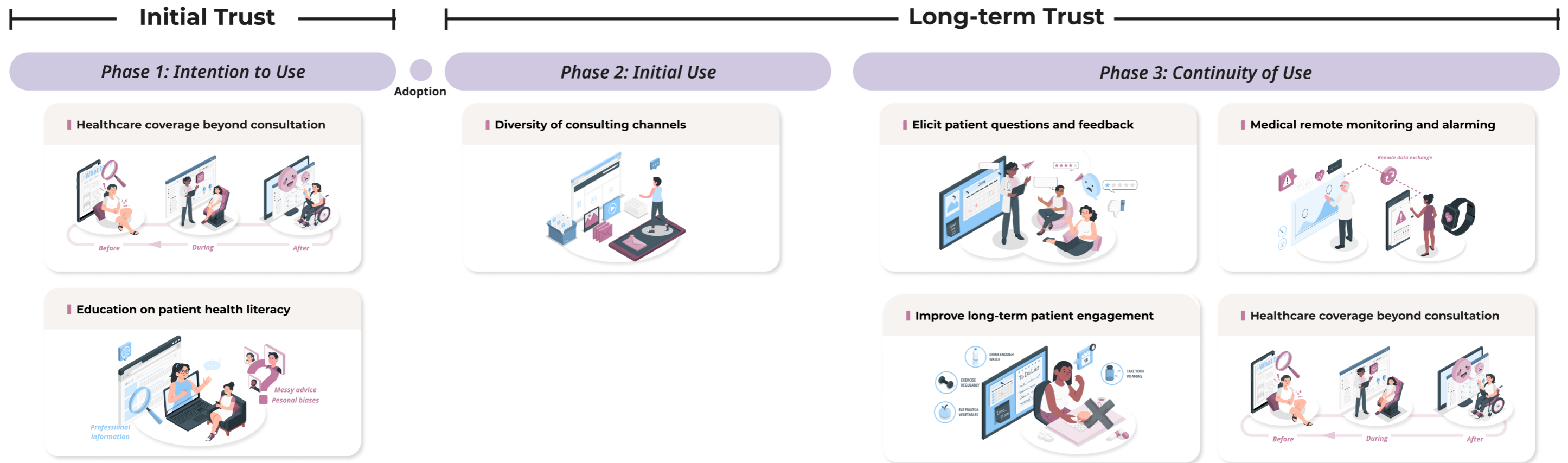


Figure 4.3: Design strategies on the behavior phases

04 DESIGN

Conclusion

Six design strategies were presented in summary based on the findings from the previous chapter. These strategies were discussed and categorized along three dimensions: the covered influencing factors, the implementation stage corresponded with patient behavior phases, and the value priority for four patient archetypes. The influencing factors were marked on each strategy card, while the corresponding behavior stages and the value priority for patient archetypes were demonstrated separately.

05 DELIVER

This chapter focuses on validating and evaluating the six strategy strategies and the website design. Two part sof evaluation were executed. In the first part, patient participants from previous interviews were invited to access five categories of factors that promote trust and six design strategies to evaluate the desirability. The second part invited designers to evaluate the feasibility and viability of the design strategies.

Ultimately, based on the results of the evaluation, the adapted design strategies and the final website design were presented.

05 - 1 Evaluation Methods

To further validate the design strategies, two parts of evaluation was excuted separately.

Evaluation with Patients

In the first part, patients who participated in the previous interviews were invited to complete an evaluation questionnaire, assessing the five categories of factors that promote trust, the design strategies promoting the trust, and the value priority of the design strategies to them.

The questionnaire was in both Chinese and English, consisting of two sections. Section 1

asked participants to choose the factors based on the five categories that promote trust effectively (see figure 5.1). In section 2, participants were asked to carefully read each strategy card, then evaluate six strategy cards by scoring two dimensions (see figure 5.2):

- Value for enhancing trust (Feasibility)
- Willingness to accept (Desirability)

Through the patient evaluation, the feasibility and desirability of the strategy contents was assessed.

Evaluation with Designers

For the second part of the evaluation, designers were invited to complete a design evaluation questionnaire. Participants were asked to rate each design strategy on three dimensions with three questions (see table 5.1):

- Design feasibility (Feasibility)
- Design desirability (Desirability)
- Human-centered level

Through the designer evaluation, the feasibility and desirability of the design were assessed.

The evaluation questionnaires were sent to 6 patient participants, and 6 designers. All of them sent the feedback. Table x.x provides an overview of the basic information of the participants.

Execution

The evaluation questionnaires were sent to 6 patient participants, and 6 designers. All of them sent the feedback. Table x.x provides an overview of the basic information of the participants.

Number	Age	Gender	Occupation	Location
Patient Evaluation				
1	28	Female	Designer	Italy
2	33	Male	Designer	Netherlands
3	25	Female	Teacher	China
4	23	Female	Medical graduate	China
5	24	Female	MSc graduate	Singapore
6	25	Female	BSc graduate	China
Designer Evaluation				
1	24	Female	MSc Designer	American
2	25	Male	MSc Designer	China
3	25	Female	MSc Designer	Netherlands
4	25	Male	MSc Designer	Netherlands
5	25	Female	MSc Designer	Netherlands
6	25	Female	MSc Designer	Netherlands

Table 5.1: An overview of the evaluation participants

* 1. Which of the following factors about yourself would promote your trust in doctors?
以下哪些和你自身相关的因素可以加强你对医生的信任? [多选题]

Highly involvement in treatment
You are allowed to actively participant in your care, playing an important role in decision-making.
你被允许积极参与到自己的护理过程中, 并在重要决策环节商议后做出决定而不是完全依赖医生。

Improving your technology capability
You're clearly taught to use digital tools such as the APP for teleconsultation.
你使用数字工具 (如APP) 进行远程咨询的技术技能不断提高。

Improving your health literacy
Your healthcare knowledge and medical skills are enhanced.
你的健康护理相关的医学知识和技能不断提高。

Anything to add or explain? _____

Figure 5.1: An example of the questions in the first part for patients

* 7. To what extent do you think the strategy can enhance your trust in your healthcare providers in teleconsultation?
你认为该策略在多大程度上能增强远程咨询中病人的信任?

Totally ineffective 完全无效 Very effective 很有效

○ ○ ○ ○ ○

* 8. To what extent are you willing to experience the service after the strategy has been implemented?
该策略实施之后, 你愿意体验这项服务吗?

Totally unwilling to 完全不愿意 Very willing to 很愿意

○ ○ ○ ○ ○

9. Any explanations, suggestions or questions?
任何对评价的解释、对策略的建议或疑问?

Figure 5.2: An example of the questions in the second part for patients

05 - 2 Evaluation Results

All questions from the two questionnaires were analyzed together. The average score of each question was calculated separately. At the same time, the opinions of the patients and the designers were also collected.

Part 1: Value of 5 categories of factors

Data from the first part of the patient evaluation questionnaire were analyzed to assess the value of five categories of factors in enhancing patient trust.

The facilitators selected by more than 80 percent of the participants were considered to be the most valuable factors which need to be given priority attention by the designers. Factors

selected by between 30 and 80 percent of participants were considered to be of moderate value and deserving of further attention. Factors selected by less than 30 percent of participants were not considered valuable enough. Figure 5.3 shows the results of the value assessment in three shades of color. The darker the color, the higher the value, and vice versa.

