Improving the implementation of telerehabilitation in rehabilitation centres

Miriam Groot Nibbelink
Master thesis
Health Psychology and Technology

Supervision:
Dr. M.E. Pieterse &
Dr. M.G.H. Dekker – van Weering

Enschede, 16th April 2019

UNIVERSITY OF TWENTE.

Abstract

Health care is developing due to social, demographic, economic and technological developments. Consequently, this also has an effect on rehabilitation care. Rehabilitation care is becoming more and more important due all the developments and tools to handle these developments are needed. eHealth is mentioned to help facing these changes. An element of eHealth is telerehabilitation. Telerehabilitation can be defined as a medium to use communication and information technologies for the provision of rehabilitation services. Using telerehabilitation has showed several benefits compared to traditional treatments. Benefits are the improvement of the accessibility of care, the improvement of the quality of care and lower health costs. Although the benefits, obstacles occur within the integration of telerehabilitation. There are difficulties in making it routine care for therapists and the implementation is very limited. For example, the lack of time, lack of guidance and skills are mentioned as important barriers in the implementation of telerehabilitation. Nevertheless, there are also facilitators than can stimulate and optimize the implementation of telerehabilitation. Theories can help us to understand barriers that occur during the implementation and can also enhance the ability to improve implementation processes. This study examined how to improve the implementation of telerehabilitation in rehabilitation centres to increase the change of making it routine care. Barriers and facilitators corresponding the implementation of Telerevalidatie.nl were evaluated with employees of two rehabilitation centres. Telerevalidatie.nl is an online intervention with the aim to support the patient with his or her rehabilitation program at home and to facilitate the self-management by patients. To assess the barriers corresponding the implementation of Telerevalidatie.nl, a questionnaire based on the Normalisation Process Theory was conducted (NPT). The NPT is defined as a sociological theory that helps to understand implementation, embedding and integration of innovations in order to face the gap between the technical processes and the actual use in healthcare settings. After this, interviews focusing on solutions for barriers found in the questionnaire were conducted. These solutions were categorized by strategies from the Expert Recommendation for Implementing Change (ERIC) study. The ERIC study provides a list of implementation strategies that can be used to form a tailored strategy with multiple components for implementation and serves as a guide in implementation research and practice in healthcare settings. Overall, the study demonstrated the utility of exploring implementation factors and processes at organisational specific and generic level. This study also showed the importance of focusing the implementation on different levels of an organisation, like therapists, managers and other employees. The implementation strategies that we choose for the implementation of telerehabilitation in rehabilitation centres should be dynamic and flexible to fit the different needs of organisations.

Keywords: Telerehabilitation, Telerevalidatie.nl, Implementation, Normalisation Process Theory, Expert Recommendations for Implementing Change, Barriers, Facilitators, Implementation strategies

Table of contents

Abstract **1**

Introduction **4**

1. Methods **7**

1.1 Research design and sample 7

1.2 Telerevalidatie.nl 7

1.3 Questionnaire 8

1.4 Interviews 10

1.5 Procedure 10

1.6 Outcome measures 10

1.6.1 Demographic characteristics 10

1.6.2 Barriers for implementation 11

1.6.3 Facilitators for implementation 11

1.7 Data analysis 11

1.7.1 Demographic characteristics 11

1.7.2 Barriers for implementation 11

1.7.3 Facilitators for implementation 12

2. Results **13**

2.1 Questionnaire 13

2.1.1 Characteristics of the study group 13

2.1.2 Roessingh 14

Coherence 15

Cognitive Participation 15

Collective Action 16

Reflexive Monitoring 18

2.1.3 Vogellanden 19

Coherence 20

Cognitive Participation 20

Collective Action 23

Reflexive Monitoring 26

Summary results questionnaire 28

2.2 Interviews 30

2.2.1 Characteristics of the sample 30

2.2.2 Facilitators 30

Train and educate stakeholders 32

Develop stakeholder interrelationships 33

Use evaluative and iterative strategies 34

Change infrastructure 36
Adapt and tailor to context 39
Alternative strategies 39
Summary results interviews 42
3. Discussion 43
Limitations of the study 45
Conclusion 47
References 48
Appendices 53
Appendix 1. Detailed description Telerevalidatie.nl 54
Appendix 2. Interview schemes 56
Appendix 3. Intercorrelation and Chronbach's Alpha Roessing and Vogellanden 61
Roessingh 61
Vogellanden 63
Appendix 4. Tables significant items questionnaire combined 70
Appendix 5. Barriers interview 71

Introduction

Healthcare is abundantly changing. Social, demographic, economic and technological developments trigger the constant movement of healthcare (Laurant, n.d.). The society is ageing, more and more people will suffer from chronic diseases and the amount of multimorbidity will increase (Revalidatie Nederland, 2015, 2017; Saner & Van Der Velde, 2016). Consequently, the demand for care will increase and be more complex (Revalidatie Nederland, 2017; Saner & Van Der Velde, 2016). All these developments also have an effect on the demand for rehabilitation care and the use of this care is getting more and more important. In 2017, for example, the World Health Organization (WHO) launched a campaign that emphasises that rehabilitation should be offered for all conditions in prevention, promotion, treatment and palliation (Ations, Aver, Rotty, & Ameron, 2018). This shows that rehabilitation care is developing. Therefore, it is important that there are tools to handle these developments. eHealth is mentioned as an important innovation that can help facing the changes (Jansen, 2014; Revalidatie Nederland, 2015). The Dutch association of Rehabilitation institutions stated the use of eHealth in rehabilitation care as one of the priorities in the policy plan of 2015-2019 (Revalidatie Nederland, 2015).

Telerehabilitation is an element of eHealth which focuses on remotely supervised treatment in rehabilitation care (Jansen, 2014; Zanaboni, Hoaas, Lien, Hjalmarsen, & Wootton, 2017). Using telerehabilitation has several benefits in comparison with traditional treatments. First, it increases the accessibility of care (Jansen, 2014). It provides the possibility for (after)care at home, whereby patients do not have to travel. It makes that patients can participate at times they prefer and it can reach a lot of patients compared to group- or face-to-face programs (Reinwand, Kuhlmann, Wienert, De Vries, & Lippke, 2013). This makes treatments available for larger groups (Jansen, 2014). Second, several studies show that telerehabilitation services can increase the quality of healthcare (Frederix et al., 2015; Jansen, 2014; Levy, Silverman, Jia, Geiss, & Omura, 2015; Rubeis, Schochow, & Steger, 2018; van Gemert-Pijnen et al., 2018). For example, the increasing adherence to rehabilitation protocols is a highly appreciated benefit and contributes to the improvement of healthcare (Calvaresi et al., 2017). Adherence can be achieved through treatment satisfaction by increasing self-management and self-efficacy of the patient (Dubois, Saey, Marquis, Tousignant, & Larivée, 2015; Hoaas, Andreassen, Lien, Hjalmarsen, & Zanaboni, 2016; Zanaboni et al., 2017). Finally, telerehabilitation has the potential to lower healthcare costs via, for example, the effectiveness and efficiency of interventions. Using the possibilities of technology can improve traditional treatments and interventions and therefore less resources are needed to achieve the same quality of care (Calabrò et al., 2018; Frederix et al., 2015; Hwang et al., 2018; Jansen, 2014; van Gemert-Pijnen et al., 2018).

Telerehabilitation is rapidly upcoming and has great potential in today's care, but there are major obstacles in the integration and in making it routine care (Saner & Van Der Velde, 2016; van Gemert-Pijnen et al., 2011). The implementation of telerehabilitation in rehabilitation care is very limited. Most of the innovations do not maintain after the pilot phase and integrating innovations into routine care is a complex process (Jansen, 2014; Kairy et al., 2017). According to Liu et al. (2014) the acceptance and integration of innovations depends on different barriers and facilitators. When barriers are minimalized and facilitators are maximized, the acceptance of innovations will increase (Liu et al., 2014).

Focusing on telerehabilitation, few studies have examined the factors affecting the acceptance and implementation of telerehabilitation compared to eHealth in general (Kairy et al., 2017). However, these studies show several possible barriers for the implementation of

telerehabilitation. For example, the lack of evidence that technology supported treatments are as effective as traditional treatments is an important aspect in the limited use of telerehabilitation (Jansen, 2014). Therefore professionals do not see the added value for their patients or themselves (van Gemert-Pijnen et al., 2018). Furthermore, the changing need of care in combination with the technological possibilities requires new skills and behaviour of therapists (Kaljouw & van Vliet, 2015). Without the skills and comfort of therapists to use technology successfully in their work, the potential benefits will stay unrealized (WHO, 2017). The lack of clear guidelines for the innovation is seen as a reason for slow uptake (Skubic & Rantz, 2016). The ambiguous roles and responsibilities of people involved with the implementation slow the process (Kairy, Lehoux, & Vincent, 2014). Finally, also the implementation time needed is seen as a barrier (Anderson, 2007; Carey et al., 2015; Mair et al., 2012; Wan Ismail et al., 2013). The time organisations, therapists and others need to get to know the innovation or the time the implementation process costs, is frequently seen as barrier.

Theory can help to understand the barriers concerning the implementation of innovations and can also enhance the ability to improve implementation processes (McEvoy et al., 2014). The Normalisation Process Theory (NPT) is such a theory (May & Finch, 2009). It is defined as a sociological theory that helps to understand implementation, embedding and integration of innovations in order to face the gap between the technical processes and the actual use in healthcare settings (McEvoy et al., 2014). The NPT is derived from empirical observation and also the analysis of intervention studies in clinical practice (May & Finch, 2009). The theory explores why some processes lead to an innovation becoming successful normalised and sustained (Tazzyman et al., 2017). Normalisation or routine use is achieved when the innovation becomes a part of the normal process of health care and is no longer seen as a special program. Determinants found to influence inhibition or promotion of interventions are described in the NPT, categorized in four main constructs. These constructs are ‘Coherence’, ‘Cognitive Participation’, ‘Collective Action’ and ‘Reflexive Monitoring’ (Kairy et al., 2014; May & Finch, 2009).

Next to barriers, several factors are proposed as playing a facilitating role in the successful implementation of telerehabilitation and the normalisation of it. It is important to carefully implement the new technologies in order to support the therapists and integrate using telemedicine as natural part of their professional behaviour (Kaljouw & van Vliet, 2015). Careful communication and coordination between multiple stakeholders, like patients, users, therapists, and project management is required for this integration (van Gemert-Pijnen et al., 2011). In practice this seems often hard to realize. Furthermore, leadership ensuring support, guidance and resources can support the successfulness of the implementation (Kairy et al., 2014). According to a study of Kairy et al., (2014) management leadership is important in the implementation of telerehabilitation, but there is a lesser role for management when the technology became used in practice. At this point clinical coordinators seemed to play an important role in the decision to use the technology. Management of organisations can improve the implementation of eHealth by generating enthusiasm and delegate responsibilities for resource allocation (Andreassen, Kjekshus, & Tjora, 2015). This organizational support is frequently mentioned as important in several studies (Ariens et al., 2017). Also, in literature it is indicated that providing adequate training during and after the process of implementation can optimize the use of innovations (Jafni, Bahari, Ismail, & Radman, 2017; van den Wijngaart et al., 2018). Another finding in the study from Kairy et al., (2014) showed that beliefs therapists have influence the routine use of telerehabilitation. What people see and do pushes them to use or not use telerehabilitation.

In understanding how and why therapists use telerehabilitation, the shared beliefs of therapists seem essential (Kairy et al., 2014; van den Wijngaart et al., 2018). During the whole implementation process time seems to be an important factor (Ross, Stevenson, Lau, & Murray, 2016; Varsi, 2016). Time to get to know the innovation, to experiment, to get education and training about the program and to create guidelines and resources are important aspects. However, it is still not clear how to promote these determinants in order to promote the normalisation process.

Aforementioned facilitators can be established by help of using implementation strategies. Implementation strategies show having an exceptional importance in the normalization process. They create awareness about the 'how to' component in the change of healthcare behaviour (Proctor, Powell, & McMillen, 2013). Although, which strategies are suited best to address specific barriers in implementation are still unclear (Baker et al., 2015; Boyd, Powell, Endicott, & Lewis, 2018). Reasons for this are inconsistent labelling of the strategies, the unclear description of specific actions involved and the missing justification for the selection of the elected strategies (Boyd et al., 2018; Powell et al., 2015; Waltz et al., 2014). To improve this, several studies were achieved. For example, the Expert Recommendations for Implementing Change (ERIC) study that had the aim to clarify a published compilation of implementation strategies in gathering input from stakeholders with expertise in implementation science (Powell et al., 2015; Waltz et al., 2014). The study combined implementation strategies that were identified through other reviews and taxonomies. It provides a list of implementation strategies that can be used to form a tailored strategy with multiple components for implementation and serves as a guide in implementation research and practice in healthcare settings (Powell et al., 2015). The intention of the list of strategies is to highlight strategies that could potentially be used to implement new innovations, not to present a checklist of strategies that must be used (Powell et al., 2015). However, literature about these implementation strategies does not show justification for the differences between organisations, while it is described in literature that the different characteristics of organisations can affect the implementation process (Berg, 2010; Lacerenza, Reyes, Marlow, & Joseph, 2017; Vijayasarathy & Butler, 2016). Therefore, it is still unclear whether these implementation strategies can be effective in all organisations or if it depends on the characteristics of an organisation which strategies suit best.

This study therefore focuses on the development of implementation strategies that can be used to integrate telerehabilitation into rehabilitation care at different rehabilitation centres. Barriers relating to the implementation of rehabilitation centres were uncovered by comparing therapists who use telerehabilitation with therapists who do not use it. Facilitators concerning these barriers were investigated to find possible solutions. With both aspects of this study, the differences and similarities between rehabilitation centres are central. The main question is formulated as follows: *'How can we improve the implementation of telerehabilitation in rehabilitation centres to increase the chance of making it routine care?'.* To answer this research question, the following sub-questions are formulated:

- How does the Normalisation Process Theory uncover organization-specific characteristics for tailoring eHealth implementation strategies?
- What are the differences and similarities between Roessingh Centrum voor Revalidatie and Vogellanden and how does this manifest itself in telerehabilitation adoption among professionals?

1. Methods

1.1 Research design and sample

The study has an explanatory mixed-methods design with both quantitative (questionnaire) and qualitative (interview) data analysis methods. The study was conducted in 2018 and focused on employees of rehabilitation centres. Two rehabilitation centres in the Netherlands were included in the study, being Roessingh Centrum voor Revalidatie in Enschede and Vogellanden in Zwolle. Inclusion criteria for the centres were that they had to be working on implementing Telerevalidatie.nl in their centre and that therapists could have access to the program. Dissemination of the program already took place in these centres. This study is exempt from ethical approval.

1.2 Telerevalidatie.nl

This study focused on an telerehabilitation application called Telerevalidatie.nl (Telerevalidatie.nl, n.d.). It is an online intervention with the aim to support the patient with his or her rehabilitation program at home and to facilitate self-management by patients (Telerevalidatie.nl, n.d.). The program is developed by Roessingh Research and Development (RRD). The program can be offered during inpatient, outpatient and/or aftercare treatment. Through a secure login, therapists and patients log on to a web portal to gain access to the program on a phone, tablet or computer. The program contains the following four modules: (1) information about the rehabilitation and the disease; (2) activities and exercises, with video instructions about individual exercises to enable patients to do their exercises independently at home. Telerevalidatie.nl consists of a database of 1000 video recordings of different exercises for different patient groups. From the video database, therapists can select exercises and schedule the exercise program for the upcoming days/weeks. Therapists can give additional personalized instructions to their patient about a specific exercise. They receive feedback about which and how often exercises are performed by patients. Patients can be notified by an email about exercises to perform that day. Patients log on to the web portal one or more times a day and perform the selected exercises; (3) a message function, enabling patients to leave messages for therapists and enabling the therapists to effectively target their care to the needs and wishes of patients; (4) a monitoring function with questions after each exercise sessions to monitor how patients experience the exercises and/or program at home. The therapist and patient will always be connected through this system. By sending messages and assigning exercises, the professional will always be involved and can redirect the patient when he or she needs help. Therefore, it is not a 100% self-management solution (Telerevalidatie.nl, n.d.). A more detailed description of Telerevalidatie.nl is added in appendix 1.

The application was introduced first in 2015 at Roessingh Centrum voor Revalidatie in Enschede within the disciplines lung rehabilitation, oncology rehabilitation and Chronic Fatigue Syndrome (CFS). In October 2018 there were 143 therapists who had an account at the online platform, forty of them were active the last two weeks (28%) (I. Flierman, Personal communication, November 2018). Alongside Roessingh, also the rehabilitation centre Vogellanden in Zwolle introduced the application within their organisation in 2016. This rehabilitation centre focused the implementation of the portal first within the departments physiotherapy and occupational therapy within the target groups neurology, orthopaedics and chronic pain of the sector adults. Half of the professionals of these disciplines received an account for the online portal. One year later also the department speech therapy was

involved and there is started a pilot for special dentistry and orthopaedics within the sector children. Also, within the sector adults the departments of social work and psychology are now involved in the implementation (C. Jansen, personal communication, November 2018).

1.3 Questionnaire

The questionnaire conducted is based on the Normalisation Process Theory (NPT), which helps to understand and evaluate processes where interventions are embedded in routine practice (May & Finch, 2009). It explains how an intervention becomes normalised and sustained in an organization (Tazzyman et al., 2017). The NPT focuses on the work professionals do individually and collective to implement the practices. There are four main constructs integrated in the NPT, these are 'Coherence', 'Cognitive Participation', 'Collective Action' and 'Reflexive Monitoring'. All these constructs include four components (May & Finch, 2009). For a description of these constructs see table 1 and for a description of the components see table 2.

Using the NPT as a theoretical framework in this study offers the explanation of the factors that influence the implementation of Telerevalidatie.nl from the beginning (non-users) till putting it into practice (users) (Mair et al., 2012; May & Finch, 2009; McEvoy et al., 2014). The NPT supports the need of researching the implementation of complex interventions by explaining the social processes that lead from inception to practice (McEvoy et al., 2014). Items included in the questionnaire were adapted from existing questionnaires like the NoMad and TARS (Finch et al., 2015; Finch et al., 2012) and translated to Dutch where needed. For each construct, additional items were composed by the authors based on experience from previous research on adoption and acceptance of telerehabilitation services. Additionally, the questionnaire included items to measure demographics: age, gender and profession. Face validity of the questionnaire was evaluated by three experts in health technology adoption.

Table 1 Description NPT constructs (from Finch et al., 2012).

