MASTERTHESIS HEALTH SCIENCE

DEVELOPING A QUESTIONNAIRE TO MEASURE THE UPTAKE AND IMPACT OF eHEALTH TECHNOLOGY AMONG HEALTHCARE PROVIDERS

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Preface

This thesis is the last part of my Master programme Health Sciences at the University of Twente. I followed the track Health Technology Assessment during which I also had courses about eHealth which are in line with the topic of this thesis. During the writing of my thesis, I learned a lot about eHealth and about how new the topic still is in scientific literature. Although there already is a lot of knowledge about eHealth, a lot is still unknown and there is still missing consensus about different topics in eHealth. This newness is what makes this field of research interesting, but also overwhelming at times.

I would like to thank my supervisors, Prof. Dr. Lisette van Gemert-Pijnen en Dr. Floor Sieverink, who helped me with the scientific side of my thesis and provided feedback and ideas on how to proceed when I could not see the wood for the trees.

Lastly, I would like to thank my family and friends who helped me through the tough and happy times of writing my thesis.

Mara Alexandra Kaldeweide

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Summary

Background: In the next couple of years, healthcare systems will be faced with the problem of an ageing society and more people with chronic diseases and cancer. Therefore, healthcare needs to change to make sure that all age and patient groups are provided with effective, safe, efficient, responsive and reasonably priced healthcare. One possibility to ensure this is eHealth. Research has shown the need for evaluation of eHealth, but there is still lack in practical methods for the evaluation of eHealth after implementation.

Objective: Since health care professionals play a crucial role in the implementation of eHealth technologies, this research wants to develop a method that measures experiences, knowledge and the affinity of healthcare providers regarding the use and implementation of eHealth.

Methods: To see which methods are currently available to evaluate eHealth, a systematic review is done, during which twenty-two articles were included. After that, a new questionnaire was set up based on concepts identified during literature research and pre-defined implementation outcomes. The questionnaire was validated in two rounds of card sort by firstly students from the University of Twente and secondly researchers in the Department of Psychology, Health & Technology of the University of Twente. During the first validation round, students needed to sort a set of questions to the right implementation outcome. Researchers needed to sort each question individually to an implementation outcome.

Results: The articles identified during the systematic review showed that there are numerous articles that describe frameworks or give hand-on guidelines for the evaluation of eHealth. However, the approaches to evaluation were diverse and based on different theories. In order to bring all frameworks and approaches together in one questionnaire, the different concepts were sorted to implementation outcomes. The validation under students showed that the different implementation outcomes were very similar and abstract and that students were therefore not able to sort a set of questions to the right implementation outcome. Researchers were able to sort some questions to the right implementation outcome, but still there was no clear indication that the whole questionnaire was valid.

Conclusion: All in all, this research made a step forward in the research about evaluation of eHealth. However, further research is needed to find a unified and valid method for the evaluation of eHealth that can be used by researchers and in real-life practice.

Samenvatting

Achtergrond: De komende jaren staan gezondheidssystemen voor het probleem van een vergrijzend gezelschap en meer patiënten met chronische ziektes en kanker. Dit betekent dat gezondheidssystemen moeten veranderen om ervoor te kunnen zorgen dat alle patiëntengroepen effectieve, veilige, efficiënte, toegankelijke en redelijk geprijsde zorg kunnen ontvangen. Een mogelijkheid dit te realiseren is door het gebruik van eHealth. Onderzoek laat zien dat het belangrijk is om eHealth te evalueren, maar er is onvoldoende kennis over praktische methodes voor de evaluatie van de implementatie van eHealth.

Doel: Omdat zorgverleners een belangrijke rol spelen bij de implementatie van eHealth is het doel van dit onderzoek het opstellen van een methode voor het meten van ervaring, kennis en affiniteit van zorgverleners tegenover het gebruik en de implementatie van eHealth.

Methode: Dit onderzoek is een explorerend onderzoek. Het eerste deel bestaat uit een literatuuronderzoek waarin methodes worden gezocht die gebruikt worden om eHealth te evalueren. Tweeëntwintig artikelen werden geïncludeerd. Daarna werd er een vragenlijst opgesteld door

concepten uit het literatuuronderzoek en vooraf gedefinieerde uitkomsten van implementatie aan elkaar te koppelen en op basis daarvan vragen op te stellen. De vragenlijst werd gevalideerd door middel van een ‘card sort’ in twee rondes. In de eerste ronde werden studenten van de Universiteit Twente gevraagd om een set van vragen aan één uitkomst van implementatie te koppelen. Vervolgens werden onderzoekers van het Department of Psychology, Health & Technology van de Universiteit Twente gevraagd om elke vraag afzonderlijk bij een uitkomst van implementatie te sorteren.

Resultaten: De artikelen uit het literatuuronderzoek tonen aan dat er meerdere frameworks zijn die de evaluatie van eHealth beschrijven. Helaas zijn de aanpakken van evaluatie verschillend en ook gebaseerd op verschillende theorieën. Om al deze verschillende aanpakken samen te brengen in één vragenlijst werden de concepten uit eerdere onderzoeken gekoppeld aan uitkomsten van implementatie. Validatie onder studenten laat zien dat de definities van de uitkomsten van implementatie niet veel verschillen en abstract zijn. Hierdoor hadden studenten moeite om de sets van vragen te koppelen aan een uitkomst van implementatie. Onderzoekers konden daarentegen wel vragen sorteren maar er was nog steeds geen indicatie dat de opgestelde vragenlijst valide was.

Conclusie: Dit onderzoek maakt een stap voorwaarts in het onderzoek naar evaluatie van eHealth. Desondanks is er meer onderzoek nodig om een uniforme en valide methode te vinden voor de evaluatie van eHealth die zowel door onderzoekers als in de praktijk gebruikt kan worden.

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Introduction

Healthcare systems in Europe will be faced with the problem of an aging society in the next couple of years (1, 2). Furthermore, not only do people get older, but they also have a higher risk of having chronic diseases and cancer (3). Therefore, healthcare systems need to change the way healthcare is provided to ensure that all age and patient groups are provided with effective, safe, efficient, responsive and reasonably priced care (2).

One possibility of ensuring effective, safe, efficient, responsive and reasonably priced healthcare for an aging society, without the need for more physicians or nurses, is eHealth. (1). Generally, eHealth uses different information and communication technologies to improve health and healthcare for either the healthcare professional, patient or external parties. (1, 4) Therefore, eHealth interventions or technologies can be very diverse. Different variants for eHealth interventions are web-based applications, mobile apps, electronic health records or personal health records; health sensors, gateways and wearable devices; domotics; video communication, robotics, health information exchange, business to business gateways; and business intelligence and 'big data' solutions. Unfortunately, it is not possible to keep an up-to-date list of eHealth technologies because eHealth is an emerging field with a high breakthrough rate of new technologies. Moreover, there are eHealth technologies that combine one or more variants of above mentioned technologies which makes it difficult to assign them to one of the mentioned variants of eHealth. (1)

Since eHealth is a relatively new field with a changing dynamic, there are a lot of discussions about the definition of eHealth. The term is described and perceived differently by researchers. The most commonly used, and frequently quoted, description is by Eysenbach. He defines eHealth as a „field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies." (1, 5) According to Eysenbach, this definition is broad enough to not only apply to the changing environment of the Internet, but also the dynamic of everything that has to do with "medicine and computers". In order to broaden the definition even more and to show what eHealth needs to fulfil, Eysenbach defines 10 e's in eHealth:

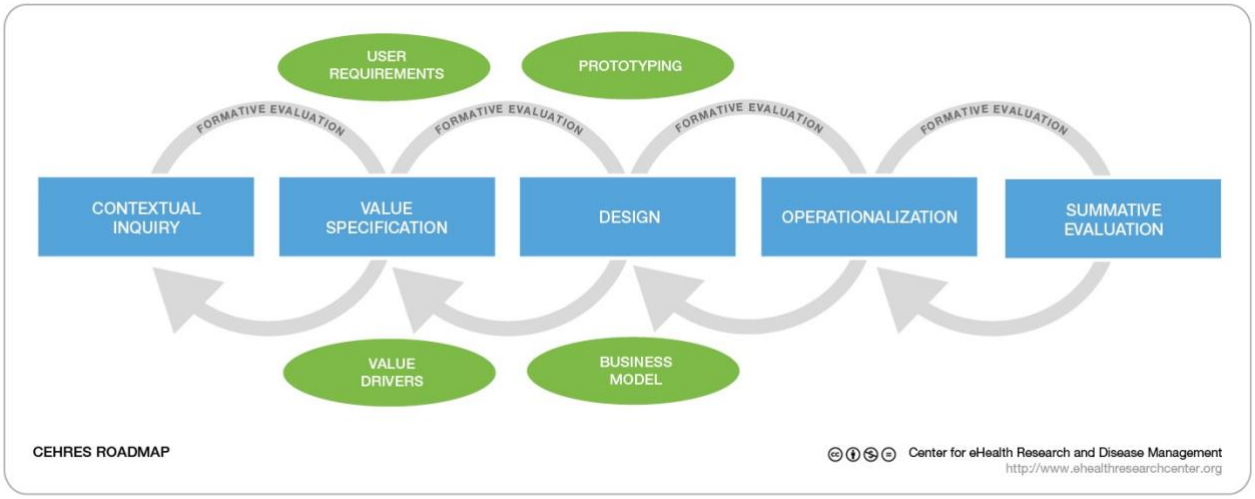
- Efficiency: eHealth can increase the efficiency of healthcare which is then followed by decreasing costs;
- Enhancing quality of care: By increasing the efficiency of care, the quality can be improved;
- Evidence based: Here, Eysenbach calls for a need for evidence based eHealth applications;
- Empowerment of consumers and patients;
- Encouragement of a new relationship between provider and consumer of healthcare in order to ensure shared decision making;
- Education of health professionals and consumers;
- Enabling information exchange and communication;

- Extending the scope of healthcare beyond its conventional boundaries;
- Ethics: Eysenbach sees new challenges and threats to ethics in eHealth;
- Equity: As Eysenbach explains, eHealth wants to make healthcare equitable, but at the same time, eHealth has the risk of being less equitable since not everyone has the access to computers, internet, etc.

Moreover, Eysenbach demands eHealth to be easy-to-use, entertaining and exciting. (5)

Earlier research (4) has shown the need for a standardized method that can be used to plan, coordinate and execute the development process of eHealth technologies in order to improve the uptake and impact of eHealth. During this research, van Gemert-Pijnen et al. used a holistic approach that combines "persuasive health technology theories with a managerial approach" (4) to develop a roadmap that can be used for the development and evaluation of every kind of eHealth intervention (see Figure I).

FIGURE I. CEHRES ROADMAP



The roadmap consists of five different phases (1, 4):

1. Contextual Inquiry: In the first phase, information about the intended user and the environment in which the technology is being used needs to be gathered. This is done to analyse the current situation and to identify possible connecting factors for eHealth technologies.
2. Value specification: During the second phase, stakeholders' economic, medical, social or behavioural values are determined. Furthermore, stakeholders need to rank their defined values based on 'the importance of finding solutions for the identified problem(s)'(4, p.12). After having done the value specification, the values are being translated into user requirements.

3. Design: The third phase is the design phase. Here, the eHealth technology can be developed based on the user requirements. Van Gemert-Pijnen at al. (4) underline the need to include future users of the technology early on in the design process.
4. Operationalization: In this phase, the eHealth technology is being launched. This also includes starting marketing plans and making procedures on how to include the technology in organizational working.
5. Summative evaluation: During the last phase, it is measured whether the intended effect of the technology was realized.

Next to this phase of evaluation, van Gemert-Pijnen et al. stress the need for continuous evaluation after each developmental phase. This is called formative evaluation. (4)

Even though the authors are very forthcoming with practical methods for the development of eHealth technologies and formative evaluation, there still is lack of knowledge on how to produce evaluation methods for summative evaluation. In addition, other research (6) has shown that there is no standardized way yet to evaluate eHealth technologies. Multiple researches (7, 8) tried to set up a unified framework for evaluation, but there is no consensus about which theories, models or frameworks and practical methods to use for evaluation in practice. This research wants to proceed with developing methods that can be used during the phase of summative evaluation in the CeHRes roadmap to evaluate the use and implementation of eHealth technologies.

Since eHealth technologies can often be used by two different end user groups (patients and healthcare providers), it is important to clearly define from which point of view the evaluation takes place. Healthcare providers are responsible for the education of patients about their (chronic) disease and the guidance about the use of medication and lifestyle habits (9). Therefore, their view and perception about eHealth can influence the uptake and impact of eHealth. When healthcare providers see barriers for the use of eHealth, they are less likely to use the technology and also less likely to endorse the technology on the patients. Nazi (10) has shown that there are several barriers for this limitation. For example, when healthcare providers are unfamiliar with the features of eHealth, they are not likely to endorse their patients to use the technology. Furthermore, when technology does not fit into the workflow or usual work habits, they are less likely to use the technology and therefore less likely to advise their patients to use it. (10) This shows that healthcare providers play a crucial role in the uptake and impact of eHealth and are an important factor for the successful implementation of eHealth technologies. Therefore, this research focuses on the evaluation of eHealth under healthcare providers.

Research question

During the master thesis, the following research question and subquestions are being answered:

1. How can experiences, knowledge and the affinity among health care providers regarding the use and implementation of eHealth interventions be measured?

    1.1. What methods are available in recent literature to evaluate the implementation of an eHealth intervention under healthcare workers?

    1.2. On which theories are the implementation evaluation methods based?

    1.3. How can the different implementation evaluation methods be put into one questionnaire that can be used universally to evaluate eHealth technologies?

Method

Review of Existing eHealth Evaluation Frameworks

In order to set up a framework for the evaluation of the implementation of eHealth technologies, a literature research must be done to find formerly described methods that describe how to implement or evaluate eHealth technologies or technologies in general.

The literature search was done by using the online databases Scopus, Pubmed and Web of Science. Articles with the following inclusion criteria were included:

1. The paper must describe a theory or method that can be used to evaluate the implementation of an (eHealth) technology. The search was particularly based on finding frameworks, models or theories that provide guiding principles or ways on how to evaluate the uptake and impact of eHealth technologies or technologies in general. A framework provides a set of principles, such as „assumptions, constructs, quality criteria, and ideas that guide research and development". Furthermore frameworks can provide strategies in the form of „hands-on guidelines, design heuristics, and methods to assist the development process, and/or constructs or criteria". (4) Based on the definition of de Groot, theories are systems of hypotheses that are based on yet other systems of explanations and models are simple representations of the reality or of facts (11). It is chosen to include frameworks, models and theories because they have in common that they try to be as generally applicable as possible and providing guidelines and strategies on how to handle a certain situation or circumstances.