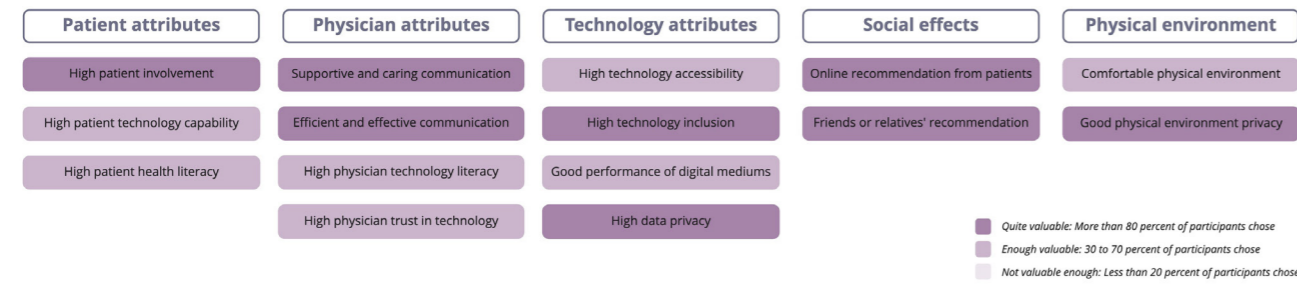


Figure 5.3: Visualisation of the different values of the factors that promote trust

The analysis shows that all factors have been validated to be of at least valuable and worthy of the designer's attention.

The number of factors considered to be of extremely high value accounts for more than half of the total. High patient involvement, the effectiveness and supportiveness of communication style, the inclusiveness and privacy of technology, recommendation online and offline, and the the environment privacy were considered to be most effective in enhancing trust.

The privacy of both digital and physical environment is considered to be an important factor affecting trust in teleconsultation. One participant even commented that privacy was her highest priority.

Communication style is also considered to be a crucial factor influencing trust, which will be affected by technological inclusiveness as well.

Part 2: Value of design strategies

The value of the design strategy was assessed by analyzing the second part of the patient questionnaire and the questions in the designer questionnaire.

Under each design strategy, the first question of the patient questionnaire and the designer questionnaire evaluated the design feasibility from two perspectives: **Whether it is accepted by the patient and implemented by design**

1. Healthcare coverage beyond consultation

The designers found this strategy to be highly feasible, adaptable and humanizing with a score of approximately 4.5. However, from the patient's perspective, this strategy was not the most effective way to promote trust with a score of 3.83.

Design feasibility : 4.12



Design desirability : 4.3



Human-centered level : 4.6



The second question of each of the two questionnaires assessed the desirability: **whether it is effective in promoting trust and assisting designers**. And the third question of the designer questionnaire assessed the degree of **user-friendliness of the strategy**.

The following are the results of the evaluation of each strategy on the five questions in the three dimensions.

2. Education on patient health literacy

The overall rating for this strategy is not so high, with a score of 4 or less for feasibility and desirability. At the same time, designers generally felt that this strategy was not very user-friendly, only with a score of 3.4.

Design feasibility : 4.04



Design desirability : 3.87



Human-centered level : 3.4



3. Elicit patient questions and feedback

Strategy 3 was the highest scoring of all the strategies on all dimensions. In particular, designers gave high marks to this strategy as being effective in helping them to design for trust, with a score of both 4.6 in the dimensions of feasibility and desirability.

Design feasibility : 4.3



Design desirability : 4.3



Human-centered level : 5



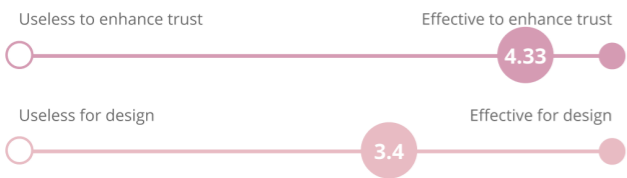
5. Diversity of consulting channels

The Strategy 5 was given a score of 3.4 by the designers on desirability, which is below the average score for this question. From a patient perspective, the strategy was much valuable in enhancing trust, both scoring above 4.0.

Design feasibility : 4.19



Design desirability : 3.87



Human-centered level : 4.2



4. Improve long-term patient engagement

The majority of patients felt that strategy 4, improving patient engagement, would help promote trust. However, the designers have different opinion. They did not consider this strategy to be of great value to their design practice, only with a score of 3.2.

Design feasibility : 4.2



Design desirability : 3.68



Human-centered level : 4.4



6. Medical remote monitoring and alarming

Patients' expectations of this strategy were slightly lower than those of the designers. However, overall, Strategy 6 was above the mean in all dimensions, with a score around 4.0.

Design feasibility : 4.02



Design desirability : 4.02



Human-centered level : 4.2



Conclusion

From a designer's perspective, the most feasible strategy to implement through design is Strategy 3: Elicit patient feedback. The most inspiring strategies for design practice are Strategies 1 and 3: Healthcare coverage beyond teleconsultation and Elicit patient feedback. In terms of the human-centered dimension, almost all strategies are highly humanizing.

In summary, Strategy 3 was assessed as having the highest design value. Future designers could focus on the strategies that encourage patient negative feedback. Strategy 2, on the other hand, had the lowest design value. Designers found for patient education is difficult to intervene in from the design perspective.

From the patient's perspective, all of the strategies have been shown to enhance patient trust in telemedicine. Strategy 2 (Patient education) and strategy 5 (Diversity channels) were the most effective and valuable. While Strategy 6, Remote monitoring, was the least valuable. It is difficult for patients to imagine a future with wearables and medical monitoring. This is also related to the patient's perception that privacy is an important influencing factor.

The value of the design outcomes and strategies was validated through the evaluation from both patient and designer perspectives. A cognitive difference between patients and designers was also identified, which deserves the attention of future designers.



05 - 3 Trust Design Guidelines

Based on the previous findings, design guidelines were produced to assist designers in building future teleconsultation and promoting patient trust. The guidelines are communicated to designers and HCPs through a website (see figure 5.4).

Online website

The website includes all the research outcomes and the design strategies to help designers or healthcare providers to understand patient trust and get inspiration for future design.

On the home page of the website, all information is presented in separate blocks. The designers can browse through the summary of each block of content on the home page and selectively read the specific information in depth according to their design objectives.

Click on each block to read specific insights. The first block presents the trust definition, dimensions, characteristics of patient trust, and the pathways that trust attitudes influence patient behavior in teleconsultation. The second block describes the five categories of factors that promote trust. The third part of content gives designers design inspiration, providing four patient archetypes and six strategy cards based on the archetypes.