Construct	***Description***
Coherence	The process of sense-making and understanding that individuals and organisations have to go through in order to promote or inhibit the routine embedding of a practice to its users. These processes are energized by investments of meaning made by participants.
Cognitive Participation	The process that individuals and organisations have to go through in order to enrol individuals to engage with the new practice. These processes are energized by investments of commitment made by participants.
Collective Action	The work that individuals and organisations have to do to enact the new practice. These processes are energized by investments of effort made by participants.
Reflexive Monitoring	The informal and formal appraisal of a new practice once it is in use, in order to assess its advantages and disadvantages and which develops users' comprehension of the effects of a practice. These processes are energized by investments in appraisal made by participants.

Table 2 NPT components (imported from Brún et al., 2016).

Construct	***Components***	***Components questions***
Coherence	Differentiation	Do stakeholders see this as a new way working?
	Individual specification	Do individuals understand what tasks the intervention requires of them?
	Communal specification	Do all those involved agree about the purpose of the intervention?
	Internalisation	Do all the stakeholders grasp the potential benefits and value of the intervention?
Cognitive Participation	Enrolment	Do the stakeholders believe they are the correct people to drive forward the implementation?
	Initiation	Are they willing and able to engage others in the implementation?
	Activation	Can stakeholders identify what tasks and activities are required to sustain the intervention?
	Legitimation	Do they believe it is appropriate for them to be involved in the intervention?
Collective Action	Interactional workability	Does the intervention make it easier or harder to complete tasks?
	Skill set workability	Do those implementing the intervention have the correct skills and training for the job?
	Relational integration	Do those involved in the implementation have confidence in the new way of working?
	Contextual integration	Do local and national resources and policies support the implementation?
Reflexive Monitoring	Systematisation	Will stakeholders be able to judge the effectiveness of the intervention?
	Individual appraisal	How will individuals judge the effectiveness of the intervention?
	Communal appraisal	How will stakeholders collectively judge the effectiveness of the intervention?
	Reconfiguration	Will stakeholders be able to modify the intervention based on evaluation and experience?

1.4 Interviews

Following the questionnaire, semi-structured interviews with open ended questions were conducted. The interview questions formed are based on barriers found important during the analysis of the questionnaire. McEvoy et al., (2014) studied that data about attitude and technical issues are missing when conducting research conform the NPT. Additional questions are therefore included in the interviews using the MIDI questionnaire as support (Fleuren, Paulussen, Van Dommelen, & Van Buuren, 2012). Besides asking for and about these barriers, the interview mainly focused on possible solutions to face these barriers. The interviews were personalized for each group of respondents (therapists, managers, project leaders and board of directors). Two different interview schemes of a therapist and manager are added in appendix 2.

1.5 Procedure

First, the qualitative part of this study was established by completing a questionnaire. Every therapist that worked in one of both centres was invited by mail from the project leaders of the centres to participate in the study. In this mail, the therapists were asked to fill in the questionnaire that was directed through a link to an online questionnaire on Qualtrics software. The participants were informed about the aim of the research and the data processing in the informed consent of the questionnaire. They participated voluntary and the data collected were discussed anonymously.

After the questionnaire, interviews were conducted to establish the quantitative part of the study. The selection and recruiting of employees for the interviews was based on the advice of project leaders of both organisations. It did not matter whether the employees had completed the questionnaire or not. The target group of the interviews included therapists, but also managers, project leaders and the board of directors. This because within the implementation of interventions not only the users (therapists), but also the supporting employees play a role (Andreassen et al., 2015; Kairy et al., 2014). The proposed employees were contacted by mail whether they wanted to cooperate with the interview. There were some approached employees who wanted to cooperate but did not have the time to do so. There were also approached employees who did not respond to the invitation mail. The participants of the interviews were informed about the aim of the interviews and the data processing in the introduction of the interview. Also, they signed a consent form. The duration of the interviews variated between 30 minutes and one hour. All participants were talkative and did not have difficulties in giving answers.

1.6 Outcome measures

1.6.1 Demographic characteristics

In the questionnaire participants were asked about their gender, age and profession. In addition, they were asked whether they were currently using Telerevalidatie.nl. If they did not use Telerevalidatie.nl at the time of filling in the questionnaire, they were categorized as ‘non-users’. If they did use Telerevalidatie.nl, they were categorized as ‘users’. The questionnaire consisted of 71 items, 17 of these items comprised demographic characteristics.

1.6.2 Barriers for implementation

Barriers for implementation were assessed by means of the questionnaire. An online questionnaire was conducted by therapists of the two rehabilitation centres: Roessingh and Vogellanden. The questionnaire comprised of 71 items, wherein 54 items used to evaluate Coherence (6 items), Cognitive participation (8 items), Collective action (33 items) and Reflexive monitoring (7 items). Each item was phrased on a 5-point Likert-type scale ranging wherein one was 'totally agree' and five was 'totally disagree'. In the result section some tables include not all categories (totally agree to totally disagree) when specific categories were not mentioned in the answers of the respondents.

The aim of this questionnaire was to identify barriers in the usage of Telerevalidatie.nl comparing the answers of users and non-users. Furthermore, the differences and similarities between the two participating rehabilitation centres were challenged. All results were categorized with help from the NPT. According to Bishop (2015) the strong and unexpected results of this questionnaire could be challenged and defined in the interviews. The barriers that showed a significant difference between users and non-users within the questionnaire were further questioned in the interviews.

1.6.3 Facilitators for implementation

Semi-structured interviews were held to gather more comprehensive information and understanding of the barriers found in the questionnaire and the main goal was to generate possible explanations and solutions to face these barriers. The solutions, also called facilitators, mentioned in the interviews were categorised on account of the strategies of the Expert Recommendations for Implementing Change (ERIC) (Waltz et al., 2014). The ERIC study provides a nomenclature for implementation strategies and clusters that can be used in guiding implementation research in health care settings (Waltz et al., 2015). There are nine clusters including 73 strategies in the list of ERIC strategies.

1.7 Data analysis

Data of both the questionnaire and interviews were analysed by an independent researcher neither working at Roessingh or Vogellanden. The program IBM SPSS Statistics 19 is used to measure the statistics in the study. The level of significance in this study was set at $\alpha < 0.05$.

1.7.1 Demographic characteristics

Descriptive statistical methods in SPSS were used to measure relevant outcome measures, such as gender and profession. The statistics were converted into a summarized table. Participants were excluded from further data analysis when then filled in they had never heard of Telerevalidatie.nl before.

1.7.2 Barriers for implementation

First, respondents were divided in the groups *user* and *non-user* by making a new variable. Like mentioned before, users included respondents who used Telerevalidatie.nl at least once, non-users included respondent who never used Telerevalidatie.nl before but did know the portal. The significant difference between users and non-users was measured by performing an independent t-test between all different variables as test variable and the new variable as grouping variable. The significant items were analysed in detail by executing frequency tables to explore the distribution of answers given by users and non-users.

Internal consistency between the significant items of a specific component were measured with Cronbach's Alpha in order to investigate whether the significant items could be addressed with similar solutions or whether they had to be addressed with different solutions.

1.7.3 Facilitators for implementation

The conducted interviews were recorded and afterwards literally transcribed in Microsoft Word. Names, dates, locations and other private data were substituted with functional codes to ensure confidentiality. The data was imported in ATLAS.ti 8 and coding was conducted within this program. First, a meaningful phrase was indicated as a barrier or facilitator. The main goal of the interviews was to investigate the facilitators; therefore, the coding of these phrases was executed more comprehensive. Facilitators were first coded inductive; the phrases were named as facilitating actions. After coding, the different codes were classified into clusters and when possible specific strategies belonging to the ERIC study (Waltz et al., 2014). This was a deductive approach. Not all codes were point-to-point in line with the ERIC strategies, however the majority of the codes were corresponding. Barriers were coded inductive by means of barriers and they were not further divided into categories. Two researchers coded the interviews to create intersubjectivity whereby the determinants were presented in labels and sub-labels. Phrases were used as the unit of analysis, because these meaningful phrases conducted most complete information. There is used context information while coding by using other parts of the interviews to give meaning to the phrases. The excerpts or phrases chosen are particular prototypes of the different codes.

2. Results

In this chapter first the results of the quantitative component, the questionnaire, of this research are discussed. Next, the results of the qualitative component, the interviews, of this research are provided. Regarding to the respondents, R01 to R08 indicate the specific participant.

2.1 Questionnaire

To begin the characteristics of the study group are described. After this the results of the questionnaire are showed per rehabilitation centre in order of the different relevant constructs of the NPT, beginning with Coherence, followed by Cognitive Participation, Collective Action and Reflexive Monitoring. The significant items are displayed within the corresponding construct and component. At the end of these results there is a summarizing paragraph mentioning the most remarkable results of the questionnaire.

2.1.1 Characteristics of the study group

The sample of the questionnaire included 71 respondents, mainly females (n=55) and less males (n=13). In total there were 40 respondents from Roessingh and 31 respondents from Vogellanden. There were more non-users compared with users who filled in the questionnaire. Most of the respondents were aged between 36 and 35. See table 3 for an overview of the characteristics of the respondents.

Table 3 Characteristics of respondents in questionnaire (n=71)

	Roessingh	*Vogellanden*
Total (n)	40	31
Users	17 (42%)	6 (19%)
Non-users	23 (58%)	25 (81%)
Gender (n)		
Male	9 (23%)	4 (13%)
Female	31 (78%)	24 (77%)
Missing	-	3 (10%)
Age (n)		
<20	1 (3%)	-
21-35	6 (15%)	11 (36%)
36-55	22 (55%)	16 (52%)
>56	5 (13%)	2 (6%)
Missing	6 (15%)	2 (6%)
Profession (n)		
Occupational therapist	10 (25%)	7 (23%)
Physiotherapist	8 (20%)	5 (13%)
Nurse	8 (20%)	-
Psychologist / educational generalist	5 (13%)	2 (6%)
Movement agogist	3 (8%)	2 (6%)
Speech therapist	1 (3%)	5 (16%)
Activity- and creative therapist	-	4 (13%)
Other	3 (8%)	6 (19%)
Missing	2 (5%)	-

2.1.2 Roessingh

In this paragraph the results for Roessingh are displayed. To begin with a table (table 4), including all significant items within this organisation labelled with the corresponding NPT construct. The results in this table are displayed in order of significance and t-value. Afterwards, all significant items are analysed and described in order of the NPT constructs.

Table 4 Overview of all items significantly associated with portal usage. Items are ranked according to effect size (t-value).

Item	M non-user	M user	t	Sig.	construct
Door het inzetten van het oefenportaal verandert de werkverdeling tussen mij en mijn collega's	2.4	3.5	-4.8	.000	Collective Action – skill set workability
Ik weet wat de mogelijkheden van het oefenportaal zijn binnen de behandeling van mijn patiënten	3.5	2.4	4.2	.000	Collective Action – Skill set workability
Binnen mijn afdeling bestaat voldoende flexibiliteit in hoe en bij wie ik het oefenportaal in kan zetten	2.2	3.2	-3.8	.001	Collective Action - Interactional workability
Ik denk dat het oefenportaal meerwaarde voor de mantelzorger kan hebben	2.1	2.9	-2.8	.009	Coherence-Internalization
Ik begrijp hoe het inzetten van het oefenportaal verschilt van mijn gebruikelijke manier van werken	2.8	2.1	2.7	.011	Coherence – Differentiation
Ik ben voldoende op de hoogte gebracht van de ontwikkelingen rondom het oefenportaal in mijn organisatie	3.1	2.5	2.6	.012	Cognitive Participation – Activation
Ik weet wie er binnen mijn organisatie is aangewezen voor het coördineren van de invoering van het oefenportaal	2.4	1.7	2.5	.017	Cognitive Participation - Initiation
Ik heb voldoende training gehad om mij in staat te stellen het oefenportaal op een goede manier te gebruiken	4.0	3.2	2.5	.019	Collective Action – Skill set workability
Ik ben voldoende op de hoogte van de inhoud van het oefenportaal om het goed toe te kunnen passen in de behandeling van mijn patiënten	3.7	3.0	2.3	.027	Collective Action – Skill set workability
Het is voor mij duidelijk wat er van mij verwacht wordt vanuit de organisatie m.b.t het inzetten van het oefenportaal	3.8	3.1	2.1	.041	Collective Action – Contextual integration

Coherence

Differentiation

Within the component 'Differentiation' the item *"Ik begrijp hoe het inzetten van het oefenportaal verschilt van mijn gebruikelijke manier van werken"* showed a significant difference between users and non-users. Compared to non-users, users do realize more how using the portal differs from their current way of working (p=.011). The majority of these users understands the difference, in contrast to non-users where most are neutral.

Table 5 Differentiation, Roessingh

	Ik begrijp hoe het inzetten van het oefenportaal verschilt van mijn gebruikelijke manier van werken					
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Total*
Non-users	2.8	0	8	11	3	22
		0%	36.4%	50.0%	13.6%	100%
Users	2.1	3	9	3	1	16
		18.8%	56.3%	18.8%	6.3%	100%

Internalization

There is one significant result within this component, concerning the item *"Ik denk dat het oefenportaal meerwaarde voor de mantelzorger kan hebben".* Non-users perceive the portal more as an added value for informal caregivers compared to users (p=.009). The large majority of the non-users agreed with the statement, while in the user group the opinions were more divided.

Table 6 Internalization, Roessingh

	Ik denk dat het oefenportaal meerwaarde voor de mantelzorger kan hebben						
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-users	2.1	3	13	4	1	0	21
		14.3%	61.9%	19.0%	4.8%	0%	100%
Users	2.9	0	6	7	2	1	16
		0%	37.5%	43.8%	12.5%	6.3%	100%

Cognitive Participation

Initiation

Within the component 'Initiation' the one significant item is "*Ik weet wie er binnen mijn organisatie is aangewezen voor het coördineren van de invoering van het oefenportaal".* The results show the user group has a more positive opinion about this item compared with the non-user group, what means they have better knowledge about the coordination of the portal (p=.017). Also, within the user group no one disagrees, while in the non-user group there are some respondents who disagreed.

Table 7 Initiation, Roessingh

	Ik weet wie er binnen mijn organisatie is aangewezen voor het coördineren van de invoering van het oefenportaal						
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	2.4	2	13	3	2	1	21
		9.5%	61.9%	14.3%	9.5%	4.8%	100%
User	1.7	6	9	1	0	0	16
		37.5%	56.3%	6.3%	0%	0%	100%

Activation

The item *"Ik ben voldoende op de hoogte gebracht van de ontwikkelingen rondom het oefenportaal in mijn organisatie"* shows a significant difference between users and non-users, with most of the users agreeing with this item and most non-users being neutral. (p=.012). Furthermore, another large part of the non-users disagrees, compared to only one out of 17 of the users who disagrees. This indicates that non-users do not think they are not informed sufficiently, while users think they were.

Table 8 Activation, Roessingh

	Ik ben voldoende op de hoogte gebracht van de ontwikkelingen rondom het oefenportaal in mijn organisatie				
	Mean	*Agree*	*Neutral*	*Disagree*	*Total*
Non-user	3.1	5	9	8	22
		22.7%	40.9%	36.4%	100%
User	2.5	9	7	1	17
		52.9%	41.2%	5.9%	100%

Collective Action

Interactional workability

The results show a significant difference between users and non-users in the item *"Binnen mijn afdeling bestaat voldoende flexibiliteit in hoe en bij wie ik het oefenportaal in kan zetten".* Most of the respondents of the non-user group seem to agree with this statement (p=.001). Respondents of the user group show some more division in their answer and the majority of them disagrees. Within the non-user group only two out of 21 disagrees.

Table 9 Interactional workability, Roessingh

	Binnen mijn afdeling bestaat voldoende flexibiliteit in hoe en bij wie ik het oefenportaal in kan zetten						
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-users	2.2	1	16	2	2	0	21
		4.8%	76.2%	9.5%	9.5%	0%	100%
Users	3.2	0	4	5	6	1	16
		0%	25.0%	31.3%	37.5%	6.3%	100%

Skill set workability

The component 'Skill set workability' shows four significant items. The first significant item is *"Ik weet wat de mogelijkheden van het oefenportaal zijn binnen de behandeling van mijn patiënten",* with the majority of the non-users who disagree and the majority of the users who agree (p=.000). This indicates that non-users perceive this lack of knowledge about the opportunities of the portal as a barrier.

The second significant item is *"Door het inzetten van het oefenportaal verandert de werkverdeling tussen mij en mijn collega's,* with non-users indicating the portal will change the distribution of work between them and their colleagues more than users do (p=.000). None of the non-users think the portal will not have an effect on this distribution, while a part of the users does.

The items *"Ik heb voldoende training gehad om mij in staat te stellen het oefenportaal op een goede manier te gebruiken"* is the third item that showed significant difference

between users and non-users. With non-users perceiving the amount of training as more insufficient than users do (p=.019). The large majority of the non-users disagreed with this item, while within the user group there was more division in opinions about agreeing or disagreeing with this item. Although, also within the user group most of the respondents disagreed with this item.

The last significant item in component is *"Ik ben voldoende op de hoogte van de inhoud van het oefenportaal om het goed toe te kunnen passen in de behandeling van mijn patiënten".* Non-users indicate to be informed more insufficient about the content of the portal in order to enable them using the portal adequately compared to users (p=.027). Users show a distribution in agreeing or disagreeing looking to this item, while the clear majority of the non-users disagrees.

The Cronbach's Alpha between the four items is high (α=.723). This means there is a high internal consistency between the items (see appendix 3).

Table 10 Skill set workability (1), org A

	Ik weet wat de mogelijkheden van het oefenportaal zijn binnen de behandeling van mijn patiënten						
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	3.5	0	3	7	11	2	23
		0%	13.0%	30.4%	47.8%	8.7%	100%
User	2.4	1	10	4	2	0	17
		5.9%	58.8%	23.5%	11.8%	0%	100%

Table 11 Skill set workability (2), org A

	Door het inzetten van het oefenportaal verandert de werkverdeling tussen mij en mijn collega's.						
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-users	2.4	1	11	9	0	0	21
		4.8%	52.4%	42.9%	0%	0%	100%
Users	3.5	0	1	8	5	2	16
		0%	6.3%	50.0%	31.3%	12.5%	100%

Table 12 Skill set workability (3), Roessingh

	Ik heb voldoende training gehad om mij in staat te stellen het oefenportaal op een goede manier te gebruiken					
	Mean	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-users	4.0	1	4	10	6	21
		4.8%	19.0%	47.6%	28.6%	100%
Users	3.2	7	1	6	2	16
		43.8%	6.3%	37.5%	12.5%	100%

Table 13 Skill set workability (4), Roessingh

	Ik ben voldoende op de hoogte van de inhoud van het oefenportaal om het goed toe te kunnen passen in de behandeling van mijn patiënten						
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	3.7	0	2	5	11	3	21
		0%	9.5%	23.8%	52.4%	14.3%	100%
User	3.0	1	4	6	4	1	16
		6.3%	25.0%	37.5%	25.0%	6.3%	100%

Contextual integration

Within the component 'Contextual integration' the item *"Het is voor mij duidelijk wat er van mij verwacht wordt vanuit de organisatie m.b.t het inzetten van het oefenportaal"* showed significant difference between user and non-users. Non-users perceive expectations in embedding the portal as more unclear than users do (p=.041). The large majority of the non-users disagrees with this statement. Users are more divided, the biggest group disagrees, but another group agrees and some are neutral.