2. The title of the paper must include at least one of the following search terms: eHealth or similar terms, such as telemedicine, telecare, telehealth, health information systems/technology, interactive health communication applications or health technology; AND implementation OR evaluation OR assessment OR impact, AND theory OR model OR framework. Since the term eHealth is commonly described with different other terms (1), it is important to include as much of the other terms into the literature search as possible. Therefore, relevant terms were conducted from an earlier research (4). Even though van Gemert-Pijnen et al. looked at frameworks that describe the uptake and impact of eHealth and not specifically the evaluation of eHealth, synonyms used for describing eHealth still can be applied to this current research because the authors focussed on the same kind of technology (eHealth). (4)

Articles with the following exclusion criteria were excluded:

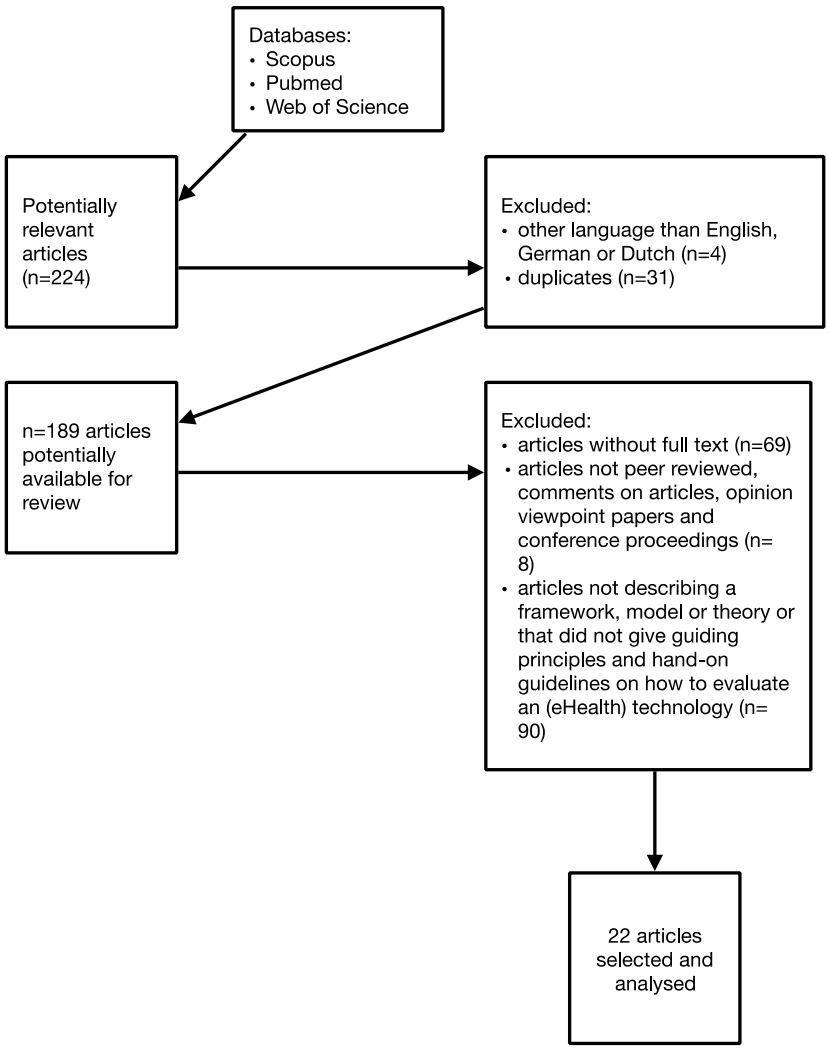
1. Articles in other languages than English, Dutch or German;
2. Articles without a full text or not peer reviewed, comments on articles, opinion viewpoint papers and symposium or conference proceedings;
3. Articles that did not describe a framework, model or theory or that, in general, did not give guiding principles and hand-on guidelines on how to evaluate an (eHealth) technology.

The number of hits per database, based on the search terms defined above, are presented in Table I and the literature search strategy is presented in Figure II.

TABLE I. SEARCH ITEMS AND HITS PER DATABASE

Date	Database	#Hits	Search items
3.08.2016	Scopus	173	(TITLE ("e*health" OR "tele*medicine" OR "tele*care" OR "tele*health" OR "health information system*" OR "health information technology" OR "interactive health communication application" OR "health technolog*") AND TITLE (implementation* OR evaluation* OR assessment* OR impact*) AND TITLE (theor* OR model* OR framework*))
3.08.2016	Pubmed	25	(TITLE ("e*health" OR "tele*medicine" OR "tele*care" OR "tele*health" OR "health information system*" OR "health information technology" OR "interactive health communication application" OR "health technolog*") AND TITLE (implementation* OR evaluation* OR assessment* OR impact*) AND TITLE (theor* OR model* OR framework*))
3.08.2016	Web of Science	26	(TITLE ("e*health" OR "tele*medicine" OR "tele*care" OR "tele*health" OR "health information system*" OR "health information technology" OR "interactive health communication application" OR "health technolog*") AND TITLE (implementation* OR evaluation* OR assessment* OR impact*) AND TITLE (theor* OR model* OR framework*))

FIGURE II. SEARCH STRATEGY



As can be seen in Figure II, 22 articles were included into the research. Information was extracted from the full text based on a set of dimensions which were deemed relevant for this research. The dimensions are developed after thoroughly reading the first two articles and extracting information that are important to set up a questionnaire. The dimensions are:

- **strategies and principles of evaluation**. This dimension is based on the objective described by Van Gemert-Pijnen (4). It describes the way in which the authors see their approach to evaluation or the context in which they place evaluation of eHealth. This is important to understand the setup of the different frameworks. For example, there are authors that simply see eHealth as a technology and apply parts of technology assessment to the evaluation while others see evaluation of eHealth as a more complex task and apply a more multidisciplinary approach to evaluation or see the evaluation in the context of user-task-technology interaction.

The different approaches, health technology assessment, multidisciplinary approach and user-task-technology interaction, are based on the descriptions mentioned in the articles.

- **foundation of frameworks, models, theories**. Since new frameworks, models or theories are usually not developed without any basis (11), it is important to identify how the different frameworks, models or theories are set up. The different foundations are 1. systematic literature review, 2. unstructured literature study, 3. combination of existing models, theories and frameworks, 4. combination of models, theories and frameworks with literature review. Where frameworks, models or theories were directly named in articles, the names of the frameworks are retrieved. This is done in order to find out, which frameworks were used frequently.
- **main concepts of framework, model or theory**. This dimension is chosen because it is important to explain concepts of the different frameworks, models or theories to see the differences or similarities and to be able to draw conclusions for the framework that is being developed in this research.

Questionnaire

After the literature review, a questionnaire for the evaluation of implementation among healthcare providers is set up. This is done in different stages. Firstly, the articles found through previously described literature search were systematically reviewed based on the dimensions described above. During the second stage, implementation outcomes that evaluate the implementation of new treatments, practices or services in the health sector on the basis of „iterative reading and discussion of the literature“ (12) are identified. This is done to give structure and an underlying formation to the questionnaire. The implementation outcomes and definitions as described by the authors (12) are shown in Table II. Then, findings from the systematic review were categorized using the implementation outcomes as described by Proctor et al. (12). This means that concepts found during the literature review (Appendix B) were sorted to the most fitting implementation outcome as described by Proctor et al. (12). In order to set up questions based on the concepts identified in the literature, it is important to understand the different concepts and their dimensions. Therefore, the implementation outcomes from Proctor (12) are complemented with the different concepts found during the literature review and further identified dimensions of the concepts. In the end, questions were formed based on the description of the implementation outcome defined by Proctor et al. (12) and dimensions for eHealth. Per concept and dimension for eHealth, a couple questions are set up to make sure every concept comes back in the questionnaire.

TABLE II. IMPLEMENTATION OUTCOMES AND DEFINITIONS AS DEFINED BY PROCTOR ET AL. (12)

Implementation Outcome	Definition
Acceptability	Acceptability is the „perception (…) that given treatment, service, practice, or innovation is agreeable, palatable, or satisfactory". The assessment of acceptability should take place by assessing the stakeholder's knowledge of different dimensions of the innovation or by assessing the direct experience of the various aspects of the innovation. The different aspects can for example be content, complexity and comfort. Since the authors see acceptability as a dynamic outcome, ratings of acceptability might change over time because the stakeholders have gained knowledge or experience with the system.
Adoption	(also named uptake) Is seen as the intention to adopt a new service. It is advised to measure uptake from the provider or organization perspective.
Appropriateness	Describes the „perceived fit, relevance or compatibility of the innovation for a given practice setting, provider or consumer" (12). When appropriateness is not high, it might create a „pushback" to implementation efforts by end-users because they feel like the innovation is too far away from the „mission of the health care setting". Furthermore, it might also not be compatible with the providers' skills, role in the practice or job expectation.
Feasibility	Describes the extent to which an innovation can successfully be carried out in a specific setting. Although this concept is very much linked to appropriateness, it is different. Although an innovation might be appropriate because it fits with the mission of the healthcare setting, it might not be feasible because there are not enough resources to implement it.
Fidelity	Is seen as the way in which an innovation is implemented in the way it was intended. There are five different fidelity dimensions: 1. adherence, 2. quality of care, 3. program component differentiation, 4. exposure to the intervention, 5. participant responsiveness or involvement.
Cost	This looks at the different implementation costs. Implementation costs can vary widely and depend highly on the costs of the particular innovation, the implementation strategy and the location of service delivery.
Penetration	Penetration is defined as the integration of a practice into a service setting.
Sustainability	Sustainability means the extent to which a new innovation is maintained within the normal workflow. This means the way in which the new innovation is being involved in the organization's culture, by forming policies and practices. There are three different stages of sustainability defined in the literature. The first one is passage, which describes a single event. The second stage is cycle or routine. Here, one can think about the repetitive reinforcement of using the innovation. The third stage is called niche saturation. This describes the way in which an innovation is integrated into every category of an organization.

Validation of the questionnaire

It is necessary to validate the questionnaire in order to check whether it measures what wants to be measured. There are different dimensions that need to be considered during validation. These dimensions are:

- **Face validity**, which refers to the extent in which a questionnaire appears to measure what it was intended for in the opinion of experts and the study subjects themselves.
- **Content validity**, which describes the degree with which the measurement contains most of the dimensions of the concept that is being studied.
- **Construct validity** refers to the degree to which the measurement reflects the concept to be measured. It increases the possibility that the measurements resulting from questionnaire responses can be used as a measurement for the concepts that are being investigated.
- **Criteria validity**. This aspect describes the extent to which a measure predicts an outcome for another measure. (13)

Validation in this research looks at the construct validity because it is important to know whether the questions from the questionnaire are measuring the concepts that are being investigated. It is described, that "factorial analysis which groups responses in relation to the underlying factors" is commonly used as a method to evaluate construct validation (13). Therefore, it is chosen to use a closed card sort as validation method since it is a form of grouping responses in relation to the underlying factors or concepts (14). Card sort in this research is done by letting questions be sorted to the right implementation outcome.

The different question clusters (all questions asked per implementation outcome) and implementation outcomes (acceptability, adoption, appropriateness, cost, feasibility, fidelity, implementation cost, penetration, sustainability), are presented to four different students at the University of Twente. The students had to connect the right cluster of questions to the right implementation outcome. The implementation outcomes are explained by using the definition found in literature (see Table II). Each concept can only be used once and respondents are given 15 minutes time to fill in the concepts. This amount of time is given in order to let students understand the different concepts but not give them too much time to think about the different answers because they should go with their instincts or first impression. The prerequisite was that all implementation clusters had to be sorted to a question cluster and could not be used more than once. The validation for the group of students can be found in Appendix A.

The second round of validation is done by doing a card sort with different researchers from the Department of Psychology, Health & Technology from the University of Twente. During this validation, questions are not being presented to the participants as a cluster, like in the first round of validation, but each question was put on an individual piece of paper. Each participant was given 56

questions and eight different papers, each with an implementation outcome and its definition on it. Participants had to group each question to the right implementation outcome. They were given 45 – 60 minutes to sort the questions. The prerequisite was that, firstly, all questions had to be sorted somewhere and, secondly, the questions could only be placed with one implementation outcome.

Results from the validation are used to give recommendations on how to change the questions to make it a more comprehensive and valid questionnaire.

Results

In this paragraph, the results of the systematic review, the questionnaire and the validation are presented.

Frameworks, Models or Theories

During the literature research, 22 articles were found an analysed. Included articles in this research can be found in Table III.

In the following, the findings from the literature search are summarized. The different dimensions that have been looked at during the systematic review are strategies and principles of evaluation, foundation of frameworks and the main concept of frameworks.

Strategies and principles of evaluation

Different authors handle different approaches to the evaluation of eHealth. Some authors describe the need for a multidisciplinary or multidimensional approach to the evaluation of eHealth (4, 7, 15-22). This means that different stakeholders that can be affected by eHealth are also involved in the evaluation of such (4, 7).

Other authors focus more on the interaction of the task to be performed, the user that uses the eHealth technology and the technology itself (8, 23-25). Task, technology and user interaction is described important because eHealth is only deemed successful when the functionality of technology matches the task, as well as the user (23).

There are also authors, who acknowledge eHealth as a new form of technology and see evaluation as a part of health technology assessment (26-32). Therefore, evaluation focusses on economic evaluation, efficiency and effectiveness and clinical outcomes (28, 29, 32).

Foundation of frameworks

Since a new framework is usually not developed without a basis of underlying frameworks, models or general applicable theories, it was important to identify these.

The foundation of frameworks, models and theories is even more diverse than the approaches mentioned above. All in all, there are five frameworks that are based on a systematic literature review with a clearly described method section for the literature review (4, 15, 16, 18, 28). Four articles (22, 26, 29, 30) are based on a literature study but do not use a systematic structure to perform the literature study. The other articles use either a combination of different models, theories and frameworks (7, 19,

20, 25, 31-33) or a combination of different models, theories and frameworks together with a literature review (8, 17, 21, 23, 24, 27).

As to the content of the foundation, authors of the different articles make use of different frameworks, models or theories. The frameworks, models and theories articles are based on can be seen in Appendix B. Five different frameworks appear as a foundation in more than one article. The most used frameworks can be seen in Table III.

Especially the 'Information Success model' by DeLone and McLean is used as a foundation for the newly developed frameworks. Other commonly used models, theories or frameworks are the 'Technology acceptance model' by Davis, the 'Quality of Care model' by Donabedian, the 'CHEATS approach' and a model by Ohinmaa and Reponen. It is important to say that these frameworks, models or theories are all used in frameworks either based on user-task-technology interaction or multidimensional approach. This underlines the need for a framework that does not only look at the technology itself, but at the tasks to be done and the different users. Since healthcare professionals are not all experts in these topics, there is a high need for a multidisciplinary team for the evaluation of eHealth.

