Personal Health Records in The Netherlands; will they be adopted?

A study using the PRIMA-model

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Abstract

A personal health record (PHR) is an electronic resource of health information for individuals to make health decisions. These patients can own and manage the information in the PHR, which comes from healthcare providers and the patient himself. According to a study done by the NCPF there is a huge interest in PHR's in The Netherlands. However, there is only little adoption of this product. We used the PRIMA-model in order to understand why the adoption-rate is low. We have mapped this model to the several well-known IS-success models, like TAM, UTAUT and the IS-success model. During this study we have found out that there are several aspects that have a negative influence on the adoption rate: Perceived Risk (especially privacy), perceived usefulness when they are not sick, Information Quality, perceived compatibility and ease to use. Finally, we have suggested some factors that PHR-suppliers could improve in order to increase the adoption rate of PHR's in The Netherlands.

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1. Introduction

According to Dr. Richard Satava , "The future of [medicine] is not about blood and guts; it is about bits and bytes." (Satava, 2013) And “eHealth is here to stay and will forever change the way care is delivered” according to the organization of the 24th conference of the European Wound Management Association. (EWMA, 2014)For the last few years eHealth is a rapidly developing market. Expectations are that the market could be as big as $16 billion a year. Part of this trend is the uprising of PHR’s.

A personal health record (PHR) is an electronic resource of health information for individuals to make health decisions. These patients can own and manage the information in the PHR, which comes from healthcare providers and the patient himself.

According to a survey done by the NCPF (Dutch patient society), there is a huge interest in Personal Health Record (PHR). More than 4 out of 5 patients (83%) are interested in the ability to look up their personal health information, stored at health providers.

Despite this large amount of interest, there is little actual adaption of PHR. During this study we will try to find the actual reasons why that is the case.

2. Research questions

We try to describe the main factors that impede and drive the adoption of PHR’s. To combine these two, we phrase one final research question:

What factors influence the adoption of PHR’s by Dutch individuals and how can it be more succesful?

We will be using the PRIMA-model to research this question. Investigating these five factors, we will try to find out which factors are crucial for the success of PHR’s in The Netherlands.

This question can be divided into smaller pieces:

1. Does the use of a PHR suit in the current lifestyle of the interviewees?
2. Do the interviewees think that a PHR is relevant?
3. Does a PHR give good information?
4. Do the interviewees have sufficient means available?
5. What are the interviewee’s current attitudes towards a PHR?
6. How can PHR’s be more successful?

3. Literature search

Before finding a suitable methodology, we need to find good (scientific) articles that can be used to provide relevant information. In order to do so, we will use the article of Wolfswinkel et al (2013) that provides a strategy to find these articles. It consists of five steps:

Number	Task
1.	DEFINE
1.1	Define the criteria for inclusion/exclusion
1.2	Identify the fields of research
1.3	Determine the appropriate sources
1.4	Decide on the specific search terms
2.	SEARCH
2.1	Search
3.	SELECT
3.1	Refine the sample
4.	ANALYZE
4.1	Open coding
4.2	Axial coding
4.3	Selective coding
5.	PRESENT
5.1	Represent and structure the content
5.2	Structure the article we will only focus on the selection of the articles

Because we will use this article only for the selection of articles, we only will use steps 1-3.

3.1 Define

1.1 Define the criteria for inclusion/exclusion

To eliminate articles that are not suitable for this review, we have made some constraints:
Year of publication: (Healthcare) Information systems are a field that is evaluates fast, due to the technical developments that are made. Therefore is no need to search in articles that are published in the 20th century. Therefore the year of publication is set at 2000+.

Sources: We have no use for notes, editorials and reviews, so we focus on articles and conference publications only.

Citations (Scopus only): The make sure the articles are respected among the scientific community; we have set the bar of citations at 5+.

1.2 Identify the fields of research

Obviously, the Information Systems is all about computers, so we will focus on Computer Science only.

1.3 Determine the appropriate sources

The sources were selected on the availability of Full texts. The university has subscriptions on various databases, i.e. Scopus and Springer. Springer has a wide availability of healthcare journals and articles and Scopus has a wide variety of articles on various on topics. These databases will be the main sources of information for this literature review.

1.4 Decide on the specific search terms

First subject is “Information systems”, because that is a subject I am particularly interested in. In the healthcare area there are different synonyms: Healthcare Information Systems, Medical Information Systems, Clinical Information Systems. Furthermore general practitioners are a good group to generate data from, so an General Practitioners Information system was added to the search terms.

3.2 SEARCH:

During the first search we have searched through 807 articles and look at the title and, if necessary, the abstract to select a first tier of articles that could be used in this study. These were 75 articles in total.

Database	Term	Hits	Used
Scopus	Healthcare Information systems	38	1-10
	Medical Information systems	221	11-16
	Clinical Information sytems	101	17-28
	General practitioners “information system”	35	29-35
Database	**Term**	**Hits**	**Used**
Springer	Healthcare Information systems	157	36-48
	Medical Information systems	96	48-55
	Clinical Information sytems	113	56-68
	General practitioners “information system”	46	69-74

3.3 Refine the sample

After this, we will review the full articles to see if these articles can be applied in our study.
To do this, we first have to see which articles’ full texts are available online. From the initial 74 articles, 15 had no full text available.

The 59 remaining articles were scanned through to provide a decent background for this study.

4. Literature Background: IT-adoption and success models

In this chapter we will discuss three different subjects: the Electronic Health Record, the Personal Health Record and relevant models in the IS-field.

4.1 EHR

In this subchapter we will discuss the EHR and its advantages and disadvantages.

What is an EHR?

An EHR is “An electronic health record (EHR) is an evolving concept defined as a systematic collection of electronic health information about individual patients” (Gunter & Terry, 2005). It is a personal record that holds all relevant medical information, such as treatments, diagnosis results, illness history, etc. Its main role is it to exchange this information among health institutions. The difference between the usage by patients of the EHR and the adoption of regular IS-systems is that patients only have an opt-in or opt-out choice; the voluntariness of use is high: they have to sign up to get their info used in an EHR.

What are the benefits of an EHR?

(Spil et al, 2010) and (Jensen & Aanestadt, 2007) provides us with the benefits of EHR:

- positive financial returns on investments to health care organizations
- Treatment time savings
- The EHR is helping clinicians in making better decisions
- the patient will be treated on the basis of one set of information
- the record will always be accessible and brought up to date
- the risk of making mistakes is reduced

What are the disadvantages of an EHR?

Nieuwsuur, a Dutch newsreel provides us with some disadvantages:

- The information in the file could be false or incomplete
- Privacy violation: a lot of medical professionals have access to a patients file
- Security: The system can be hacked. When that happens, information could be available for everybody.
- Dependence of electronic infrastructure: when the internet or electricity fails, there will be no access to the system.
- Availability in future: for now the EHR is only available for medical professionals. This could change in the future.

4.2 PHR

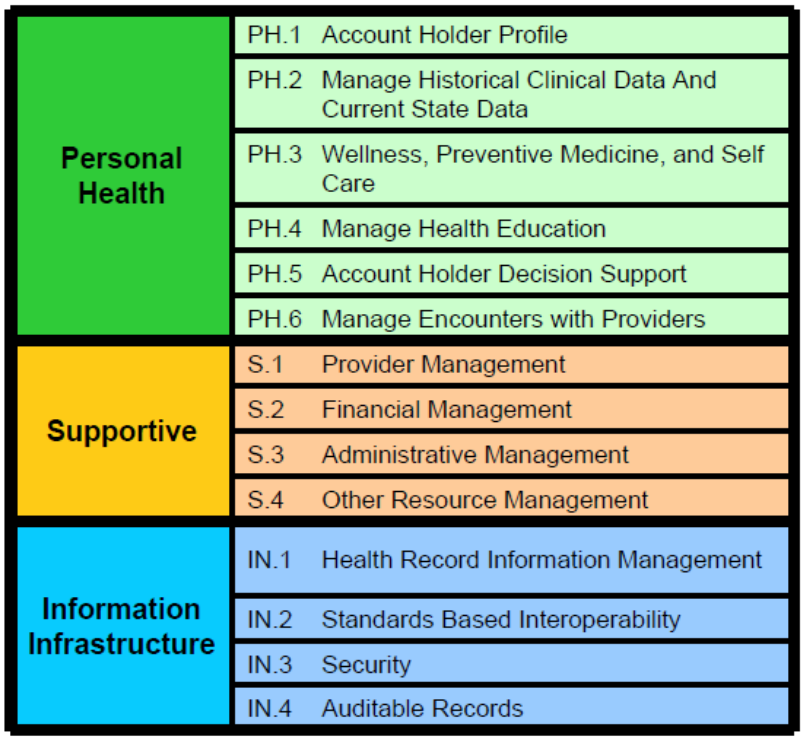
In this sub-chapter we will discuss the Personal Health Record.