Table 14 Contextual integration, Roessingh

	Het is voor mij duidelijk wat er van mij verwacht wordt vanuit de organisatie m.b.t. het inzetten van het oefenportaal						
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	3.8	0	2	3	13	3	21
		0%	9.5%	14.3%	61.9%	14.3%	100%
User	3.1	1	5	2	7	1	16
		6.3%	31.3%	12.5%	43.8%	6.3%	100%

Reflexive Monitoring

There were found no significant differences between users and non-users of Roessingh within the component Reflexive Monitoring.

2.1.3 Vogellanden

In this paragraph, the results for Vogellanden are displayed. To begin a with a table (table 15), including all significant items within this organisation labelled at the right construct of the NPT. It is remarkable that again most items are from the construct Collective action. However, also the construct Cognitive participation has multiple significant items within this organisation.

Table 15 Overview of all items significantly associated with portal usage. Items are ranked according to effect size (t-value).

Item	M non-user	M user	t	Sig.	Construct
Patiënten zijn over het algemeen tevreden als ik het oefenportaal toepas in hun behandeling	2.7	2.0	7.5	.000	Reflexive Monitoring - Systematization
Ik heb voldoende training gehad om mij in staat te stellen het oefenportaal op een goede manier te gebruiken	4.6	2.3	6.0	.000	Collective Action- Skill set workability
Ik kan zelf bepalen of ik het oefenportaal ga gebruiken	2.9	1.5	5.7	.000	Cognitive Participation - Initiation
Ik vind het oefenportaal de moeite waard	2.6	2.0	5.3	.000	Reflexive Monitoring - Individual appraisal
Door het inzetten van het oefenportaal verandert de werkverdeling tussen mij en mijn collega's	2.6	3.8	-4.9	.000	Collective Action - Skill set workability
Ik weet wie er binnen mijn organisatie is aangewezen voor het coördineren van de invoering van het oefenportaal	2.8	1.2	4.8	.000	Cognitive Participation - Initiation
Ik verwacht dat door het inzetten van het oefenportaal de productie omlaag zal gaan	3.1	4.3	-4.3	.000	Collective Action – Relational integration
Ik weet wat de mogelijkheden van het oefenportaal zijn binnen de behandeling van mijn patiënten	4.2	2.3	4.2	.000	Collective Action – Skill set workability
Ik ben voldoende op de hoogte gebracht van de ontwikkelingen rondom het oefenportaal in mijn organisatie	3.7	2.2	3.6	.001	Cognitive Participation – Activation
Ik ben voldoende op de hoogte van de inhoud van het oefenportaal om het goed toe te kunnen passen in de behandeling van mijn patiënten	4.5	3.0	3.9	.001	Collective Action – Skill set workability
Het is voor mij duidelijk wat er van mij verwacht wordt vanuit de organisatie m.b.t. het inzetten van het oefenportaal	4.0	2.7	3.3	.003	Collective action – contextual integration
Ik weet wat mijn verantwoordelijkheden zullen zijn als ik het oefenportaal toepas in de behandeling van mijn patiënten	4.1	2.4	3.1	.004	Collective Action – Relational integration
Ik ben voldoende betrokken geweest bij de ontwikkeling van het oefenportaal	3.8	2.3	2.9	.007	Cognitive Participation – Legitimation
Mijn leidinggevende(n) staan achter de invoering van het oefenportaal in mijn organisatie	2.6	1.8	2.8	.010	Cognitive Participation - Initiation
In mijn organisatie zijn formeel afspraken vastgelegd door het management over het gebruik van het oefenportaal (in beleidsplannen. werkplannen etc.)	3.5	3.0	2.8	.011	Collective Action – Contextual integration
Over het algemeen beschikken mijn patiënten over voldoende kennis en vaardigheden om het oefenportaal thuis te gebruiken	3.3	2.3	2.6	.014	Collective Action – Skill set workability
Ik heb vertrouwen in de stabiliteit en betrouwbaarheid van het oefenportaal	2.7	2.0	2.5	.019	Reflexive Monitoring - Systematization
Ik vind het bij mijn functie horen om het oefenportaal te gebruiken	2.9	1.8	2.5	.020	Cognitive Participation – Legitimation
Het gebruik van het oefenportaal verstoort de relatie tussen mij en de patiënt	3.5	4.3	-2.4	.021	Collective Action - Relational integration
Het inzetten van het oefenportaal zal mijn huidige manier van werken beïnvloeden	2.6	3.2	-2.4	.023	Coherence – Individual specification
Ik sta achter de invoering van het oefenportaal in mijn organisatie	2.0	1.3	2.3	.026	Cognitive Participation – Activation
Ik beschik over de nodige vaardigheden om het oefenportaal te gebruiken	3.3	2.2	2.2	.035	Collective Action - Skill set workability
Het oefenportaal is geschikt voor (een deel) van mijn patiënten	2.8	2.0	2.1	.046	Cognitive Participation – Legitimation

Coherence

Individual specification

The item *"Het inzetten van het oefenportaal zal mijn huidige manier van werken beïnvloeden"* showed a significant difference between users and non-users, with non-users perceiving the portal to be more of influence on their current way of working (p=.023). Almost half of the non-users agreed with this statement, compared to only one out of six users.

Table 16 Individual specification, Vogellanden

	Het inzetten van het oefenportaal zal mijn huidige manier van werken beïnvloeden				
	Mean	*Agree*	*Neutral*	*Disagree*	*Total*
Non-user	2.6	11	14	0	25
		44.0%	56.0%	0%	100%
User	3.2	1	3	2	6
		16.7%	50.0%	33.3%	100%

Cognitive Participation

Initiation

Within the component 'Initiation' there are three items which show significant differences between users and non-users. First, the statement *"Ik kan zelf bepalen of ik het oefenportaal ga gebruiken"* showed a significance difference between users and non-users, with users indicating the use of the portal more as a free choice than non-users do (p=.000). All users report they can decide themselves whether they want to use the portal or not, compared to non-users where only five out of 25 agree with this.

The second item showing a significant difference is *"Ik weet wie er binnen mijn organisatie is aangewezen voor het coördineren van de invoering van het oefenportaal",* with all of the users indicating they know who is responsible for the coordination and only a bit more than half of the non-users indicating this (p=.000).

Third, the item *"Mijn leidinggevende(n) staan achter de invoering van het oefenportaal in mijn organisatie"* showed a significance difference, with users perceiving their executive more as supportive (p=.010). Only one of the users indicates to be neutral with this statement, compared with more than half of the non-users being neutral. None of the respondents indicated to disagree with the statement.

The Cronbach's Alpha of these items is medium high (α=.585). This means there is a medium high internal consistency between the items (see appendix 3).

Table 17 Initiation (1), Vogellanden

	Ik kan zelf bepalen of ik het oefenportaal ga gebruiken					
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Total*
Non-user	2.9	0	5	18	2	25
		0%	20.0%	72.0%	8.0%	100%
User	1.5	3	3	0	0	6
		50.0%	50.0%	0%	0%	100%

Table 18 Initiation (2), Vogellanden

	Ik weet wie er binnen mijn organisatie is aangewezen voor het coördineren van de invoering van het oefenportaal					
	Mean	*Totally agree*	*Agree*	*Neutral*	*Totally disagree*	*Total*
Non-user	2.8	3	12	2	7	24
		12.5%	50.0%	8.3%	29.2%	100.0%
User	1.2	5	1	0	0	6
		83.3%	16.7%	0%	.0%	100.0%

Table 19 Initiation (3), Vogellanden

	Mijn leidinggevende(n) staan achter de invoering van het oefenportaal in mijn organisatie				
	Mean	*Totally agree*	*Agree*	*Neutral*	*Total*
Non-user	2,6	1	8	16	25
		4,0%	32,0%	64,0%	100%
User	1,8	2	3	1	6
		33,3%	50,0%	16,7%	100%

Legitimation

The component ‘Legitimation’ shows three items which show significant differences between users and non-users. First the item “*Ik ben voldoende betrokken geweest bij de ontwikkeling van het oefenportaal”* shows a significant difference, with users stating they are more sufficiently involved during the development of the portal (p=.007,). Most of the users agree, while the majority of the non-users disagrees with this statement.

The second item showing a significant difference between users and non-users is *“Ik vind het bij mijn functie horen om het oefenportaal te gebruiken”,* with users perceiving the portal more part of their job than non-users do (p=.020). Most of the non-users state to be neutral towards this item, while most of the users agree. Almost the same percentage of users and non-users disagrees.

Third, the item *“Het oefenportaal is geschikt voor (een deel) van mijn patiënten”* shows significant difference, with users perceiving the portal to be more suitable for their patients (p=.046). None of the user group indicate the portal as unsuitable. Within the non-user group most of the respondents are neutral, some agree and a small group disagrees and thinks the portal is unsuitable for some of their patients.

There is a medium Cronbach’s Alpha between the three items (α=.623). This means there is internal consistency between the items. For the intercorrelation, see appendix 3.

Table 20 Legitimation (1), Vogellanden

	Ik ben voldoende betrokken geweest bij de ontwikkeling van het oefenportaal						
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	3.8	1	2	6	9	7	25
		4.0%	8.0%	24.0%	36.0%	28.0%	100%
User	2.3	1	3	1	1	0	6
		16.7%	50.0%	16.7%	16.7%	0%	100%

Table 21 Legitimation (2), Vogellanden

	Ik vind het bij mijn functie horen om het oefenportaal te gebruiken						
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	2.9	1	6	14	3	1	25
		4.0%	24.0%	56.0%	12.0%	4.0%	100%
User	1.8	4	0	1	1	0	6
		66.7%	0%	16.7%	16.7%	0%	100%

Table 22 Legitimation (3), Vogellanden

	Het oefenportaal is geschikt voor (een deel) van mijn patiënten						
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	2.8	1	7	12	2	1	23
		4.3%	30.4%	52.2%	8.7%	4.3%	100%
User	2.0	1	4	1	0	0	6
		16.7%	66.7%	16.7%	0%	0%	100%

Activation

Within the component 'Activation' there are two significant items. The first item that shows significant difference between users and non-users is *"Ik ben voldoende op de hoogte gebracht van de ontwikkelingen rondom het oefenportaal in mijn organisatie"* (p=.001). The majority of non-users state they were not informed sufficiently about the developments of the portal, comparing with only one of the users who indicates this. Within the user group most of the respondents agree with the statement.

The second item that shows significant difference is *"Ik sta achter de invoering van het oefenportaal in mijn organisatie",* with the majority of the users agreeing with this statement and the majority of the non-users being neutral (p=.026). None of the respondents disagrees.

There seems to be no intercorrelation between both items (see appendix 3).

Table 23 Activation (1), Vogellanden

	Ik ben voldoende op de hoogte gebracht van de ontwikkelingen rondom het oefenportaal in mijn organisatie						
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	3.7	1	1	6	13	4	25
		4.0%	4.0%	24.0%	52.0%	16.0%	100%
User	2.2	1	4	0	1	0	6
		16.7%	66.7%	0%	16.7%	0%	100%

Table 24 Activation (2), Vogellanden

	Ik sta achter de invoering van het oefenportaal in mijn organisatie				
	Mean	*Totally agree*	*Agree*	*Neutral*	*Total*
Non-user	2.0	5	15	5	25
		20.0%	60.0%	20.0%	100%
User	1.3	4	2	0	6
		66.7%	33.3%	0%	100%

Collective Action

Relational integration

Within the component 'Relational integration' there are three items which showed significant differences between users and non-users. Fist, the item *"Ik verwacht dat door het inzetten van het oefenportaal de productie omlaag zal gaan"* (p=.000). All users disagree with the statement and think that using the portal will not influence their production, while the majority of the non-user group is neutral towards this statement. Some of this group disagree and some agree.

Next, the item *"Ik weet wat mijn verantwoordelijkheden zullen zijn als ik het oefenportaal toepas in de behandeling van mijn patiënten"* showed significant difference, with non-users responding more negative what indicates they do not know what their responsibilities are when using the portal, comparing with only one of the user group who indicates this (p=.004).

The third item that showed significance *is "Het gebruik van het oefenportaal verstoort de relatie tussen mij en de patiënt",* with users perceiving the portal to be less interruptive comparing with non-users (p=.021). All users report to disagree with the statement, while within the non-users group the opinions are more divided.

There is a high Cronbach's Alpha (α=.705). There seems to be a high intercorrelation between the items (see appendix 3).

Table 25 Relational integration (1), Vogellanden

		Ik verwacht dat door het inzetten van het oefenportaal de productie omlaag zal gaan				
	Mean	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	3.1	4	14	6	0	24
		16.7%	58.3%	25.0%	.0%	100%
User	4.3	0	0	4	2	6
		0%	0%	66.7%	33.3%	100%

Table 26 Relational integration (2), Vogellanden

		Ik weet wat mijn verantwoordelijkheden zullen zijn als ik het oefenportaal toepas in de behandeling van mijn patiënten				
	Mean	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	4.1	2	3	11	9	25
		8.0%	12.0%	44.0%	36.0%	100%
User	2.4	2	3	1	0	6
		33.3%	50.0%	16.7%	0%	100%

Table 27 Relational integration (3), Vogellanden

		Het gebruik van het oefenportaal verstoort de relatie tussen mij en de patiënt				
	Mean	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	3.5	2	10	11	2	25
		8.0%	40.0%	44.0%	8.0%	100%
User	4.3	0	0	4	2	6
		0%	0%	66.7%	33.3%	100%

Skill set workability

Within the component 'Skill set workability' there are six items that showed significant differences between users and non-users. The item *"Ik heb voldoende training gehad om mij in staat te stellen het oefenportaal op een goede manier te gebruiken"* showed significant difference, with non-users perceiving the amount of training to use the portal in an effective way less sufficient than users (p=.000). Within users, the majority stated the amount was sufficient and only one disagreed with the statement.

The second significant item is *"Door het inzetten van het oefenportaal verandert de werkverdeling tussen mij en mijn collega's"*, with users indicating the distribution of work as less changeable through the portal than non-users did (p=.000). Within the non-user group none of the respondents disagreed with this statement.

The following item *"Ik weet wat de mogelijkheden van het oefenportaal zijn binnen de behandeling van mijn patiënten"* also showed a significant difference, with users indicating to be more informed about the possibilities of the portal compared to non-users (p=.000). The majority of the user group agreed with the statement, while only two out of 24 of the non-users agreed. Most of this non-user group disagreed.

The fourth item that showed significance is *"Ik ben voldoende op de hoogte van de inhoud van het oefenportaal om het goed toe te kunnen passen in de behandeling van mijn patiënten",* with non-users perceiving their knowledge about the content of the portal less sufficient than users do (p=.001). Half of the users agree and half of them disagree, compared with 23 out of 25 of the non-users who disagreed.

The next significant item is *"Over het algemeen beschikken mijn patiënten over voldoende kennis en vaardigheden om het oefenportaal thuis te gebruiken",* with users perceiving their patients more suitable for the portal than non-users do (p=.014). Most of the non-users state to be neutral about the statement.

The last significant item of this component is *"Ik beschik over de nodige vaardigheden om het oefenportaal te gebruiken",* with users notice themselves having the skills needed to use the portal more than non-users do (p=.035). Within the non-user group, the majority disagrees with this statement, compared to only one out of six of the users.

The Cronbach's Alpha of these items is high (α=.861). There are several significant items within this component who show to have intercorrelation (see appendix 3).

Table 28 Skill set workability (1), Vogellanden

	Ik heb voldoende training gehad om mij in staat te stellen het oefenportaal op een goede manier te gebruiken						
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	4.6	0	1	1	6	17	25
		0%	4.0%	4.0%	24.0%	68.0%	100%
User	2.3	1	3	1	1	0	6
		16.7%	50.0%	16.7%	16.7%	0%	100%

Table 29 Skill set workability (2), Vogellanden

	Door het inzetten van het oefenportaal verandert de werkverdeling tussen mij en mijn collega's.					
	Mean	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	3.4	10	15	0	0	25
		40.0%	60.0%	0%	0%	100%
User	2.1	0	2	3	1	6
		0%	33.3%	50.0%	16.7%	100%

Table 30 Skill set workability (3), Vogellanden

	Ik weet wat de mogelijkheden van het oefenportaal zijn binnen de behandeling van mijn patiënten					
	Mean	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	4.2	2	3	10	9	24
		8.3%	12.5%	41.7%	37.5%	100%
User	2.3	5	0	1	0	6
		83.3%	0%	16.7%	0%	100%

Table 31 Skill set workability (4), Vogellanden

	Ik ben voldoende op de hoogte van de inhoud van het oefenportaal om het goed toe te kunnen passen in de behandeling van mijn patiënten					
	Mean	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	4.5	1	1	8	15	25
		4.0%	4.0%	32.0%	60.0%	100%
User	3.0	3	0	3	0	6
		50.0%	0%	50.0%	0%	100%

Table 32 Skill set workability (5), Vogellanden

	Over het algemeen beschikken mijn patiënten over voldoende kennis en vaardigheden om het oefenportaal thuis te gebruiken					
	Mean	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	3.3	2	17	3	3	25
		8.0%	68.0%	12.0%	12.0%	100%
User	2.3	5	0	1	0	6
		83.3%	0%	16.7%	0%	100%

Table 33 Skill set workability (6), Vogellanden

	Ik beschik over de nodige vaardigheden om het oefenportaal te gebruiken					
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	3.3	1	6	6	8	4	25
		4.0%	24.0%	24.0%	32.0%	16.0%	100%
User	2.2	2	2	1	1	0	6
		33.3%	33.3%	16.7%	16.7%	0%	100%

Contextual integration

There are two items within the component 'Contextual integration' which show significant differences between users and non-users. The item *"Het is voor mij duidelijk wat er van mij verwacht wordt vanuit de organisatie m.b.t. het inzetten van het oefenportaal"* showed a significant difference, with non-users indicating more uncertainty about what the organisation expects from them (p=.003). Sixteen out of 25 of the non-users disagrees with the statement, towards one out of six from the user group that disagree.