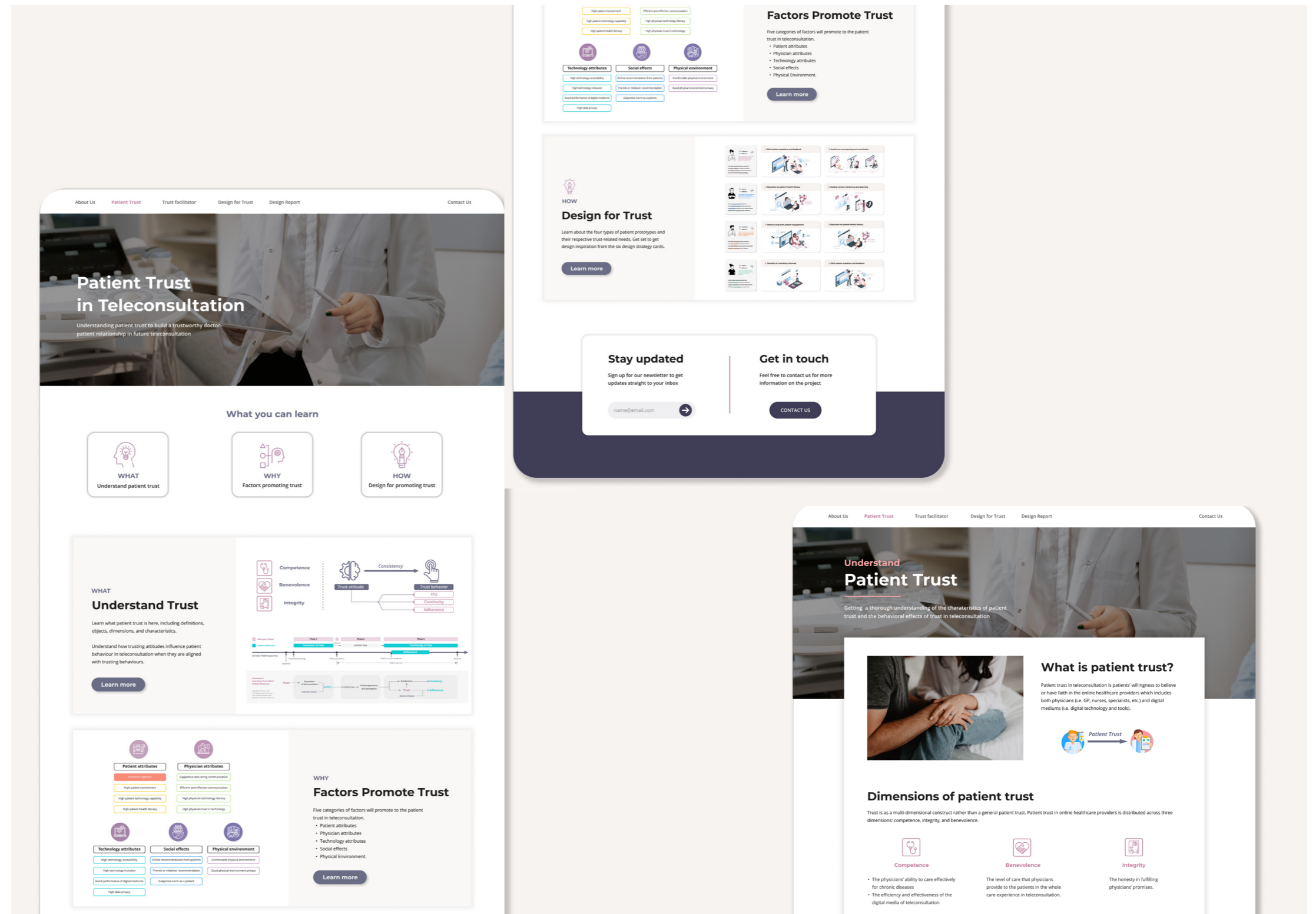


Figure 5.4: The user interface of the online website

06 CONCLUSION

The purpose of this chapter is to review and summarize the entire project. The limitations of the research were discussed to provide future recommendations for other researchers and designers. Following that, personal reflections on personal learning objectives were indicated in the end.

06 - 1 Conclusion

This graduation project is a research-oriented project. It is based on the Consultation Room 2030 project, investigating patient trust in healthcare providers under a teleconsultation context, trying to enhance patient trust by means of design in order to achieve the Triple Aim in healthcare.

Research: Theoretical research

Following an analysis of challenges and trends from both the technological and healthcare perspective, a future vision of teleconsultation was initially constructed at first. The context in which the final design strategy will be implemented is based on this future vision:

"The future teleconsultation is a hybrid consultation model combining multiple digital technologies and community collaboration that provides efficient, convenient, and personalized care plans and healthcare support in daily life."

In the theoretical research, three research questions were posed for the literature review:

RQ1. Understanding

What is patient trust in HCP in teleconsultation?

RQ2. Consequences

How does trust affect patient behaviors in teleconsultation?

RQ3. Predictors

What affects patient trust in HCP in teleconsultation?

Through literature review, three questions were answered in order to construct a conceptual framework for this project.

RQ1. What is patient trust in teleconsultation?

The results of this question clarify the theoretical definition of patient trust in this project, the three dimensions of trust, and the distinction between trust attitudes and trust behaviors.

In previous research about trust, trust behavior has often been equated with the results of trust attitudes. However, in some contexts, trust attitudes and trust-related behaviors do not consistent. In order to broaden the inclusiveness of the design to cover all trust-related scenarios, it is necessary to study both contexts where trust attitudes and behaviors are consistent and inconsistent.

RQ2. How does trust affect patient behaviors in teleconsultation?

RQ 2 focused on the scenario in which trust attitudes and behaviors are consistent. Healthcare behaviors and technology-related trust behaviors are the consequences of trust attitudes in this scenario.

Firstly, three important behaviors in teleconsultation were identified as the focus of this project: Intension to Use (ITU), Continuity of Use (Continuity), and Adherence to treatment (Adherence). Based on the three behaviors, the process of patients using teleconsultation is divided into three behavior phases: Intension to Use, Initial usage, and Continuity of Use.

According to the behavioral model, the way in which trust influences three focused behaviors is elucidated (see figure 6.1), which is the first outcome of this project.

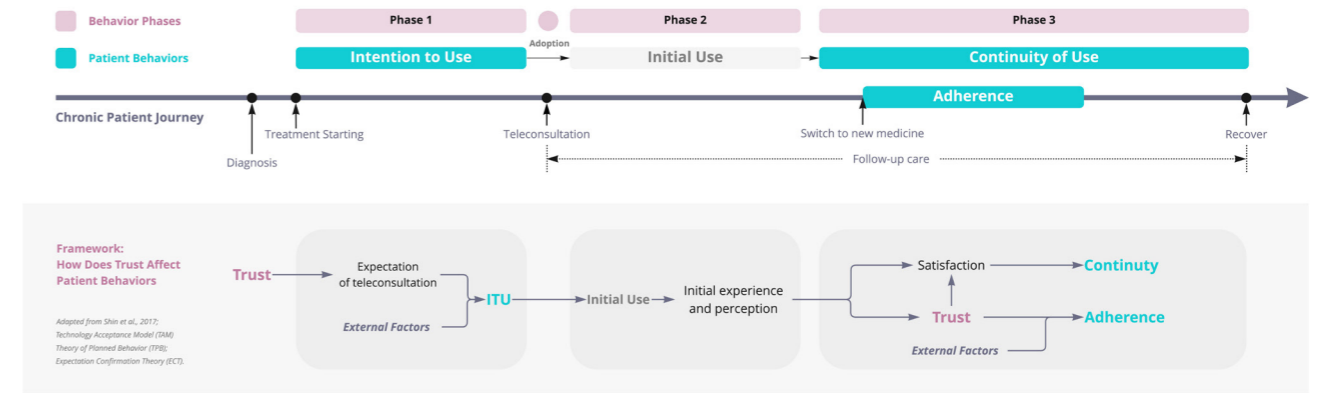


Figure 6.1: The framework that explains how trust affects three patient behaviors in teleconsultation

RQ3. What affects patient trust in HCP?