What is a Personal Health Record?

A personal health record (PHR) is an EHR for individuals to make health decisions. These patients can own and manage the information in the PHR, which comes from healthcare providers and the patient himself. The PHR is maintained by the patient, with him determining the rights of access. The PHR is separate from and does not replace the legal record of any provider (Wolter & Dolan, 2009).

What features does a PHR have?

The study of Whetstone and Wanderee (2008) provides us with a model that shows the main features of a PHR.



They also describe the capabilities of a PHR:

- Ability to enter and edit demographic information
- Ability to make appointments and receive reminders (wellness)
- Ability to communicate with care provider, reorder prescriptions
- Ability to locate "vetted" patient educational information
- Ability to track bills, co-pays, insurance payments
- Ability to review medical records, lab work, discharge summaries
- Ability to report outcome data
- Ability to track trends, map data
- Ability to use multiple languages and ADA compliant

What are the benefits for maintaining a PHR?

According to Archer et al (2009) there are several purposes for maintaining a PHR:

1. Patient – Provider communication: The benefits of and satisfaction with PHRs include easy access to test results and better communication with healthcare practitioners.
2. Education and lifestyle changes: In addition to personal data and data from the provider a PHR could store other data on, for instance, social status, family history and work environment. Additionally, data about lifestyle can be stored, like diet, exercise, smoking and weight.
3. Health self-management: Patient health self-management can be supported by PHRs that allow patients to record, edit, and retrieve their healthcare data, including blood glucose and blood pressure measurements, weight and activity logs, and stress scales. Frequent monitoring can lead to early detection of critical situations and timely intervention.

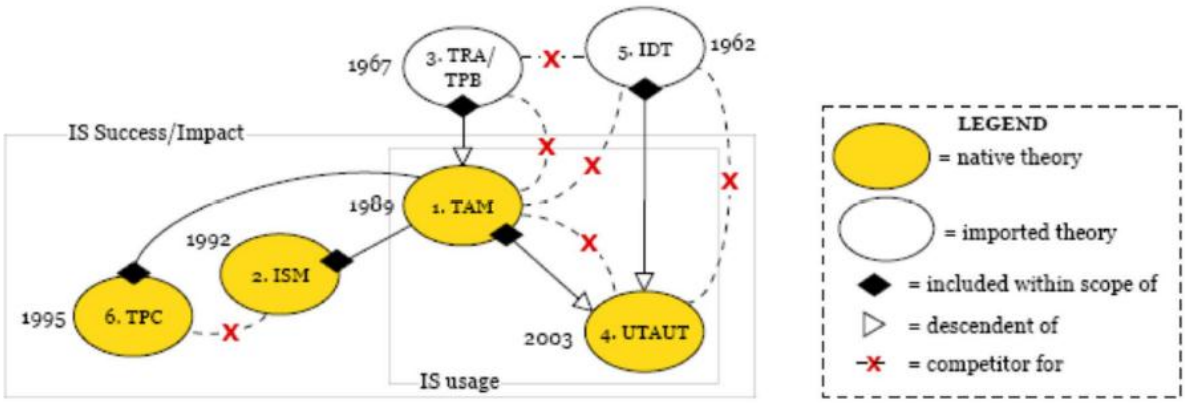
Trends in PHR

The IT-market is a fast growing business and its products develop rapidly. PHR are no exception. In this sub-chapter we will suggest some trends that are most likely to happen in 2014, according to HP (2013).

- *The use of Big data:* Because of the rapidly changing internet environment more and more information becomes available. For example, if more healthcare organizations use EHR and share their information, they can spot trends like epidemics. A benefit of big data and large-scale data analysis will be made use of to deliver better care at lower costs as well as more customized treatment plans.
- *Virtual healthcare:* People are more and more occupied and have less time to consult a healthcare professional. In order to reduce travel and waiting time, virtual healthcare is on its uprising. Together with the use of PHR and self-monitoring devices a consult can be given on a physical distance, without an appointment.
- *Mobile apps:* The first healthcare apps are already available, but more will become available and they will be used more and more. By using this, healthcare becomes available anywhere and anytime. The apps will be more target specific, specifying on certain diseases, people groups etc. For example, it is announced that IOS6 will have some functionalities for personal health management. (Nu.nl, 2014)
- *Improved security:* when more devices use PHR's, the chance on security breaches also rises. For example: the ability to erase information from devices that have been compromised has become a great backup tool. Device tracking and wiping is now readily available as a security solution.

4.3 Relevant models in IS

For this research the PRIMA-model is used. This model is not yet fully accepted within the entire scientific community, but relies on the most leading IS-success models and extensions of it (Moody & Iacob & Amrit (2010)). These models are: UTAUT, TAM, ISM, TTF and TPC. In Appendix A a short summary of these models are given. Figure 1 describes the independence relationships between these models.



5. Research methodology

5.1 The PRIMA-model

The PRIMA-model

For this study, the PRIMA-model is used (also known as USE IT) (Spil, Schuring, & Michel-Verkerke, 2004). The PRIMA-model is an interview model-based research method that consists of five different factors:

Process: the compatibility with existing values, experiences, and practices.

Relevance: The perceived usability of the system.

Information: The alignment of information needed by the user and the supplied information of the system

Means and people: This aspect examines the resources available to the user given the assumption that hardware and support enable effective use.

Attitude: The resistance of the user to use the system.

The PRIMA-model and relevant IS-mdels

Every aspect of the PRIMA-model can be used to make a qualitative score on adoption of the EHR by patients. (Landeweerd, 2013) provides us with indicators that can measure every aspect of the PRIMA-model. These indicators all improve usage; they are supported by the models provided in the Literature review found in Appendix A.

PRIMA construct	Covered success factor
Process	Perceived compatibility *(user characteristics)*
Relevance	Perceived usefulness Perceived usability
Information needs	Information quality
Means and people	Service quality System quality
Attitude	Trust Perceived risks Social en personal influence

Process: Perceived compatibility: (Rogers, 1983) suggests that, in order to successfully adopt IS only small changes should be made at the present process. Using the Goodwin TTF-model, we can measure whether an EHR fits together with the process of a consultation at a healthcare professional.

Relevance: Davis TAM-model (Venkatesh & Davis, 2000) suggests that usage depends on, among others, perceived usefulness and perceived usability.

Information: Delone IS-success model (Delone & McLean, 2003) suggests that Information Quality is a factor that increases usage of IS.

Means: If the system is up and running the only service the patient receives are direct contact with healthcare professionals and their assistant(s) and the support desks of the PHRs.

Attitude: The TPB-model (Ajzen, 1991) suggests that a Behaviour/Usage increase depends on Subjective norms, like trust and behavioural attitude. Furthermore, a positive subjective norm increases usage, according to the UTAUT-model.

1.2 Interview set-up

In section 5.1 Landeweerd (2013) provided relevant IS-success models. However, relevant interview questions are not provided. For the interview setup a link has to be made between the interview questions and the models provided by Landeweerd (2013) and other IS-models. For each factor relevant models are provided together with suggestions for interview questions. The final interview setup can be found in Appendix B.

1.2.1 Demographics

According to the UTAUT-model Gender and Age are moderating factors for the adoption of IS.

Gender

According to Afonso (2012) the moderating effect of Gender on the relation between performance expectancy and behavioural intention showed that this relationship is stronger among men than women.

Age

Morris and Venkatesh (2000) argued that age reduced perceived behavioral control due to lower self-efficacy and cognitive skills. They argued that agei ncreased the effect of subjective norms due to older workers' greater need for affiliation.

1.2.2 Process

Relevant literature:

According to Rogers (1983) adoption is: "the decision to make full use of an innovation as the best course of action available". In the Process-factor we will try to understand which competing courses of action are executed. According to the TTF-model (Goodhue & Thompson, 1995) utilization increases when there is a fit between the technology and the performed tasks. Furthermore Rogers (1983) defines Compatibility as "The degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters." In conclusion he also states: "that, in order to successfully adopt IS only small changes should be made at the present process. " Karahanna et al (2006) links the compatibility with current work practices to the TAM-model, stating that it will both affect the usefulness as the ease of use.

Interview setup:

If the current tasks in the competing processes are similar to the tasks demanded by the PHR (i.e. using a computer, making online appointments, online training), it is more likely that potential users will adopt the PHR. Thus, interview questions will be added that will provide insight how these processes are done at the moment and how much change it takes to adapt these processes to the processes of the PHR.