The item *"In mijn organisatie zijn formeel afspraken vastgelegd door het management over het gebruik van het oefenportaal"* also showed significant difference between users and non-users (p=.011). All the users mention to be neutral towards this statement. Within the non-users there is more division, but also the majority states to be neutral. It seems for both groups it is not totally clear what the agreements made by the management are.

The results show there is an intercorrelation between both items, see appendix 3.

Table 34 Contextual integration (1), Vogellanden

	Het is voor mij duidelijk wat er van mij verwacht wordt vanuit de organisatie m.b.t. het inzetten van het oefenportaal					
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	4.0	0	0	9	6	10	25
		0%	0%	36.0%	24.0%	40.0%	100%
User	2.7	1	1	3	1	0	6
		16.7%	16.7%	50.0%	16.7%	0%	100%

Table 35 Contextual integration (2), Vogellanden

	In mijn organisatie zijn formeel afspraken vastgelegd door het management over het gebruik van het oefenportaal					
	Mean	*Agree*	*Neutral*	*Disagree*	*Totally disagree*	*Total*
Non-user	3.5	1	16	3	5	25
		4.0%	64.0%	12.0%	20.0%	100%
User	3.0	0	6	0	0	6
		0%	100%	0%	0%	100%

Reflexive Monitoring

Systematization

Within the component 'Systematization' there are two significant items. The first item *"Patiënten zijn over het algemeen tevreden als ik het oefenportaal toepas in hun behandeling"* showed significant difference between users and non-users (p=.000). All the users agree with the statement, while most of the non-users are neutral and only seven out of 24 agree.

The second item *"Ik heb vertrouwen in de stabiliteit en betrouwbaarheid van het oefenportaal"* showed significant difference between the two groups as well, with users mentioning trusting the stability and reliability of the portal more than non-users did (p=.019). Five out of six users agreed with the statement, while only nine of the 24 non-users agreed.

The items show no intercorrelation (see appendix 3).

Table 36 Systematization (1), Vogellanden

	Patiënten zijn over het algemeen tevreden als ik het oefenportaal toepas in hun behandeling			
	Mean	*Agree*	*Neutral*	*Total*
Non-users	2.7	7	17	24
		29.2%	70.8%	100%
User	2.0	6	0	6
		100.0%	0%	100%

Table 37 Systematization (2), Vogellanden

	Ik heb vertrouwen in de stabiliteit en betrouwbaarheid van het oefenportaal					
	Mean	*Totally agree*	*Agree*	*Neutral*	*Disagree*	*Total*
Non-user	2.7	0	9	13	2	24
		0%	37.5%	54.2%	8.3%	100%
User	2.0	1	4	1	0	6
		16.7%	66.7%	16.7%	0%	100%

Individual appraisal

Within the component 'Individual appraisal' the item *"Ik vind het oefenportaal de moeite waard"* showed significant difference between users and non-users, with all users agreeing on this statement and non-users being more divided in their opinion (p=.000). Users perceive the portal as more useful than non-users do.

Table 38 Individual appraisal, Vogellanden

	Ik vind het oefenportaal de moeite waard				
	Mean	*Agree*	*Neutral*	*Disagree*	*Total*
Non-user	2.6	10	13	1	24
		41.7%	54.2%	4.2%	100%
User	2.0	6	0	0	6
		100%	0%	0%	100%

Summary results questionnaire

This summary of the results of the questionnaire will expose the most remarkable and noticeable results. To begin with the results of Roessingh, it is remarkable that six out of the ten significant items are from the NPT construct Collective Action and three out of these form the top three of all the significant items within this organisation. Three out of four components from this construct show significant results (skill set workability, interactional workability and contextual integration). Skill set workability is the component with the most significant items. It seems that Collective Action, and especially skill set workability are important when looking at important barriers in Roessingh. It is also noticeable that the construct Reflexive Monitoring did not show any significant items within this organisation. Next, the component skill set workability showed intercorrelation between the significant items, which indicates the two items probably can be addressed with the same solution. Finally, two items showed that users are more negative about those items than non-users are (interactional workability and internalization). These items are *"Binnen mijn afdeling bestaat voldoende flexibiliteit in hoe en bij wie ik het oefenportaal in kan zetten"* and *"Ik denk dat het oefenportaal meerwaarde voor de mantelzorger kan hebben.*

Looking at the other rehabilitation centre, Vogellanden, there are some noticeable results as well. First, also within this organisation results show there are multiple items from the same constructs and components that show significance, what means there are differences between non-users and users. Looking at Cognitive Participation, there are three out of four components showing multiple significant items (initiation, legitimation and activation). Collective Action also has three out of four components that show multiple significant items within the results (relational integration, skill set workability and contextual integration). The constructs Cognitive Participation and Collective action therefore seem important in this organisation. The most significant items are part of the component skill set workability. The other constructs, Coherence and Reflexive Monitoring, show some significant items as well, however significant less compared to the other two constructs. The components initiation, legitimation, relational integration and skill set workability show intercorrelation between the significant items in these components. This indicates the significant items within these components can be addressed with the same solution. The components activation, contextual integration and systematization did not show intercorrelation between the significant items, which indicates they should be considered as different barriers that need different solutions. There are four items were the mean score of the non-users is lower compared with the user score, so the users disagree more with these statements. These items are *"Door het inzetten van het oefenportaal verandert de werkverdeling tussen mij en mijn collega's", "Ik verwacht dat door het inzetten van het oefenportaal de productie omlaag zal gaan", "Het gebruik van het oefenportaal verstoort de relatie tussen mij en de patiënt"* and *"Het inzetten van het oefenportaal zal mijn huidige manier van werken beïnvloeden".*

Comparing the two rehabilitation centres, there are some noticeable results as well. First, there are some items that show significance in both rehabilitation centres (see appendix 4). These items belong to the NPT constructs Collective Action and Cognitive Participation and mainly focus on the lack of knowledge, training and guidance. The following significant items are similar in both rehabilitation centres:

- *"Ik heb voldoende training gehad om mij in staat te stellen het oefenportaal op een goede manier te gebruiken",*

- *“Door het inzetten van het oefenportaal verandert de werkverdeling tussen mij en mijn collega's”,*
- *“Ik weet wie er binnen mijn organisatie is aangewezen voor het coördineren van de invoering van het oefenportaal”,*
- *“Ik weet wat de mogelijkheden van het oefenportaal zijn binnen de behandeling van mijn patiënten”,*
- *“Ik ben voldoende op de hoogte gebracht van de ontwikkelingen rondom het oefenportaal in mijn organisatie”,*
- *“Ik ben voldoende op de hoogte van de inhoud van het oefenportaal om het goed toe te kunnen passen in de behandeling van mijn patiënten”,*
- *“Het is voor mij duidelijk wat er van mij verwacht wordt vanuit de organisatie m.b.t. het inzetten van het oefenportaal”.*

Also similar is that both rehabilitation centres show most significant items within the construct Collective Action (6 out of 10 within Roessingh and 11 out of 23 within Vogellanden) and mainly the component skill set workability.

There are also found differences between both rehabilitation centres. First, it is remarkable that there are way less significant items in Roessingh, compared to Vogellanden while the sample size in Vogellanden is much smaller (see appendix 4). Second, some items show significance in the one centre while they do not show significance in the other centre. For example, from first five significant items of Vogellanden, three items do not appear within the significant items of Roessingh. This is the same looking at the top five items from Roessingh, from which three do not appear in Vogellanden. Furthermore, looking at the level of constructs, within Roessingh the construct Reflexive Monitoring showed no significant items, although in Vogellanden there are three significant items from this construct.

2.2 Interviews

The barriers and facilitators raised during the interviews are divided into several themes. These themes are described below and are represented in order from most frequent to less frequent mentioned. At the end of these results there is a summarizing paragraph mentioning the most remarkable results. For an overview of all themes, see appendix 6.

2.2.1 Characteristics of the sample

The sample of the interviews included 9 respondents. The distribution of females (n=4) and males (n=5) was in proportion. See table 39 for the characteristics of the respondents. The interview with the board of directors was with both of the directors at the same time, so this interview is presented as one.

Table 39 Characteristics of respondents of the interview (n=9)

	Roessingh	*Vogellanden*
Total	7	2
Gender (n)		
Male	4 (57%)	1 (50%)
Female	3 (43%)	1 (50%)
Profession (n)		
Therapist	3 (43%)	1 (50%)
User	2	-
Non-user	1	1
Manager	1 (14%)	1 (50%)
Project leader	1 (14%)	-
Board of directors	2 (29%)	-

2.2.2 Facilitators

Beneath the facilitators conducted from the interviews are displayed, supported with quotes from respondents (R) and sometimes also questions from the interviewer (I). The facilitators are categorized by strategies and clusters of ERIC and ordered from most frequently mentioned to less frequently mentioned. Finally, the 'Alternative strategies' are added for mentioned facilitators that could not be categorized in one of the ERIC strategies. Table 40 displays an overview of all collected facilitators, categorized by ERIC cluster and strategy. Also displayed in the table is which respondent mentioned which facilitator.

Table 40 Demonstration of all codes and corresponding ERIC strategies and clusters.

ERIC cluster	**ERIC strategy**	**Facilitator**	**Respondents Roessingh**	**Respondents Vogellanden**
Train and educate stakeholders	Provide ongoing consultation	Ongoing facilitation		07
	Conduct educational meetings	Educate	02, 04, 06, 08	
	Conduct ongoing training	Keep practicing	02	
		Information up-to-date	08	
		Keep focus	01, 06	
Develop stakeholder interrelationships	Promote network weaving	Work together with other organisations	05	07
		Shared Decision Making	01	07

	Identify and prepare champions	Dedicated and enthusiastic employees	01, 06	07
	Identify early adopters	Early adopters	05	07
	Capture and share local knowledge	Learn from others	06,08	
	Recruit, designate and train for leadership	Make someone responsible	01, 02	
Use evaluative and iterative strategies	Develop a formal implementation blueprint	Flexible implementation plan	01, 04, 06	
	Obtain and use patients/consumers feedback	Added value patient	01, 02, 04, 07	
		Added value therapist	01, 06	03
		Motivation patient	02	03
		evaluation	01	03
	Stage implementation scale up	Start with small pilots		07
Change infrastructure	Mandate change	Emphasize importance	04	
		Management declare priority	01, 02	
	Obtain formal commitments	Support management	01,04	
	Change record systems	Integration REPD	02	
	Create or change credentialing and/or licensure standards	Application widely accessible		03
	Change liability laws	Obligate use	04	
		Part of protocol	01, 02, 04, 06	07
		Agreements protocol	02, 04, 06, 08	
		Formal commitments usage	01, 05	03
		Enthuse/encourage	04	07
Adapt and tailor to context Alternative strategy	Promote adaptability	Develop application to needs	01	
		Make time available	01, 02, 04, 05, 06, 08	07
		Increase user-friendliness	02, 06, 08	03
		Multidisciplinary development	01, 02, 06, 08	
		Positive attitude towards application	02	
		Aspiration patient	01	
		Satisfaction application	02	
		External publicity	01	
		Vision organisation regarding application	04, 05	
		Confidence in application	01	
		Suitability patient	02	
		Evidence technology	01	

Train and educate stakeholders

Train and educating stakeholders seems to be an important aspect in the implementation of an innovation. Respondents from both rehabilitation centres mentioned several aspects of training and education being a facilitator in the improvement in the use of the portal. The possibility of asking ongoing support from experts was stated as a facilitator by the manager of Vogellanden. Whenever therapists have questions about anything that has to deal with the usage of the portal, it is helpful they can always ask for help of an expert. This manager mentioned *"when there are questions it is important that they (referring to therapists) always can ask the experts for feedback"* (respondent 07). This is consistent with the ERIC strategy 'providing ongoing consultation' which means providing ongoing consultation with one or more experts supports implementing the innovation (Powell et al., 2015).

Increasing the knowledge of therapists seems to be important to extend the use of the portal. This can, for example, be achieved through education. This is also consistent with the ERIC strategy 'conduct educational meetings', meaning that meetings towards different stakeholders have to be held to teach them about the innovation (Powell et al., 2015). Especially employees of Roessingh point out that education can be an important facilitator (respondent 02,04,06,08). The following fragment is from one of the interviews with a therapist of Roessingh.

> *I: En hoe zou jou dat kunnen helpen om daar toch meer kennis over te krijgen of wat zou daar voor nodig zijn?*
>
> *R: "Eu… Ik denk gewoon uitleg wat je allemaal ermee kunt, wat er nu al is"* (respondent 06)

Another therapist who participated in a project about the portal before mentioned that they got positive reactions from other therapists on the information sessions they gave a while ago. See the following fragment of this therapist:

> *"En daar moet ik ook wel bij zeggen die informatie sessies die wij hebben gegeven waren ook wel, daar kwamen ook wel heel veel van die momenten voorbij van 'oooh, oh leuk. Oh dat kan dit en dat kan dat"* (respondent 08)

A manager of Roessingh mentions there are several meetings organised where employees were informed about the portal, the developments and possibilities of it. Although, a limited number of employees attended these meetings because of 'the rush of the day'. Employees had to take initiative to attend the meetings. An advice of this manager is to actively provide it to employees. According this manager, providing this information in an active way can be done several ways. For example, providing the information in team meetings. The fragment below illustrates this:

> *"Als je het actief meer actief dan nu naar de teams toebrengt dan zal het aantal wat zegt van ja ik weet het niet of ik heb er nooit van gehoord, dat zou wel afnemen, maar zolang je iets aanbiedt van je kunt daar informatie halen is mijn ervaring is dat dat maar bij een beperkt aantal mensen terecht komt"* (respondent 04)

Continuing this topic of educational meetings, therapists did also mention the importance of keep practicing with the portal and continuous training (respondents 01, 02, 06, 08). This will help to adopt and train the skills regarding the portal. This is coherent with the ERIC strategy 'conduct ongoing training' (Waltz et al., 2015). See the following quote:

"En dan is het taak dat mensen gewoon een keer een halfuur of uur nog weer kunnen oefenen met het oefenportaal dat ze weten hoe het functioneert en dat ze ook een oefenprogramma in 5 of 10 minuten neer kunnen zetten" (respondent 02)

Also a therapist of Roessingh, non-user, indicates the importance of making the portal a much-frequent item in the organisation: *"Dan moet je zorgen dat je het in ieder geval regelmatig terugkomt"* (respondent 06).

The project leader of Roessingh stated that it is important to keep attention to the use of the portal and to stimulate the maintenance. See the quote below:

"Ja, het is niet zo van nou daar hebben we het aan de praat, dat blijft wel lopen. Nee, dan moet je daar toch nog mee bezig blijven om het te onderhouden".

According to the respondents, providing this ongoing training will also help to keep the information regarding the portal up-to-date and will help to maintaining focus on the portal.

Develop stakeholder interrelationships

According to the management of Vogellanden and the board of Roessingh it can be helpful to cooperate with other organisations. The board mentions that working together with others will increase your knowledge and can finally ensure an effective innovation or practice. This is in line with the 'promote network weaving' strategy of the ERIC study, wherein working relationships and networks within and outside the organizations in order to promote information sharing etcetera is central (Powell et al., 2015). See the fragment below with a quote of the manager:

"We hebben veel contact met Roessingh. We doen het samenspel van Telerevalidatie. We werken daarin, dus we leren er ook heel veel in van elkaar. … Om ook juist die samenwerking op te zoeken en daarin van elkaar te leren. En dat blijven we ook gewoon voortzetten" (respondent 07)

Not only the cooperation with other organisations, but also the cooperation with patients can stimulate the usage. The project leaders of Roessingh and the manager of Vogellanden mentions Shared Decision Making with the patient as a possible facilitator.

Creating a group of therapists, also named champions, who will support the implementation is mentioned by the manager of Vogellanden and the project leader to contribute to the implementation of the portal. These employees are content experts who can motivate and stimulate others in the use of the portal (Powell et al., 2015). The project leader of Roessingh points out these champions should have an experimental attitude and have the courage to try thing out: *"… een beetje experimenteren en een beetje buiten de gebaande paden durven gaan…"* (respondent 01). The manager of Vogellanden mentions also that these 'frontrunners' should be content experts and should be able and like to support and market the implementation: *"…mensen hebben die daar ook wel inhoudsdeskundigen in zijn en de markt op de juiste wijze weten aan te boren en dat ook leuk vinden he"* (respondent 07). Also, a non-user (respondent 06) of the portal identifies the importance of *"selecting specific therapists*" who are interested and can function as frontrunners. This is consistent with the 'Identify and prepare champions' ERIC strategy (Waltz et al., 2015).

The board of directors of Roessingh and the manager of Vogellanden acknowledge early adopters from Rogers (2003) as a facilitator in the implementation of innovations. This is also in line with the ERIS strategy 'Identify early adopters'. Early adopters can teach the organisation about the innovation from their experiences (Powell et al., 2015). This 'trial and error' attitude seems to be important. See also the quote below of the project leader of Roessingh:

> *"Je ziet dat sommige behandelaren die vinden dat leuk en die gaan een beetje aan het stoeien en een beetje aan het experimenteren en 'kijken hoe de patiënt reageert' en dan gaan ze weer veranderen. Dat heb je eigenlijk nodig om dit goed in te zetten"* (respondent 01)

Next, learning from others about the usage of the portal was mentioned as a facilitator by therapists from Roessingh (respondents 06 and 08): An user states: *"Samen zitten en zijn er dan vragen dan kan je dat gelijk stellen met elkaar gaan oplossen"* (respondent 08). Also sharing knowledge with other teams can facilitate in the implementation of the portal. This learning from others is consistent with the 'Capture and share local knowledge' strategy from the ERIC (Waltz et al., 2015). The fragment below with this non-user of Roessingh shows this:

> *R: "Ja dat scheelt wel dat heel veel teams het al wel gebruiken, dus volgens mij kun je daar best ook wel een idee uit halen"*
>
> *I: Kijken hoe zij dat hebben gedaan?*
>
> *R: "Ja"*
>
> *I: Hoe zou je dat van een ander team dan mee kunnen nemen?*
>
> *R: "Ja.. dat moet je gewoon een keer afspreken van hoe gebruiken jullie het. Dus dat moet volgens mij wel kunnen"* (respondent 06)

Give someone, or a group, responsibility for the implementation can also be a facilitating aspect according to employees of Roessingh (respondent 01,02). The following quote illustrates this:

> *"Dus als je ook daarvoor meer een protocol maakt, van we zetten een paar personen, bijvoorbeeld uit die werkgroep of eu 'person x' he die is bij Spinzo betrokken. Die gaan we echt zeggen om dit en dat te doen en kijken of dat het verandert. Als je toch alleen richting CVA-team wil doen, dan mis je een beetje, dan zou je alleen dat team kunnen zeggen en dan zou je 'person x' een opdracht kunnen geven van eu binnen Spinzo project ga jij dus dit en dat op die manier doen"* (respondent 01).