TABLE III. INCLUDED ARTICLES AND USED APPROACHES PER ARTICLE

Reference number in literature list	**Approaches**					
	Information Success model by DeLone and McLean	Technology acceptance model by Davis	Quality of Care model by Donabedian	CHEATS approach	Five-dimensional assessment model by Ohinmaa and Reponen	Other, namely
(23)	X	X				Information Technology Adoption Model by Dixon, Task-Technology-Fit Model by Goodhue
(7)	X	X	X	X	X	Management Information System, Information Security Assurance Model, Unified Theory of Acceptance and Use of Technology Model, Telemedicine Maturity Model, literature review
(33)						Oxford Implementation Index & Rubin Causal Model
(26)						Literature review
(27)					X	-
(8)	X		X			-
(15)						EUnetHTA Core Model, literature review
(28)						Literature review
(24)						Literature review
(16)						Literature review
(17)						Literature review
(29)						Literature review

(18)						Literature review
(30)						Literature review
(19)						SERVQUAL model by Parasuraman et al. (1998)
(20)	X					IT-Organization Fit Model
(21)						TEMPEST methodology
(22)						Literature review
(31)						Theory of constraints
(25)						Stead et al. (1994) framework
(32)						Institute of Medicine (IOM) framework
(4)				X		-

Main concepts of frameworks

There are important similarities and differences between the different frameworks found in the systematic review. In Appendix B, an overview of all the different concepts of the frameworks can be found. In the next paragraph, a summary is given.

Firstly, it is important to see whether frameworks provide guidelines on evaluation based on the content of evaluation or the timing. Most frameworks are about the content of the evaluation (7, 8, 15-24, 26-32). This means they give guidelines on how evaluation should take place and which items should be looked at. One framework was concerned only with the timing of evaluation (25) and two frameworks (4, 22) included content and timing of evaluation.

Secondly, as already indicated in the chapter of strategies and principles of evaluation, there are different approaches to the evaluation of eHealth. Therefore, the content of evaluation differs as well. Frameworks that are approached from a technological point of view usually measure effectiveness on palpable measurements (p.e. time (27) or clinical outcomes (28)). Furthermore, costs play an important role in the evaluation of the frameworks that approach evaluation from a technological assessment point of view (27, 29, 30, 32). Most of the time, cost-effectiveness is measured or calculated based on the measures named above, such as time, clinical outcomes and costs. Another striking similarity between the technological assessment frameworks is, that most of them compare eHealth with other treatments, mostly the formerly used practice.

In contrary to the technology assessment frameworks, frameworks that are based on a multidimensional approach, or a user-task-technology approach are structured differently and have another focus on the evaluation. As the name already suggests, multidimensional or multidisciplinary frameworks combine different approaches with one another. Therefore, these frameworks are more complex than frameworks from the first category. They usually consist of different dimensions and different factors that evaluate eHealth (7, 15, 20-22). The most common factors in multidimensional frameworks are the factors human (e.g. satisfaction, acceptance, enjoyment), system/technology (e.g. system quality, accuracy, usefulness) and environment/organization (e.g. culture, planning, financing) (4, 7, 15, 16, 20, 21).

User-task-environment based frameworks are also mostly divided into different dimensions in order to identify the different dimensions that have to be taken into consideration during the evaluation (23, 24). As opposite to the multidimensional approach to evaluation, the user-task-environment approaches to evaluation do not combine different dimensions, but solely look at one dimension at a time.

All in all, it can be said that the articles are all very different regarding the approach to evaluation, the foundation, the main concepts and even the structure. The frameworks contain different criteria, different measurements and different connections between them.

Questionnaire

Having identified different implementation outcomes and combining these with the content of the different frameworks found during the systematic review, a base for the questionnaire can be set up. In order to set up specific questions based on the concepts identified in the literature and the different implementation outcomes, it is important to understand the different concepts and their dimensions. Most of the identified concepts can be clearly described by various literature. Other concepts stay vague and cannot be defined by literature very well. In the following, the most important concepts from literature are defined for the use in eHealth evaluation research. In Appendix C, the questionnaire can be found.

One concept that has been found during the systematic review is knowledge. This concept has been linked to the implementation outcome acceptability because the definition of acceptability says that assessment of acceptability should take place by assessing the stakeholder's knowledge of different dimensions of the innovation or by assessing the direct experience of the various aspects of the innovation. (12) There are several ideas about how knowledge can be defined and what parts of knowledge are important when talking about it. Dick and Wehner (34) defined two different types of knowledge: the individual knowledge which is the base of one's individual capacity to do something and the collective knowledge which they describe as the representation of reality and the base of the collective capacity to do something (34). At the same time, there are two types of knowledge from the field of knowledge management. These two types are tacit knowledge and explicit knowledge (35). Tacit knowledge is subjective and experiential knowledge that cannot be expressed in any specific measurement (p.e. words, numbers or formulas). This knowledge is about technical skills and the know-how of a person to do something. Furthermore, it includes cognitive skills such as beliefs, images, perspectives and mental models. Explicit knowledge on the other hand, is objective and rational. Therefore, it can be expressed in words, numbers or formulas. This type of knowledge includes theoretical approaches, manuals and databases. (35) Since this research is interested in the technical skills and the know-how of health professionals as well as the theoretical approach or training to eHealth, it is chosen to set up questions based on the approach by Smith (35).

Attitude is another important concept identified during the literature review. This concept fits with the implementation outcome acceptability because this outcome is about the perception of eHealth. Attitude is the „psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (36). As such, attitude consists of an affective component, a behavioral component and a cognitive component. The affective component is about an individual's feelings or emotions about an „attitude object". The behavioral component describes the attitudes' influence on behavior. Lastly, the cognitive component is about a person's beliefs or knowledge about an attitude object (37). As described earlier, the health professionals' attitude towards eHealth can influence the uptake and impact of eHealth (10). Therefore, it is important to include questions about the attitude

towards eHealth. It is chosen to use statements in the questionnaire and let respondents indicate how much they agree with a statement. There are six questions/statements asked per component.

The next concept identified during the literature review is openness (to change). This concept belongs to the implementation outcome adoption because adoption is seen as the intention to adopt. When a user is not open to change, he or she has no intention to adopt a new service. Unfortunately, there are no indications in literature that openness can be divided into different categories or dimensions. Since the definition of openness to change is „the acceptance of or receptiveness to change or new ideas", questions are loosely based on the definition (38).

Another important concept identified earlier concerns cultural and organizational aspects. These fit to the implementation outcome of appropriateness because that outcome is concerned with the compatibility in a practice setting (12). There are a lot of theories, models or frameworks that try to give structure to an organization's culture or organization. Schein (2010) has identified three different levels of culture: Artifacts, espoused beliefs and values, and basic underlying assumptions. Artifacts describe visible and palatable structures and processes in an organization. Espoused beliefs and values are basically ideals, goals, values, aspirations or ideologies in an organization. Basic underlying assumptions are believes and values that are taken for granted or unconscious for people. (39) Other authors handle different approaches to analyzing culture. Denison and Spreitzer (40) describe four different cultures: group culture, developmental culture, rational culture and hierarchical culture. The group culture focusses on human relations, developmental culture focusses on flexibility and change but also external environment. Rational culture focusses solely on achievement, productivity and performance. Lastly, hierarchical culture emphasizes uniformity and internal efficiency. Since this research focusses on the way eHealth is being used in an organization, it is important to know how the total organization has influence on the individual's uptake of eHealth (40). Therefore, it is chosen to base the questions on the concept by Schein.

The last concept that can be defined by literature is usability. This fits with the implementation outcome feasibility because this outcome is concerned with the extent to which an innovation can successfully be carried out in a specific setting (12). Nigel defines usability as the quality of use in a context. Since features and attributes differ highly between different contexts, it is difficult to measure. However, three dimensions of usability can be identified: effectiveness, efficiency and satisfaction. Furthermore, Nigel defines different context components: users, task, equipment and environment. (41) Questions for the questionnaire are based on the combination of the three dimensions of usability and the context components.

For the other implementation outcomes (cost, fidelity, penetration and sustainability), concepts found in literature are sorted according to the definition of the implementation outcomes as well. Unfortunately, these concepts could not be further defined for eHealth, so questions were based

directly on the concepts from the systematic review and not also on the definition for eHealth. An overview of the different implementation outcomes, concepts from the systematic review, the definition for eHealth and the different questions that have been set up can be found in Table IV. For the specific questions about one eHealth technology, the example technology eVita was used.

TABLE IV. RESULTS SET UP QUESTIONNAIRE

Implementation outcome	Concepts from systematic review	Definition for eHealth	Questions
Acceptability	IT knowledge	Tacit knowledge	• How good are you with IT? • How well do you think you know how to use eVita? • Did you get better in the use of eVita through time? • Did you get better in the use of IT through time?
		Explicit knowledge	• Did you receive training for the use of eVita? • How often do you use eVita per week? • How often do you need help with the use of eVita per week? • How often do you stop using eVita and choose an alternative (not eHealth)?
	attitude towards IT and eHealth	affective	• IT is a helpful tool in daily practice • IT brings a lot of challenges with it • IT is scary • eHealth is a helpful tool in daily practice • eHealth brings a lot of challenges with it • eHealth is scary
		behavioural	• I use some form of Information Technology (IT) in my free time • I communicate through IT with friends and/or colleagues • I use IT to organize/handle official or administrative papers (bank, municipality, etc.) (Think of mijnoverheid.nl or online banking) • I use a smartphone • I use eHealth in my professional life • I use eHealth in my personal life
		cognitive	• I believe IT has an added value to my work • I believe IT has an added value to my patients life • I believe IT has an added value to my personal life • I believe eHealth has an added value to my work

			• I believe eHealth has an added value for the patients life • I believe eHealth has an added value to my personal life
Adoption	openness to change		• I always want to have the newest technology that is available • I only hear of new technologies when a friend/colleague/family member tells me about it • I like to change my habits from time to time • I like change in general • I motivate others to change their habits
Appropriate-ness	cultural aspects	Artifacts (visible, feel able structures and processes)	• My organization uses computers • My organization uses tablets or smartphones
		Espoused beliefs and values (ideals, goals and values, ideologies)	• My organization wants to go with time/be up to date • My organization puts the emphasize on the patients
		Basic underlying assumptions (taken for granted)	• My organization supports the use of IT • My organization wants to provide qualitative care
Cost			• I need …(more/less/the same amout of/I do not know) time to use eVita compared to the formerly used method.
Feasibility	usability of eHealth technology	effectiveness user task equipement environment	• eVita helps patients to manage their disease • eVita improves the quality of life of patients • eVita saves time during consultation
		efficiency	• eVita fits into my worklife/workflow • eVita fits into the patients life • I know where to find what in eVita • I can find everything I need in eVita quickly
		satisfaction	• I am satisfied with the use of eVita • I am satisfied with the content of eVita • The patients are satisfied with the use of eVita • The patients are satisfied with the content of eVita
Fidelity	• effects of eHealth intervention on patient • effects of eHealth intervention on caregivers	-	• Do you think eVita is helpful for you? • Do you think eVita is helpful for the patients? • Are you satisfied with the way you deliver care to the patients?

	• effects of eHealth intervention on care processes		
Penetration	completeness and correctness of data	-	• How satisfied are you with the content of eVita? • Is there something you miss in eVita?
Sustainability	organizational aspects	-	• Already asked through cultural aspects
	Support	-	• Who do you ask if you have questions about eVita? • Is there technical support available for the use of eVita?

Validation

Validation among students

The first round of validation was held with four different students from the University of Twente. Students characteristics can be found in Table V.

TABLE V. CHARACTERISTICS RESPONDENTS FIRST VALIDATION

Person number	Age	Study programme	Score
1	24	Health Science, Master	4 of 8
2	21	Applied Physics, Bachelor	0 of 8
3	19	Technical Medicine, Bachelor	3 of 8
4	23	Health Science, Master	3 of 8

Although all students indicated that they were unsure about their choices, students with a medical or health related background score higher than the student of Applied Physics. This indicates that the different concepts are difficult to understand for people that are not used to health-related topics.

The validation scores for the other students do not differ too much. When looking closely at the answers the students gave, it is clear that students 1, 3 and 4 all filled in the right answer for adoption and sustainability. Furthermore, it is striking that these three students used the concept appropriateness when they should have used acceptability. A possible reason for this is that the two definitions of appropriateness and acceptability are too closely related because they both are about the perception of the innovation.

Since the validation under students did not validate each question individually, but each group of

questions had to be sorted to the right concept, it is interesting to know the outcomes if each question had to be validated individually. Therefore, a second validation in which each question was validated individually was done under researchers from the University of Twente. Other aspects of the questions were not altered for the second validation because there was no indication that questions were unclear.

Validation among researchers

Validation of the questionnaire under researchers was done by using card sort with five different researchers from the Department of Psychology, Health & Technology from the University of Twente (1 man, 4 women). In Appendix D, an overview of how the different researchers sorted the questions can be found. In the following, a short summary is given. Table VI shows the questions that have been sorted to the right concept and the explanation why it has been sorted to the concept.

TABLE VI. RESULTS VALIDATION AMONG RESEARCHERS

Concept	Short definition used in validation	Questions sorted right	Explanation
Acceptability	= is the „perception (…) that (a) given treatment, service, practice, or innovation is agreeable, palatable, or satisfactory“.	1. I believe IT has an added value to my personal life (sorted right twice) 2. I believe eHealth has an added value to my personal life (sorted right twice) 3. IT is a helpful tool in daily practice (sorted right three times) 4. I believe eHealth has an added value to my work (sorted right three times) 5. IT is scary (sorted right twice) 6. I believe IT has an added value to my patients' life 7. eHealth is scary (sorted right twice) 8. eHealth brings a lot of challenges with it 9. IT brings a lot of challenges with it 10. How good are you with IT in general? (sorted right twice) 11. Did you get better in the use of IT through time?	1. Degree to which someone thinks it is of added value 2. User satisfaction 3. Opinion about whether technology works 4. Perception whether it works for daily practice, if it is seen as satisfactory, technology has added value 5. If you are afraid of it, you are less likely to use it 6. Has something to do with qualitative care, therefore health professionals see it as added value 7. User satisfaction, agreeable 8. Not satisfactory 9. See 7 and 8 10. Satisfaction 11. Is about personal knowledge and learning
Adoption	= also named uptake, is seen as the intention to adopt a new service	1. I motivate others to change their habit 2. I always have to have the newest technology that is available (sorted right four times) 3. I like change in general (sorted right twice) 4. I only hear of new technologies when a friend/colleague/family member tells me about it (sorted right twice) 5. I like to change my habits from time to time (sorted right twice)	1. Is about change of habits 2. Early adopter, new technology is interesting 3. People who like change are more likely to try something new 4. From theory about adoption 5. See 3

Appropriate-ness	= „perceived fit, relevance or compatibility of the innovation for a given practice setting, provider or consumer“	1. My organization wants to provide qualitative care (sorted right twice) 2. My organization puts the emphasize on the patients 3. My organization supports the use of IT	1. Meets the goal of the organization about quality of care 2. Good fit because meets requirements of organization 3. Is about whether it fits with practice setting
Feasibility	= Describes the extent to which a new innovation can successfully be carried out in a specific setting given the available resources	1. eVita helps patients to manage their disease	1. Means it can successfully be implemented
Fidelity	= the way in which an innovation is implemented in the way it was intended	1. Are you satisfied with the way you deliver care to the patients with the use of eHealth? 2. Do you think eVita is helpful for you? 3. Do you think eVita is helpful for the patients	1. Is about quality of care 2. Is about the goal you want to use eVita for 3. Goal for the patients
Cost	= looks at the costs of different implementation efforts. Implementation costs can vary widely and depend highly on the costs of the particular innovation, the implementation strategy and the location of service delivery.		
Penetration	= the integration of a practice into a service setting		
Sustainability	= the extent to which a new innovation is maintained within the normal workflow; the way in which the new innovation is being involved in the organization’s culture, by forming policies and practices	1. Who do you ask if you have questions about eVita?	1. Is about how IT can be implemented in workflow

All respondents indicated that it was more difficult than they thought to sort the individual questions to the right concepts because the different concepts and definitions are similar and abstract. Therefore, it was crucial to use the definition as described in Table V. During the card sort, it was striking that all respondents looked more at the terms used in the definitions than at the name of the concept directly. For example, respondent 1 sorted the question "eVita fits into the patients' life" to the concept appropriateness, although it should have been feasibility, with explanation "*it is about how it fits, so perceived fit*". When looking at the descriptions for appropriateness and feasibility, it is logical that the respondent chose to go with appropriateness because the definition says something about 'perceived fit'. But when looking at the concepts and definitions of concepts for eHealth (p.24), it is clear that appropriateness is not the right concept for the question that respondent 1 sorted. However, it can be discussed whether the definition of the concepts for eHealth are chosen correctly, especially for the concept feasibility because only one question was correctly sorted to the concept feasibility by one respondent (Respondent 3).