Furthermore interview questions are added that will try to increase insight how the interviewees use technology to communicate with other individuals and see if this is similar to the way communication takes place between the individual and the PHR.

5.2.2. Relevance

Relevant literature:

The relevance factor focuses how a PHR can contribute in the health process. Does it take a lot of effort to use it? Which features of the PHR are relevant for me?

According to the TAM-model (Davis & Venkatesh, 2003), usage increases whenever perceived usefulness and perceived ease of use increases. According to the UTAUT-model (Venkatesh, 2001), usage increases when the effort expectancy decreases.

Interview setup:

We will measure the factor perceived usability in multiple ways, which are:

- **Perceived usability of IT:**
  Does IT contributes to increase an individual's health?
  How much does IT contribute in the information an individual consumes?

- **Perceived usability of a PHR?**
  Which features of the PHR seem interesting to make use of?

- **Perceived usability of the output information?**
  Can your personal information be used for Big Data research?
  Can your personal information be used for diagnoses and treatments?

- **Perceived ease of use/effort expectancy**:
- Do you think a PHR is easy to use?

5.2.3. Information

Relevant literature:

The AIMQ-model (Lee et al, 2002) proposes 15 aspects that measure Information Quality. These are Accessibility, Appropriate amount, Believability, Completeness, Concise representation, Consistent representation, Ease of operation, Free-of-error, Interpretability, Objectivity, Relevancy, Reputation, Security, Timeliness, Understandability.

Together with an extra aspect: value-added, the PSP/IQ model (Kahn et al., 2002) maps these aspects. According to the TAM-model, usefulness and usability increases adoption (Davis & Venkatesh, 2003).

	Conforms to Specifications	Meets or Exceeds Expectations
Product	**Soundness** • Free of error • Concise representation • Completeness • Consistent representation	**Usefulness** • Appropriate amount • Relevancy • Understandability • *Interpretability* • *Objectivity*
Service	**Dependability** • Timeliness • Security	**Usability** • Believability • Accessibility • Ease of operation • Reputation • Value-added

Figure 1: PSP/IQ Model (Kahn, 2002)

Interview set-up:

Timeliness is regulated by law: all medical files should be kept for 15 years. (CPB, 2014)

We will focus on the two main aspects of information: quality (Free of error, concise and consistent representation, timeliness, security, relevancy, objectivity, believability, ease of operation, reputation, and value added) and quantity (Completeness, accessibility, appropriate amount, understandability). The interpretability is only partially depending on the information in the system; the other part is depending on the user of the system. We will keep this factor separated from quality and quantity. Furthermore we want to address which information the interviewees want to share.

5.2.4. Means

Relevant literature:

In the dictionary Means is described as “Available resources”. In this part of the interview we will focus on the means made available and/or demanded by both individual as PHR-supplier, according to the perception of the individual. Besides that we want to research whether the PHR-supplier will supply enough direct contact.

Time and money:
Yau et al (2011) found out that ease of use without time or money being a burden is a key facilitator for the adoption of PHR’s. Thus, we want to know, how much time and money it takes for it to become a burden.

System quality:

Delone and McLean (2003) have extended their famous model, which was discussed in Chapter 4.3 and Appendix B, based on papers that were written as a response to their initial model. Among others, they added System quality to one of the factors that affects IS adoption. System quality consists of five factors: adaptability, reliability, usability, availability and response time (Delone and McLean (2003).

Trustworthiness:

Kim et al (2007) found out that a consumer's trust has a strong positive effect on the purchasing intention as well as a strong negative effect on a consumer's perceived risk. This study also provides evidence that a consumer's increased perceived risk reduces the consumer's intention to adopt a product.

Featherman & Fuller (2003) state that Perceived Risk is a moderating factor affecting the Ease of Use, which is used in the TAM-model.

Perceived Recourses:

One of the factors that TAM does not take into account is that they assume there are no barriers that would prevent an individual from using an IS if he or she chooses to do so. In order to add this factor, Matheison et al (2001) adds Perceived Recourses to the TAM-model.

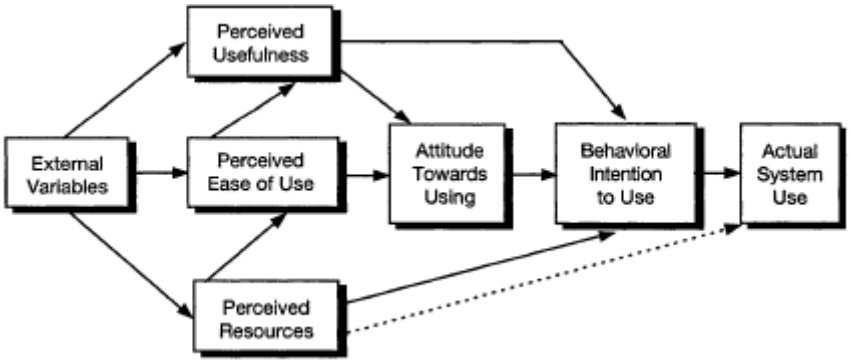


Figure 2: Perceived Resources: Matheison et al (2001)

Interview setup:

Means of the potential users:

First we will look at the available resources of the potential adopters for a PHR. First we will take a look at which devices they have available. Besides that, we will ask which device they especially want to use, while using a PHR. If they can use that device (perceived resource), it will increase the Ease of Use. Furthermore we want to know how much of their resources they want to allocate to a PHR. For this, we will focus on the two most important means, besides devices and internet-connection, which are time and money. Finally, we will look if there is a need to extend the PHR with extra means, like measurement tools, extra schooling and Management support.

Means towards PHR suppliers:

Trust can be essential for the adoption of a PHR, because it can decrease Perceived Risks. Perceived risks, and especially Privacy/Security, are one of the most important factors in the adoption of a PHR. Furthermore we will look at availability to measure the perception of system quality.

5.2.5 Attitude

Relevant literature:

Attitude towards IT:

According to the UTAUT-model (Venkatesh et al, 2003), experience is a moderating factor for adoption. Positive experiences will increase the chance for adoption.

Quality of life and IT:

According to Cortada (2009), governments see IT as a way to improve the quality of life. According to Mundorf et al (1994) there is generally a positive relationship between information technology and the quality of life.

Positive experiences:

The updated Delone & McLean IS Success model (2003) adds "Net benefit" to the initial model. It states that Net benefit has a positive effect on Usage. In other words: When one experiences Net benefit(s), it is more likely that it will adopt sort-a-like products.

Social Influence:

According to the UTAUT-model (Venkatesh et al, 2003) Social Influence has a positive effect on Behavioural Intention. Social Influence is defined as "the degree to which an individual perceives that important others believe he or she should use the new system. "

Product awareness:

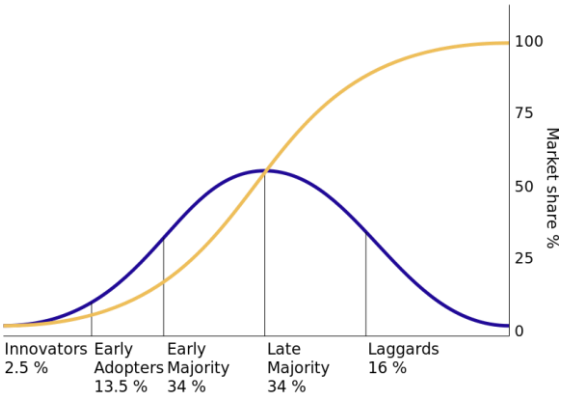
In the Diffusion of Innovations Theory Rogers (1962) suggests that the adoption of an innovation is a 5-step process of which the first is Awareness: In this stage the individual is first exposed to an innovation but lacks information about the innovation. During this stage of the process the individual has not been inspired to find more information about the innovation. Furthermore het suggests that there are four main elements that influence the spread of a new idea: the innovation, communication channels, time, and a social system.

Perceived Risk - Privacy:

According to Kaelber et al (2008) Patients' greatest concern about nearly every type of electronic healthcare applications, including PHR's, is security and privacy. According to Featherman & Fuller (2003) privacy concerns are huge for potential adopters of e-services. This Perceived Risk is a moderating factor affecting the Ease of Use, which is used in the TAM-model (Featherman & Fuller, 2003)

Adoption rate:

One of the first and one the most known IS-research models is the Diffusion of Innovation curve (Rogers, 1962). It shows the adoption of an innovation among time.