This is coherent with the 'Recruit, designate and train for leadership' from the ERIC study (Powell et al., 2015). This includes that leaders should be trained for the change effort and therefore get responsible for a part of the implementation.

Use evaluative and iterative strategies

According to employees of Roessingh (respondents 01, 04, 06), it would be helpful to work with an implementation plan. This implementation plan includes everything that is needed to implement the innovation in an organisation or even a particular team. For example, a therapist stated it was important to know with which group to start with implementing. This

therapist also indicated *"Dat je ergens goed vastlegt van hoe je het wil gaan implementeren"* (respondent 06). This is consistent with the strategy 'Develop a formal implementation blueprint' from the ERIC study, which is to develop a implementation blueprint that includes goals and strategies (Powell et al., 2015). A manager mentioned it is important to know which amount of hours and employees are needed to implement the innovation. When he knows this, he can help in facilitating these needs. See the quote of this manager below:

> *"Nou praktisch aangereikt in de zin van dan komt een medewerker bij me die zegt van dit jaar hebben we zoveel ruimte om aandacht te geven aan eHealth of als afgeleide daarvan aan dat project of aan dat oefenportaal. Ik heb eigenlijk nog twee pionnen nodig, ik heb zoveel uur, en ik heb al met mensen gesproken en Jantje en Marietje die zou ik daar heel graag op in willen zetten. En dan zeg ik gaan we doen, gaan we kijken hoeveel uur, welke periode, gaan we formuliertje invullen, kosten plaats niveau regelen en dat betekent dat de betreffende mensen uit mijn sector de ruimte krijgen om daarin mee te denken. Dus op die manier faciliteer ik dat wel en daar achteraan kan ik dus weer informatie aanvullen"* (respondent 04)

The project leader of Roessingh pointed out the importance of a flexible implementation tool. See the fragment below:

> *I: Ja, en dat is dan lastig om mee om te gaan kan ik begrijpen. Als het op team niveau is, kun je daar heel gericht wat op doen, maar dat verschilt dus heel erg?*
>
> *R: "Ja, dat verschilt heel erg. En ook de manier hoe het ingezet wordt en wat je er mee kan en ook de manier waarop ik denk dat we zo'n team mee moeten krijgen. En volgens mij moet je misschien verschillende methodes hebben voor verschillende teams en dan weer verschillende methodes voor verschillende personen"* (respondent 01)

With both organisations it is highlighted the portal should have added value for the patients (respondent 01, 02, 04, 07). An user of Roessingh indicates the following:

> *"En kijk, dat gevoel moet gecreëerd worden bij de medewerker en de patiënt, dat het iets oplevert. Dus op tijdwinst, of dat de patiënt zich beter gehoord voel of dat patiënt meer zelf regie heeft of nouja... zo'n gevoel moet gecreëerd worden"* (respondent 02)

Also, therapists should be aware of this added value for their patients. A therapist of Roessingh stated that he used the portal for a particular patient because he knew this patient had to practice a lot, but there was a big travel distance. See below this fragment:

> *"… omdat het een poliklinisch patiënt was die eigenlijk best wel veel zou moeten oefenen, maar waarbij het reizen wel behoorlijk belastend was. En daarom hebben we daarom contact momenten hier vrij klein gehouden en hebben we hem via Telerevalidatie wel voor gezorgd dat hij dagelijks voldoende oefent"* (respondent 02)

Besides the added value for patients the added value for therapists seems to be a facilitator as well. From both organisations several employees mentioned this aspect. The project leader of Roessingh points out that the portal should make their work easier: *"Hun werk moet er makkelijker van worden".* A therapist of this same organisation mentions *"Wat voor een belang wordt erin gezien".*

Next, the motivation of a patient appears to stimulate a therapist to use the portal (respondents 02, 03). When a patient is motivated to use the portal, starting or maintaining the treatment with help of the portal will be stimulated. The following quotes illustrates this:

> *"Kijk op het moment dat een revalidant daar ook heel enthousiast over is dan kan het voor mij natuurlijk ook weer gaan prikkelen om het wel weer te gaan gebruiken of om het überhaupt te gaan gebruiken "(*respondent 03)

Employees of both organisations (respondent 01, 03) indicate that evaluation can help with implementing. A non-user of Vogellanden (respondent 03) mentioned for example it would be stimulating to know how patients experience using the portal, he advised a kind of evaluation to find out the feedback of the patient. Also, the project leader of Roessingh mentions obtaining information and feedback from patients, informal carers, therapists would be helpful. A manager of Vogellanden shares an idea for capturing and sharing this knowledge, see the quote below:

> *"… we gaan ook wel in 2019 spiegel gesprekken organiseren. Dat we met revalidanten ook vragen hoe zij dit nu ervaren hebben, dit stukje Telerevalidatie. En we gaan ook tips ophalen van 'zijn er nog andere mogelijkheden tot eHealth of tot uitbreiding daarvan wat jullie als revalidant dan ook tegemoetkomt?'. Want dan.. tenminste, wij vinden dat wel heel belangrijk om dat ook van de revalidant zelf te weten"*

The added value, motivation and evaluation of the patient can be obtained by using feedback of patients and consumers, which corresponds with the ERIC strategy 'Obtain and use patients/consumers and family feedback (Waltz et al., 2015).

Furthermore, within the ERIC strategies 'stage implementation scale up' is mentioned as an implementation strategy (Waltz et al., 2015). This corresponds with a statement the manager from Vogellanden made. She stated it can be facilitating to start with small pilots and after this gradually roll out the implementation in the organisation. See the quotes below:

> *"Dus ze zijn klein begonnen, en dat is natuurlijk de kracht he, klein beginnen en laat het dan als olievlek."*

> *"… eerst in het klein beginnen. Even een beetje op ontdekkingsreis gaan pionieren, wat is mogelijk? Dan eu... focus je op één doelgroep. In dit geval hebben we dat bij fysiotherapie en ergotherapie, van wat kunnen we daar betekenen om dan eu materiaal, filmmateriaal te maken zodat de revalidanten dat thuis kunnen doen. En hoe kunnen we dan ook de vakgroepen enthousiast maken hierin. En als dat werkt, dan gaan toch andere groepen, in dit geval RVE-kinder of tandheelkunde, hé maar dat doen ze bij jullie en wij hebben ook wel ideeën om daar iets mee te willen. En dan gebeurt het gewoon vanuit intern, van joh, de volgende stap en dan ben je ook toe aan een volgende stap"*

Change infrastructure

The help of management during the implementation and integration seems an important facilitator. A project leader of Roessingh declares support from management is needed to improve the implementation and sustainability in the use of the portal. The priority declaration of managers for the use of the portal appears to facilitate the usage. This is corresponding with the ERIC strategy 'mandate change', what includes that leaders declare

priority of the intervention and their determination to implement it (Powell et al., 2015). The interviews show this only applies for Roessingh (respondents 01, 02). The quote below from a using therapist of this organisation shows this:

> *"Ik kan me voorstellen dat als het management zegt van jongens we willen dat het oefenportaal meer gebruikt gaat worden en we willen ervoor zorgen dat er een uur beschikbaar wordt gesteld om het oefenportaal eigen te maken, maar dan willen we wel terugzien dat het ook meer gebruikt gaat worden. Dan kan ik me voorstellen dat dat wel een boost gaat geven ja"* (respondent 02)

Also, the project leader of this organisation supported this aspect as a facilitator: *"Dus ze willen eigenlijk iets meer van hoge hand, vanuit management, horen vertel me maar wat ik moet doen, want dan doe ik het wel"* (respondent 01). The interviewed manager of Roessingh indicates he can play a role in mandating the desired behaviour and emphasizing the importance, but he is not doing this at a conscious level at this moment.

This manager of Roessingh also initiated he could encourage and enthuse his employees about the portal during team meetings to support implementation and integration. He clarified this in the following quote:

> *"… Ik kan mensen wel enthousiasmeren om daarover na te denken... Dus in die zin kan ik ook wel een rol spelen, dus niet alleen maar even regelen als het al zo ver is"*

The manager of Vogellanden, who already stimulated her employees consciously, mentions encouragement as a facilitator. According to this manager this triggers the amount of usage of the portal:

> *"Want in het begin moesten we ook nog zelfs stimuleren dat ze daar gebruik van gingen maken. Dus je moet wel draagvlak creëren ook. Nu zien we dat we dat, dat al die licenties echt gebruikt worden en nu zijn we wel toe aan uitbreiding".*

It seems also important that management declare they will support the implementation (respondent 01, 04). The project leader of Roessingh mentions it is important to the commitment of management they will support the implementation. This is consistent with the ERIC strategy 'obtain formal commitments'. Which indicates that there has to be formal commitments form key partners that state how they will contribute implementing the innovation (Powell et al., 2015).

Next to this priority declaration of managers, also the obligation of the use of the portal is mentioned as a facilitator. The manager of Roessingh indicates that obligating the use of the portal can help integrating the portal in certain departments. This is in line with the ERIC strategy 'change liability laws' (Waltz et al., 2015).

The importance of integrating eHealth in the protocols and pathways of treatments is acknowledged in the majority of the interviews (respondents 01, 02, 04, 06, 07). The respondents declare this will contribute to increase the use of the portal. A therapist of Roessingh mentions integrating the portal as a subject in multidisciplinary patient discussion will contribute to the actual usage of it. Another therapist gives an example how to integrate it in clinical pathways. See the following quote:

> *"We werken natuurlijk allemaal met zorgpaden waarin feitelijk vast staat wanneer wat is, dus misschien moet je in het zorgpad wel 1 uur ergens in de een na laatste week*

ofzo, of de laatste vier weken van de behandeling moet Telerevalidatie zijn, dat weet ik niet" (respondent 06)

Managers agree on this issue. For example, a manager of Vogellanden declares the following "… *bij de behandelplanbesprekingen zou dat ook een onderwerp kunnen zijn, van gaan we deze revalidant eHealth aanbieden en waar kunnen we dan aan denken?"* (respondent 07). The manager and project leaders interviewed from Roessingh also agree. The manager indicates he following:

"Het is dus de uitdaging ook als, te vinden, dat als dat oefenportaal er is dat dat ook een integraal onderdeel wordt van het behandeltraject. Want dan kun je die uren gewoon op zorgpaden schrijven. Als het er eenmaal is, ja dan moet dat zijn weg wel vinden in behandelprogramma's" (respondent 04)

According to a large part of the respondents it is important when integrating the portal in the protocol to make formal commitments about the usage (respondents 01, 02, 03, 04, 05, 06, 08). Realizing formal commitments within an organisation can stimulate the usage of eHealth, and in this case the online portal. The board of directors, managers, project leaders and therapists all mention developing formal commitments will help integrating the portal. The quote supports the importance of formal commitments:

*"Nou kijk als men zegt van weetje 50% van onze cliënten, revalidanten die moet de oefeningen krijgen via het oefenportaal, dan hé, dan zou dat zeker helpen" (*respondent 3)

A manager of Roessingh comments one of the ways he can facilitate and stimulate the implementation and integration of the portal is to focus more on this in the annual plan. "… *maar de laatste tijd hoor ik wel wat geluiden ook uit de werkgroep dus van behandelaren zelf dat ze meer houvast willen over wat moeten we nou doen" and "Dus ik denk dat we het veel meer voor moeten kauwen van zo gaan we het inzetten en bij iedereen"* (respondent 1) are quotes of the project leader that support this facilitator.

Another aspect that can facilitate the use and make it part of the protocol is integrating it in the enrolment of a new patient. A therapist pointed out for example to integrate it within the anamnesis sheet. See the following quote:

"In zo'n anamnese formulier staat hoe het maatschappelijk leven van de patiënt eruitziet of wat de patiënt heeft gehad, welke hulpvraag de patiënt heeft, of medicijngebruik dat die heeft. Het is eigenlijk een heel dossier met reden waarom de patiënt hier komt. Hoe de patiënt functioneerde en hoe hij graag weer wil functioneren. En met bepaalde testen erin. En ik kan me voorstellen dat ergens onderin die lijst komt te staan van patiënt wel of niet geschikt voor oefenportaal" (respondent 02)

Another idea of integrating it in the enrolment of a new patient is already subscribe each new patient to the portal. The fragments beneath illustrate this idea from using therapists of organisation A: The quotes below from therapists indicate the importance:

"… maar dat je dan gelijk binnen Roessingh binnenkomt en je hebt gelijk al een portaal die je openstaat zeg maar. Dan is er geen drempel. Dan kan iedereen gelijk oefeningen of informatie klaarzetten en hupsakee. Weet je, want nu is het even kijken heeft iemand toestemming gegeven voor het portaal, dan moet je dan iemand

vinden die dat voor je kan openen die een portaal voor je kan aanmaken, dan moet je eerst wat gaan neerzetten en uitleg geven en en en en..." (respondent 8)

"Dus eigenlijk moeten mensen al een toestemmingsformulier invullen op het moment dat zij hier aangemeld worden en niet op het moment dat zij e-revalidatie nodig hebben. Dus op het begin dat zij hier gelijk toestemming voor geven, dat het een onderdeel is van het revalidatie traject en dat het kan zijn dat er een e-portaal wordt aangemaakt en dat we via mail contact met hun zoeken" (respondent 02)

Management of Roessingh indicates that the first step to implement innovations like Telerevalidatie is to introduce the innovation within a treatment group. They can decide after this introduction whether they want to include it within their treatment program. See the following fragment:

"Dat betekent dat het geïntroduceerd moet worden in een behandelteam, in een doelgroep gericht multidisciplinair team, daar is altijd een dokter aan verbonden die daar inhoudelijk verantwoordelijk voor is. … En als dat zeg maar aan een aantal voorwaarden voldoet dan kan een team besluiten om dat in een behandelprogramma op te nemen. Vervolgens, dan heet het consequenties, dan komt het in een zorgpad" (respondent 04).

Another important aspect in making it more routine care by changing the infrastructure is mentioned by one of the therapists of Roessingh (respondent 02). This therapist, user, mentions the integration of the portal in the Rehabilitation Electronic Patient Dossier (REPD) can make it easier for therapists to think about the portal. This is in line with the ERIC strategy 'change record systems' (Waltz et al., 2015).

A therapist of Vogellanden (respondent 03) stated the most important facilitator for him was to make the portal widely accessible. At this moment, not every therapist in his organisation has the authorisation to use the portal. This clearly forms a barrier in the usage of Telerevalidatie.nl. He mentions that when the portal is available for everyone, the usage will grow enormously, without many other barriers. This is consistent with the ERIC strategy 'Create or change credentialing and/or licensure standards' (Waltz et al., 2015).

Adapt and tailor to context

Developing the portal to the needs of therapists (and patients) seems to be a facilitator. This is mentioned by the project leader of Roessingh. This is corresponding with the ERIC strategy 'promote adaptability' what includes the development and tailoring of the portal to meet local needs (Powell et al., 2015). See the quote below:

"Dat hebben we in eerdere versies dus wel gehad, toen was het technisch nog niet zo goed. Nou, dan is het gelijk doei laat maar. Dan zijn ze gelijk helemaal negatief en dan is het ook heel moeilijk om ze daar weer overheen te halen. … En de doorontwikkeling gaat goed, dus er zijn iedere keer weer nieuwe mogelijkheden" (respondent 01)

Alternative strategies

Furthermore, also the aspiration of a patient to use the portal will probably stimulate the use of the portal. When patients get to know the portal, they can ask their therapist if they can participate. Through this, the patient can increase their self-reliance. This is mentioned by the project leader of Roessingh and the manager of Vogellanden as a facilitator.

Alongside the lack of time being mentioned in literature as an important barrier, the availability of time seems to be an important facilitator as well. The large majority of the respondents mentioned time as a facilitator in the use of the portal (respondents 01, 02, 04, 05, 06, 07, 08). Having the time to get to know the program and assimilate it are frequently mentioned facilitators. A therapist and user of the portal indicates the following fragment:

> *"Nou ja, weet je wat ik fijn vind is eu, wij krijgen van de momenten dat je een patiënt in het portaal hebt staan, dan krijg je een half uur EHE-tijd, dan kun je een half uur door de planning laten inplannen om eum, om het programma klaar te zetten, of om op de hoogte te blijven of een beetje te finetunen zeg maar"* (respondent 08)

Another therapist indicates there should be more time available to integrate the portal in the daily use of a therapist. The following quote of this therapist illustrates this:

> *"Ik kan me voorstellen dat als het management zegt van jongens we willen dat het oefenportaal meer gebruikt gaat worden en we willen ervoor zorgen dat er een uur beschikbaar wordt gesteld om het oefenportaal eigen te maken, maar dan willen we wel terugzien dat het ook meer gebruikt gaat worden. Dan kan ik me voorstellen dat dat wel een boost gaat geven ja"* (respondent 02)

Also, at the level of management time is mentioned as facilitator. Managers and the project leader think therapists need time to prepare the usage of the portal and this time should be arranged: '*tijd moeten hebben om eHealth voor te bereiden'* (respondent 01) and *´er moet tijd voor worden ingericht'* (respondent 04). Alongside, a manager of Roessingh declares he does not know how this is executed at this moment. See the following quote:

> *I: Dus daar zijn nog geen duidelijke afspraken over gemaakt?*
> *R: "Nee, nogmaals, er zullen.. en daar heb ik niet helemaal zicht op, daar ben ik eerlijk in eu... in onze sector speelt dat denk ik minder, maar er zullen groepen zijn waar dat misschien al wat verder wel ingeregeld is..."* (respondent 04)

The fragment below belongs to the project leader of Roessingh:

> *"Dan kun je denk ik heel erg inzoomen naar een planning per week of per weken, of per maand of per dag. En daar staat dan in instructie eHealth of dat een behandelaar tijd heeft om eHealth voor te bereiden, want daar hebben ze wel wat tijd voor nodig om te kijken wat de patiënt met het portaal heeft gedaan of om oefeningen klaar te zetten, dus dat moet ingepland worden"* (respondent 01)

Also, the board of directors of Roessingh mention that to succeed the integration of an innovation time is needed for example for therapist to experiment with the innovation.