All researchers sorted the most questions correctly for the concepts acceptability and adoption, as can be seen in Table VI. This indicates that the definition for these two concepts are clear and that questions that were sorted right for these concepts are indeed measuring what they are intended to measure. For other concepts (appropriateness, fidelity, and sustainability), no clear results can be seen on whether the questions clearly measure the underlying concept because some questions were sorted correctly. For the concepts costs and penetration, no questions were sorted correctly. Therefore, it is assumed that questions for these two concepts are not valid enough to use in the questionnaire.

During the validation, a couple of interesting details were striking. After the first couple of questions, the respondents had interpreted the concepts based on their own experiences and background, and they were able to sort the questions quicker than at the beginning. It was striking that most researchers (4 out of 5) took into consideration the questions they sorted earlier in order to make a decision where to place questions. Only one researcher did not take earlier sorted questions in consideration and sorted the questions without a clear strategy.

Furthermore, a number of questions were shown as a statement (p.e. "I believe IT has an added value to my personal life"). During the validation, respondents seemed to understand or interpret this as their own statement. When they could not find themselves in this, it made it more difficult for them to sort the statement to the right concept (see Appendix D, respondent 1, concept acceptability, question and comment 4).

Discussion and Conclusion

This research wanted to give an answer to the question 'How can experiences, knowledge and the affinity among health care providers regarding the use and implementation of eHealth interventions be measured?'. To answer this question, a literature research was done wherein all currently available methods on how to evaluate eHealth were identified. After that, a new questionnaire was set up based on the available literature and has been validated with a closed card sort in two different ways in order to make a step forward in the research of a universal tool for the evaluation of eHealth. The literature research showed that there are numerous articles which describe frameworks or give hand-on guidelines for the evaluation of eHealth. Unfortunately, the different articles are very diverse and based on different theories and approaches. To be able to bring all the various frameworks together in one questionnaire, it was chosen to relate the different parts of these framework to pre-defined implementation outcomes. Based on that, a questionnaire was set up. A first validation with students from the University of Twente showed that the different implementation outcomes were very similar and abstract and the questions were divers. Therefore, students had trouble with sorting a set of questions to one implementation outcome. For that reason, a second round of validation was done wherein researchers were asked to sort each question to an implementation outcome. It was striking that questions from the outcome 'feasibility' were wrongfully sorted to the implementation outcome 'appropriateness' by multiple researchers. This indicated that questions set up for 'feasibility' are not valid. The implementation outcomes with the most questions sorted right were acceptability and adoption which indicates that the questions set up for these outcomes were valid and could be used in a questionnaire. For the other concepts (appropriateness, fidelity, and sustainability), no clear results were seen on whether the questions clearly measure the underlying concept. The questions for the concepts costs and penetration seemed to not be valid enough to use in a questionnaire because no questions were sorted correctly to these concepts.

During this research, a couple of problems or discussion points came forward. Firstly, the literature research has been performed as a systematic review to include as many concepts as possible. However, there are important concepts missing because the identified search terms do not include all articles that have been published about the evaluation of eHealth. For example, Glasgow et al. (42) have set up a framework that evaluates eHealth based on different factors. The factors are reach, efficacy, adoption, implementation and maintenance. Each of these factors is represented on a scale from 0 to 1 (or 0% to 100%). This means that during evaluation, the different factors are given a score. That way, different eHealth interventions can be easily compared. The different factors defined by Glasgow et al. (42) relate to the implementation outcomes in this research. For example, Glasgow et al. describe that the factor 'reach' measures the participation at an individual level (so the participation of patients or employees), which makes it necessary to gain insight in the amount of people using the eHealth intervention, but also demographic and personal information. (42) This part is also included in the questionnaire set up during this research because there are questions focussing on the use of

technology in general, and about the use of eHealth. Furthermore, Glasgow et al. talk about efficacy, which in this case focusses on the outcomes of eHealth interventions. The authors describe that positive and negative outcomes need to be included and that evaluation of eHealth also should include behavioural, quality of life, and participant satisfaction outcomes. This is also realized in the questionnaire set up during this research. Glasgow et al. do not include evaluation of costs, but mentioned that it is point for further research. (42) The implementation outcomes used for setting up the questionnaire in this current research, include costs.

Another article that was not included in this research is from Cain and Mittman (43). They identified the dynamics around diffusion of innovation for "new medical and information technologies in the health care industry". The authors describe ten different dynamics: 1) relative advantage, 2) trialability, 3) observability, 4) communication channels, 5) homophilous groups, 6) pace of innovation/reinvention, 7) norms, roles, and social networks, 8) opinion leaders, 9) compatibility, 10) infrastructure (43), which could have made an addition to the questionnaire set up during this research. In the questionnaire from this research, one implementation outcome (adoption) focusses on the intention to adopt a new service, which relates to the different dynamics Cain and Mittman have defined. But Cain and Mittman present a distinction between the different kind of adopters or phases of adoption. When setting up the questionnaire in this research, these distinctions could have been used to ask questions to identify in to which phase a user belongs.

Unfortunately, the articles from Glasgow et al. (42) and Cain & Mittman (43) did not come forward in the literature search because they did not include one of the search items in their titles and during this research, search items were limited to the title. This was done because of the otherwise massive amount of irrelevant literature that would have been found when also searching in the abstracts for the search terms. However, when changing the search terms, it is likely that these two articles could have been found. Therefore, it should be considered to not only search in titles, but also in the abstracts in future research. Even though this results in a high amount of found articles and creates a lot of work excluding irrelevant articles, it would add depth and quality to the research on evaluation of eHealth.

Another point of discussion relates to the results from the literature research. As identified earlier, the different articles are very divers and based on a lot of different theories and approaches to eHealth and evaluation. Some researchers approach evaluation of eHealth from a technological point of view, others believe it is important to use a multidimensional approach in which they look at different aspects and include the user, environment, task, etc. in the evaluation. But even though more researchers handle a multidimensional approach (7, 15, 20-22), there is no consensus about the different aspects that need to be included. This can be explained by the fact that eHealth still is a relatively new field of research (1, 44). Therefore, there is still no consensus about which definition to use (1) and which domains to include into the field of eHealth (44). This also makes evaluation of eHealth difficult because of the diverse points of views that are floating around in the field of eHealth.

The next topic of discussion is that the outcomes of the two validation rounds do not give enough evidence that the questionnaire is valid. There are a couple of possible reasons for that. One possibility is that the method chosen for validation was not the best choice in this research. Card sort is described as a good method to validate questionnaires in a short amount of time. However, the outcomes of a card sort are qualitative. (45) Therefore, it can be argued that the validity of a questionnaire cannot be measured in a quantitative way and hence is not easily comparable with validity of other questionnaires. A suggestion for a possible follow up research is that quantitative methods for validation are used to be able to compare validity with earlier set up questionnaires. Furthermore, it is possible that the sort of validity that was chosen in this research is not the right one. As mentioned earlier, there are different kinds of validity: Face validity, content validity, construct validity and criteria validity. It was chosen to determine the construct validity through card sort because it was interesting to see whether the questions reflect the concepts that want to be measured. Since the first card sort did not give any clear results, a second card sort was being undertaken among researchers from the University of Twente, all experts in the field of eHealth. This actually refers more to face validity – the extent to which a questionnaire appears to measure what it was intended for in the opinion of experts. In that case, a card sort might not be the right method. During the card sort, experts gave their explanation on why they sorted questions to which concept, but it is possible that this was not sufficient for the participants to explain themselves and give their opinion on the different concepts and questions. It would be interesting to see whether a different method changes the outcomes of the validity testing. A possibility to give more room for experts to evaluate on the questionnaire would be to use some sort of DELPHI method because this has been proven to obtain a reliable consensus of opinion in a group of experts. That way, the reasons behind experts' judgements are clear to understand for the researcher and the other experts (46).

Another issue relates directly to the questionnaire. During the second validation round, it could be identified that respondents looked very differently at the different questions that had to be sorted. Some interpreted the questions based on their own professional background/knowledge (tacit knowledge) (35). This means that they could makeup missing connection between questions and implementation outcomes or missed connections because their focus is on another topic. Since card sort depends on the respondents, this "bias" cannot be totally ruled out. However, it is possible to restrict the amount of interpretation by respondents. In future research this problem can be solved by not only giving the questions, but also the answer possibilities or indicating whether it is an open or closed question. Furthermore, the respondents could have been asked to only use their explicit knowledge, so the knowledge that is objective and rational. This could have been done by asking them to link every question to a method, model or theoretical approach they know (35). That way, it is clearer to the researcher, which knowledge is used during the validation and therefore makes it easier to determine how much weight can be added to the opinion of the participant.

Strengths and limitations

There are several strengths and limitations in this research. This research included several articles that are concerned with the evaluation of eHealth and technology in general. All of these articles are combined in a questionnaire that wants to be generally applicable for the evaluation of eHealth under different stakeholders. However, as identified earlier, more broad search terms or a literature search in not only the title, but also the abstract or full text, could have brought even more relevant articles to light. This is because even though terms like eHealth (or other frequently used terms for it), evaluation, assessment or framework are not mentioned in the title, it is likely that these terms are mentioned in the abstract of articles that are otherwise fulfilling the different inclusion criteria. The broadening of the search in also the abstract or full text will result in a higher amount of found literature and probably also in a higher number of irrelevant articles that need to be excluded by hand after reading the abstract. That was also the reason why the literature search in this research has been limited to only the abstracts of articles. Furthermore, it is possible to also use snowballing method, screening the citations of articles found during literature search by hand, in order to really include all literature.

Another limitation of this research is about the questionnaire itself. Although the implementation outcomes used to set up the questionnaire in this research contain the concept 'cost', the questionnaire does not include direct questions about costs. But costs are crucial in determining whether eHealth can be adopted, implemented and maintained (42). Therefore, further research should focus more on questions about cost. These costs can be either monetary, such as in cost-benefit analysis or comparing costs and outcomes, such as in cost-effectiveness analysis.

A strength of this research is that the different terms for eHealth are included in the literature search. As already addressed in the beginning, there is discussion about the definition of eHealth because different researchers describe and perceive eHealth differently (1). In this research, the term eHealth is based on the definition by Eysenbach, who sees eHealth as a „field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies." (1, 5). But since not all researchers use the same definition, a lot of similar terms to eHealth were used during literature search to include as much articles as possible.

Another strength of this research is that it does not only provide hand-on guidelines on how to evaluate eHealth, like many other researches did (15-17, 23, 25, 26, 29, 30, 32, 47), but also set up a questionnaire that can be easily used in practice without the need for a new scientific research. This fills a gap between the scientific literature about the evaluation of eHealth and the real-life practice where evaluation needs to take place. This is also what another research that is concerned with the evaluation of eHealth indicates. Greenhalgh et al. (48) set up a framework that wants to help evaluate

eHealth and indicate that although that research is academically defensible, it is also important to develop evaluation frameworks and techniques for the intended users of eHealth (48).

Advice for further research

For further research on the evaluation of eHealth, it is advised to make an effort to include all relevant literature. Because of the continuous development of new eHealth technologies and different approaches to (the definition of) eHealth (1), defining the right search terms and combinations of these is a challenge. However, only with a full overview of current literature on evaluation of eHealth, every important aspect of evaluation of eHealth can be included in a questionnaire or other method on how to evaluate eHealth. Furthermore, it should be considered to extend the literature search by using snowballing (screening citations of articles "by hand").

For the evaluation itself, it is important to not only focus on one part of the intervention, for example the technology itself, but include all aspects of it. A multidimensional approach so to speak, like different authors call for (4, 7, 15). This can also be seen from the complexity of concepts identified in the literature review during this research: Although the different articles found in literature have little to no consensus about the underlying frameworks, methods or models on how to evaluate eHealth, they all include more aspects than only looking at whether the technology itself works. Commonly mentioned aspects are technology, task, individuals, environment/context, economic measures, legal and ethical issues, social issues (16, 21, 23, 28, 32). This is also described by Greenhalgh et al. (48), who indicate that approximately half of the frameworks identified in their research included a wider context for the evaluation. The authors also strengthen the importance for the need to include different aspects in the evaluation because of the complex environment in which eHealth is implemented: eHealth technologies can only be successful when they can adapt to all aspects that can have influence on or are influenced by eHealth technologies. (48)

Since questionnaires should be validated in order to check whether they really measure what they should measure, it is important to choose the right validation method. As explained earlier, it is debatable whether the method chosen in this research was the right one. Firstly, a quantitative validation method should be chosen to make it comparable to other questionnaires. This research used a qualitative validation method and it did not proof to be able to clearly identify whether the questionnaire was valid. Furthermore, it should be considered to also include the opinion of experts more during the validation by using a method that gives them space to discuss and form a unified opinion. As described earlier, DELPHI method could be considered for the validation because it gives experts the possibility to evaluate on their own opinions and the opinions of others.

Conclusion

All in all, this research made a first step towards a more unified method for evaluation of eHealth. The literature around the topic of evaluation of eHealth is divers and a lot of effort needs to be done to include all relevant literature in future research. The questionnaire set up during this research creates a base for further research on methods for the evaluation of eHealth that can also be used in real-life practice and not only by scientific experts. Nevertheless, more research is needed to set up a more valid questionnaire that is easily applicable to different technologies and service settings.