Interview setup:

First of all we will look at the attitude towards IT in general. According to the UTAUT-model, if they have positive experiences, it will be more likely to adopt the PHR. We will focus on both the net benefits of the experiences (how positive were they) as the quantity (how often do they use IT).

Furthermore we will focus on the social pressure the interviewees get. First we will ask if they were aware of the PHR as a product. Besides that, we will ask, how many times they did come in contact with a PHR. We will focus here on two parts: social (talked about it with acquaintances) and marketing (advertising).

Besides above topics, we will focus on the biggest perceived risk: privacy. According to a study by the NCPF (Bonthuis, 2008) 51% of the patients is afraid of hackers and 23% is afraid of fraud and abuse of the personal information. We will focus on these two biggest Privacy-issues.

Finally, we will try to place the interviewees on the curve of the Diffusion of Innovation.

Extra interview question:

We also asked the interviewees what they think will be the most important factor for the adoption of PHR's.

5.2.6 Summary

In chapter 5.1 Landeweerd et al (2013) provided some relevant IS-models. Because the factors are not always easy to measure, the PRIMA-model is extended with additional models and factors, like perceived recourses. Below are the relevant models and factors for each of the PRIMA-factors.

PRIMA construct	Success factors expected to be measured	What would we like to know
Process	Perceived compatibility Task-Technology fit	How often do you visit a GP? Do you monitor your own health? Do you ever have seen your medical file? Do you prepare yourself for consultations? Which tools do you use to prepare yourself for consultation?
Relevance	Perceived usefulness Perceived usability	Which functions of an EHR are most important for you? Which parts of the system you experience as a bottleneck? Do you have suggestions for improvements? Were you ever prescript the wrong medicines due to miscommunication?
Information needs	Information quality	Which information you need to give to the system? Do you think you get sufficient information back from the system? Is the information quality sufficient?
Means and people	Direct contact Perceived Resources Trust	Do you get sufficient support? Is the system reliable? Are PHR-suppliers trustworthy?
Attitude	Social influence Perceived risks Adoption stage	Do you think IT is necessary to improve health information? Do you feel social pressure of using the EHR? Does the system offer enough privacy?

5.4 Gathering information from qualitative data: Coding

The most used data analysis for qualitative research is coding (Maxwell & Miller, 2008). It provides a structural way that translates rough data, in our case the interviews, to data that can be interpreted and where conclusions can be based on. While using coding the data segments are labelled and grouped by category. Then they are examined within the category and between categories (Maxwell & Miller, 2008).

Coding can be done by looking for relationships when reading the transcripts of the interviews. There is no maximum amount of categories. After that focused coding can be used to eliminate, combine, or subdivide coding categories and look for repeating ideas and larger themes that connect codes.

Berkowitz (1997) suggests considering six questions when coding qualitative data:

- What common themes emerge in responses about specific topics? How do these patterns (or lack thereof) help to illuminate the broader central question(s) or hypotheses?
- Are there deviations from these patterns? If so, are there any factors that might explain these deviations?
- How are participants' environments or past experiences related to their behaviour and attitudes?
- What interesting stories emerge from the responses? How do they help illuminate the central question(s) or hypotheses?
- Do any of these patterns suggest that additional data may be needed? Do any of the central questions or hypotheses need to be revised?
- Are the patterns that emerge similar to the findings of other studies on the same topic? If not, what might explain these discrepancies?

Bogdan and Biklin (1998) provide common types of coding categories, but emphasize that your central questions or hypotheses shape your coding scheme.

- **Setting/Context** codes provide background information on the setting, topic, or subjects.
- **Defining the situation** codes categorise the world view of respondents and how they see themselves in relation to a setting or your topic.
- **Respondent perspective** codes capture how respondents define a particular aspect of a setting.
- **Respondents' ways of thinking about people and objects** codes capture how they categorize and view each other, outsiders, and objects. For example, a dean at a private school may categorize students: "There are crackerjack kids and there are junk kids."
- **Process** codes categorize sequences of events and changes over times.
- **Activity** codes identify recurring informal and formal types of behaviour.
- **Event codes**, in contrast, are directed at infrequent or unique happenings in the setting or lives of respondents.
- **Strategy** codes relate to ways people accomplish things, such as how instructors maintain students' attention during lectures.
- **Relationship and social structure** codes tell you about alliances, friendships, and adversaries as well as about more formally defined relations such as social roles.
- **Method** codes identify your research approaches, procedures, dilemmas, and breakthroughs.

6. Results

In this chapter we will discuss the out comings of the interviews. While using coding, we have tried to find patterns within the interviews. We will discuss six different areas. These are the five factors of the PRIMA-model and, additionally, any demographic relationships and crucial factors we have found. This demographic factor can be used to predict if this interviewee-group is likely to adopt new software compared to other demographic groups.

We have found several patterns in the interview. These patterns were translated into several hypotheses that subject the same matter. Most of these are contrary to each other, other give a different "touch" to the other hypotheses, to put it in more perspective. Each of these set of hypotheses were assigned to the most relevant PRIMA-factor, which we discussed in Chapter 5.3.

6.1 Demographic

6.1.1. Gender

There is not a pattern when it comes to gender. The interviewee population is about 40% male and 60% female.

6.1.2 Age

In this category two groups can be separated: These are the group with the age of 50+ (mostly the parents of the interviewers) and the group between 18-25 (mostly fellow-student, brother/sister or SO)

6.1.3. Education

Almost every interviewee has a high education level (HBO or WO). Relatively medical studies, especially nursing school, are more present among this group.

6.2 Process

We have separated four processes a PHR could be used for. These were making appointments, using data for sport training, retrieving medical information and monitoring their health. We have asked them to what degree they make use from devices (computer, laptop, tablet) in order to do these processes. We will try to make clear to what degree they do this, for each process separately. We used coding to separate each process in a number of statements.

6.2.1

Statement	Number of interviewees
"I never make appointment using devices"	12
"I make appointments online, but never for medical reasons"	11
"I also make appointments for medical reasons"	5

Only a few people use devices for making medical appointments. Most of those only did it one or two times. Besides that, there are two bigger groups. The first make appointments online, but never for medical reasons. Most of them use online agenda's at work or appointment tools, like Datumprikker.nl for private appointments.

6.2.2

Statement	Number of interviewees
“I never look up medical information”	5
“I look up symptoms, before consultation”	5
“I look up illnesses and/or medicines after consultation”	5
“I look up medical information, both for as after a consultation”	10

There is only a small group that never look up medical information. They trust their own logic and the information given by medical professionals. From the ones that do look up medical information, half of them only look up info before or after a consultation. The other half look up info both before as after a consultation. The ones that look up info, they mostly use Google. Some of them are medical professionals themselves; they sometimes use info from their own company’s information system.

6.2.3

Statement	Number of interviewees
“I never make use of online training tools”	16
“I use online programs for diets”	2
“I use online programs for tracking running training”	6

Most of the interviewees never make use of a training tool. Only two persons use a dieting training. A small group uses a computer to track their running progress. Most of them use it with an app on the smartphone to provide data while running.

6.2.4

Statement	Number of interviewees
“I never monitor my own health”	3
“I monitor my health at a fitness club”	2
“I monitor my health at home”	19

Only a small group monitor their own health. They either go to the gym for that, or do it at home. The great majority however, never monitor their own health.

6.2.5

“I communicate with other individuals through …….”

Medium	Number of interviewees
Mail	26
Text messages (whatsapp/sms)	23
Social Media	18
Calling	13
Skype	1

Almost every interviewee uses mail to communicate with other people. Besides that, they use text messages and social media (LinkedIn, Facebook). Only some call others to communicate. A distinction can be made here between younger and older people: the younger use more social media and whatsapp and the more old people use SMS and call.

6.2.6

"I communicate with other individuals using a……."

Device	Number of interviewees
Smartphone	23
Tablet	8
Computer	24

The great majority uses or a smartphone or a computer, but mostly both. Besides that, some use a tablet.

Also here distinction can be made here between younger and older people: the younger use their smartphone more and the older people use a computer. Also they use the tablet more often.

6.2.7

Device	Number of interviewees
Miscommunication due to lack of ad-hoc response	5
Networking problems (Wi-Fi/3g)	25

Main reason why the processes of P1 are disturbed is a failure in the connection with the system. Furthermore some interviewees think that a lack of ad-hoc response can be a problem. For example, calling a doctor will provide data faster than mailing him, because a call will force him to respond.