The answers to RRQ3 summarized four categories of factors influencing patient trust in teleconsultation: **Patient attributes**, **Physician attributes**, **Technology attributes**, and **Social effects**. A gap of the lack of technology factors remained in the end.

Research: Generative research

Two research questions were generated based on the unsolved questions left over from the previous section and were answered by patient and expert interviews.

RQ4. What are the emerging factors that influence patient trust in teleconsultation?

Combining the findings of the literature study, five categories of factors that promote trust were identified (see figure 6.2). This is the second research result of this project.

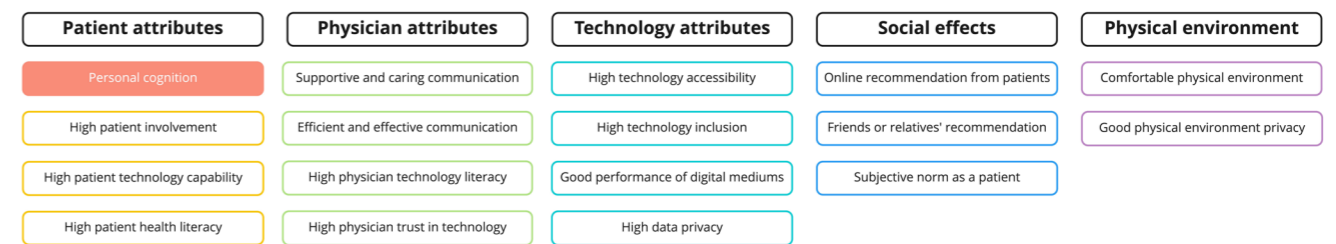


Figure 6.2: The updated framework of five categories of factors affecting trust

RQ5. What are the trust-related needs and expectation of each patient archetype?

In order to investigate inconsistency in trust attitudes and behaviors, the method of patient archetypes was applied (see figure 6.3). The results of RQ5 elucidated the mindsets, behavioral characteristics, and derived trust needs of each patient archetype. The design values of the different behavioral stages based on different patient archetypes were elucidated, and the important influencing factors were mapped on the corresponding phases (see figure 6.4).

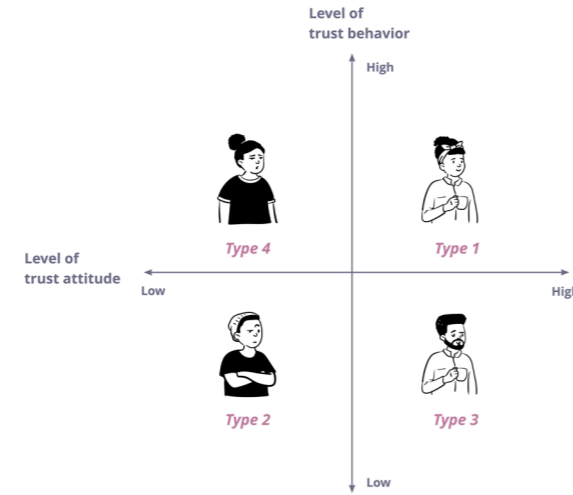


Figure 6.3: The patient archetype axis

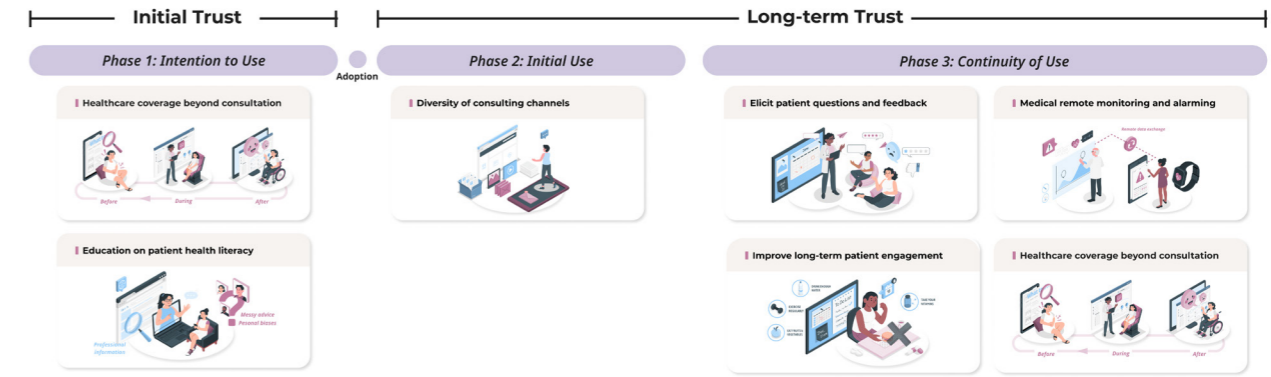


Figure 6.6: Design strategies on the behavior phases

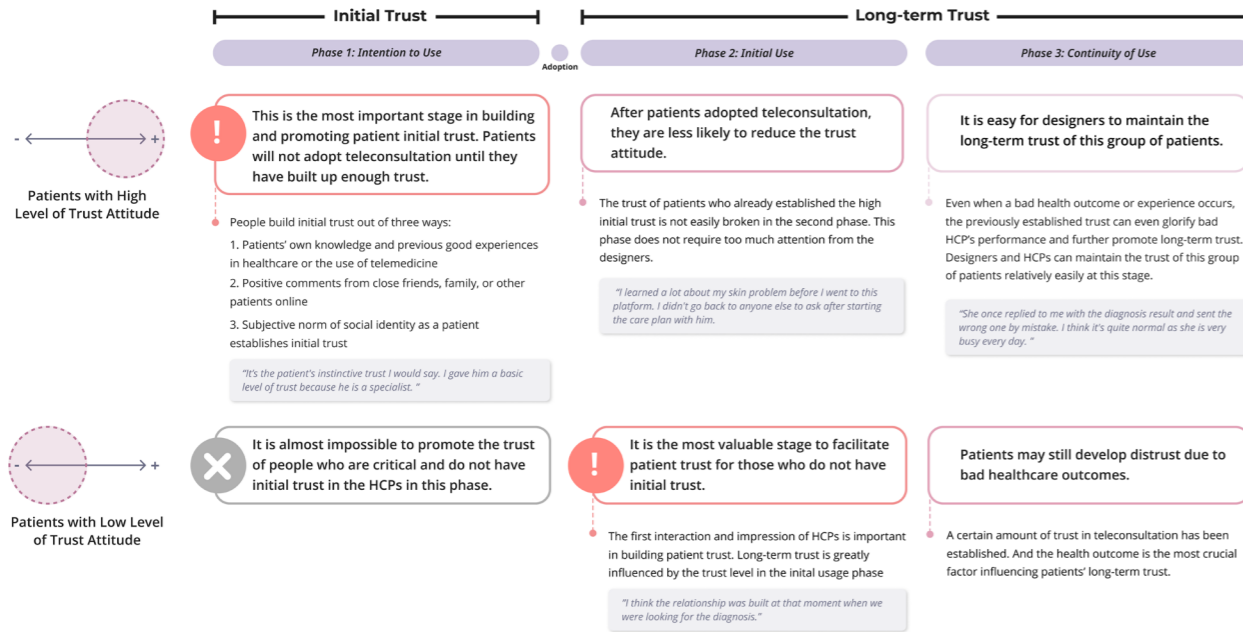


Figure 6.4: The design value of trust promotion at different behavior phases in teleconsultation

Design

Six design strategies were presented in summary (see figure 6.5). Each strategy card includes a description of the design strategy, a detailed explanation, the addressed influencing factors from the five categories, and the initial inspiration for the design. These strategies were discussed and categorized along three dimensions: the covered influencing factors, the implementation stage corresponded with patient behavior phases (see figure 6.6), and the value priority for four patient archetypes (see figure 6.7).