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Appendix

Appendix A – Card sort students

Name: Age: Study:

Questionnaire Evaluation

With this small test, I want to see whether my proposed questions are indeed measuring the concepts.

Your task is to connect the questions in the different columns with the concept you find most fitting. Do not think to much about it. It is important that you decide based on your first feeling and impression. It is not bad if you do not connect the questions with the right concepts.

Every concept can only be used once and you have 15 minutes to fill them in.

1. Acceptability = is the „perception (…) that (a) given treatment, service, practice, or innovation is agreeable, palatable, or satisfactory".
2. Adoption = also named uptake, is seen as the intention to adopt a new service
3. Appropriateness = „perceived fit, relevance or compatibility of the innovation for a given practice setting, provider or consumer"
4. Cost
5. Feasibility = describes the extend to which a new innovation can successfully be carried out in a specific setting given the available resources
6. Fidelity = the way in which a innovation is implemented in the way it was intended
7. Penetration = the integration of a practice into a service setting
8. Sustainability = the extent to which a new innovation is maintained within the normal workflow; the way in which the new innovation is being involved in the organization's culture, by forming policies and practices

I need …(more/less/the same amount of/I do not know) time to use eHealth compared to the traditional care.	
How old are you? Are you a male or female? Where do you work? What is your job description? How good are you with IT in general? How well do you think you know how to use e-Vita? Did you get better in the use of e-Vita through time? Did you get better in the use of IT through time? Did you receive training for the use of eVita? How often do you use eVita per week? How often do you need help with the use of eVita per week? How often do you choose an alternative for eHealth (not eHealth)? IT is a helpful tool in daily practice IT brings a lot of challenges with it IT is scary eHealth is a helpful tool in daily practice eHealth brings a lot of challenges with it	

eHealth is scary I use some form of Information Technology (IT) in my free time I communicate through IT with friends and/or colleagues I use IT to organize/handle official or administrative papers (bank, municipality, etc.) (Think of mijnoverheid.nl or online banking) I use a smartphone I use eHealth in my professional life I use eHealth in my personal life I believe IT has an added value to my work I believe IT has an added value to my patients life I believe IT has an added value to my personal life I believe eHealth has an added value to my work I believe eHealth has an added value for the patients life I believe eHealth has an added value to my personal life	
eVita helps patients to manage their disease eVita improves the quality of life of patients eVita saves time during consultation eVita fits into my worklife/workflow eVita fits into the patients life I know where to find what in eVita I can find everything I need in eVita quickly I am satisfied with the use of eVita I am satisfied with the content of eVita The patients are satisfied with the use of eVita The patients are satisfied with the content of eVita	
I always want to have the newest technology that is available I only hear of new technologies when a friend/colleague/family member tells me about it I like to change my habits from time to time I like change in general I motivate others to change their habits	
Who do you ask if you have questions about eVita? Is there technical support available for the use of eVita?	
How satisfied are you with the content of eVita? Is there something you miss in eVita?	
Do you think eVita is helpful for you? Do you think eVita is helpful for the patients? Are you satisfied with the way you deliver care to the patients with the use of eHealth?	
My organization uses computers My organization uses tablets or smartphones My organization wants to go with time/be up to date My organization puts the emphasize on the patients My organization supports the use of IT My organization wants to provide qualitative care	

Appendix B – Stategies, principles; foundation of frameworks and main concepts of included articles

Frame-work (Citation number)	Strategies and principles	Foundation of framework	Main concepts of framework/model/theory
(23)	user-task-technology interaction	Combination of models, theories and frameworks with literature study • DeLone information success model • Technology acceptance model (TAM) of Davis • Information Technology Adoption Model (ITAM) of Dixon • task-technology-fit model (TTF) of Goodhue	IT adoption in clinical environment depends on the fit between the attributes of the individual user, attributes of the technology and attributes of clinical tasks and processes. • Individuals: represent an individual user or user group • Technology: interaction of various tools needed to accomplish given task • Task: wholeness of tasks and working processes that have to be completed by user and that are supported by given technology Quality of fit depends on attributes of the objects. • Individual level: IT knowledge, motivation and interest in task to be completed, flexibility and openness, team culture, organizational context, cooperations within team, politics within organization • Technological level: stability and usability of software or hardware tool, costs, functionality, technical infrastructure, integration of tools, availability of tools in clinical context • Task level: organization of the tasks to be completed, activities and their interdependence, complexity of tasks
(7)	multidimensional	Combination of models, theories and frameworks: • Model of Donabedian ○ observes structure, processes and outcome of a service ○ Structure measures: accessibility, availability, quality of resources ○ process measures: delivery of healthcare services by clinicians and providers ○ outcome measures: final result of healthcare • DeLone and McLean Information Success Model	The framework is illustrated as a fish-bone diagram. The main skeleton consists of three categories with each two different dimensions: • Human • service provider • patient/client • System • organization • technology • Environment • society • rules/policies For each of the dimensions, the fish-bone diagram shows different factors and barriers that can potentially influence the overall outcome. These factors and barriers are, however, examples and can be broadened depending on the situation in which evaluation is taking place.

		• Management Information System • Technology Acceptance Model • Information Security Assurance Model (Chaula et al.) • Unified Theory of Acceptance and Use of Technology Model (UTAUT) • Clinical, Human And organizational, educational, administrative, technical, social (CHEATS) approach • Ohinmaa and Reponen five dimensional assessment model • Bashshur et al. The taxonomy of telemedicine • Approach from Institute for a Broadband-Enabled Society • Telemedicine Maturity Model (TMM) • Nepal et al. A framework for telehealth programm evaluation	

(33)	not described	Combination of different models, theories and frameworks
		• Oxford Implementation Index: identifies components of implementation fidelity
		  ○ treatment design
		  ○ treatment delivery
		  ○ treatment uptake
		  ○ context factors
		• Rubin Causal Model: provides a method for estimating the average causal effect of a treatment
			The Oxford Implementation Index defines the evaluation components and the Rubin Causal Model provides the evaluation method.
			Components of implementation fidelity are:
			• treatment design
			• treatment delivery
			• treatment uptake
			• context factors
			The Rubin Causal Model is used to measure an average usual effect of a treatment.

(26)	technology assessment	Unstructured literature study	Purpose of the framework is to specify several critical dimensions with which evaluation can take place. Since it would be a too broad scope to simply evaluate the effectiveness, the authors say that the scope should be narrowed to:
			• Use of a restricted number of conditions as indicators of effectiveness
			• Selection of conditions to be used as indicators of effectiveness
			  ○ Relatively high incidence and/or prevalence
			  ○ Subtle or difficult to diagnose disorders
			  ○ Expected to be difficult to detect by telemedicine
			  ○ Significant risk associated with missed diagnosis, or significant benefits of early detection
			  ○ Significant burden of suffering
			• Establishing minimal levels of sensitivity and specificity
			  ○ Flexible levels of accuracy expected as a function of the condition
			  ○ Other factors considered include improved access, cost, effects on care

(27)	technology assessment	Combination of models, theories and frameworks with literature study
		• Ohinmaa and Reponen five dimensional assessment model
			Framework consists of:
			• specification
			  ○ clear outline of application, equipment, staff and other resources
			  ○ plan of implementation
			• performance measure
			  ○ effect of telemedicine on time taken for tasks
			  ○ effect on quality
			  ○ cost of telemedicine application
			• outcomes
			  ○ patient outcomes
			  ○ health status
			  ○ net effect on health
			• summary measures
			  ○ cost-effectiveness
			  ○ cost-comparison analysis
			• operational and other considerations
			  ○ access to telemedicine
			  ○ legal issues

(8)	user, task, technology interaction	Combination of models, theories and frameworks with literature study • Donabedian's Framework for assessing Quality of Care • Management Information System (DeLone & McLean)	Expansion of Donabedian's framework. • The process of care is central in the framework. • It is influenced through individual structure (e.g. patients and providers) and organizational structure (e.g. scheduling, equipment location suitability, culture, cost, etc.). • The process of care itself influences the individual outcomes (e.g. patient: satisfaction with outcome of care, quality of life; provider: satisfaction with outcome of care, number of re-admissions) or organizational outcomes (e.g. efficient use of resources, cost effectiveness)

(15)	multidimensional	Systematic literature review
		• EUnetHTA Core Model
		• 7 domains
		  ○ Health problem and description of the application
		  ○ Safety
		  ○ Clinical effectiveness
		  ○ Patient perspectives
		  ○ Economic aspects
		  ○ Organizational aspects
		  ○ Socio-cultural, ethical, and legal aspects
			Mast consists of three different steps:
			• Preceding Considerations
			  ○ Purpose of technology
			  ○ Alternatives
			  ○ Legislation
			  ○ Reimbursement
			  ○ Maturity
			  ○ Number of patients
			• Multidisciplinary assessment
			  ○ Health problem and characteristics of the application
			  ○ Safety
			  ○ Clinical effectiveness
			  ○ Patient perspectives
			  ○ Economic aspects
			  ○ Organisational aspects
			  ○ Socio-cultural, ethical and legal aspects
			• Transferability assessment
			  ○ Cross-border
			  ○ Scalability
			  ○ Generalizability

(28)	technology assessment	Systematic literature review	Assessment framework consisting of 7 different dimensions • Clinical effectiveness: related to the application performance after a certain time of use. Measurement can take place by measuring usual outcomes and comparing it to former care scenario • Economics: measures whether technology is good value for money from a societal point of view (meaning including all costs) • Legal/ethical issues • Organisational Impact: measures the organizational actors that influence resistance or acceptance and utilization of the new technology • Acceptance: Patients and staff need to accept new technology in order for it to be useful because acceptance has influence on quality of care and health outcomes • Equity of Access: describes the accessibility of the technology to diverse population groups in relation to different variable; it is purely related to the supply • Technical Feasibility
(24)	user-task-technology interaction	Combination of models, theories and frameworks with literature study	Seven different parts(dimensions) of the model • consultation medium • patient characteristics • provider characteristics • contextual characteristics • verbal and non-verbal medical encounter communication: providers —> Instrumental behaviour - information giving to patient or other providers, information seeking from patient or other providers; social conversation; affective behaviour - positive talk, negative talk; partnership building • verbal and non-verbal medical encounter communication: patients —> Instrumental behaviour - information giving to provider(s), information seeking from provider(s); social conversation; affective behaviour - positive talk, negative talk • health outcomes
(16)	multidimensional	Systematic literature review	Framework with different domains: • Health domain: refers to the domain in medical field or the application area (e.g. oncology, neurology, etc.) • Health services: meaning a service or action that has to do with cure or care of an individual • Telehealth Technologies • Communication Technologies

			• Environment Setting: elements included into environment are people, locations, communication mode and devices
			• Socioeconomics Evaluation
			  ○ Barriers
			  ○ Costs
			  ○ Benefits
			  ○ Outcomes

(17)	multidimensional	Combination of models, theories and frameworks with literature study	Framework proposes that interventions to promote self-management, optimization of treatment, and care coordination are essential aspects of chronic disease management, which are likely to lead to improved health outcomes, patient experience, access to care and more cost-effective delivery of care.
			Evaluation is done by describing the extent to which each element of the model was successfully delivered and the intended outcomes that were achieved.
			
			Important elements of the model are:
			• Chronic disease management
			  ○ promote self-management
			  ○ optimise treatment
			  ○ co-ordinate care
			• Improved outcomes
			  ○ health outcomes
			  ○ access to care
			  ○ patient experience
			  ○ cost-effectiveness

(29)	technology assessment	Unstructured literature study	Economic evaluation for telemedicine is more complex then usual economic evaluation for medical devices because there are more alternatives. Therefore, when researching cost-effectiveness or when doing a cost-benefit analysis, the full range of actual alternatives needs to be considered. Areas to look at are: • Effects/Consequences: source of evidence on efficacy, effectiveness and safety needs to be specified and the relation between the intervention and the expected effect needs to be justified. Health outcomes are important. They can be very divers and every aspect needs to be taken into consideration. • Costs: measure the value of all resources used. The actual use and per-unit cost of resource is needed in order to give the best cost analysis • Perspective of Analysis: needs to be taken into consideration because there is a difference in costs and effects when looking from a societal, patient or provider point of view

			• Discounting: When health effects or cost implications of telemedicine extend over time, they need to be discounted.

(18)	multidimensional	Systematic literature review	Evaluation criteria grouped into four different categories:
			• Structural Quality
			  ○ hardware and technical quality
			  ○ software quality
			  ○ organizational support/capacity
			  ○ functionality
			• Quality of Information Logistics
			  ○ completeness or correctness of data
			  ○ costs of information processing
			  ○ user satisfaction
			  ○ patient concerns about security, privacy or confidentiality
			  ○ patient satisfaction, attitudes, perception toward HIT
			  ○ diffusion
			• Effects on Quality of Processes
			  ○ efficiency of work processes
			  ○ appropriateness of patient care
			  ○ organizational or social quality
			  ○ HIT selection/development, implementation and training
			  ○ unintended consequences/benefits
			  ○ barriers or facilitators to adoption
			• Effects on outcome of quality of care
			  ○ morbidity, mortality, quality of life
			  ○ costs of patient care
			  ○ patient-related knowledge
			These categories with each their factors have to be evaluated for the different stakeholders within the different factor levels (individual, group, organizational, systematic and environmental)

(30)	technology assessment	Unstructured literature study	Evaluation of telemedicine has different areas: • Task domains • Tools • Settings • Integration • Costs • Customer satisfaction Each of the areas is divided into different sub-areas that need to be considered for evaluation.