6.3 Relevance

6.3.1

Statement	Number of interviewees
"I think IT will improve my personal health, because it will increase insight and helps me monitor it"	13
"I think IT will improve my personal health, because it will increase insight"	10
"I think IT will improve my personal health, because it helps me monitor it"	3
"I think IT will not improve my personal health"	7

Most interviewees think IT can improve their personal health, mostly because it will increase their insight. They think they will become more aware of their personal health. But also online monitoring can improve their health, they think. Some interviewees (3) think IT will online increase their health only when they are sick.

6.3.2

Statement	Number of interviewees
"I think it is easy to work with a PHR"	22
"I think it is not easy to work with a PHR"	6

Most of the interviewees think it will be easy to work with a PHR. Concerns are: a simple lay-out, suitable for elderly (5), start-up problems (2) and using it on the long-term (1).

6.3.3

Statement	Number of interviewees
"My health info can be used for Big Data"	27
"My health info cannot be used for Big Data"	2

Almost every interviewee will allow their health data for research purposes. A very large part of them have privacy concerns (17). They want to give permission or only provide anonymous data. The reason why they want to give their statistics is because they think it will help the general public.

6.3.4

Statement	Number of interviewees
"My health info can be used for diagnoses and treatments"	26
"My health info cannot be used for diagnoses and treatments"	2

Almost every interviewee will allow their health data for diagnoses and treatments. Main reasons for that are: they have nothing to lose and it will probably benefit them. Some of them (5) want to give permission for access. The reason why do not want to give access is that they think errors in the data will occur.

The interviewees see various purposes for a PHR: Monitoring (8), Medication (7), Information (4), Lifestyle change (4), E-consulting (3), Appointments (3), Help abroad (1), Insight (1) and Domology (1). Some say that monitoring can help with the adjustment of the medication level. I.e. The amount of blood thinners they should take, when they have a problem with their blood pressure.

6.4 Information

6.4.1

Statement	Number of interviewees
"My health information quantity will improve"	25
"My health information quantity will not improve"	5

Most of the interviewees think the health quantity will improve. The main reasons the quantity of information will improve is: Better access (15) and synergy of information (12). Although they think the information will give enough insight in their personal health (10), the quantity will not be sufficient enough to cover every aspect of health (13), mostly because it will not measure mental illnesses (5) and the human body is to complicated (3).

6.4.2

Statement	Number of interviewees
"My health information quality will improve"	11
"My health information quality will not improve"	12
"it will depend on the users whether information quality will improve"	5

The interviewees are in doubt whether the information quality will improve. The two biggest concerns are that errors will occur during the data entry. Most of them think that mostly the patient will make these errors. The other problem is that medical information given by two different medical professionals can contradict, mostly because a different interpretation will be given to the same data.

6.4.3

Statement	Number of interviewees
"I will not have enough medical knowledge to interpret a PHR"	12
"I will have enough medical knowledge to interpret a PHR"	16

More than half of the interviewees who respond to this question think they will have enough knowledge to interpret the information given by the PHR. From this group everybody is well educated and a lot of them have a medical education. So this group is probably not representative for the entire Dutch populations. Biggest reason why the interviewees thought it would be hard to interpret a PHR is the amount of medical terms that will be used by medical professionals. If they will look for additional information, most of them will use Google (9) or contact a medical professional (6). Some (2) hope that the PHR will contain a help-section to help to interpret the information.

6.4.4

Statement	Number of interviewees
"I do not want to share my body data"	0
"I do not want to share my habits"	7
"I do not want to share information about my surroundings"	5

Most of the interviewees want to share all their data. The reason why they do not want to share their habits is because it is too private and they only want to share it with medical professionals. The reason why they do not want to share information about their surroundings is that they think it is not useful for a PHR.

6.5 Means

6.5.1

"I have a ….. to my disposal"

Device	Number of interviewees
Smartphone	31
Tablet	27
Computer	22
Laptop	26

A lot of the interviewees have access to all four above devices. Especially the more old people have access to a Tablet. Every interviewee had access to at least one device that is connected to the internet. Besides that practically every interviewee has access to a smartphone.

6.5.2

"If I use a PHR, I want to use …."

Device	Number of interviewees
Smartphone	14
Tablet	16
Computer	12
Laptop	9

Most of the interviewees want to have an application on their smartphone and especially on their Tablet. This app should be available on both Android as IoS. Main reasons why they want to make use of these devices are easy access and a low start-up time. Reason why they do not want to use a smartphone is that it could get stolen and so can infringe their privacy.

6.5.3

Statement	Number of interviewees
"I think a PHR will be reliable"	16
"I think a PHR will not be reliable"	7

Most of the interviewees think that a PHR will be reliable. For the interviewees who not share that opinion, their biggest concern is entry-errors in the system.

6.5.4

Statement	Number of interviewees
"I think a PHR will be easy available"	23
"I think a PHR will not be easy available"	0

All of the interviewee think that a PHR will be easy available. In an earlier question we found out that every interviewee has access to at least one device that is connected to the internet. Because a PHR is available from the internet that will probably be the reason they think a PHR will be easily available for them.

6.5.5

Statement	Number of interviewees
"I fear for my privacy if I start using an PHR"	26
"I fear for my privacy if I start using an PHR"	6

Most of the interviewees fear their privacy. There are two reasons, why that is the case: First 22 of them think the system can be hacked ("every system can be hacked"). Furthermore 14 of them think other users of the system, like doctors, will make abuse of their info.

6.5.6

Statement	Number of interviewees
"I think a PHR-supplier can protect my privacy"	11
"I think a PHR-supplier cannot protect my privacy"	14

More than half of the interviewees who have answered this question think that a PHR cannot protect their privacy. Main reasons are: hackers and infringement by other doctors.

Furthermore seven of the interviewees think that privacy should be an absolute priority and is a perquisite. They should think that the PHR should be severely tested.

6.5.7

Statement	Number of interviewees
"I think a PHR will provide enough education"	9
"I think a PHR should not need any education"	10

A part of the interviewees think that a PHR will provide enough education. They think that they will need education mostly when they start using the product.

6.5.8

Statement	Number of interviewees
"I do not want to spend any time for using a PHR"	9
"I want to spend as little time as possible for using a PHR"	7
"I want to spend some time on a PHR to keep it up-to-date"	11

The interviewees do not want to spend a lot of time on a PHR. Nine of them think it is a waste of time at this moment. A small group (7) want to spend some time on it, but only very limited. Only eleven interviewees want to spend enough time to keep the system as up-to-date as possible.

6.5.9

Statement	Number of interviewees
"I do not want to spend any money for using a PHR"	22
"I want to spend some money for using a PHR"	4

A very big part of the interviewees do not want to spend any money on a PHR. Most named reasons are: they do not think they will make use of it while they are healthy or they think other parties (government, insurance and/or employer) should pay for the cost, because they can financially benefit from it.

6.5.10

Statement	Number of interviewees
"I want to use measuring equipment at home"	16
"I do not want to use measuring equipment at home"	6

Most of the interviewees want to make use of measurement equipment at home. They mostly suggest simple equipment, like body temperature and blood pressure measurement. The biggest reasons they do not want to make use of measurement equipment at home are: they think these measurement equipment should be only available for medical professionals or they think it can cause unrest.

6.6 Attitude

6.6.1

Statement	Number of interviewees
"IT will improve my quality of life"	20
"IT will not improve my quality of life"	2

Most of the interviewees think that IT will improve the quality of life. Named reasons are monitoring (3) and better access to info (4). Only two of them could name a positive experience. For the ones that do not share their opinion, their main argument is that can live without IT, especially for health purposes.

6.6.2

Statement	Number of interviewees
"I do feel social pressure to use a PHR"	1
"I do not feel social pressure to use a PHR"	28

There is only little social pressure. The reason for this is obvious, only two of the interviewees have ever talked about a PHR with acquaintances and only six have ever heard about it through media.

6.6.3

Statement	Number of interviewees
"My surroundings pressure me to adopt new IT-products"	15
"My surroundings do not pressure me to adopt new IT-products"	7
"I'm an early adopter, so I adapt new IT-products faster than my surroundings"	3

Most of the interviewees feel pressure to adopt new IT-products. Mostly they are pressured by their children and/or their SO.

6.6.4 Conclusion Attitude

The interviewees are not negative about the use of IT in healthcare; they think it will improve their quality of life. However, a big problem is that they have never heard about PHR's, not through acquaintances, not through other media. If manufacturers want to sell the product, they have to let (potential) users know it exists. Once the early adopters have embraced the PHR, it is likely that other individual users also start to use a PHR, because most of the interviewees are pressured by their surroundings to use new IT-products.

6.7 Crucial factors

Besides the PRIMA-model questions, we asked what the interviewees thought which factors will going to be the crucial ones.