Besides having time to get to know the portal, to learn which possibilities it has and to have time set to prepare the portal for patients, it is also important therapist can prepare the portal in a short time. See the following quote:

> *"… je moet wel binnen 5 of 10 minuten zo'n programma klaar moet hebben"* (respondent 02)

User-friendliness of the portal is mentioned as a facilitator in the usage of the portal. Users and non-users (respondents 02, 03, 06, 08) both indicate that the ease of use of the portal is an important aspect to increase the use and maintain the use of it. A therapist said that it is important to ensure the ease of use of the portal, the following is a quote:

“Aan de andere kant denk ik weleens qua Telerevalidatie, dat digitaal en of afstand Social Media achtig, dat is denk ik wel voor een heel groot deel de toekomst waar we mee te maken krijgen, dus dat ook een reden kunnen zijn, waarom wel iedereen het moet doen, maar dan moet je ook zorgen dat mensen het goed kunnen gebruiken denk ik. Dus dan moet het ook over het algemeen gebruiksvriendelijk zijn, laagdrempelig, eu makkelijk te gebruiken” (respondent 06)

Furthermore, the project leader of Roessingh mentions that evidence supporting the effectiveness of the technology is important for several groups in the organisation. They first want to see scientific evidence, before they will integrate innovations in to their treatments.

A therapist and user of the portal (respondent 02*)* states when therapist like to work with the portal and they are satisfied in the use, they appear to be stimulated to increase or maintain their use. Furthermore, according to the project leader of Roessingh (respondent 01) also having confidence in the portal will increase the use.

It is also stimulating if other teams also use the innovation. When a patient already uses the program with another therapists or another discipline within his or her treatment it makes is easier to use it as well and it is stimulating (respondents 01, 02, 06, 08). See the fragment below:

“Eigenlijk wil je meer een integraal of een module of een hele behandelformat voor alle disciplines. Dus daar moeten we ook eigenlijk meer naar toe. Dat er niet alleen op discipline niveau naar die inhoud wordt gekeken, maar vooral ook op team niveau. Van wat heeft die behandeling in dat team nodig in het portaal en hoe kunnen we dat dan inzetten” (respondent 01)

In using the portal, it can be stimulating if a patient is ‘suitable’ for it. A therapist, user of the portal, declares when a patient has connection with computers for example, he will get triggered to think about the use of the portal. See the fragment below of this therapist:

“Daarna heb ik het twee keer gebruikt omdat er toen sprake was van een poliklinische patiënt die veel met computers deed en we het er in het team over hebben gehad dat ‘Tele’ voor die patiënt wel heel geschikt zou zijn” (respondent 02)

According to the board of directors of Roessingh (respondent 05), the suitability of a patient should not only be based on his or her connection with ICT but should also focus on their attitude towards eHealth.

Finally, external publicity and the positive expression of the organizations vision towards the portal were mentioned as facilitation aspects. The project leader of Roessingh (respondent 01) indicates that demonstrating products, like the portal, towards other organizations and public can affect and stimulate the change of the desired behaviour. According to employees of organization A (respondents 04, 05), by doing this the vision against innovations like the portal being a key message of the organization can be demonstrated. They hope this will affect the behaviour of therapists as well.

Summary results interviews

This summary of the results of the interviews will expose the most remarkable and noticeable results. Like described before, the mentioned facilitators are categorized in strategies from ERIC and these strategies fall within clusters. To begin, there are facilitators that were mentioned by employees of both organisations and by most of the respondents. These facilitators and ERIC strategies therefore seem to be important in the general implementation process in rehabilitation centres. The cluster train and educate stakeholders includes facilitators mentioned by most of the respondents including therapists, project leader and managers. Noticeable is that this are mostly respondents of Roessingh. This cluster includes three strategies; provide ongoing consultation, conduct educational meetings and conduct ongoing training. The ERIC strategies conduct educational meetings and conduct ongoing training seem important in Roessingh. Management, project leaders and also therapists agree with this. In Vogellanden the strategy *provide ongoing consultation* was mentioned as important by a manager of this organisation. The other two strategies were not mentioned by Vogellanden.

Next, the cluster *develop stakeholder interrelationships* was also mentioned by the majority of the respondents of both rehabilitation centres. This cluster contains six strategies. There is no strategy that stand out as more important than others, because they are all mentioned by almost the same amount of people. It is remarkable that non-therapists (managers and board of directors) mention *promote network weaving* and *identify early adopters* as facilitating, while therapists did not mention these strategies. The manager of Vogellanden and therapists of Roessingh noticed many of the strategies included in this cluster. The manager of Roessingh did not mention any of these strategies.

Next, *use evaluative and iterative strategies* and *change infrastructure* were mentioned by most of the respondents. Within this first cluster, mainly the strategies *develop a formal implementation blueprint* and *obtain and use patients and consumers feedback* seem to be important based on the number of times this is mentioned. Developing an implementation blueprint is only mentioned by respondents of Roessingh at different levels. Strategies corresponding with using patients and consumer's feedback is noticed by respondents of both rehabilitation centres and at different levels as well. Within the cluster change infrastructure the strategy *change liability laws* includes facilitators that are mentioned frequently. The facilitators corresponding with this strategy are mentioned by respondents of multiple levels of both organisations. Therefore, this seems to be a facilitator for rehabilitation centres in general.

Adapt and tailor to context includes only one strategy and one facilitator in this research. The ERIC strategy is *promote adaptability*. The facilitator develop application to needs corresponds with this strategy. It is only mentioned by one employee of Roessingh.

Finally, there are described several alternative facilitators. These facilitators could not be categorized within one of the ERIC strategies and clusters but are not less important because of this. Mainly the facilitators make time available, increase user-friendliness and multidisciplinary development seem to be important in the implementation process. The first is mentioned by employees of both rehabilitation centres and at different levels in the organisations. The second is only mentioned by therapists of both rehabilitation centres.

Because the aim of the interviews was to discover facilitators, the part of the barriers is not described in detail in the result section. For a detailed description of these barriers, see appendix 5.

3. Discussion

The aim of this study was to investigate how the implementation of telerehabilitation could be improved to increase the chance of making it routine care at rehabilitation centres. Hereby the differences and similarities between different rehabilitation centres were considered. This study focused on the telerehabilitation application Telerevalidatie.nl. First, a questionnaire based on the Normalisation Process Theory (NPT) was conducted to collect barriers found important in the centres included in this study, Roessingh Centrum voor Revalidatie and Vogellanden. Therapists of both rehabilitation centres were asked to fill in this questionnaire. Next, to support, comprehend and challenge the information gathered by the questionnaire, an interview was conducted with several employees (therapists, managers, board of directors) of both rehabilitation centres. The second and main aim of this interview was to gather information about solutions for barriers found and facilitators to support the implementation.

With regard to barriers in the implementation of Telerevalidatie.nl, several barriers show to be important in both investigated rehabilitation centres. These barriers mainly focus on the lack of knowledge, training and guidance. This is in line with literature showing similar barriers like lack of skills, lack of guidance and lack of communication (Skubic & Rantz, 2016; van Gemert-Pijnen et al., 2011; WHO, 2017). The barriers found similar in both centres belong to the NPT constructs Collective Action and Cognitive Participation. Collective action refers to the effort individuals and organisations should do to execute the innovation and Cognitive Participation refers to processes individuals and organisations have to go through to accept individuals to use the innovation (Finch et al., 2012). Also, both rehabilitation centres show the most significant results in the construct Collective Action, mainly within the component skill set workability. This component offers insight and understanding of what work has to be done to achieve the goal of actually embedding the innovation into practice (Brún et al., 2016). This is also in line with the literature of Skubic & Rantz (2016), van Gemert-Pijnen et al., (2011) and World Health Organization (2017) about the lack of skills, training and guidance. It seems important in the implementation of telerehabilitation in rehabilitation centres in general to perform strategies that challenge barriers in this area. A study of McEvoy et al., (2014) reviewed that in multiple studies Collective Action was established by emphasizing on organizational resources, training, confidence and the workability of the intervention in clinical practice. To summarize, there seem to be organisational generic barriers occurring in rehabilitation centres. These barriers seem to appear in the area of lack of skills, training and guidance in an organisation. However, there are also barriers not found generically important in both investigated rehabilitation centres, while literature shows evidence for these barriers. For example, not seeing the added value of telerehabilitation because of a lack of evidence about the actual effects is in literature indicated as a barrier in the implementation (Jansen, 2014; van Gemert-Pijnen et al., 2018). However, in both rehabilitation centres this is not mentioned as a barrier. This also applies to the lack of time for implementing an innovation.

Both investigated centres also show differences in the barriers found. For example, within Vogellanden all constructs of the NPT show some significant results, but within Roessingh the construct Reflexive Monitoring shows no significant items. With Vogellanden, next to Collective Action there is one other construct that seems to be important due to striking more significant items compared to the other constructs, this is Cognitive Participation. In a study of Coupe. et al., (2014) Cognitive Participation was established by creating relationships needed to work with the new intervention. In order to achieve this,

supervisor sessions were well-structured and weekly scheduled. To continue, Roessingh demonstrates way less significant items compared with Vogellanden, which may imply that there are more important barriers to deal with when implementing telerehabilitation in Vogellanden compared to Roessingh. Nevertheless, it is difficult to explain these specific differences only with help of the found barriers. Looking at the items that differ in the centres, there are no specific constructs or components that stand out. There are no clear similarities of patterns visible between the items. Therefore, it is for example, possible that both rehabilitation centres are in different phases of the implementation process and this leads to the differences established. This is consistent with literature showing that different barriers occur within the different phases of implementation (Bertram, Blase, & Fixsen, 2015; Powell et al., 2017). Literature also shows that the characteristics of an organization, like size and top-down or bottom-up vision and leadership, can have an effect at the implementation process (Berg, 2010; Lacerenza, Reyes, Marlow, & Joseph, 2017; Vijayasarathy & Butler, 2016). The differences presented are interesting, but this study does not establish their origin. Further research is recommended to investigate these differences. Concluding, depending on several factors like in which phase an organisation is within the implementation process, different barriers can play an important role. So, alongside organisation generic strategies, also organisation specific strategies are necessary to embed telerehabilitation successfully. An important aspect to this is to constantly investigate which barriers are occurring in a specific phase of the implementation to meet the specific needs. Therefore an formative evaluation can be employed, which ensures that ongoing information is collected on how to improve the process (van Gemert-Pijnen et al., 2018). This makes it a continuous and dynamic process.

Also, in this study, facilitators were collected to find solutions for the barriers mentioned and which could support the implementation of the portal. The facilitators that were found were categorized with help of the clusters and strategies of the Expert Recommendations for Implementing Change (ERIC) study (Waltz et al., 2014). Some strategies and clusters of ERIC were found to be more important than others and also here there seem to be differences and similarities between both centres. For example, four clusters; develop stakeholder interrelationships, train and educate stakeholders, change infrastructure and use evaluative and iterative strategies show strategies respondents mentioned as important. Nevertheless, for each cluster and corresponding strategies it differs whether therapists, managers, the project leader, the board of directors or all of them mentioned the facilitators as important in the implementation. The strategies mentioned by both organisations and at different levels, and therefore seem important for the implementation of telerehabilitation at rehabilitation centres in general, are obtain and use patients/consumers feedback, change liability laws and make time available. The last two are in line with literature about organizational support being an important facilitator (Ariens et al., 2017). Also, the strategy changing liability laws is in line with the barrier lack of guidance found in literature and in this study. The strategies about making time available and patient/consumers feedback are in line with literature found about barriers for implementation, however it is remarkable that they are not in line with barriers found important in this study. To summarize, there seem to be organization generic implementation strategies (one-size-fits-all strategies) which are important in the implementation of telerehabilitation in rehabilitation centres.

Some strategies are only mentioned by respondents of Roessingh, and therefore seem to be organisation specific important facilitators for this organisation. Within Roessingh, these strategies are conduct educational meetings, conduct ongoing training,

develop a formal implementation blueprint and develop application to needs. This is coherent with the found literature about guidance and provision of training and education (Jafni et al., 2017; Kairy et al., 2014; van den Wijngaart et al., 2018). Literature shows training and education about effectiveness, data security, types and benefits of telerehabilitation can increase the use of it (Hennemann, Beutel, & Zwerenz, 2017). Looking at these facilitators, they are also in line with the barriers found important within this organisation, about a lack of skills, training and guidance. However, it is remarkable that even though these barriers were also found important in Vogellanden, this organisation does not mention the same facilitators. Also, based on personal observation employees of Vogellanden did not focus on training and guidance as strategies to improve the implementation. Again, it is possible these differences occur due to organizational differences, like the implementation phase, size ,vision and leadership of an organization (Berg, 2010; Bertram et al., 2015; Lacerenza et al., 2017; Powell et al., 2017; Vijayasarathy & Butler, 2016). Furthermore, one strategy is only mentioned with a respondent of Vogellanden, and therefore seem to be an organisation specific important facilitator for this organisation. These strategy is provide ongoing consultation, which is also in line with the literature about guidance (Kairy et al., 2014).

Furthermore, this study also showed the discrepancy between different levels of the organisations: therapists, managers, project leaders and board of directors. Some facilitators were, for example, only mentioned by therapists and other were only mentioned by managers. Example given, non-therapists mentioned promote network weaving and identify early adopters as facilitators, while therapists did not mention these facilitators. In turn, therapists mentioned increase user-friendliness as facilitator, while this was not mentioned with non-therapists. Also based on personal observation the differences between therapists and non-therapist concerning the user-friendliness were clearly emphasised. Differences in vision towards telerehabilitation for example can explain these differences (Berg, 2010; Lacerenza et al., 2017; Vijayasarathy & Butler, 2016). To clarify these differences, further research is needed. The results show that during an implementation process it is important to involve all levels of the organisation and find what is necessary at each level to effectively implement telerehabilitation applications. This is coherent with literature showing implementation can be more successful when is clarified who should enact a certain strategy and for what purpose (Leeman, Birken, Powell, Rohweder, & Shea, 2017). This will assist users establishing strategies that match their needs the best.

This seems to conclude that there are similarities, but also differences looking at facilitators that can stimulate the implementation of telerehabilitation. These similarities and differences occur between organisations, but also between different levels of organisations. Therefore, organisation generic, but also organisation specific implementation strategies and even strategies directed at specific levels of an organisation can facilitate in a successful implementation.

Limitations of the study

There are some limitations in this study which should be considered in further research. First, the study conducted is cross sectional, what means associations that were found between adoption of non-users and users and barriers may not indicate causality. This design made it impossible to assess variables over time. So, for further research executing a longitudinal research would improve the outcomes in finding barriers and facilitators. Also, this study is limited to perceptions of therapist and other health care professionals, not on

observations of the researcher. So, in further research mixed-methods approach should also include observations to find more objective information.

Second, there are limitations within the measurement's instruments used in this study. The study showed using the NPT as a tool has benefit for examining different implementation practices. The NPT helped to structure the data and to highlight the most important factors required by implementing a complex innovation. Some of the findings fell outside or were not included within the NPT framework. This is a common thing, because the NPT is clearly not a theory of everything (McEvoy et al., 2014). The same applies to the ERIC study. Some facilitators found could not be categorized within one of the ERIC clusters and where therefore categorized as alternative strategies. Another limitation of the questionnaire is the ambiguity of some items. These items are: *"Het inzetten van het oefenportaal zal mijn huidige manier van werken beïnvloeden",* and *"Door het inzetten van het oefenportaal verandert de werkverdeling tussen mij en mijn collega's".* Within this study these items are perceived as barriers, but there can also be perceived as facilitators. This ambiguity of some items threatens the validity of the questionnaire. However, this can be easily solved by redefining these items more clearly as positive or negative consequences. Furthermore, it must be noticed that the NPT construct Collective Action consists of many more items within the questionnaire compared to the other constructs. This can bias the effect in overestimating the importance of this construct due to a higher likelihood of observing significant effects. Finally, in this study there is conducted an intercorrelation between the significant items of the same construct. These results showed some items did not have an intercorrelation, what means they cannot be considered as one. When looking at strategies for these items, it is important to develop strategies that focus original on the item self, and not on multiple of these items.

Third, there are limitations within the sample of the study. Only two rehabilitation centres were included during the research, what makes it difficult to generate conclusions about the organisation generic aspects of this study. The two included centres both have a positive and innovative attitude based on personal observation. This might have an impact on the implementation process in a way that these centres already have an advantage when starting the implementation process over other rehabilitation centres with a less positive and innovative attitude and vision. This makes it complex to draw conclusion about these organisations. Including more rehabilitation centres with different attitudes and perspectives can easily solve this problem. Looking at the number of users and non-users within the questionnaire, there are significant more non-users compared to users within Vogellanden, what can affect the reliability of the study. Furthermore, in the interviews only two employees of Vogellanden are interviewed and within the whole therapist group only physiotherapists are interviewed. Nevertheless, the results are expected to be similar when a larger sample will be established and the saturation will not increase when more employees of both organisations, therapists with different professions and other organisation will be interviewed.

Finally, looking at the data analysis there are some limitations in this study. To begin, there was no correction for the number of t-tests conducted. Through this, there was no correction for multiple comparisons and there is a chance that significant differences in barriers between non-users and users are based on coincidence. Another limitation within the data analysis concerns the coding of the interviews. The coding is conducted by two researchers at the same time what makes there cannot be established an intercoder-reliability.

Conclusion

Overall, the study demonstrated the utility of exploring implementation factors and processes at organisational specific and generic level. The findings provide insight into the importance of manifesting organization specific implementation strategies when improving the implementation of complex innovations. Both investigated rehabilitation centres require different strategies to deal with the specific barriers within these organisations. The implementation of telerehabilitation should be dynamic and flexible to fit the different needs of organisations and the employees of these organisation. However, together with these organisation specific strategies, there also seem to be organisation generic strategies which can be used for the successful implementation of telerehabilitation. Furthermore, within these organisation specific strategies there should be a focus on the different levels of the organisation, for example directed at therapist, managers or both. Also the characteristics of an organization, like size and top-down or bottom-up vision and leadership, can have an effect at the implementation process. Therefore, this research showed the importance of the development of a flexible implementation tool which is able to adapt all the differences and similarities in organisations.