(19)	multidimensional	Combination of different models, theories and frameworks • SERVQUAL model by Parasuraman et al. (1998) • Importance performance analysis	First, service quality is determined by using the SERVQUAL model. The model consists of different dimensions: • tangible • reliability • responsiveness • reassurance • empathy Together, the dimensions have twenty-two questions that can be adapted in order to fit the context of research. After that, service items were classified into different categories for importance and performance. The classifications are: • Possible overkill • Keep up the good work • Low priority • Concentrate here These function as management tasks.
(20)	multidimensional	Combination of different models, theories and frameworks • Information System Success Model (DeLone and McLean) • IT-Organization Fit Model (Scott Morton)	Human, Organization and Technology are essential components of IS. The impact of Health information system is assessed in net benefits These three factors and the impact of HIS correspond to interrelated dimensions of HIS success: • System Quality • Information Quality • Service Quality • System Use • User Satisfaction • Organizational Structure • Organizational Environment • Net benefits

(21)	multidimensional	Combination of models, theories and frameworks with literature study
		• TEMPEST methodology, reinforced with Health Technology assessment (items identified by literature review)
			Framework of seven themes, 21 sub-themes and 84 quantitive indicators. Furthermore, it is reinforced by an interdisciplinary and multidimensional model of health technology assessment.
			The themes and sub-themes are:
			• Technology
			  ○ Enabling/emerging technology
			  ○ Interoperability of eHealth
			  ○ eHealth service delivery model
			• Economic
			  ○ Healthcare funding
			  ○ performance and population
			  ○ labour market segmentation
			• Market
			  ○ Market-driven healthcare
			  ○ Consumer-driven healthcare
			  ○ IT market capabilities and skills
			• Policy
			  ○ eHealth policy
			  ○ education and training
			  ○ institutional structure
			• Evaluation
			  ○ Governance, regulation, and compliance
			  ○ eHealth adoption/user engagement
			  ○ performance measurement and benefits realization
			• Social
			  ○ social inclusion/access to it
			  ○ patient-centered healthcare
			  ○ demographics
			• Transformation
			  ○ education and training
			  ○ reform agenda
			  ○ eHealth strategy and implementation

(22)	multidimensional	Unstructured literature study	Framework made of three dimensions:
			• Domain: determines whether the evaluation addresses the information of the intervention or its outcomes.
			  ○ Formative evaluation: addresses the information of the intervention
			  ○ Summative evaluation: addresses the outcomes of the intervention
			• Mechanism: identifies the specific components of the information technology and/or its health system that will be subject of the evaluation study
			  ○ Formative evaluation: concerned with processes that start with the idea for a new technology and ends with the creation of the innovation
			  ○ Summative evaluation: starts with the healthcare processes that are impacted by the technology and ends with society's long-term possible health benefits
			• Timing: determines whether the evaluation takes place before or after implementation

(31)	technology assessment	Combination of different models, theories and frameworks • Theory of constraints (focus on the impact of technologies on organizational constraints) (by Eliyahu M. Goldratt)	Theory can be divided into different steps: 1. Identify system's constraints, such as described in the Theory of constraints 2. Alternative technologies' effect on constraints is evaluated These two steps can be put into a constraints matrix in order to visualize the relationship between technologies and constraints 3. The different constraints have to be ranked by their estimated impact on the system 4. The fourth step is the financial analysis. This analysis can be done by using cost-benefit analysis or cost-effectiveness analysis.

(25)	technology assessment	Combination of different models, theories and frameworks • Stead et al. (1994) framework	Framework says that evaluation needs to be matched to the stages of system development. The system development stages mentioned in this framework are the ones of a standard software design life cycle. • Stage 1 (specify needs for setting and users): Evaluate definition/specification • Stage 2 (develop system components): Evaluate in the lab. This means that the system is evaluated by doing case studies or scenarios and by testing different components of the system (p.e. database, user interface) • Stage 3 (combine components): Evaluate in the lab. Again, the system is tested in a „realistic“ setting • Stage 4 (integrate system into setting): Evaluate validity. The system is now used in a real setting by real end users, away from the developers. • Stage 5 (put system to routine use): Evaluate efficacy. Done in order to determine the effectiveness and the reasons for the level of effectiveness.
(32)	technology assessment	Combination of different models, theories and frameworks: • Institute of Medicine (IOM) framework • Australia and New Zealand (ANZ) Telehealth Committee Methodology • Finish Office of Health Technology Assessment (FinOHTA)	Framework consists of seven criteria with different measures: • Access: Seen as the ability of patients to get appropriate care at the right moment and in a timely manner. The two main elements are appropriateness of care and timeliness of care • Cost: Defines the economic value of resource use associated with the use of telemedicine (or the pursuit of defined objectives and outcomes) • Efficiency and Effectiveness: efficiency refers to the benefit of using a new technology in ideal conditions of use; effectiveness refers to the benefit of using a new technology in general or routine conditions of use • Appropriateness: refers to a judgment on whether the technology should be used in a particular circumstance • Acceptability: refers to the degree to which users of the technology are satisfied with it and are willing to use it • Technical properties and infrastructure: Infrastructure is seen as the general base of facilities, resources and equipment required for delivery of a health service. • Safety: is concerned with making a judgement about the acceptability of a possible health risk associated with technology The framework includes example questions and indicators.

(4)	multidimensional and holistic approach	Systematic literature review: • CHEATS (Shaw) • Catwell & Sheikh. Evaluating eHealth interventions: the need for continuous systemic evaluation	Framework is set up in a roadmap design. The process of designing, implementing and evaluating eHealth should take place in a multidisciplinary management team. The framework consists of five different steps. • Contextual inquiry: information is gathered from the intended user and the environment • Value specification: values from key stakeholders and the most favorable solutions for these are being identified • Design: prototypes are build based on the values, goals and tasks that need to be fulfilled • Operationalization: during this phase, introduction, adoption and employment of the technology takes place • Evaluation: the uptake of technology and actual usage are being evaluated All these steps take place in a iterative, flexible and dynamic process. Therefore, evaluation does not only have to take place during the last step, but can also happen after every part of the process or even during the process.

Appendix C – Questionnaire

Inleiding

Ik ben Mara Kaldeweide en volg de master Gezondheidswetenschappen aan de Universiteit Twente. Op het moment ben ik bezig met het afstuderen in de richting eHealth. Hiervoor doe ik onderzoek naar het gebruik en de implementatie van eVita onder zorgverleners.

Hiervoor heb ik u hulp nodig. Ik zou het daarom erg waarderen als u deze enquête invult. Het kost slechts … minuten en u helpt mij er veel mee.

Alle antwoorden worden vertrouwelijk behandeld en kunnen niet aan uw als persoon gekoppelt worden.

Als er vragen of opmerkingen zijn kunt u mij altijd bereiken via m.a.kaldeweide@student.utwente.nl.

Alvast bedankt voor uw tijd!

Vragenlijst

Persoonlijke gegevens

9. Wat is uw leeftijd?
    1. Leeg antwoord (zelf invullen)
10. Wat is uw geslacht?
    1. Man/vrouw (keuze)
11. Waar werkt u?
    1. Keuze uit verschillende praktijken die meedoen aan eVita
12. Wat doet u voor werk?
    1. Keuze uit arts, praktijkondersteuner, doktorsassisent, anders namelijk
13. Heeft u weleens gebruik gemaakt van eVita?
    1. Keuze uit Ja/Nee (bij Nee wordt enquête beëindigd)

4. Hoe vaak maakt u gebruik van eVita?

1-2 keer per week; 3-4 keer per week; 5-6 keer per week; 6-7 keer per week; meer dan 7 keer per week

5. Hoe vaak heeft u hulp nodig bij het gebruik van eVita?

1-2 keer per week; 3-4 keer per week; 5-6 keer per week; 6-7 keer per week; meer dan 7 keer per week

6. Hoe vaak kiest u een alternatief voor eVita?

1-2 keer per week; 3-4 keer per week; 5-6 keer per week; 6-7 keer per week; meer dan 7 keer per week

De volgende vragen gaan over de aanvaardbaarheid en uw kennis van IT en eVita.

- On a scale from 1 to 5, how good are you with IT in general?
- On a scale from 1 to 5, how well do you think you know how to use e-Vita?

- Did you get better in the use of e-Vita through time?

Ja/Nee/Weet niet

- Did you get better in the use of IT through time?

Ja/Nee/Weet niet

- Did you receive training for the use of eVita?

Ja/Nee/Weet niet

In hoeverre bent u het eens met de volgende uitspraken? (1 = Helemaal mee eens; 2 = enigszins mee eens; 3 = neutraal; 4 = enigszins mee oneens; 5 = helemaal niet mee eens)

- IT is a helpful tool in daily practice
- IT brings a lot of challenges with it
- IT is scary
- eHealth is a helpful tool in daily practice
- eHealth brings a lot of challenges with it
- eHealth is scary
- I use some form of Information Technology (IT) in my free time
- I communicate through IT with friends and/or colleagues
- I use IT to organize/handle official or administrative papers (bank, municipality, etc.) (Think of mijnoverheid.nl or online banking)
- I use a smartphone
- I use eHealth in my professional life
- I use eHealth in my personal life
- I believe IT has an added value to my work
- I believe IT has an added value to my patients life
- I believe IT has an added value to my personal life
- I believe eHealth has an added value to my work
- I believe eHealth has an added value for the patients life

- I believe eHealth has an added value to my personal life

De volgende vragen gaan over de adoptie en geschiktheid van eHealth. Geef ook hier weer aan in hoeverre u het eens bent met de uitspraken. (1 = Helemaal mee eens; 2 = enigszins mee eens; 3 = neutraal; 4 = enigszins mee oneens; 5 = helemaal niet mee eens)

- I always want to have the newest technology that is available
- I only hear of new technologies when a friend/colleague/family member tells me about it
- I like to change my habits from time to time
- I like change in general
- I motivate others to change their habits
- My organization uses computers
- My organization uses tablets or smartphones
- My organization wants to go with time/be up to date
- My organization puts the emphasize on the patients
- My organization supports the use of IT
- My organization wants to provide qualitative care

De volgende stellingen gaan over uw persoonlijke mening over eVita. Geef ook hier weer aan in hoeverre u het eens bent met de uitspraken. (1 = Helemaal mee eens; 2 = enigszins mee eens; 3 = neutraal; 4 = enigszins mee oneens; 5 = helemaal niet mee eens)

- eVita helps patients to manage their disease
- eVita improves the quality of life of patients
- eVita saves time during consultation
- eVita fits into my worklife/workflow
- eVita fits into the patients life
- I know where to find what in eVita
- I can find everything I need in eVita quickly
- I am satisfied with the use of eVita
- I am satisfied with the content of eVita
- The patients are satisfied with the use of eVita
- The patients are satisfied with the content of eVita
- eVita is helpful for me

- eVita is helpful for the patients
- I am satisfied with the way I deliver care with the use of eHealth
- I am satisfied with the content of eVita

Deze vragen gaan over het werken met eVita.

- I need … time to use eHealth compared to the traditional care.

(more/less/the same amount of/I do not know)

- Who do you ask if you have questions about the use of eVita?

coworker, boss, developer, I do not know

- Is there technical support available for the use of eVita?

yes/no/I do not need technical support/I don't know

- In eVita, I miss …

ruimte om antwoord te geven

- Is er nog iets wat u mij wil laten weten over eVita of eHealth?

Ruimte voor antwoord

Dit is het eind van deze enquête! Hartelijk bedankt voor het invullen! Als u nog opmerkingen of vragen heeft kunt u mij bereiken via m.a.kaldeweide@student.utwente.nl.

Appendix D – Validation under researchers

All questions marked in green were sorted correctly

Respondent 1

Concept	Questions	Comment
Acceptability	1. The patients are satisfied with the content of eVita 2. I believe IT has an added value to my personal life 3. I believe eHealth has an added value to my personal life 4. I always want to have the newest technology that is available 5. I am satisfied with the use of eVita 6. IT is a helpful tool in daily practice 7. I believe eHealth has an added value to my work 8. The patients are satisfied with the use of eVita	1. Accepteren van Patienten met de content, dus hadden ze dat niet gedaan zouden ze het niet gebruiken 2. Mate waarin iemand, toegevoegde waarde nodig is als ze het moeten gebruiken, maar denk dat ze niet zonder kunnen 3. zie boven 4. gekke, want is statement waar hij zelf niet zo'n link mee heeft, dus heeft er moeite mee om zich erin te verzetten, maar is wel belangrijk voor eHealth; als het niet nieuwste van het nieuwste is en iemand krijgt het (moet wermee werken) zal die het niet accepteren in zijn of haar leven 5. acceptable 6. gebruik in daily practice, maar twijfel, vind het niet helemaal passen, mening over hoe goed techniek werkt, hoe het ondersteund, dus toch wel van adoption naar acceptability 7. iemand moet het doen, en added value is perceptie van het het werkt voor dagelijkse praktijk 8. blijkbaar is het goed genoeg
Adoption	1. Did you get better in the use of e-Vita through time? 2. My organization wants to go with time/be up to date 3. I use a smartphone 4. Did you receive training for the use of eVita?	1. neigt meteen naar adoptie. je wilt gebruik evalueren en dat hangt af van hoe iemand het in eerste instantie kan gebruiken 2. organisatie wil snel nieuwe technologieën gebruiken/implementeren 3. omdat het gaat over gebruik 4. training kan uptake of adoption verbeteren of verslechteren
Appropriateness	1. Do you think eVita is helpful for you? 2. eVita fits into the patients life 3. eVita fits into my worklife/workflow 4. I believe IT has an added value to my patients life 5. How well do you think you know how to use e-Vita? 6. I like change in general 7. How good are you with IT in general? 8. Is there something you miss in eVita? 9. Did you get better in the use of IT through time? 10. I can find everything I need in eVita quickly 11. IT is scary + eHealth is scary	1. Kwaliteitsevaluatie, gaat over doel van techniek 2. gaat over inhoeverre die past, perceived fit 3. perceived fit 4. op blik van een zorgverlener over patiënt, dat eigenlijk meer kan kijken naar de fit dan naar de mate of iemand het wel of niet accepteert 5. mening van iemand vragen, maar gaat toch over hoeverre iemand denkt dat het bij iemand past, je krijgt inzicht in hoe iemand denkt over een techniek, maar dat hoeft niet te zijn hoe het daadwerkelijk is 6. iemand die zo'n mening heeft zou je techniek hierop aan kunnen passen 7. fit met technologie 8. is er iets waardoor techniek beter aansluit bij persoon

	12. Do you think eVita is helpful for the patients? 13. Is there technical support available for the use of eVita? 14. I believe eHealth has an added value for the patients life 15. Are you satisfied with the way you deliver care to the patients with the use of eHealth? 16. How satisfied are you with the content of eVita? 17. I know where to find what in eVita 18. I motivate others to change their habits 19. I am satisfied with the content of eVita	9. geen nadere uitleg 10. value voor hoe duidelijk technologie is, sluit goed aan bij gebruiker 11. iemand vindt het eng om te gebruiken, dus lastig om goede fit te creëren (zelfde redenen) 12. anders heb je geen fit 13. is dit op deze manier gepast genoeg voor gebruik 14. zelfde redenen 15. zie 13 16. zie 13 17. sluit het goed aan 18. aansluiting 19. zie 18
Cost	eVita saves time during consultation	saves costs when less time is needed
Feasibility	1. I need …(more/less/the same amount of/I do not know) time to use 2. eHealth compared to the traditional care. 3. How often do you need help with the use of eVita per week? 4. eHealth brings a lot of challenges with it + IT brings a lot of challenges with it	1. omdat nieuw met oud wordt vergeleken, en feasibility heb je dat in een context, dus geen effect en kosten 2. zie boven 3. evalueren van hoe vaak heb je hulp bij nodig, hoeveel problemen heb je erbij, hoe goed kan iemand het wel of niet gebruiken, omdat dit gaat over hoe goed technologie aansluit bij wat patiënt kan of hoe hij het wel of niet kan gebruiken en door aansluiting van techniek op patiënt is denk ik dat het over feasibility gaat :“extent to which innovation can sucessfully be carried out 4. het zou iets goeds kunnen bringen, maar miss brengt het ook problemen met zich mee die opgelost moeten worden
Fidelity	1. eVita helps patients to manage their disease 2. How often do you use eVita per week? 3. Who do you ask if you have questions about eVita? 4. eVita improves the quality of life of patients	1. evita is ervoor gemaakt om patiënten hun ziekte te laten managen, als je dit kan zeggen is fidelity goed, is ht zo geïmplementeerd zoals het de bedoeling is 2. omdat je evalueert hoe vaak iemand het gebruikt, miss ten opzichte van hoe vaak je wil dat het gebruikt wordt 3. wat iemand doet als die het even niet meer weet, en of dat zo is zoals die zou willen 4. Denk dat het doel om evita is om kwaliteit van leven beter wordt of zelfde blijft, dan bewerkstelligen wat doel was van technologie