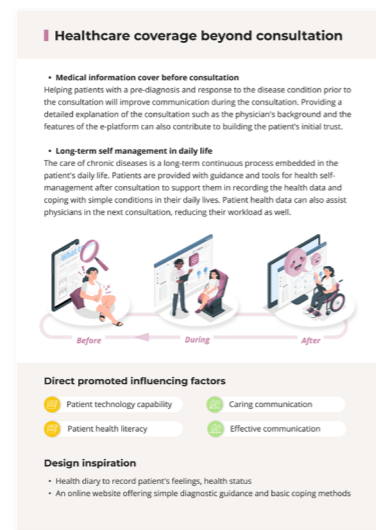


Figure 6.5: An example of the strategy card

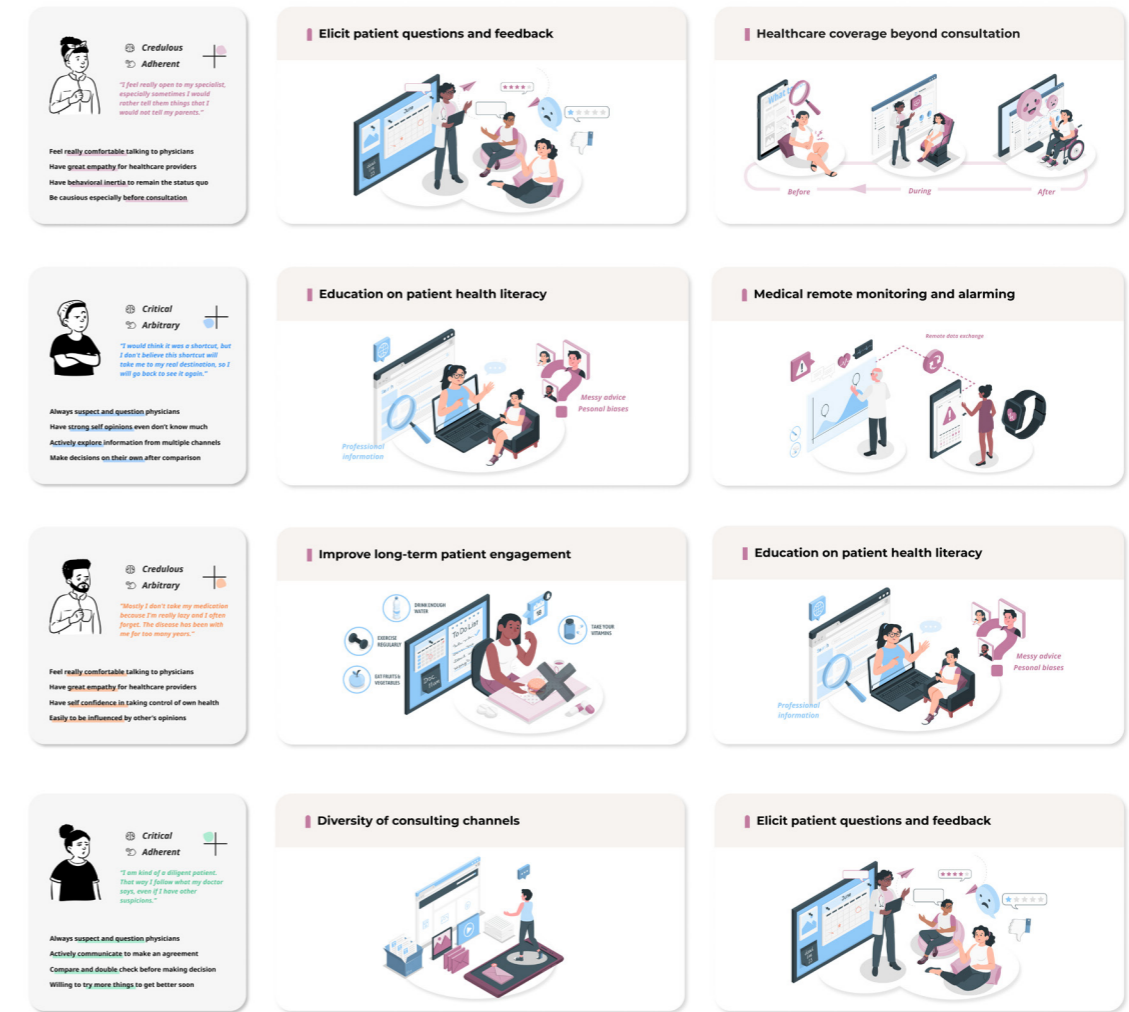


Figure 6.7: Design strategies based on the archetypes

Conclusion

Ultimately, based on the previous research elements, an online website was produced to provide design insights for future designers to promote patient trust in teleconsultations. All research findings and design strategy cards are included in the design guide.

The framework of this graduation project is shown in the figure 6.8 on the right.