References

Anderson, J. G. (2007). Social, ethical and legal barriers to E-health. *International Journal of Medical Informatics*. https://doi.org/10.1016/j.ijmedinf.2006.09.016

Andreassen, H. K., Kjekshus, L. E., & Tjora, A. (2015). Survival of the project: A case study of ICT innovation in health care. *Social Science and Medicine*, *132*, 62–69. https://doi.org/10.1016/j.socscimed.2015.03.016

Ariens, L. F. M., Schussler-Raymakers, F. M. L., Frima, C., Flinterman, A., Hamminga, E., Arents, B. W. M., … Os-Medendorp, H. van. (2017). Barriers and facilitators to ehealth use in daily practice: Perspectives of patients and professionals in dermatology. *Journal of Medical Internet Research*. https://doi.org/10.2196/jmir.7512

Ations, M. O. C., Aver, K. A. T. E. E. L., Rotty, M. A. C., & Ameron, I. A. N. D. C. (2018). Rehabilitation in dementia care, (November 2017), 171–174. https://doi.org/10.1093/ageing/afx173

Baker, R., Camosso-Stefinovic, J., Gillies, C., Shaw, E. J., Cheater, F., Flottorp, S., … Jäger, C. (2015). Tailored interventions to address determinants of practice (Review) SUMMARY OF FINDINGS FOR THE MAIN COMPARISON. *Cochrane Database of Systematic Reviews*, (4), 1–118. https://doi.org/10.1002/14651858.CD005470.pub3.www.cochranelibrary.com

Berg, M. (2010). Implementing information systems in health care organizations, *64*, 143–156. https://doi.org/10.4324/9780203563298.ch9

Bertram, R. M., Blase, K. A., & Fixsen, D. L. (2015). Improving Programs and Outcomes: Implementation Frameworks and Organization Change. *Research on Social Work Practice*, *25*(4), 477–487. https://doi.org/10.1177/1049731514537687

Bishop, F. L. (2015). Using mixed methods research designs in health psychology: An illustrated discussion from a pragmatist perspective. In *British Journal of Health Psychology*. https://doi.org/10.1109/ICUMT.2014.7002129

Boyd, M. R., Powell, B. J., Endicott, D., & Lewis, C. C. (2018). A Method for Tracking Implementation Strategies: An Exemplar Implementing Measurement-Based Care in Community Behavioral Health Clinics. *Behavior Therapy*, *49*(4), 525–537. https://doi.org/10.1016/j.beth.2017.11.012

Brún, T. De, Brún, M. O. R., Donnell, C. A. O., & Macfarlane, A. (2016). Learning from doing : the case for combining normalisation process theory and participatory learning and action research methodology for primary healthcare implementation research. *BMC Health Services Research*, 1–12. https://doi.org/10.1186/s12913-016-1587-z

Calabrò, R. S., Bramanti, A., Garzon, M., Celesti, A., Russo, M., Portaro, S., … Bramanti, P. (2018). Telerehabilitation in individuals with severe acquired brain injury. *Medicine*, *97*(50), e13292. https://doi.org/10.1097/MD.0000000000013292

Calvaresi, D., Schumacher, M., Marinoni, M., Hilfiker, R., Dragoni, A. F., & Buttazzo, G. (2017). Agent-based systems for telerehabilitation: strengths, limitations and future challenges. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *10685 LNAI*, 3–24. https://doi.org/10.1007/978-3-319-70887-4_1

Carey, M., Noble, N., Mansfield, E., Waller, A., Henskens, F., & Sanson-Fisher, R. (2015). The role of ehealth in optimizing preventive care in the primary care setting. *Journal of Medical Internet Research*. https://doi.org/10.2196/jmir.3817

Coupe., C.-G., Anderson, E., Gask, L., Sykes, P., Coupe, N., Richards, D. A., & Chew-Graham, C. (2014). Facilitating professional liaison in collaborative care for depression

in UK primary care; a qualitative study utilising normalisation process theory. *BMC Family Practice*, *15*, 78. Retrieved from http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=24885746%5Cnhttp://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed12&NEWS=N&AN=24885746

Dubois, M.-F., Saey, D., Marquis, N., Tousignant, M., & Larivée, P. (2015). In-Home Pulmonary Telerehabilitation for Patients with Chronic Obstructive Pulmonary Disease: A Pre-experimental Study on Effectiveness, Satisfaction, and Adherence. *Telemedicine and E-Health*, *21*(11), 870–879. https://doi.org/10.1089/tmj.2014.0198

Finch, T., Girling, M., May, C. R., Mair, F. S., Murray, E., Treweek, S., … Rapley, T. (2015). Nomad: Implementation measure based on Normalization Process Theory. [Measurement instrument].

Finch, T. L., Mair, F. S., Odonnell, C., Murray, E., & May, C. R. (2012). From theory to "measurement" in complex interventions: Methodological lessons from the development of an e-health normalisation instrument. *BMC Medical Research Methodology*, *12*, 1–16. https://doi.org/10.1186/1471-2288-12-69

Fleuren, M. A. H., Paulussen, T. G. W. M., Van Dommelen, P., & Van Buuren, S. (2012). Meetinstriment voor Determinanten van Innovaties (MIDI). *Leiden: TNO*. https://doi.org/10.1093/intqhc/mzu060

Frederix, I., Hansen, D., Coninx, K., Vandervoort, P., Vandijck, D., Hens, N., … Dendale, P. (2015). Effect of comprehensive cardiac telerehabilitation on one-year cardiovascular rehospitalization rate, medical costs and quality of life: A cost-effectiveness analysis. *European Journal of Preventive Cardiology*, *23*(7), 674–682. https://doi.org/10.1177/2047487315602257

Hennemann, S., Beutel, M. E., & Zwerenz, R. (2017). Ready for eHealth? Health Professionals' Acceptance and Adoption of eHealth Interventions in Inpatient Routine Care. *Journal of Health Communication*, *22*(3), 274–284. https://doi.org/10.1080/10810730.2017.1284286

Hoaas, H., Andreassen, H. K., Lien, L. A., Hjalmarsen, A., & Zanaboni, P. (2016). Adherence and factors affecting satisfaction in long-term telerehabilitation for patients with chronic obstructive pulmonary disease: A mixed methods study eHealth/ telehealth/ mobile health systems. *BMC Medical Informatics and Decision Making*, *16*(1), 1–14. https://doi.org/10.1186/s12911-016-0264-9

Hwang, R., Morris, N. R., Mandrusiak, A., Bruning, J., Peters, R., Korczyk, D., & Russell, T. (2018). Cost-Utility Analysis of Home-based Telerehabilitation Compared with Centre-based Rehabilitation in Patients with Heart Failure. *Heart Lung and Circulation*. https://doi.org/10.1016/j.hlc.2018.11.010

Jafni, T. I., Bahari, M., Ismail, W., & Radman, A. (2017). Understanding the Implementation of Telerehabilitation at Pre-Implementation Stage: A Systematic Literature Review. *Procedia Computer Science*, *124*, 452–460. https://doi.org/10.1016/j.procs.2017.12.177

Jansen, S. (2014). *The added value of telemedicine services for physical rehabilitation*.

Kairy, D., Lehoux, P., & Vincent, C. (2014). Exploring routine use of telemedicine through a case study in rehabilitation. *Revista Panamericana De Salud Publica-Pan American Journal of Public Health*, *35*(5–6), 337–344. https://doi.org/http://dx.doi.org.ezproxy.library.uq.edu.au/S1020-49892014000500004

Kairy, D., Poissant, L., Rushton, P., Fillion, B., Messier, F., Vincent, C., … Ieee. (2017). Telerehabilitation Implementation and Routine Clinical Use : Preliminary Findings from a Case Study Across Three Rehabilitation Centers. *2017 International Conference on*

Virtual Rehabilitation, 8–9.
Kaljouw, M., & van Vliet, K. (2015). Naar nieuwe zorg en zorgberoepen: de contouren. *Minsterie van Volksgezondheid, Welzijn En Sport*, 74. Retrieved from http://www.rijksoverheid.nl/documenten-en-publicaties/rapporten/2015/04/10/naar-nieuwe-zorg-en-zorgberoepen-de-contouren.html
Lacerenza, C. N., Reyes, D. L., Marlow, S. L., & Joseph, D. L. (2017). Leadership Training Design , Delivery , and Implementation : A Meta-Analysis, *102*(12), 1686–1718.
Laurant, L. M. G. H. M. (n.d.). *Samenwerken aan Duurzame Zorg*.
Leeman, J., Birken, S. A., Powell, B. J., Rohweder, C., & Shea, C. M. (2017). Beyond "implementation strategies": Classifying the full range of strategies used in implementation science and practice. *Implementation Science*, *12*(1), 1–9. https://doi.org/10.1186/s13012-017-0657-x
Levy, C. E., Silverman, E., Jia, H., Geiss, M., & Omura, D. (2015). Effects of physical therapy delivery via home video telerehabilitation on functional and health-related quality of life outcomes. *Journal of Rehabilitation Research and Development*, *52*(3), 361–370. https://doi.org/10.1682/JRRD.2014.10.0239
Liu, L., Cruz, A. M., Rincon, A. R., Buttar, V., Ranson, Q., & Goertzen, D. (2014). What factors determine therapists ' acceptance of new technologies for rehabilitation – a study using the Unified Theory of Acceptance and Use of Technology (UTAUT), 1–9. https://doi.org/10.3109/09638288.2014.923529
Mair, F. S., May, C., O'Donnell, C., Finch, T., Sullivan, F., & Murray, E. (2012). Factors that promote or inhibit the implementation of e-health systems: an explanatory systematic review. *Bulletin of the World Health Organization*. https://doi.org/10.2471/BLT.11.099424
May, C., & Finch, T. (2009). Implementing, embedding, and integrating practices: An outline of normalization process theory. *Sociology*, *43*(3), 535–554. https://doi.org/10.1177/0038038509103208
McEvoy, R., Ballini, L., Maltoni, S., O'Donnell, C. A., Mair, F. S., & MacFarlane, A. (2014). A qualitative systematic review of studies using the normalization process theory to research implementation processes. *Implementation Science*. https://doi.org/10.1186/1748-5908-9-2
Powell, B. J., Beidas, R. S., Lewis, C. C., Aarons, G. A., McMillen, J. C., Proctor, E. K., & Mandell, D. S. (2017). Methods to Improve the Selection and Tailoring of Implementation Strategies. *The Journal of Behavioral Health Services & Research*, *44(2)*, 177–194.
Powell, B. J., Waltz, T. J., Chinman, M. J., Damschroder, L. J., Smith, J. L., Matthieu, M. M., … Kirchner, J. A. E. (2015). A refined compilation of implementation strategies: Results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation Science*, *10*(1), 1–14. https://doi.org/10.1186/s13012-015-0209-1
Proctor, E. K., Powell, B. J., & McMillen, J. C. (2013). Implementation strategies: Recommendations for specifying and reporting. *Implementation Science*, *8*(1), 1–11. https://doi.org/10.1186/1748-5908-8-139
Reinwand, D., Kuhlmann, T., Wienert, J., De Vries, H., & Lippke, S. (2013). Designing a theory-and evidence-based tailored eHealth rehabilitation aftercare program in Germany and the Netherlands: Study protocol. *BMC Public Health*, *13*(1), 1–10. https://doi.org/10.1186/1471-2458-13-1081
Revalidatie Nederland. (2015). Zichtbaar, innovatief en patiëntgericht. Strategisch beleidsplan 2015-2019.

Revalidatie Nederland. (2017). Revalidatie in 2030. Hoe revalideren patiënten in de toekomst?

Roessingh Research and Development. (2014). Tele-Nu! Retrieved from http://www.tele-nu.nl/

Rogers, E. (2003). *Diffusion of Innovation, 5th ed.,*. *Visual Cognition*. https://doi.org/10.1080/13506285.2017.1297339

Ross, J., Stevenson, F., Lau, R., & Murray, E. (2016). Factors that influence the implementation of e-health: A systematic review of systematic reviews (an update). *Implementation Science*, *11*(1), 1–12. https://doi.org/10.1186/s13012-016-0510-7

Rubeis, G., Schochow, M., & Steger, F. (2018). Patient Autonomy and Quality of Care in Telehealthcare. *Science and Engineering Ethics*, *24*(1), 93–107. https://doi.org/10.1007/s11948-017-9885-3

Saner, H., & Van Der Velde, E. (2016). EHealth in cardiovascular medicine: A clinical update. *European Journal of Preventive Cardiology*, *23*(2_suppl), 5–12. https://doi.org/10.1177/2047487316670256

Skubic, M., & Rantz, M. J. (2016). *Tigerplace*. *Handbook of Smart Homes, Health Care and Well-Being*. https://doi.org/10.1007/978-3-319-01583-5_37

Tazzyman, A., Ferguson, J., Hillier, C., Boyd, A., Tredinnick-rowe, J., Archer, J., … Walshe, K. (2017). The implementation of medical revalidation : an assessment using normalisation process theory, 1–14. https://doi.org/10.1186/s12913-017-2710-5

Telerevalidatie.nl. (n.d.). Telerevalidatie.nl. Retrieved November 29, 2018, from https://www.telerevalidatie.nl

van den Wijngaart, L. S., Geense, W. W., Boehmer, A. L., Brouwer, M. L., Hugen, C. A., van Ewijk, B. E., … Merkus, P. J. (2018). Barriers and Facilitators When Implementing Web-Based Disease Monitoring and Management as a Substitution for Regular Outpatient Care in Pediatric Asthma: Qualitative Survey Study. *Journal of Medical Internet Research*. https://doi.org/10.2196/jmir.9245

van Gemert-Pijnen, J. E. W. C., Nijland, N., van Limburg, M., Ossebaard, H. C., Kelders, S. M., Eysenbach, G., & Seydel, E. R. (2011). A holistic framework to improve the uptake and impact of eHealth technologies. *Journal of Medical Internet Research*. https://doi.org/10.2196/jmir.1672

van Gemert-Pijnen, L., Kelders, S. M., Kip, H., & Sanderman, R. (2018). *eHealth Research, Theory and Development*. *eHealth Research, Theory and Development*. https://doi.org/10.4324/9781315385907

Varsi, C. (2016). *Implementation of eHealth patient–provider communication tools into routine practice Facilitators and barriers from the perspectives of patients, middle managers and health care providers*. Retrieved from https://www.duo.uio.no/bitstream/handle/10852/53265/Cecilie-Varsi-2016-PhD.pdf?sequence=1

Vijayasarathy, L. R., & Butler, C. W. (2016). Choice of Software Developments Methodologies: Do organizational, project, and team characteristics matter? *IEEE Software*. Retrieved from http://ci.nii.ac.jp/naid/110008908509/

Waltz, T. J., Powell, B. J., Chinman, M. J., Smith, J. L., Matthieu, M. M., Proctor, E. K., … Kirchner, J. A. E. (2014). Expert recommendations for implementing change (ERIC): Protocol for a mixed methods study. *Implementation Science*, *9*(1), 1–12. https://doi.org/10.1186/1748-5908-9-39

Waltz, T. J., Powell, B. J., Matthieu, M. M., Damschroder, L. J., Chinman, M. J., Smith, J. L., … Kirchner, J. A. E. (2015). Use of concept mapping to characterize relationships

among implementation strategies and assess their feasibility and importance: Results from the Expert Recommendations for Implementing Change (ERIC) study. *Implementation Science*, *10*(1), 1–8. https://doi.org/10.1186/s13012-015-0295-0

Wan Ismail, W. K., Jahanbakhsh, M., Mokhtari, H., Ayat, M., Tavakoli, N., & Sharifi, M. (2013). E-Health Implementation Challenges in Iranian Medical Centers: A Qualitative Study in Iran. *Telemedicine and E-Health*, *19*(2), 122–128. https://doi.org/10.1089/tmj.2012.0071

WHO. (2017). *Global diffusion of eHealth: Making universal health coverage achievable . Report of the third global survey on eHealth* . Retrieved from papers3://publication/uuid/6D2CF35D-81C1-4FEC-8B56-1601403D4BD7

Zanaboni, P., Hoaas, H., Lien, L. A., Hjalmarsen, A., & Wootton, R. (2017). Long-term exercise maintenance in COPD via telerehabilitation : a two-year pilot study, *23*(1), 74–82. https://doi.org/10.1177/1357633X15625545

Appendices

Appendix 1. Detailed description Telerevalidatie.nl

Appendix 2. Interview schemes

Appendix 3. Intercorrelation and Chronbach's Alpha Roessing and Vogellanden

Appendix 4. Tables significant items questionnaire combined

Appendix 5. Barriers interview

Appendix 1. Detailed description Telerevalidatie.nl

Telerevalidatie.nl is a telemedicine application. First, Telerevalidatie.nl was part of a larger project 'Tele-nu' (Roessingh Research and Development, 2014). The purpose of this project was increasing the chance of successful implementation of eHealth in daily rehabilitation care.

The aim of Telerevalidatie.nl is to support patients with their physical and mental recovery, with supervision of a therapist. They can use the portal at home, in a rehabilitation centre or wherever they want to use it. By executing homework assignments, the patient can work at their own pace at his or her recovery (Telerevalidatie.nl, n.d.). The portal has several modules and other functionalities what provides an accessibility for different groups. The different modules are directed to several disorders, namely cerebrovascular accident, chronic fatigue, hand, hip, knee, lung, oncology, Parkinson, pain and back problems. There are also modules that focus on a specific part within a revalidation, like condition, coordination, mobility, strength, relaxation, stretching, transfers, Time2Act and fall prevention.

Examples of activities available on the portal are:

- Information provision
  Via the portal a therapist can provide information for a patient. This can be information about an affection or disease, but it can also be information about the rehabilitation centre or the treatment.
- Executing (physical) exercises
  Therapist can compose exercises for a patient within a scheme. The patient can execute the exercises one by one. Exercises are provided by movies including voice and textual explanation.
- Filling in questionnaires
  A therapist can also provide questionnaires for a patient. This can be periodic questionnaires to measure the progress within a specific period or a questionnaire for after a treatment.
- Messages
  Patients and therapists can send messages through the portal.
- Goals
  Each patient can add his or her own learning goals. A goal can be marked as completed after completing a learning goal. These goals can make it explicit for a patient and therapist to see what the goals is, whether there is being worked on or the goal is already completed.

Figure 1 and 2 are examples how the portal Telerevalidatie.nl looks like for users.