Penetration	1. I use IT to organize/handle official or administrative papers (bank, municipality, etc.) (Think of mijnoverheid.nl or online banking) 2. I use eHealth in my professional life 3. I only hear of new technologies when a friend/colleague/family member tells me about it 4. I communicate through IT with friends and/or colleagues 5. My organization uses computers 6. I use some form of Information Technology (IT) in my free time 7. I use eHealth in my personal life 8. My organization supports the use of IT	1. gaat over use van techoogie in alledagse dingen, en dus een goede penetratie van techniek in de praktijk 2. eHealth heeft het bij hem diep genoeg te penetreren dat die het ook op professional vlak gebruikt 3. als iemand er zelf niet aan komt, is het lastig om technologie diep genoeg te laten penetreren 4. zie 3 5. wordt gebruikt op dagelijkse basis 6. zie boven 7. zie 3 8. als organisatie het gebruikt, dan is het goed gepenetreerd
Sustainability	1. I believe IT has an added value to my work 2. My organization uses tablets or smartphones 3. How often do you choose an alternative for eHealth (not eHealth)? 4. I like to change my habits from time to time 5. My organization puts the emphasize on the patients 6. My organization wants to provide qualitative care	1. IT is een concept dat al een integratie is met het normale systeem, en dan heb je het niet over adoptie of acceptatie 2. zonder tablets and smartphones kun je niet werken, dus dit is nodig om het in je werkproces op te nemen 3. als het de bedoeling is dat iemand het vaak gebruikt en het dan toch niet doet, is het niet sustainable genoeg, dan wil iemand het niet gebruiken, heeft het te veel impact op wat die normaal doet 4. gaat over gedrag van iemand 5. werkbasis is van ziekenhuis blijkbaar en wil je goede aansluiting bij ziekenhuis en patiënt moet je iets hebben wat organisatie in stad houdt en niet ergens in mee gaat. bij eHealth of techniek bij appropriateness 6. blijkbaar iets wat organisatie hoog in vaandel heeft staan

Respondent 2

Concept	Questions	Comment
Acceptability	1. I believe IT has an added value to my work 2. The patients are satisfied with the use of eVita 3. I believe eHealth has an added value to my personal life 4. eVita improves the quality of life of patients 5. IT is scary 6. I believe IT has an added value to my patients life 7. My organization wants to go with time/be up to date 8. I can find everything I need in eVita quickly 9. eHealth is scary 10. I believe IT has an added value to my personal life	1. omdat satisfactory belangrijk is, als je het ziet als meerwaarde, dan kan het bijdragen aan satisfactory van design 2. gaat over gebruiksvriendelijkheid 3. ,‘ 4. als het bijdraagt dan zijn mensen sneller satisfied 5. als je het eng vindt is het minder acceptable om te gebruiken 6. maar sluit ook aan bij kwalitatief care, dus als zorgverleners zien dat er meerwaarde voor patients leven in zit, ene wat meer ik kant en andere vanuit organisatie. 7. relevantie wat innvoation is voor practice setting

	11. eHealth brings a lot of challenges with it 12. I am satisfied with the content of eVita 13. The patients are satisfied with the content of eVita 14. IT brings a lot of challenges with it 15. I am satisfied with the use of eVita 16. Is there something you miss in eVita? 17. I know where to find what in eVita 18. I believe eHealth has an added value to my work 19. How satisfied are you with the content of eVita? 20. Do you think eVita is helpful for you?	8. of iemand tevreden is met design 9. eerste gevoel dat iemand heeft bij nieuwe interventie, gebruiksvriendelijkheid, is agreeable, als iemand het scary vind is het geen goede oplossing 10. als je meerwaarde in ziet is het sneller agreeable 11. meer aansluiten bij scary dan adopter 12. satisfaction with the design 13. gaat over satisfactie 14. past bij scary, veel uitdagingen, 15. gebruiksvrinedelijkheid 16. satisfaction with design 17. gaat over adherence, gebruiker kent programma (fidelity) maar toch meer acceptability want iemand is tevreden met wat het programma kan (design) 18. als je er meerwaarde in ziet ben je sneller geneigd om het te gebruiken, dus meer adoption, maar toch meer acceptability in algemeen, dus as die er meerwaarde in ziet eerder acceptatie 19. zie boven 20. zelfde
Adoption	1. I motivate others to change their habits 2. I need …(more/less/the same amount of/I do not know) time to use eHealth compared to the traditional care. 3. I always want to have the newest technology that is available 4. eVita saves time during consultation 5. I like change in general 6. I use some form of Information Technology (IT) in my free time 7. I use a smartphone 8. How often do you choose an alternative for eHealth (not eHealth)? 9. I only hear of new technologies when a friend/colleague/family member tells me about it 10. IT is a helpful tool in daily practice 11. I like to change my habits from time to time	1. gaat over veranderen van gewoonte, en uptake daar moet je toch een nieuwe service implementeren en daarvoor is verandering van habitus voor nodig 2. als het meer tijd gaat kosten neem je niet het besluit om het te gebruiken 3. vanuit theorie, early adopter, nieuwe technologie interessant, eerder gebruiken 4. tijd saving is reden om iets te gebruiken 5. mensen die change liken zijn eerder geneigd iets nieuws te gebruiken 6. ,‘ 7. zie boven, drempel minder hoog 8. als iemand het vaak doet is die niet gewend aan ehealth 9. theorie, adoption 10. gaat om perceptie van iemand over it 11. zie boven
Appropriateness	1. My organization wants to provide qualitative care 2. My organization puts the emphasize on the patients 3. Do you think eVita is helpful for the patients? 4. My organization supports the use of IT 5. I believe eHealth has an added value for the patients life	1. want sluit aan bij doelen van organisatie 2. valt binnen waarde van organisatie dus heeft een goede fit 3. zie je relevantie van innovatie voor patiënten 4. gaat over of het eigenlijk past binnen practice setting 5. relevantie
Cost		

Feasibility	1. Is there technical support available for the use of eVita? 2. How often do you need help with the use of eVita per week? 3. Did you receive training for the use of eVita?	1. wil je het successvol implementeren moet er support voor zijn, is bepaalde resource, en die moet er zijn voor successvolle implementatie 2. als je er hulp bij krijgt is het makkelijker te implementeren 3. genoeg resources zijn voor het inzetten
Fidelity	1. How often do you use eVita per week? 2. Who do you ask if you have questions about eVita? 3. eVita helps patients to manage their disease 4. Are you satisfied with the way you deliver care to the patients with the use of eHealth?	1. je hebt vast een bepaalde gedachte erbij hoe vaak iemand zo iets moet gebruiken dat het effectief is 2. je moet weten hoe iemand ter werk gaat met evita en daar zit bij of het intended was dus degene moet de juiste vragen bij juiste persoon stellen 3. gaat over quality of care, dus kan daadwerkelijk bijdragen aan quality 4. quality of care
Penetration	1. eHealth is a helpful tool in daily practice 2. Did you get better in the use of e-Vita through time? 3. How well do you think you know how to use e-Vita? 4. Did you get better in the use of IT through time?	1. integratie van practice into service setting dus draagt bij aan penetratie 2. gaat echt over integration, als iemand steeds gemakkelijker in wordt zegt het iets over of iets steeds meer onderdeel wordt 3. als iemand het goed weet te gebruiken zegt het iets over integratie van system 4. inheoverre kun je er gemakkelijk mee werken en is het geïntegreerd
Sustainability	1. I use eHealth in my personal life 2. I communicate through IT with friends and/or colleagues 3. I use IT to organize/handle official or administrative papers (bank, municipality, etc.) (Think of mijnoverheid.nl or online banking) 4. I use eHealth in my professional life 5. My organization uses tablets or smartphones 6. How good are you with IT in general? 7. My organization uses computers 8. eVita fits into my worklife/workflow 9. eVita fits into the patients life	1. gaat over of het in mijn manier van doen past, en dus verwacht ik dat ik ehealth gebruik en je wil ehealth toepassen, kan bijdragen aan sustainability, want dan kan je het makkelijk toepassen in je workflow 2. iemand is al gewend om it te gebruiken dus adoption, maar kan ook bij susatainability, want past dan ook makkelijker in workflow 3. zie boven, maar kan ook bij penetration passen, want sneller integreren als je gewend bent het te gebruiken, zou ook kunnen passen bij sustainability 4. gaat over professionele leven van iemand dus past goed binnen workflow 5. als organisatie iets gewend is past het beter in workflow 6. als je goed bent in gebruik van system past het beter in je workflow 7. lijkt op supports use of it, dus meer appropriateness, maar of het daadwerkelijk computer gebruikt past het beter bij workflow 8. gaat over workflow 9. gaat niet over professional maar patiënt in zijn eigen leven

Respondent 3

Concept	Questions	Comment
Acceptability	1. I am satisfied with the use of eVita 2. The patients are satisfied with the use of eVita 3. I motivate others to change their habits 4. I am satisfied with the content of eVita 5. IT is a helpful tool in daily practice 6. How satisfied are you with the content of eVita? 7. How satisfied are you with the content of eVita? 8. How good are you with IT in general?	1. als je ergens tevreden over bent, ga je het ook eerder accepteren, maar als je relevantie ziet, kun je ook tevreden zijn, daarom zou het ook bij appropriateness kunnen passen 2. gaat over tevredenheid 3. ervoor open staan 4. tevredenheid over platform 5. behandeling zou van voordeel kunnen zijn voor iemand 6. tevredenheid 7. tevredenheid 8. tevredenheid
Adoption	1. eHealth is a helpful tool in daily practice 2. I believe IT has an added value to my personal life 3. eHealth is scary 4. I need …(more/less/the same amount of/I do not know) time to use eHealth compared to the traditional care. 5. I like change in general 6. I only hear of new technologies when a friend/colleague/family member tells me about it 7. My organization wants to go with time/be up to date 8. How often do you choose an alternative for eHealth (not eHealth)? 9. IT is scary 10. I always want to have the newest technology that is available 11. I like to change my habits from time to time	1. added value 2. door added value ga je het accepteren 3. als je bang bent, ga je het niet zo gauw gebruiken 4. ook bij kost kunnen want als je denkt het kost me te veel dan ga je het niet implementeren, maar hier omdat het ook het besluiten nemen is 5. bereidheid om iets nieuws te gebruiken 6. het besluit om mee te doen met programma (intention to adopt) 7. openstaan voor veranderingen 8. heeft te maken met besluit om daadwerkelijk deel te nemen 9. past bij e health is scary 10. past ook bij gevoel, ik moet up to date blijven 11. past bij change
Appropriateness	1. I believe eHealth has an added value to my work 2. eVita improves the quality of life of patients 3. I can find everything I need in eVita quickly 4. eVita fits into the patients life 5. Do you think eVita is helpful for the patients? 6. Do you think eVita is helpful for you? 7. My organization wants to provide qualitative care 8. Are you satisfied with the way you deliver care to the patients with the use of eHealth? 9. Is there something you miss in eVita?	1. het toont relevantie aan, dus ik denk het voegt iets toe aan mijn werk 2. IT is van grote relevantie voor bepaalde groep 3. past bij gebruiker 4. past bij gebruiker 5. besef dat het goed toegepast kan worden 6. ervaren fit of relevance 7. twijfel maar ze willen kwalitatief goede zorg leveren dus 8. ervaring dat het past en relevant is, en satisfaction 9. …
Cost	I know where to find what in eVita	het kost me weinig moeite om mijn weg te vinden

Feasibility	1. eVita fits into my worklife/workflow 2. I believe eHealth has an added value to my personal life 3. How well do you think you know how to use e-Vita? 4. I use eHealth in my personal life 5. eVita helps patients to manage their disease 6. I believe IT has an added value to my patients life 7. I believe eHealth has an added value for the patients life 8. eHealth brings a lot of challenges with it 9. IT brings a lot of challenges with it	1. in hoeverre het toegepast kan worden/gebruikt kan worden in setting waarin je werkt 2. heeft bepaalde waarde 3. hoe goed kan ik ermee omgaan 4. ik vind het is goed toepasbaar in mijn leven 5. betekend het kan succesvol toegepast kan worden dan 6. succesvol toepassing 7. succesvolle toepassing 8. als je het gevoel hebt je kunt het niet goed toepassen, dan is het niet feasible 9. past bij eerdere vraag
Fidelity	1. How often do you use eVita per week? 2. eVita saves time during consultation 3. My organization puts the emphasize on the patients 4. Did you receive training for the use of eVita? 5. I can find everything I need in eVita quickly	1. gaat over hoe het gebruikt gaat worden en vaak willen we dat je het een keer per week gebruikt 2. gaat over quality of care, bespaart tijd 3. patient staat centraal dus willen iets gebruiken wat voor patiënten goed is 4. gaat over manier waarop het geïmplementeerd wordt, zou ook kunnen bij sustainability, gebruikt wordt zoals bedoeld 5. vanwege quality of care
Penetration	1. I communicate through IT with friends and/or colleagues 2. I use eHealth in my professional life 3. My organization uses tablets or smartphones 4. My organization uses computers 5. I use a smartphone 6. I use some form of Information Technology (IT) in my free time 7. I use IT to organize/handle official or administrative papers (bank, municipality, etc.) (Think of mijnoverheid.nl or online banking)	1. ik integreer het in de praktijk 2. omdat ik het integreer in mijn werk 3. zie 1 en 2 4. zie 1 en 2 5. zie 1 en 2 6. zelfde zoals gebruik van smartphone 7. ik integreer het
Sustainability	1. How often do you need help with the use of eVita per week? 2. Is there technical support available for the use of eVita? 3. Who do you ask if you have questions about eVita? 4. Did you get better in the use of e-Vita through time? 5. My organization supports the use of IT 6. Did you get better in the use of IT through time?	1. hoe kunnen we IT goed in workflow integreren 2. zie boven 3. zie boven 4. ik probeer het te behouden maar ook beter in te worden 5. supporting staat gelijk aan maintaining 6. zelfde soort vraag