UNDERSTAND

Contextual understanding

Literature review

Unsolved questions

EXPLORE

Patient & Expert interviews

DESIGN

DELIVER

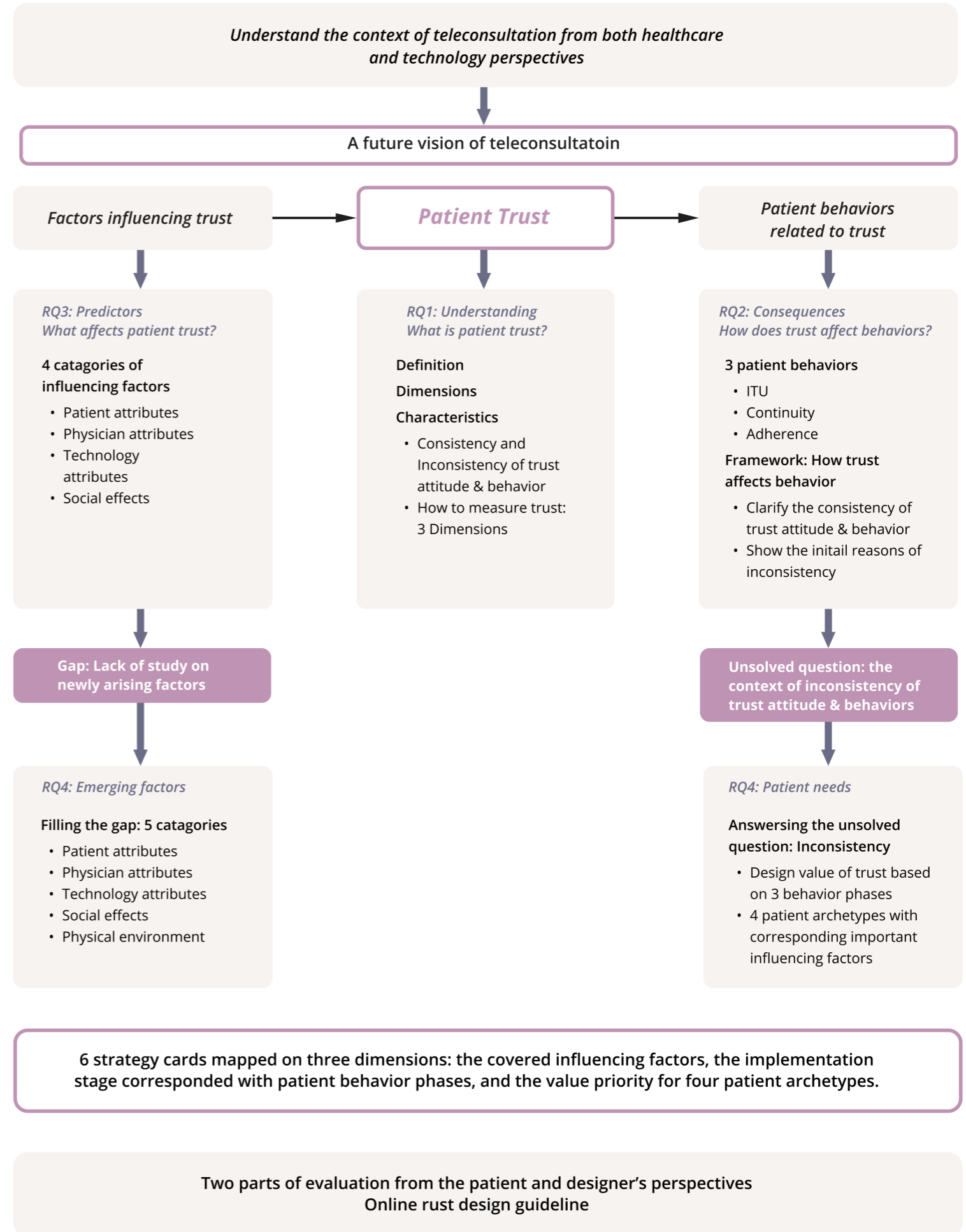


Figure 6.8: The structural framework of this graduation project

06 - 2 Limitation & Recommendation

The theoretical framework of trust affecting behavior has not been evaluated.

The first outcome of this project is a framework for the way in which trust influences the three behaviors in teleconsultation based on other behavior models. However, the framework has not been validated due to objective constraints, such as project time, of this project.

In further research, this model needs to be validated and modified by observing patients' behavior in consultation and interviewing medical specialists.

Lack of interview participants from different backgrounds

The project starts from the Dutch healthcare system and eventually spreads globally. When conducting user interviews to understand the teleconsultation experience of chronic patients, various participants from different backgrounds were needed to study teleconsultation in different regions in comparison. However, due to objective limitations, only one patient from the Netherlands, one from Italy, and one from Singapore were approached for this project, which is not representative enough.

Moreover, chronic conditions include many diseases such as hypertension, depression, rhinitis, etc. These chronic diseases vary in their symptoms, degree of urgency, and means of treatment and care. However, in order to focus more on the context of teleconsultation, this project does not strictly distinguish and then focus on specific chronic diseases.

In future research, it is valuable to focus on a specific chronic disease or category of chronic diseases for in-depth research or to compare

and contrast whether different types of chronic diseases have different effects on patients' trust attitudes and behaviors.

Lack of research on other patient behaviors or mindset in teleconsultation

This project focused on three patient behaviors: ITU, Continuity and Adherence. Therefore, the analysis of the interview data focused only on what was relevant to these three behaviors and the mindset of trust. However, during the analysis, other patient characteristics were found.

Based on these characteristics, more tensions can be generated (see figure 6.9). For example, patients can be divided into two categories depending on whether they are more concerned about privacy in the physical or digital environment. There are also patients who are more comfortable talking face-to-face, but others who would find online consultation more relaxing.

In the future, research into these dimensions that were not considered in the data analysis could help to construct a more complete picture of the different patient archetypes.

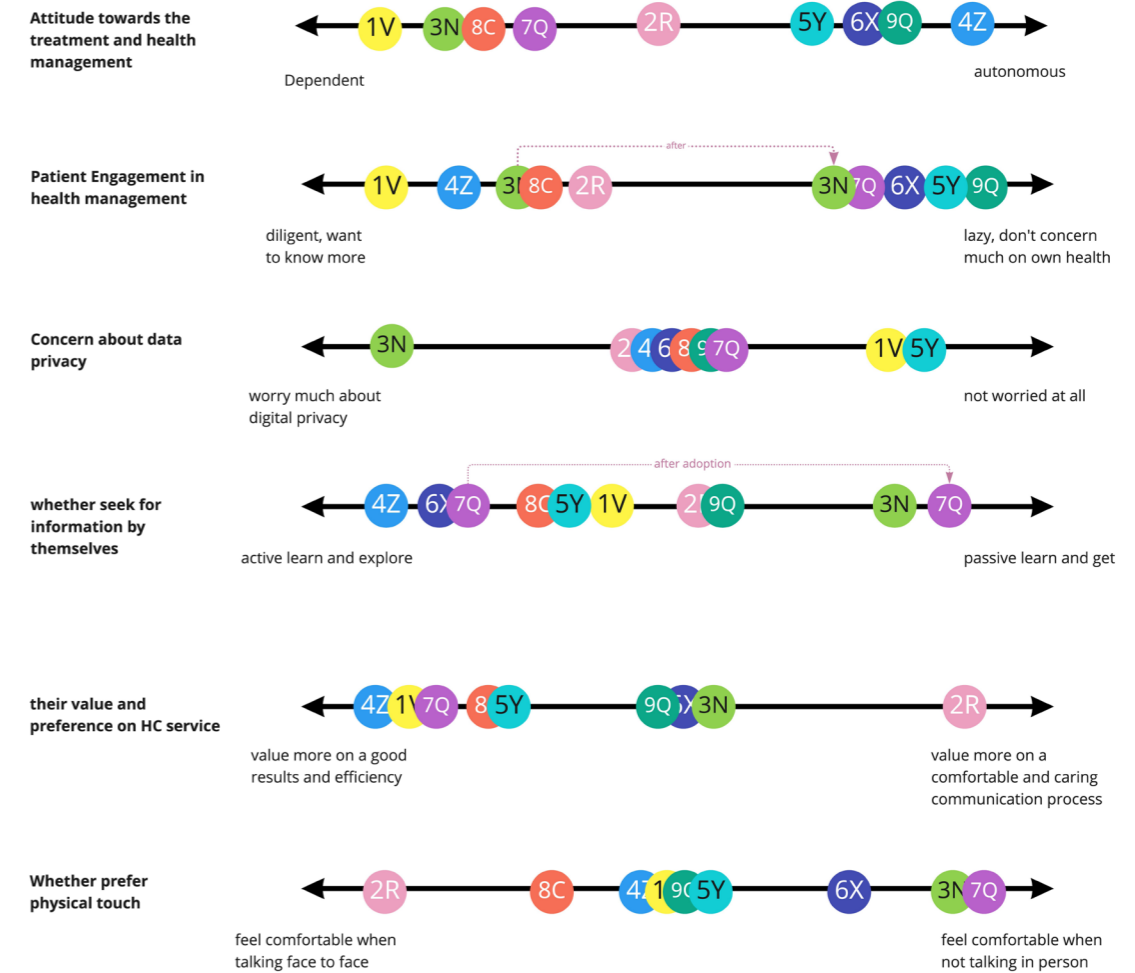


Figure 6.9: The tensions based on other characteristics of patient behavior or mindsets patterns

More design strategies can be generated

This project screens for factors that promote trust by two indicators (see figure 6.10). However, there are still many factors outside the focused scope, such as the function design of digital tools for teleconsultation. These factors were not covered in this project, but still valuable to be researched and designed in the future.