Factor	Number of interviewees
Security/Privacy	14
Information quality	6
Self-interest	5
Ease of use	5
Low costs	2
Takes little time to use	1

Conclusion

The interviewees think that security is the most important factor. Furthermore, the information quality, self-interest to use the system and ease of use are considered important.

7. Analysis

In this chapter we will try to analyse the outcome of the interviews per factor.

7.1 Demographics

Like said in Chapter 6.1 Afonso et al (2012) suggest that the gender male is more moderating that the gender female. Furthermore, people are more likely to adapt at a younger age. These factors should be taken in account when reading the interviews. For example, maybe we can see a difference between the two different age groups when it comes to a certain factor.

7.2 Process

Will a PHR suit in the current processes of the interviewees? Most of them use online systems in order to search for medical information and to make appointments, but hardly make any medical appointments online. Only a few of them use online systems for training and monitoring purposes, but they hardly name an alternative for these. It can assumed that is because they never use training or monitoring.

They use mostly smartphones and computers to connect with others. Besides that, they are used to getting digital information.

In conclusion can be said that it will not fully fit into their overall current processes overall. They are used to communicating through IT so little adaption is needed for communication. According to Karahanna (2006), this could positively affect the ease of use and the perceived usefulness. However, the interviewees do not use IT for medical purposes. This requires a lot of adaption towards a new process. This does not fit the statement of Rogers that ”in order to successfully adopt IS only small changes should be made at the present process. “ The interviewees are not even used to using IT to order medication or for appointments. This is an intermediate step the interviewees have to take to be more compatible with the practices of a PHR. It can be concluded that the perceived compatibility for communication is high and the perceived compatibility for healthcare applications is low.

7.3 Relevance

Most of the interviewees think that a PHR will fulfil its primary task: improving their health. They see reason why their health info can be used to improve the health of not only them, but also the public. If, in the future, PHR's are adopted, there will only be small resistance for using their data for Big Data- analysis. They understand that their info can help them for not only diagnosis and treatment, but also to improve insight and monitoring. Furthermore, they think a PHR will be easy to work with. Hence, the PHR scores well on Ease to Use.

Finally, they also see useful applications for a PHR. As a side note we have to say that all they factors named by the interviewees (besides the lifestyle change) only will be used only when they think they are sick; especially for chronicle diseases.

In conclusion it can be stated that a PHR is perceived as useful, for both themselves as the public; especially when they are sick. Furthermore, they perceive a PHR as easy to use. According to the TAM-model (Davis & Venkatesh, 2003) this increases the chance for adoption.

7.4 Information

Based on the PSP/IQ and the AIMQ-models we have 15 constructs divided in three categories, which will allow us to assess Information Quality. Some of these factors are focussed on in other sections of this study, so we will not focus on them in this section. Other aspects of information quality cannot be retrieved by the interviews, so those factors are ignored.

Quality:

- Free of error: NO →Wrong entries by patient-user
- Concise and consistent representation: Unknown
- Timeliness: Regulated by law
- Security: Focussed on in the Attitude-section
- Relevancy: Focussed on in the Relevance-section
- Objectivity: Most info are diagnoses or interpretation by medical professionals.
- Believability: Unknown
- Ease of operation: Focussed on in the Relevance-section
- Reputation: Unknown
- Value added: Unknown

Quantity

- Completeness: NO → Human body is too complicated; no focus on psychological aspect.
- Accessibility: YES
- Appropriate amount: YES

Interpretability

- Understandability and Interpretability: From the perspective of the interviewees a PHR is understandable. However, because the interviewees are all well-educated (of which some had a medical background) this result is not generalizable for the entire Dutch population

Most of the interviewees think that the quantity of the information will improve. But not all of the interviewees think that the quality will improve. According to the data and the PSP/IQ-model, the information will increase usefulness, because it will meet the demands of: appropriate amount, relevance and interpretability and understandability, although extra research for these last two with more varied interviewees should be done to confirm this. Furthermore it will increase the ease of use, because of the increased accessibility. According to the TAM-model (Davis & Venkatesh,2003) this should increase adoption.

7.5 Means

The interviews only want to spend little money on the product, so they should look for another earning model than to sell it to the individuals. Furthermore, it should take little time to use the program; the interviewees want to spend as little time as possible using a PHR. Besides that, the interviewees have a lot of devices available to use the system. If they can, they want to use a PHR on both a computer and a more portable device. A PHR should fit with these preferences in order to have score well on the perceived resources. If they do so, this will increase perceived ease of use.

One of the biggest threads for the adoption of PHR's is privacy concerns. The interviewees do not have a mutual understanding whether to trust the PHR-suppliers with the privacy. However, the perceive privacy as a big risk. This Perceived Risk will negatively moderate the ease of use, which is used in the TAM-model (Davis & Venkatesh, 2003).This will decrease the chance of adoption.

In order to decrease this perceived risk, they should increase their perceived trust. They should focus on two subjects: 1. Make it as hacker proof as possible and try to communicate to the public that they try to hardest to make that so. Furthermore, they should try to avoid that medical professionals will make abuse of the given info. For example, they could show a warning message if somebody has downloaded their record.

There is no doubt about the availability of the system. This will increase the system quality and so the use of the PHR, according to the Delone & McLean model. Most of the interviewees regard the PHR's a reliable. This will also increase the System Quality. There is only some doubt on the reliability of the entries done by the individual. This will decrease the information quality and so the usage, according to the Delone & McLean model.

7.6 Attitude

The interviewees are not negative about the use of IT in healthcare; they think it will improve their quality of life.

However, a big problem is that they have never heard about PHR's, neither through acquaintances, nor through other media. Most of the interviewees are not even aware of the PHR-product and thus have not reached the first step of adoption of the Rogers Diffusion of Innovation theory. Once the early adopters have embraced the PHR, it is more likely that other individual users also start to use a PHR, because most of the interviewees are pressured by their surroundings to use new IT-products. It can be concluded that there is no/little social influence. This will has a negative effect on the behavioural intention (BI), according to the UTAUT-model.

8. Conclusion

In this chapter we will discussed the factors that will be of influence on the adoption of a PHR. Furhermore, we will elaborate on the most interesting finding on Perceived risk – Privacy, Perceived usefulness - Self-interest, Information Quality and Perceived Compatibility.

PRIMA construct	Success factors expected to be measured	Findings
Process	Perceived compatibility Task-Technology fit	- Fit between currently used communication and communication used for a PHR. - Low perceived compatibility between current medical processes and the process used within a PHR.
Relevance	Perceived usefulness Perceived ease of use	- Perceived easily to use - Perceived useful - But only a perceived useful when ill.
Information needs	Information quality	- Increased quantity of data - Increased quality of data - Perceived risk of data-errors
Means and people	Direct contact Perceived Resources Perceived risks	- System is perceived as reliable and available - Only little time should be needed to use the product. - The product should be paid for by another party then the individual - Large perceived risk of privacy breach.
Attitude	Social influence Adoption stage Trust	- No social influence by acquaintances or media - Product is still in its early adoption stage

Perceived risk - Privacy

The interviewees perceive a great risk that their privacy will be infringed. They trust the suppliers that they do their best to protect their private data, but are pessimistic in their ability to do so: “Every system can be hacked”. Besides the risk of hackers, they also think their privacy will be infringed by their medical environment (doctors, insurance companies) and the personal environment (employer).

Perceived usefulness - Self-interest

When the interviewees are ill, they see the usefulness of a PHR, especially if the disease in chronicle. In those cases, the system can be used for medication, self-monitoring, appointments and retrieving information. Although four of the interviewees name lifestyle change as a useful aspect of a PHR, probably the major part of the interviewees thinks they will not use a PHR if they are healthy.

Information quality

The two biggest concerns for information quality are that errors will occur during the data entry. Most of them think that mostly the patient will make these errors. The other problem is that medical information given by two different medical professionals can contradict, mostly because a different interpretation will be given to the same data, this will decrease interpretability.

Perceived compatibility

Although the interviewees are used to using IT in order to communicate with each other (on both a professional as private level), they current practices are not very aligned with the practices used by a PHR. However, they see possibilities as appointment making and for medication purposes. Adoption of these aspects could be more likely, because it is a much smaller step.

9. Recommendations for PHR-suppliers

In this chapter we will give recommendations, which are a result of this study. We will split these recommendations in two: first we will suggest practical improvements for PHR-suppliers in order to increase the adoption-rate.