Respondent 4

Concept	Questions	Comment
Acceptability	1. Are you satisfied with the way you deliver care to the patients with the use of eHealth? 2. eVita helps patients to manage their disease 3. Do you think eVita is helpful for you? 4. How often do you need help with the use of eVita per week? 5. IT is a helpful tool in daily practice 6. I am satisfied with the use of eVita 7. How satisfied are you with the content of eVita? 8. I am satisfied with the content of eVita 9. Do you think eVita is helpful for the patients? 10. The patients are satisfied with the use of eVita 11. Is there something you miss in eVita? 12. The patients are satisfied with the content of eVita 13. eVita saves time during consultation 14. I know where to find what in eVita 15. I can find everything I need in eVita quickly 16. eVita improves the quality of life of patients 17. How well do you think you know how to use e-Vita?	1. stukje satisfactory zit erin, een service 2. tevreden met doel 3. hetzelfde 4. Gebruiksgemak, maar dat ziet ze niet echt terug, maar toch hier want past bij laatste 5. zie 4 6. ook weer acceptability want gaat om satisfactory 7. zie boven 8. zie boven 9. zie boven 10. eigenlijk weer bij acceptability, maar probeer ander plek te vinden, gaat toch hier 11. miss appropriateness, maar ook niet helemaal want gaat niet over fit tussen it en gebruiker, toch acc want als je iets mist, minder wss om het leuk te vinden 12. zelfde redenen 13. motivatie om te gebruiken 14. ease of use, miss soort van workflow, of het daarbij past, kan ook zijn dat het wordt gebruik zoals bedoeld, zou bij fidelity passen, maar niet helemaal, toch weer satisfactory 15. zelfde als die hierboven, heeft te maken met satisfactory 16. zou ook bij fidelity passen door quality of care, maar toch bij acceptability, evita is sactisfactory als quality of life of patients improved, dus toch hierbij 17. sneacky vraag, zegt iets over is het implemented the way it was intended, maar past niet bij 5 dimensies, dus meer iets over acceptability

Adoption	1. IT is scary 2. eHealth is scary 3. My organization wants to go with time/be up to date 4. I always want to have the newest technology that is available 5. I believe IT has an added value to my work 6. eHealth brings a lot of challenges with it 7. IT brings a lot of challenges with it 8. I believe eHealth has an added value to my work 9. I believe IT has an added value to my personal life 10. I believe eHealth has an added value for the patients life 11. I believe IT has an added value to my patients life 12. I believe eHealth has an added value to my personal life 13. eHealth is a helpful tool in daily practice	1. als je het scary vind is het niet je intentie om het te gebruiken 2. past bij IT is scary 3. gaat over de reden waarom je het zou kunnen gebruiken, als een soort hipster 4. broertje van organisatie up to date wil zijn 5. gaat eigenlijk weer naar acceptability, maar meer IT als algemeen, dus daarom toch wel adoption 6. zelfde categorie als laatste 7. IT algemeen, dus daarom adoption, wel gek, want is niet inhoudelijk verschil. 8. zelfde redenen 9. zelfde redenen 10. ik denk dat ik die weer eHealth dingetjes doe 11. lijkt op ehealth has added value dus ook hier 12. zelfde redenen als hiervoor 13. zegt iets over hoe leuk je het vindt om ermee te werken
Appropriateness	1. I use some form of Information Technology (IT) in my free time 2. I use a smartphone 3. I use eHealth in my professional life 4. I use eHealth in my personal life 5. How good are you with IT in general? 6. Did you get better in the use of IT through time? 7. I use IT to organize/handle official or administrative papers (bank, municipality, etc.) (Think of mijnoverheid.nl or online banking) 8. I communicate through IT with friends and/or colleagues 9. I only hear of new technologies when a friend/colleague/family member tells me about it 10. How often do you choose an alternative for eHealth (not eHealth)?	1. beetje of je gewend bent, of het past bij je, dus miss appropriateness, bij uitleg past het (perceived fit met provider), maar bij de naam appropriateness past het niet voor haar gevoel 2. gewend bent om ermee te werken 3. of je het gewend bent 4. gaat weer over je gewoontes, wat je gewend bent 5. zie boven 6. gaat over je eigen skills met IT 7. gaat over je gewoontes 8. wat je gewend bent dus appropriateness 9. perceived fit want als je het alleen maar van anderen hoort dan ben je zelf niet eager om het te gebruiken 10. zegt iets over hoe zeer je eHealth bij je vindt passen, als je vaak voor alternatief kiest is het blijkbaar geen goede fit, zegt ook iets over uptake, eerst midden, toch naar appropriateness
Cost	1. Did you receive training for the use of eVita? 2. Is there technical support available for the use of eVita? 3. Who do you ask if you have questions about eVita? 4. Did you get better in the use of e-Vita through time?	1. implementation strategie dus gaat bij cost 2. implementatie strategie dus ook weer bij cost 3. weer implementatie 4. eerst appropriateness, want gaat over eigen skills met it, past bij did you get better in use of IT though time, maar dit is eVita dus past er toch minder bij, zegt iets over implementatie, je wordt er steeds beter in dus implementatie steeds beter geslaagd

Feasibility (implementeerbaarheid zegt nienke)	1. My organization wants to provide qualitative care 2. My organization uses tablets or smartphones 3. My organization supports the use of IT 4. My organization uses computers 5. My organization puts the emphasize on the patients	1. wat er staat iets over dat het past bij missie van healthcare setting 2. gaat over available resources 3. zelfde 4. gaat weer over resources, dus hier. maar groep beter resources noemen want feasibility is breder voor haar gevoel (makkelijk in gebruik) 5. gaat weer over resources
Fidelity (andere betekenis verwacht, meer betrouwbaarheid)	-	
Penetration	1. eVita fits into my worklife/workflow 2. eVita fits into the patients life 3. How often do you use eVita per week?	1. raar want past bij patients life, maar toch beter naar penetration, dus daarom ook patients life ernaartoe, maar voor gevoel wel gek, want leven van patiënt valt eigenlijk buiten de service setting 2. zou kunnen passen bij penetration, maar uitleg gaat meer over service setting(de zorg) en niet om leven van patient, dus eerst appropriateness 3. zegt iets over gebruik, zou je denken sustainability, maar uitleg ervan gaat meer over beleid en of het daarin past, dus penetration want gaat over of het past bij … als je vaker per week gebruikt zegt iets over mate van integratie
Sustainability	1. I need …(more/less/the same amount of/I do not know) time to use eHealth compared to the traditional care. 2. I like to change my habits from time to time 3. I motivate others to change their habits 4. I like change in general	1. gaat over invloed die de technologie heeft op je normale workflow 2. is geen policy, maar wel practice 3. same, als je meer bereid bent om gewoontes te veranderen zegt het iets over of je ook je workflow kan aanpassen aan nieuwe technologie 4. past weer bij veranderende habitus

Respondent 5

Concept	Questions	Comment
Acceptability	1. eHealth is scary 2. IT is scary 3. Are you satisfied with the way you deliver care to the patients with the use of eHealth? 4. I am satisfied with the content of eVita 5. I can find everything I need in eVita quickly 6. How well do you think you know how to use e-Vita? 7. I know where to find what in eVita 8. Did you get better in the use of IT through time? 9. The patients are satisfied with the use of eVita 10. I am satisfied with the use of eVita 11. I like change in general 12. I motivate others to change their habits 13. Did you get better in the use of e-Vita through time? 14. I need …(more/less/the same amount of/I do not know) time to use eHealth compared to the traditional care. 15. How good are you with IT in general? 16. How often do you need help with the use of eVita per week? 17. My organization puts the emphasize on the patients 18. I like to change my habits from time to time 19. I only hear of new technologies when a friend/colleague/family member tells me about it 20. My organization wants to provide qualitative care	1. gaat om hoe jij eHeatlh ervaart 2. gevoel en geloof, dus acceptability 3. eerst in kaart brengen of huidige manier van werken met ehealth voldoende voldoening heeft, dus hierbij vanwege satisfactory 4. gaat om inhoud, gaat ook om tevredenheid en hoe je het ervaart 5. gaat over gemak van gebruik, dus appropriateness eerst, maar appropriateness gaat toch meer op inhoud dus dan acceptability, vind ik het voor mij acceptabel dat ik het snel kan vinden 6. zie boven 7. mijn gevoel dat ik het goed kan gebruiken 8. gaat over eigen leerervaring, als je het meer gebruik wordt ik er beter in 9. niet zo zeer doel, dus geen fidelity maar meer perceptie 10. gaat om gevoel dat je bij evita heeft 11. gevoel is die je bij innovatie is 12. zelfde, gevoel dat je over wil brengen op anderen 13. gevoel dat ik er beter in ben geworden 14. zelfde, is gevoel hoe goed je erin bent 15. gevoel 16. feasibility want gaat gedeeltelijk over technische support, maar gaat meer over vind ik het dusdanig goed dat ik er weinig hulp bij nodig heb 17. lastig omdat ze die helemaal los ziet van ehealth of evita, it. dit is meer doel van een organisatie, vanwege perception hier plaatsen, maar zou ook fidelity want geeft doel van organisatie aan 18. gaat ook over perceptie 19. ik zelf ben niet geintereseerd, of adoption omdat het een reden kan zijn om aan hand van vrienden en collegas technologie te gaan gebruiken miss straks toch naar adoption zoals een paar anderen 20. hoe zie ik dat mijn organisatie zorg levert, dus nadruk op patiënt en kwalitatief goede zorg

Adoption	1. I always want to have the newest technology that is available 2. How often do you choose an alternative for eHealth (not eHealth)? 3. I believe eHealth has an added value to my personal life 4. I believe IT has an added value to my personal life 5. I believe IT has an added value to my work 6. I believe eHealth has an added value to my work 7. IT is a helpful tool in daily practice	1. Gaat erover of je technologie belangrijk vind en het zou toepassen of niet 2. kan ook op verschillende manieren uitlegt worden: dus nu gebruik ik het of niet, gaat puur om beslissing 3. eigen mening en perceptie dus acceptability, maar toch later. zegt heel gericht dat ik het zou gebruiken omdat ik het van toegevoegd waarde vind 4. eerst acceptability, maar dan zit ze weer met adoption want dit zijn redenen om service te gebruiken dus deze en nummer 3 toch naar adoption 5. acceptability, maar alleen omdat er I believe staat, dus soort gevoel hoe iemand ertegenaan kijkt 6. acceotability eerst omdat het over een gevoel gaat 7. eerst acceptability, ze merkt dat ze vooral dingen naar acceptability zet omdat ze af gaat op het woord perceptions, dus hoe ervaar ik technologie, gaat meer over algemeen en niet specifieke toepassing of je het zou gebruiken in je leven
Appropriateness	1. IT brings a lot of challenges with it 2. eHealth brings a lot of challenges with it 3. eVita fits into the patients life	1. twijfel tussen appropriateness en feasibility omdat je kijkt naar, past het binnen organisatie, maar nu hier want dat is eerste laag van problemen die je tegen zou kunnen komen en niet bijv. financieel 2. zelfde reden als bij punt 1. eerste problemen die je zou kunnen ondervinden met ehealth 3. lastig met onderscheid maken tussen verschillende concepten, maar dit gaat echt om de fit dus appropriateness, omdat die moet matchen met eindgebruiker
Cost	-	vond ze niet relevant
Feasibility	1. My organization supports the use of IT 2. My organization uses computers 3. Is there technical support available for the use of eVita? 4. My organization uses tablets or smartphones 5. Who do you ask if you have questions about eVita?	1. randvoorwaarde waarin voldaan moet worden zodat ik het kan gebruiken 2. zelfde 3. zou bij sustainability passen omdat die dan onderdeel van normale workflow zou zijn, maar tech support niet echt cultuur binnen organisatie, maar goede ondersteuning 4. is er ondersteuning van uit organisatie 5. gaat om ondersteuning

Fidelity	1. eVita improves the quality of life of patients 2. My organization wants to go with time/be up to date 3. Do you think eVita is helpful for you? 4. I believe eHealth has an added value for the patients life 5. eVita saves time during consultation 6. Is there something you miss in eVita? 7. I believe IT has an added value to my patients life 8. eVita helps patients to manage their disease 9. eHealth is a helpful tool in daily practice 10. How satisfied are you with the content of eVita? 11. The patients are satisfied with the content of eVita 12. Do you think eVita is helpful for the patients?	1. zegt iets over wat je ermee gaat doen en de bedoeling 2. zegt iets over een doel waarom je eHealth zou kunnen toepassen 3. dit gaat meer over doelen waar voor je evita wil gebruiken 4. zowel acceptability want ik heb gevoel, maar ook fidelity vanwege doelen wat je met ehealth beoogde, doelen sterker dus fidelity 5. doelen die evita beoogt en die je nu ervaart 6. ligt heel erg eraan wat je zou missen: inhoudelijk meer bij fidelity, doet evita wat ik ermee zou willen doen of dat ik mis dat ik het op mobiel kan gebruiken dan feasibility, en een stap hoger appropriateness als het alleen maar op mannen gericht zou zijn maar ik ben vrouw, snelst denkt aan eerste 7. gaat over een doel dus bij fidelity plaatsen, wat je met it zou willen berijken 8. wat je ermee wil doen 9. fidelity and acceptability lijken ook heel erg op elkaar, fidelity meer gezien als doelen en acceptability meer als perceived (hoe zie ik technologie) maar dit kan ook door elkaar lopen, als het over helpful gaat, meer over inhoud dus fidelity 10. wat kan ik ermee, wat wil ik ermee 11. verschil tussen acceptability en fidelity, of overeenkomst meer, maar acceptability meer eigen mening en nu hoe kan patiënt het gebruiken dus fidelity 12. niet eigen mening, dus niet acceptability, maar doet het iets voor patiënt
Penetration	Did you receive training for the use of eVita?	Gaat over hoe je voorbereid bent om het te gebruiken, maar zou ook sustainability want moet passen bij workflow en daarvoor heb je training nodig
Sustainability	1. eVita fits into my worklife/workflow 2. How often do you use eVita per week? 3. I communicate through IT with friends and/or colleagues 4. I use a smartphone 5. I use IT to organize/handle official or administrative papers (bank, municipality, etc.) (Think of mijnoverheid.nl or online banking) 6. I use some form of Information Technology (IT) in my free time 7. I use eHealth in my personal life 8. I use eHealth in my professional life	1. past het bij mijn normale werk? 2. adoption zou ze eerst zeggen, want denkt verdere gebruik valt er ook onder maar toch sus want wordt na tijd onderdeel van je normale workflow 3. doe je wel of doe je niet, dus adoption, maar gaat ook om verdere gebruik niet alleen decision to adopt, dus daarom toch sustainablity 4. alle dingen over ik gebruik het al naar sustainability en adoption meer over decision 5. gaat over of je het wel of niet gebruikt, dus eerst adoption 6. eerst adoption, of je het wel of niet gebruikt, maar toch twijfel want adoption en sustainability lijken op elkaar, want als je het ziet als onderdeel van werk bij sustainability, want als je adoption alleen maar ziet als decision of je het gebruikt of niet 7. onderdeel van normale handelen of workflow 8. gebruik ik het in mijn workflow