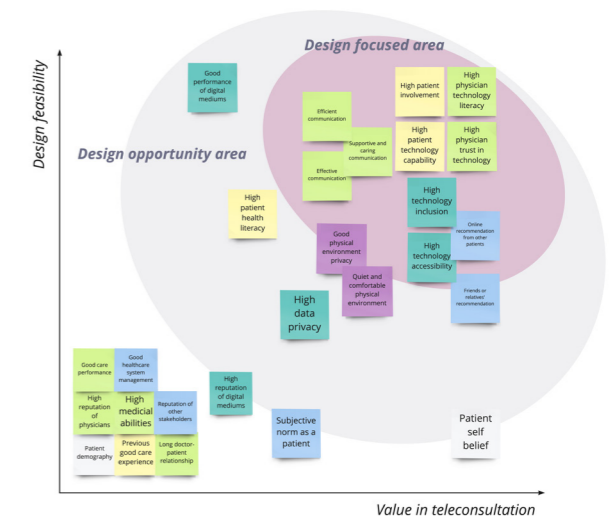


Figure 6.10: Comparison of influencing factors

06 - 3 Personal Reflection

At the beginning of the project, I set myself four learning objectives. In this section, I will reflect on what I have learned in the process of this project in relation to the four objectives.

Conducting a research-oriented project

The first learning objective is the expectation of this graduation project. Instead of conducting a design project, I planned to undertake a research-oriented project, focusing on the process and analysis of the research to practice research methods including desk research, literature research, and qualitative research.

Therefore, I spent half of the time conducting background research and literature studies, learning about different approaches to the literature review and conducting a scoping review approach to dismantle and analyze the topic of trust.

I have also used qualitative research to explore the issues that remain in the literature study. Application reviews and user interviews were performed. However, the results of the application review analysis were not within the focused scope of this project and so were not included for the insights in the end. At the beginning of the qualitative research, I did not set the hypothesis of the research questions well, which led to the problem in the research method and analysis.

Practicing communication skills

The second learning objective is to practice communication skills. Through user and stakeholder interviews, I was able to practice my communication skills with different backgrounds. Not only did I practice my skills during the interviews, but I also tried out how to use social

platforms to recruit and communicate with respondents in the recruitment phase. Talking with patients, doctors and medical experts from different backgrounds allowed me to learn about the topic of trust from multiple perspectives and get empathetic with different roles.

Learning in-depth in the healthcare field

One of the motivations that drove me to start this project was my interest in healthcare design. As a Medesign student, I not only linked my design skills in this project, but also learnt a lot about the healthcare field.

Healthcare design has always been a difficult and systemic issue. Having spoken to stakeholders from different backgrounds, I have also discovered the difference in perspective between designers and healthcare professionals, and the gap between the purpose of the design and the purpose of healthcare. As this project is only a Master's graduation project, there is fewer questions about the commercial implementation. However, in the future, if the healthcare design is to be carried out, there will be many more restrictions involved. At that time, the feasibility of the design will face more challenges.

Preparing for career development

The last learning objective is about my personal development. I have always expected to work in the healthcare field in the future, so I hope this project to help me clarify my career plans and future aims.

By completing this project, I have gained a better understanding of healthcare design and discovered more challenges. For example, it is difficult to involve patients into the healthcare design due to some objective issues such as

privacy. It is also difficult to align project goals as there are many stakeholders involved.

On the other hand, after trying out different research methods, my interest in design research has increased. It is also valuable to analyze, generalize and summarize theories to provide guidance for design practice.

Overall, the in-depth understanding of healthcare design and design research has helped me to have a clearer view of my future career direction.

Conclusion

I have learnt a lot through this graduation project in several perspectives of personal development.

One issue that was not expected at the beginning of the project was the management of the project. Due to the impact of the pandemic and personal planning problems, this project took longer than expected to complete.

Overall, however, it is a very rewarding and enjoyable process for me to undertake and complete this project. Although there are still many shortcomings, I have largely achieved the goals I set for myself at the beginning.

Acknowledgement

When I started writing the first sentence of the acknowledgment, I was still in a bit of a trance. But the truth is that this is indeed the last page of my thesis and the last days of my master's career.

Two years ago in September, under the uncertainty caused by the pandemic, I hastily began my master's studies. Due to issues with flights, I spent the first month of my academic year online via video, attending the opening week, studying, and socializing. Little did I know then that two years later now, in the autumn, I will be defending and graduating from my Master's degree online again.

It is certainly a pity that I couldn't celebrate the beginning and end of my master's with teachers and friends. But the time at TU Delft during these two years has been unparalleled in terms of pleasure and memorability. The pandemic has caused many difficulties, but underneath it all, we are still trying to overcome challenges and live our lives.

In such a scenario, I have been thinking more about healthcare and about life than in the past. During my undergraduate studies, I worked on a design project for postnatal care, which had a great impact on me. Driven by these two reasons, I chose to study Medisign to learn more about healthcare. In these two years, I have been exposed to many projects about patients, doctors, hospitals, and so on. I was astounded by the complexity of the healthcare system, but at the same time fascinated by the value that healthcare design can bring to the table. Eventually, I embarked on this graduation project, starting with the teleconsultation promoted by the pandemic and looking at the future of the healthcare system.

I greatly appreciate my chair Richard and my mentor Marieke for all the help they brought to me. When I had trouble recruiting participants, they offered me a lot of advice and helped me to complete my user research. When I was struggling to sort out the logic of my research framework, they were on hand to point out problems and show me the direction of further research. I also greatly appreciate Tingting, my project advisor, for taking personal time to discuss and brainstorm with me whenever I had any problems.

Thanks to my friends Wenhao, Tingwei, Hanchu, Camilo, and Parastou for chatting and discussing with each other regularly, pushing me to keep moving forward, and easing my anxiety. Thanks to my boyfriend and my family for being with me through many difficult moments during these eight months, even with a six-hour time difference between us. Thanks to the Beagle Qianqian and the six cats vv, ll, ss, ff, yy, and tt, for providing me with emotional support from thousands of miles away online. Last but not least, thanks to all the people who were involved in my project and provided me with a lot of help in various ways.

There is a word in Chinese called 'yuan fen'. It is a predetermined binding force between two people. And I believe that all the meeting up with someone is a kind of yuan fen. I will cherish all the encounters in these special two years.