Improved security

The security of the system is the biggest concern for the potential users. Suppliers should utilize all their means in order to increase this security. Suggestions are: extra security-layers, like Dig-id and/or text message confirmation, or let hackers try to access the information of the PHR's, for example by handing out rewards to hackers finding a bug or a security breach.

Information Quality

Some of the interviewees were sceptical whether individuals could entry good data. There are several ways this could be lowered. For example, the suppliers could limit the number of entry fields for individual users to assure information quality. Petkovin (2009) also provide some solutions for good data entry, especially for self-monitoring.

Focus on patients, not on individuals

Some of the interviewees think that they will only use the PHR if they are sick. It is doubtful whether all individuals will use a PHR. In order to anticipate patients should be the target consumer market, not all individuals. The marketing-strategy should be adapted to that specific target group.

User devices

The PHR should be easily available on both mobile devices (smartphone, tablet) as computer (laptop, PC) on Android, IoS and Windows.

Earnings model

The consumers are not very willing to pay for a PHR. The earnings should be retrieved elsewhere, like advertising, governments, insurance or employers.

Ease of use

A PHR should be very simple in order to be used, because users want to spend little time on a PHR.

10. Discussion

More focus on trust and perceived risk

The PRIMA-model is very easy to use and focuses on the most important aspects of adoption. This model could easily be used for further research, but could be expanded in order to get more insight in trust and perceived risk. According to this study, these are one of the major factors for PHR-adoption. Extra research has to be done to evaluate the influence of perceived risk and trust on the adoption of PHR's. Also extra study has to be done which factors influence this perceived risk. For example, based on the recent takeover of Whatsapp by Facebook, one can assume that international companies are less trusted then native companies. These native companies have a more likely chance to successfully penetrate the market. There is a study done that suggests that geographical location does appear to influence the formation of initial trusting beliefs (perceived trustworthiness) (Fissher & Chu, 2009). However, such a study has never been done for Personal Health Records, which contain much more private information. It can hypnotised that this influence on initial trusting beliefs will be stronger with this kind of private information, but extra research has to be done on that subject.

Generalizability of the findings

In this study we have found out that a PHR is more relevant for patients in comparison to all individual users. This study should be repeated, but only with patients in order to get more insight how relevant a PHR is for patients.

Furthermore, this study is performed on well-educated interviewees. It can be acknowledged that this sample may limit generalizability. The generalizability of this research should be tested on different pools of interviewees in order to fully acknowledge the findings of this research.

Besides that, the interviewees were performed by students. They are less experienced in interviewing compared to more professional interviewers, like college professors. However, relative to interviewers, students are lenient in their ratings. No other important differences have been reported, and findings appear to be quite comparable (Bernstein, Hakel & Harlan, 1975).

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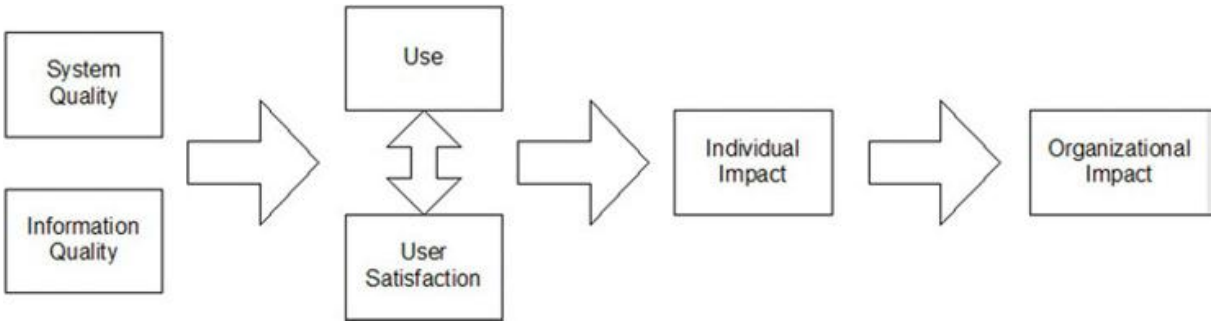
Appendix A: Relevant IS success models

Delone IS-success model

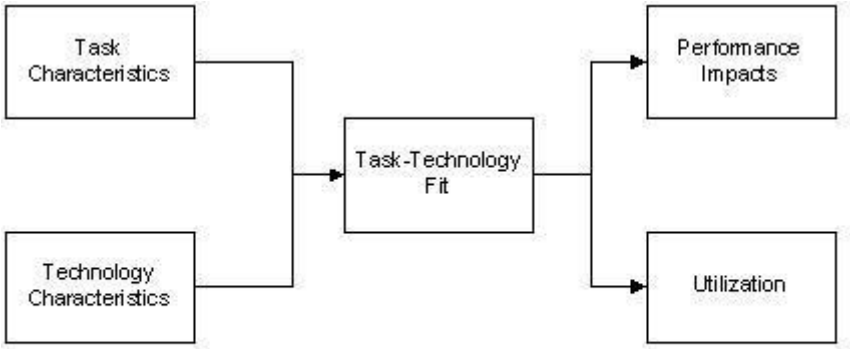
analysing the concept of information system success, DeLone developed an information success model for management information systems. The DeLone and McLean model (Delone & McLean, 1992) does not specify the methods or parameters to be used, which must be selected on a case-by-case basis. (Bossen, 2013).



So, the system and information quality are the main reasons for whether a IT-product in a succes. In the case of the embracement of HER, organizational impact will the imply the society, which is influenced by the individual impact, the patient.

Goodhue TTF-model

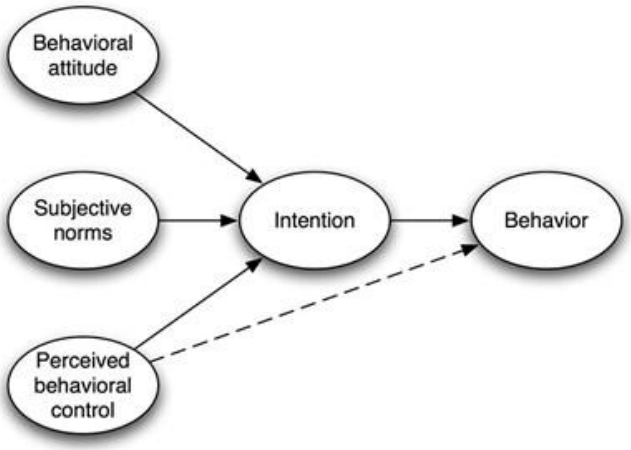
The TTF-model of (Goodhue & Thompson, 1995) shows that individual performance increases, when a system is utilized, if there is a good fit between a task and the technology of a system. Furthermore, it suggests that at least under some circumstances a link between TTF and utilization exists.



Source: Goodhue and Thompson, (1995)

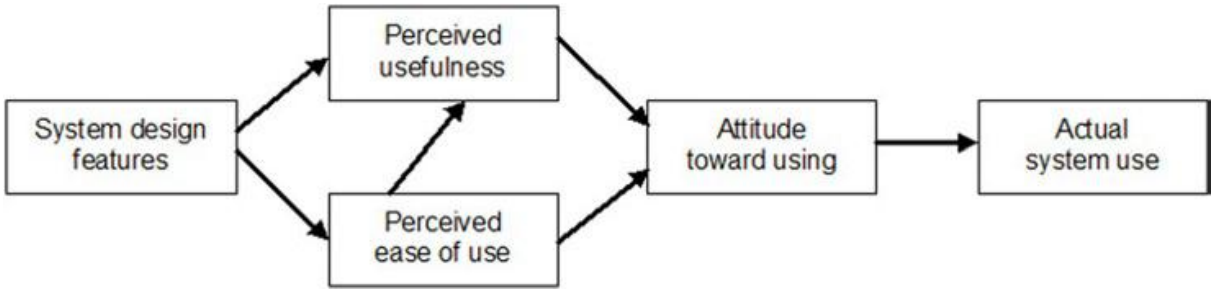
Ajzen TPB Model

The Theory of Planned Behaviour (Ajzen, 1991) is a theory about the link between beliefs and behaviour. It consists of four indicators that try to predict actual behaviour. These are: 1. The behavioural attitude: an individual's belief about consequences of particular behaviour 2. The subjective norms: The influence of judgement by significant others on an individual's perception 3. An individual's perceived ease or difficulty of performing the particular behaviour and 4. Intention: readiness to perform a given behaviour.