07 REFERENCE

- Ahmed, R., & Aslani, P. (2013). What is patient adherence? A terminology overview. *International Journal Of Clinical Pharmacy*, 36(1), 4-7. doi: 10.1007/s11096-013-9856-y
- Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. IN *Action Control from Cognition to Behavior*, J. Kuhl and J. Beckmann, ed.
- Berwick, D., Nolan, T., & Whittington, J. (2008). The Triple Aim: Care, Health, And Cost. *Health Affairs*, 27(3), 759-769. doi: 10.1377/hlthaff.27.3.759
- Bhaskar, S., Bradley, S., Chattu, V. K., Adisesh, A., Nurtazina, A., Kyrykbayeva, S., ... & Ray, D. (2020). Telemedicine across the globe-position paper from the COVID-19 pandemic health system resilience PROGRAM (REPROGRAM) international consortium (Part 1). *Frontiers in public health*, 8, 556720.
- Bhattacharjee, A. (2002). Individual Trust in Online Firms: Scale Development and Initial Test. *Journal Of Management Information Systems*, 19(1), 211-241. doi: 10.1080/07421222.2002.11045715
- Davis, F. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319. doi: 10.2307/249008
- Deldar, K., Bahaadinbeigy, K., & Tara, a. (2016). Teleconsultation and Clinical Decision Making: a Systematic Review. *Acta Informatica Medica*, 24(4), 286. doi: 10.5455/aim.2016.24.286-292
- Dennis, M., & Scott, C. (2007). Managing Addiction as a Chronic Condition. *Addiction Science & Clinical Practice*, 4(1), 45-55. <https://doi.org/10.1151/ascp074145>
- Dogra, N., Bakshi, S., & Gupta, A. (2022). Exploring the switching intention of patients to e-health consultations platforms: blending inertia with push-pull-mooring framework. *Journal Of Asia Business Studies*. <https://doi.org/10.1108/jabs-02-2021-0066>
- Edwards, C. (2016). Telemedicine – A Growing Enabler of the Triple Aim and Shift to Value-Based Care. Retrieved from <https://www.healthcareitnews.com/sponsored-content/telemedicine-growing-enabler-triple-aim-and-shift-value-based-care>
- Esser, P. E. (2011). Creating caring hands through technology: An Industrial designer's approach to medical teleconsultation.
- Gopichandran, V., & Chetlapalli, S. (2015). Trust in the physician-patient relationship in developing healthcare settings: a quantitative exploration. *Indian Journal Of Medical Ethics*. <https://doi.org/10.20529/ijme.2015.043>
- Grant, M., & Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal*, 26(2), 91-108. doi: 10.1111/j.1471-1842.2009.00848.x
- Hall, M., Dugan, E., Zheng, B., & Mishra, A. (2001). Trust in Physicians and Medical Institutions: What Is It, Can It Be Measured, and Does It Matter?. *The Milbank Quarterly*, 79(4), 613-639. <https://doi.org/10.1111/1468-0009.00223>
- Hall, M., Zheng, B., Dugan, E., Camacho, F., Kidd, K., Mishra, A., & Balkrishnan, R. (2002). Measuring Patients' Trust in their Primary Care Providers. *Medical Care Research And Review*, 59(3), 293-318. doi: 10.1177/1077558702059003004
- Kang, M., Shin, D., & Gong, T. (2016). The role of personalization, engagement, and trust in online communities. *Information Technology & People*, 29(3), 580-596. doi: 10.1108/itp-01-2015-0023
- Laubheimer, P. (2022). Personas vs. Archetypes. Retrieved from <https://www.nngroup.com/articles/personas-archetypes/>
- McKnight, D., Choudhury, V., & Kacmar, C. (2002). Developing and Validating Trust Measures for e-Commerce: An Integrative Typology. *Information Systems Research*, 13(3), 334-359. doi: 10.1287/isre.13.3.334.81
- McKnight, D., Cummings, L., & Chervany, N. (1998). Initial Trust Formation in New Organizational Relationships. *Academy Of Management Review*, 23(3), 473-490. doi: 10.5465/amr.1998.926622
- National Institute for Public Health and the Environment. (2018). The Public Health Foresight Study 2018.
- National Institute for Public Health and the Environment. (2020). Looking beyond COVID-19, about the future of our health. Retrieved from <https://www.volksgezondheidtoekomstverkenning.nl/english/magazine#health>
- Oliver, R. (1980). A Cognitive Model of the Antecedents and Consequences of Satisfaction Decisions. *Journal Of Marketing Research*, 17(4), 460. doi: 10.2307/3150499
- Onor, M., & Misan, S. (2005). The Clinical Interview and the Doctor-Patient Relationship in Telemedicine. *Telemedicine And E-Health*, 11(1), 102-105. doi: 10.1089/tmj.2005.11.102
- Pavlou, P., & Gefen, D. (2004). Building Effective Online Marketplaces with Institution-Based Trust. *Information Systems Research*, 15(1), 37-59. doi: 10.1287/isre.1040.0015
- Philips. (2022). 10 healthcare technology trends for 2022. Retrieved from <https://www.philips.com/a-w/about/news/archive/features/2022/20220120-10-healthcare-technology-trends-for-2022.html>
- Prochaska, J., & Norcross, J. (2014). Systems of psychotherapy: a transtheoretical analysis.
- Raposo, V. L. (2016). Telemedicine: The legal framework (or the lack of it) in Europe. *GMS health technology assessment*, 12.

Rolfe, A., Cash-Gibson, L., Car, J., Sheikh, A., & McKinstry, B. (2014). Interventions for improving patients' trust in doctors and groups of doctors. *Cochrane Database Of Systematic Reviews*. doi: 10.1002/14651858.cd004134.pub3

Shin, D., Lee, S., & Hwang, Y. (2017). How do credibility and utility play in the user experience of health informatics services?. *Computers In Human Behavior*, 67, 292-302. doi: 10.1016/j.chb.2016.11.007

Simonse, L. (2017). *Design Roadmapping*. Amsterdam: BIS Publishers.

Spreekkamer 2030 | . (2022). Retrieved 18 July 2022, from <https://www.spreekkamer2030.nl/>

Thom, D., Hall, M., & Pawlson, L. (2004). Measuring Patients' Trust In Physicians When Assessing Quality Of Care. *Health Affairs*, 23(4), 124-132. doi: 10.1377/hlthaff.23.4.124

Thom, D., Ribisl, K., Stewart, A., & Luke, D. (1999). Further Validation and Reliability Testing of the Trust in Physician Scale. *Medical Care*, 37(5), 510-517. <https://doi.org/10.1097/00005650-199905000-00010>

Venkatesh, V., & Davis, F. (1996). A Model of the Antecedents of Perceived Ease of Use: Development and Test. *Decision Sciences*, 27(3), 451-481. doi: 10.1111/j.1540-5915.1996.tb01822.x

World Health Organization. (2003). *Adherence to long-term therapies: evidence for action*. World Health Organization.

Wu, K., Zhao, Y., Zhu, Q., Tan, X., & Zheng, H. (2011). A meta-analysis of the impact of trust on technology acceptance model: Investigation of moderating influence of subject and context type. *International Journal Of Information Management*, 31(6), 572-581. doi: 10.1016/j.ijinfomgt.2011.03.004