Davis TAM-model

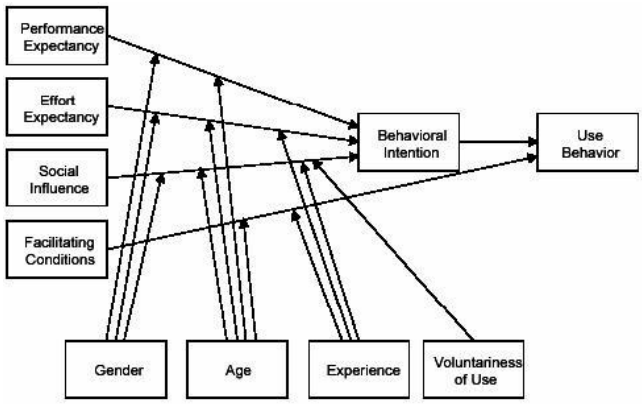
Because the use of HIS is voluntary, the TAM-model can be applied. The technology acceptance model (TAM) of Davis and Venkatesh (2000) tries to analyse why users adopt or reject a system. It defines the constructs "perceived ease of use" and "perceived usefulness" to predict attitude towards using and actual system use. Both factors themselves depend on features of the system.



Vinkatesh Utaut-model

The Utaut-model is an Unification Theory, that tries to unify several IS-theories and models (Figure x).

The theory holds that four key constructs: 1) performance expectancy, 2) effort expectancy, 3) social influence and 4) facilitating conditions. Gender, age, experience, and voluntariness of use are moderators that influence the impact of the four key constructs on usage intention and behavior.



Appendix A: interview model

Datum interview:	
Naam interviewer:	
Naam geïnterviewde:	
Leeftijd:	
Geslacht:	
Hoogst genoten opleiding?	

P	**In hoeverre past een PHR in uw dagelijkse routine?**
P1	De meeste PHR systemen dragen bij aan verschillende leef en werk processen. Kunt u de belangrijkste processen/activiteiten noemen waarbij u de computer gebruikt? Dit hoeft dus niet persee via een PHR te zijn. • Afspraken maken • Medische informatie opzoeken nav een consult met een arts (zowel ter voorbereiding als daarna) • Het maken en gebruiken van trainingen (bijv hardlopen) • Het monitoren van uw eigen lichaam, zoals hartslag, bloeddruk e.d. Per bovenstaand type: hoe gaat u te werk? 1. volgt u een vast patroon 2. Hoe vaak maakt u daar gebruik van? 3. hoe lang duurt het? 4. maakt u gebruik van hulpmiddelen? 5. waar verricht u uw activiteiten? Zou het elders kunnen? Zou u het elders willen? 6. moet u dingen nazoeken / navragen? 7. moet u dingen voorbereiden?
P 2	Welke media gebruikt u het meest om in contact te komen met andere mensen? (mail, apps, social media)? Vanaf welke apparaten maakt u het meest gebruik om dat te doen?
P 3	Welke uitzonderingen of verstoringen maken dat een systeem als deze soms spaak loopt en dat u contact via andere wegen, dan via de computer, moet belopen?

REL	**In hoeverre is een PHR voor u persoonlijk relevant?**
R1	Denkt u dat het persoonlijk gebruik van ICT uw persoonlijke gezondheid kan

	verbeteren? Welke aspecten zal het verbeteren en in welke mate: + inzicht + monitoring
R2	Denkt u dat het gebruik van een PHR gemakkelijk gaat zijn? Waarom wel, waarom niet?
R3	Vind u het goed dat de informatie die u levert over uw gezondheid, gebruikt kan worden voor groot statistisch onderzoek (uw medische gegevens zijn dus niet meer gekoppeld aan u als persoon)? Waarom wel, waarom niet?
R4	Vind u het goed medische professionals gebruik maken van gegevens die u heeft ingevoerd bij het stellen van diagnoses en behandelingen? Waarom wel, waarom niet?
R 5	Op welke punten zou de inzet van ICT voor u van persoonlijk belang kunnen zijn? + aan wat voor soort toepassing denkt u dan? + voor welk doel of in welke situatie te gebruiken?
R6	In hoeverre draagt ICT bij in de informatie die u binnenkrijgt, zoals social media en mail?

INF	***Wat is de kwaliteit van de informatie?***
I1	Denkt u dat de kwantiteit van medische informatie die u krijgt toeneemt als u een PHR gebruikt? + Heeft u er makkelijker toegang tot? + Leidt de combinatie van informatie die u aanlevert en die van artsen tot synergie? + Denkt u dat een PHR over voldoende informatie beschikt om een goed inzicht te krijgen in uw persoonlijke gezondheid? + Denkt u dat een PHR u informatie kan geven over elk aspect van uw gezondheid?
I2	Denkt u dat de kwaliteit van medische informatie die u krijgt toeneemt als u een PHR gebruikt? + Zal de informatie (meer) fouten bevatten? + Zal de informatie consistent zijn?
I3	Denkt u dat u over voldoende medische kennis beschikt om de gegevens aangedragen door een PHR zelf te kunnen intepreteren? + Heeft u hier andere media voor nodig? (Internet, telefonisch contact met arts(-assistent)?
I4	Welke informatie bent u bereidt te delen met het PHR? + Lichaamsgegevens (Hartslag, bloeddruk) + Gewoontes (Drinken, roken, andere verslavingen) + Omgeving (gezondheid van werk- en woonomgeving)

M	**Welke middelen heeft u beschikbaar/ wilt u beschikbaar stellen?**
M1	Over welke ICT-faciliteiten beschikt u ? + Hardware (Smartphone, PC, laptop, tablet)

	+ Software (besturingsysteem) + Communicatie (webcam, Wifi-verbinding, 3/4G)
M2	Van welke ICT-faciliteiten wilt u gebruik maken bij het gebruik van PHR? + Hardware
M3	Denkt u dat de leverancier van een PHR systeem u het volgende voldoende kan bieden in combinatie met uw eigen ICT-faciliteiten? Waarom wel, waarom niet? + Betrouwbaarheid + beschikbaarheid + Veiligheid/privacy
M4	Denkt u voldoende ondersteuning te krijgen als u een PHR wilt gebruiken? + scholing + management support
M5	Hoeveel van uw eigen middelen wilt u inzetten voor succesvol gebruik van een PHR? + Tijd + Geld
M6	Wilt u thuis gebruik kunnen maken van medische meetapparatuur?

A	**Attitude: wat is uw houding tegenover PHR en ICT?**
A1	In hoeverre bent u er van overtuigd dat ICT toepassingen nodig zijn om de kwaliteit van het leven te verbeteren + Hoeveel ervaring? + Hoeveel tijd ervoor over? + Zijn er positieve ervaringen uit het verleden? + Hoe vaak gebruikt u internet?
A2	Voelt u sociale druk om een PHR te gebruiken? + Heeft u het weleens besproken met een kennis + Heeft u er weleens over gehoord in de media?
A3	In hoeverre denkt u dat uw privacy in het geding is, bij het gebruik van een PHR? + Denkt u dat het systeem gehackt kan worden? + Denkt u dat de verkeerde mensen (andere artsen, verpleegkundigen) uw informatie kunnen gaan raadplegen?
A4	Wordt u door uw omgeving gestimuleerd om aan de veranderingen deel te nemen?

Appendix B: Question we want answered

General information:

7. What is your age?
8. What is your gender?
9. What is your educational background?
10. Have you ever used a PHR before?

Process:

11. How often do you visit a GP?
12. Do you monitor your own health?
13. Do you ever have seen your medical file?
14. Which media do you use to gain health information (websites, GP)
15. From which media, you want to access your information (telephone, internet, app)
16. Do you prepare yourself for consultations?
17. Which tools do you use to prepare yourself for consultation?

Relevance:

18. Do you think the use of a PHR would enable you to get access to relevant medical information more quickly?
19. Do you think the usage of a PHR will increase your insight in your personal health?
20. Do you think the usage of a PHR will make it easier to get health information?
21. Do you think the usage of a PHR will be useful to gain insight in your personal health?
22. Do you think it will be easy to use a PHR?
23. Does the PHR does give you the specific insight, you want to have?

Information:

- Do you think you will have good access to your health information?
- Do you think the PHR will generate a good amount of information?
- Do you think the PHR will give information on all aspects of personal health?
- Do you think you can interpret the provided information?
- Do you think the information is represented consistent?
- Do you think the provided information is free-of-error?

Means:

- Do you get sufficient support?
- Is the system reliable?
- Does the system offer enough privacy?
- Do you think the system is hackable?
- What kind of security do you want to guarantee security? (Dig-id, text-messages, password only)

Attitude:

- Do you think IT is necessary to improve health information?
- Do you feel social pressure of using the service?
- Have you ever discussed the PHR and the usage of it with another individual?
- How much time do you want to spend for learning to use the service?