Figure 1 Telerevalidatie.nl portal of patients (1) (from Telerevalidatie.nl)

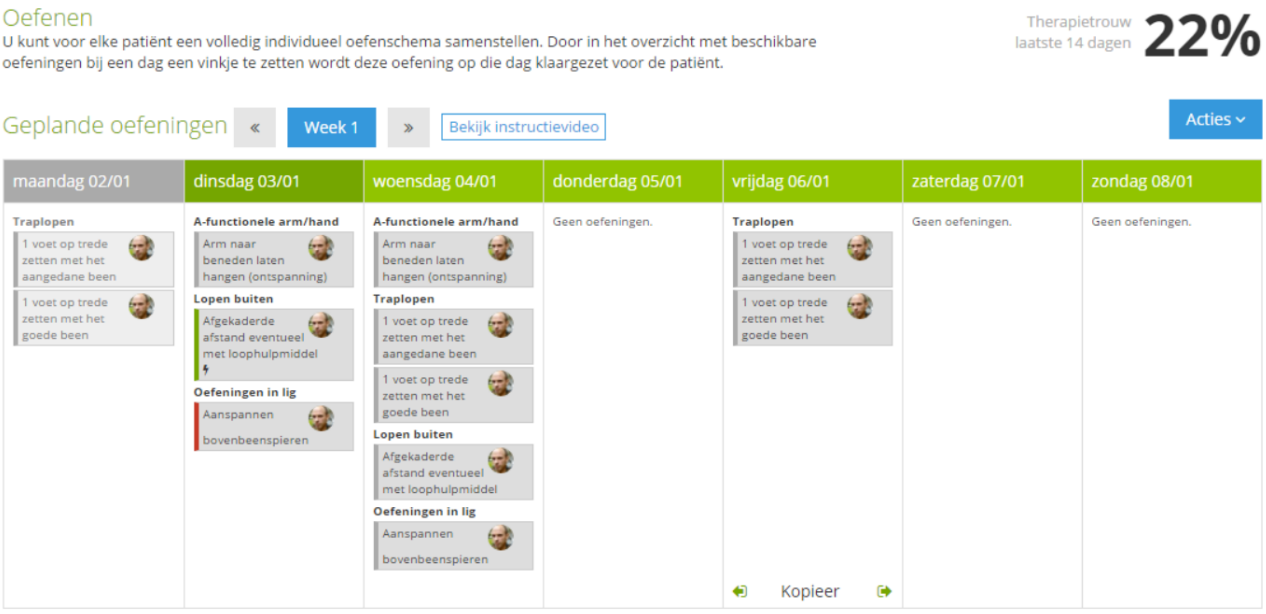

Figure 2 Telerevalidatie.nl portal of patients (2) (from Telerevalidatie.nl)

Appendix 2. Interview schemes

Behandelaren Roessingh (niet-gebruikers)

Opening

Voorstellen, onderzoek, tijdsduur, dataverzameling, privacy, opname

1. Zou je wat over jezelf kunnen vertellen?
   - Functie, leeftijd, sector, hoelang werkzaam
2. Heeft u de vragenlijst ingevuld?
3. Waarom **gebruik** je het oefenportaal op dit moment niet?
   - Wat zijn de **barrières**?
   - Heb je de **intentie** om het portaal te gaan gebruiken?
4. Wat vind je van het online oefenportaal?
   - Kan je ook uitleggen waarom?
   - Zijn er nog andere redenen?
5. Zou het online oefenportaal geschikt zijn voor (al) je **patiënten**?
   - Waarom wel/waarom niet?
   - Welke patiënten wel/welke patiënten niet? Waar ligt dit aan?
   - Wat vinden je patiënten van het online portaal (denk je)?

Vragenlijst.

De volgende **barrières** komen naar voren uit de vragenlijst:

Onvoldoende op de hoogte gebracht van de ontwikkelingen

6. In hoeverre vind je dat je voldoende **betrokken** bent geweest bij de **invoering**?
   - In hoeverre kon je meedenken in de **ontwikkeling** van het online oefenportaal?
   - In hoeverre kon je meedenken in de **implementatie** van het online oefenportaal?

Onbekendheid van de mogelijkheden van het oefenportaal
Onvoldoende op de hoogte van de inhoud van portaal

7. In welke mate ben je op de **hoogte van de inhoud** van het oefenportaal?
   - Weet je wat de **mogelijkheden** zijn?

Niet begrijpen hoe het oefenportaal verschilt van huidige manier van werken

8. Denk je dat er wat **veranderd** in je **behandelingen** door het gebruik van het online oefenportaal?
   - Zo ja, wat? Kan je dit verder toelichten?

Niet zien van meerwaarde voor mantelzorgers

9. Wat voor een **voor- en nadelen** kan het online oefenportaal opleveren voor **mantelzorgers**?
   - Hoe kunnen deze nadelen worden opgelost/voordelen vergroot?
10. Hoe zit dit voor patiënten en behandelaren?

Niet weten wie er binnen de organisatie is aangewezen voor de coördinatie

11. Wat vind je van de **ondersteuning** die wordt geboden vanuit de organisatie in het gebruik?
    - Wat kan er nog beter in deze ondersteuning?

- Weet je bij wie je terecht kan als je interesse hebt/als je een account wil?
- Weet je bij wie je terecht kan als je wil worden begeleid in het gebruik?

Onvoldoende training om oefenportaal op een goede manier te gebruiken

12. In hoeverre beschik je over voldoende **vaardigheden** om het portaal op een goede manier te gebruiken? Heb je (voldoende) training gehad?

Verandering werkverdeling tussen collega's

13. Wat voor een invloed heeft het online oefenportaal op de **werkverdeling/werklast/productie**?

Onvoldoende flexibiliteit bij inzetten oefenportaal

14. Denk je dat je **zelf zou kunnen bepalen** hoe je het online oefenportaal toepast in je dagelijkse werk?

Niet weten welke stappen nog moeten zetten

15. Weet je welke **stappen** je moet zetten om het portaal te gaan gebruiken?
    Zo ja: Welke? En wat heb je er voor nodig om dit daadwerkelijk te doen?
    Zo nee: Wat heb je nog nodig om hier wel achter te komen?

Geen tijd

16. Heb je voldoende **tijd** om het oefenportaal te leren/te kunnen toepassen?
    - Indien ja: hoe maak je deze tijd ervoor?
    - Indien nee: hoe kan je ervoor zorgen dat je deze tijd wel hebt?

17. Wat denk je over deze barrières?
18. Vind jij dit ook barrières?
    - Zo nee, waarom niet? Zo ja, hoe kan je hiermee omgaan?
19. Hoe zouden deze barrières opgelost kunnen worden?
    - Wat zou er gedaan moeten worden om dit aan te pakken?

Strategieën tegen de barrières:

- Faciliteren
- Identificeer 'champions' (voorvechter)
- Identificeer 'early adopters' (vroege instappers)
- Informeer opinieleiders/ invloedrijke
- Betrek patiënten en familie
- Verkrijg en gebruik patiënten en familie feedback
- Ontwikkel een implementatie begrippenlijst (beschrijving van innovatie, implementatie, betrokkenen)

- Uitvoeren van educatieve meetings
- Voorlichting door getrainde persoon (in praktijk)
- Voer doorlopende trainingen uit (op een dynamische manier, verschillende stijlen)
- Ontwikkel educatief materiaal (handleidingen, toolkits/hulpmiddelen)
- Train-de-trainer
- Discussie-meetings

Cognitive participation (NPT)

20. Wat voor een invloed zal het portaal hebben op de **persoonlijkheid** van de behandeling?
    - Wordt het **onpersoonlijker** of niet?
    - Wat verandert er in de **relatie** tussen **patiënt en zorgverlener**?
    - Verandert de **rol** van de zorgverlener?
21. In hoeverre vind je het bij je **functie** horen om het online oefenportaal te gebruiken?
    - In hoeverre hoort eHealth in de zorg?
22. Hoe denkt je **leidinggevende** over het gebruik van het online oefenportaal?
    - Verwacht je leidinggevende dat je het gebruikt?
    - Kan je zelf keuzes maken in hoe je het portaal gebruikt?
23. Gebruiken meerdere **collega's** van je het oefenportaal?
    - Indien ja: wat vinden zij ervan?
    - Indien nee: Weet je waarom niet?
    - Wordt er binnen het team weleens over het portaal gesproken? Hoe iedereen het gebruikt etc? Komt het ter sprake in patiëntbesprekingen?
    - Welke stappen moet je nog zetten om het portaal te gaan gebruiken?

Collective action

24. Wat heb jij nog **nodig** om het online oefenportaal **goed te kunnen gebruiken**?
    - Voorbeelden: **Training/ handleiding/ vindbaarheid/ mogelijkheden/ tijd / toegankelijkheid / behandelprotocol**
    - **Hoe** zie je dit voor je?
    - Welke **vaardigheden** heb je nog nodig?
    - Geldt dit ook voor je collega's? / Samenwerking collega's
25. Ben je op de hoogte van de **verantwoordelijkheden** wanneer je het oefenportaal gebruikt?
26. Past het online oefenportaal bij de **doelen** van de organisatie?

Algemeen

27. Heb je ideeën over hoe het **verder**/**beter** kan worden **geïmplementeerd** en **opgenomen**?

Management/ Leidinggevenden

Opening
Voorstellen, onderzoek, tijdsduur, dataverzameling, privacy, opname

1. Zou je wat over jezelf kunnen vertellen?
    - Functie, leeftijd, sector, hoelang werkzaam
2. Heeft u de vragenlijst ingevuld? JA / NEE

Algemeen

3. Ken je het oefenportaal?
4. Wat vind je van het online oefenportaal?
    - Kan je ook uitleggen waarom?
    - Zijn er nog andere redenen?
    - Vind je dat het online **oefenportaal ingezet moet worden** in de behandelingen?
5. Wordt het binnen je team gebruikt?
    - In hoeverre vind je het bij de **functies van behandelaren horen** om het online oefenportaal te gebruiken?
    - In hoeverre hoort **eHealth in de zorg**
6. Hoe zie je jouw rol als motivator in het gebruik van het portaal?
    - Wat doe je eraan om het team te stimuleren?
    - Wat zou je willen doen? Wat zou je beter kunnen doen? Hoe dan?

Effect Telerevalidatie

7. Wat voor een **voor- en nadelen** levert het online oefenportaal op de **organisatie/het team?** Wat win ik ermee?
    - Kan je dit toelichten?
    - Wordt er weleens gesproken over online behandelen in het team(overleg)?

8. Wat voor een **effect** heeft het online oefenportaal volgens jou op de behandelingen?
    - Is dit positief/ negatief?

9. Hoe denken je **collega's (andere leidinggevenden)** over het gebruik van het portaal?

Barrières

10. Wat voor een barrières zijn er in het gebruik van Telerevalidatie?

11. Waar loop je tegenaan in de praktijk?

12. Wat voor een invloed heeft het online oefenportaal op de **productie/werkverdeling/werklast?**

13. Hebben behandelaren genoeg **kennis** om het portaal te gebruiken?

14. Hebben behandelaren genoeg **vaardigheden** om het portaal te gebruiken?

15. In hoeverre vind je dat behandelaren **genoeg tijd** hebben om het online oefenportaal te gebruiken/zich eigen te maken/ te ontdekken?
16. In hoeverre denk je dat behandelaren **gemotiveerd** zijn om het online oefenportaal te integreren?

Implementatie

17. Kan je uitleggen hoe de implementatie van het oefenportaal is gegaan?

18. Wat voor een barrières zijn er nog in de implementatie?

19. Wat is er nog volgens jou nog voor nodig om het portaal te implementeren?
    - **Scholing, informatieverstrekking, bekendheid, handleiding, training**, **vindbaarheid, tijd, mogelijkheden/ behandelprotocol**
    - Hoe zie je dit voor je?
20. Wat is er voor nodig om het oefenportaal dagelijks gebruik te laten zijn?

21. Heb je ideeën over hoe het **verder/beter** kan worden **geïmplementeerd** en **opgenomen**?

22. Wat doe je om de **ondersteuning** voor het oefenportaal zo goed mogelijk te maken?

    - Of hoe zou dit moeten?

23. Wat zou er beter kunnen in de **ondersteuning**?

Roessingh

24. Zijn er formele afspraken gemaakt rondom het gebruik van het oefenportaal?
    - Wanneer in te zetten, bij wie, wanneer, hoeveel?
    - In hoeverre kunnen behandelaren het gebruik zich eigen maken?
    - Kunnen ze eigen keuzes doorvoeren?
25. Past het online oefenportaal bij de **doelen** van de organisatie?

26. Hoe zijn de keuzes met betrekking tot **financiën** en het oefenportaal gemaakt?

    - Denk aan tijd wegschrijven, oefenportaal

Appendix 3. Intercorrelation and Chronbach's Alpha Roessing and Vogellanden

Roessingh

Collective action

Skill set Workability

Table 41 Intercorrelation between significant items skill set workability, Roessingh

		Ik weet wat … van mijn patienten	WerkverdelingR	Ik heb voldoende … manier te gebruiken	Ik ben voldoende … mijn patiënten
Ik weet wat de mogelijkheden van het oefenportaal zijn binnen de behandeling van mijn patienten	Pearson Correlation	1	.211	.570**	.712**
	Sig. (2-tailed)		.210	.000	.000
	N	40	37	37	37
WerkverdelingR	Pearson Correlation	.211	1	.052	.158
	Sig. (2-tailed)	.210		.760	.350
	N	37	37	37	37
Ik heb voldoende training gehad om mij in staat te stellen het oefenportaal op een goede manier te gebruiken	Pearson Correlation	.570**	.052	1	.593**
	Sig. (2-tailed)	.000	.760		.000
	N	37	37	37	37
Ik ben voldoende op de hoogte van de inhoud van het oefenportaal om het goed toe te kunnen passen in de behandeling van mijn patiënten	Pearson Correlation	.712**	.158	.593**	1
	Sig. (2-tailed)	.000	.350	.000	
	N	37	37	37	37

**. Correlation is significant at the 0.01 level (2-tailed).

Table 42 Reliability statistics significant items skill set workability, Roessingh

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.723	.712	4

Table 43 Summary item statistics within significant items skill set workability, Roessingh

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Ik weet wat de mogelijkheden van het oefenportaal zijn binnen de behandeling van mijn patienten	10.1892	4.491	.704	.552	.538
WerkverdelingR	10.1081	6.932	.160	.053	.831
Ik heb voldoende training gehad om mij in staat te stellen het oefenportaal op een goede manier te gebruiken	9.5946	4.803	.547	.401	.640
Ik ben voldoende op de hoogte van de inhoud van het oefenportaal om het goed toe te kunnen passen in de behandeling van mijn patiënten	9.8378	4.584	.691	.559	.549

Vogellanden

Cognitive Participation

Initiation

Table 44 Intercorrelation between significant items initiation, Vogellanden

		Ik kan zelf … oefenportaal ga gebruiken	*Ik weet wie … van het oefenportaal*	*Mijn leidinggevende(n) staan … in mijn organisatie*
Ik kan zelf bepalen of ik het oefenportaal ga gebruiken	Pearson Correlation	1	,358	,352
	Sig. (2-tailed)		,052	,052
	N	31	30	31
Ik weet wie er binnen mijn organisatie is aangewezen voor het coördineren van de invoering van het oefenportaal	Pearson Correlation	,358	1	,456*
	Sig. (2-tailed)	,052		,011
	N	30	30	30
Mijn leidinggevende(n) staan achter de invoering van het oefenportaal in mijn organisatie	Pearson Correlation	,352	,456*	1
	Sig. (2-tailed)	,052	,011	
	N	31	30	31

*. Correlation is significant at the 0.05 level (2-tailed).

Table 45 Reliability statistics significant items initiation, Vogellanden

Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
,585	,653	3

Table 46 Summary item statistics within significant items initiation, Vogellanden

	Scale Mean if Item Deleted	*Scale Variance if Item Deleted*	*Corrected Item-Total Correlation*	*Squared Multiple Correlation*	*Cronbach's Alpha if Item Deleted*
Ik kan zelf bepalen of ik het oefenportaal ga gebruiken	4,93	3,651	,403	,169	,510
Ik weet wie er binnen mijn organisatie is aangewezen voor het coördineren van de invoering van het oefenportaal	5,03	1,413	,492	,254	,508
Mijn leidinggevende(n) staan achter de invoering van het oefenportaal in mijn organisatie	5,10	3,679	,495	,245	,450

Legitimation

Table 47 Intercorrelation between significant items legitimation, Vogellanden

		Ik ben voldoende … van het oefenportaal	*Ik vind het … oefenportaal te gebruiken*	*Het oefenportaal is … van mijn patiënten*
Ik ben voldoende betrokken geweest bij de ontwikkeling van het oefenportaal	Pearson Correlation	1	,513**	,412*
	Sig. (2-tailed)		,003	,026
	N	31	31	29
Ik vind het bij mijn functie horen om het oefenportaal te gebruiken	Pearson Correlation	,513**	1	,119
	Sig. (2-tailed)	,003		,538
	N	31	31	29
Het oefenportaal is geschikt voor (een deel) van mijn patiënten	Pearson Correlation	,412*	,119	1
	Sig. (2-tailed)	,026	,538	
	N	29	29	29

Table 48 Reliability statistics significant items legitimation, Vogellanden

Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
,623	,612	3

Table 49 Summary item statistics within significant items legitimation, Vogellanden

	Scale Mean if Item Deleted	*Scale Variance if Item Deleted*	*Corrected Item-Total Correlation*	*Squared Multiple Correlation*	*Cronbach's Alpha if Item Deleted*
Ik ben voldoende betrokken geweest bij de ontwikkeling van het oefenportaal	5,34	2,020	,615	,378	,210
Ik vind het bij mijn functie horen om het oefenportaal te gebruiken	6,21	2,884	,401	,262	,567
Het oefenportaal is geschikt voor (een deel) van mijn patiënten	6,31	3,579	,316	,180	,666

Activation

Table 50 Intercorrelation between significant items activation, Vogellanden

		Ik ben voldoende … in mijn organisatie	*Ik sta achter … in mijn organisatie*
Ik ben voldoende op de hoogte gebracht van de ontwikkelingen rondom het oefenportaal in mijn organisatie	Pearson Correlation	1	,341
	Sig. (2-tailed)		,060
	N	31	31
Ik sta achter de invoering van het oefenportaal in mijn organisatie	Pearson Correlation	,341	1
	Sig. (2-tailed)	,060	
	N	31	31

Collective action

Relational Integration

Table 51 Intercorrelation between significant items relational integration, Vogellanden

		productieV	Ik weet wat … van mijn patiënten	relatiepatientV
productieV	Pearson Correlation	1	.431*	.554**
	Sig. (2-tailed)		.017	.002
	N	30	30	30
Deel 3 - Ik weet wat mijn verantwoordelijkheden zullen zijn als ik het oefenportaal toepas in de behandeling van mijn patiënten	Pearson Correlation	.431*	1	.362*
	Sig. (2-tailed)	.017		.046
	N	30	31	31
relatiepatientV	Pearson Correlation	.554**	.362*	1
	Sig. (2-tailed)	.002	.046	
	N	30	31	31

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 52 Reliability statistics significant items relational integration, Vogellanden

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.705	.717	3

Table 53 Summary item statistics within significant items relational integration, Vogellanden

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
productieV	6.1333	2.257	.582	.362	.550
Ik weet wat mijn verantwoordelijkheden zullen zijn als ik het oefenportaal toepas in de behandeling van mijn patiënten	5.0000	2.000	.465	.218	.713
relatiepatientV	6.4667	2.326	.545	.334	.593

Skill set workability

Table 54 Intercorrelation between significant items skill set workability, Vogellanden

		Ik heb voldoende … manier te gebruiken	werverdelingV	Ik weet wat … van mijn patienten	Ik ben voldoende … van mijn patiënten	Over het algemeen … thuis te gebruiken	Ik beschik over … oefenportaal te gebruiken
Ik heb voldoende training gehad om mij in staat te stellen het oefenportaal op een goede manier te gebruiken	Pearson Correlation	1	.579**	.766**	.825**	.497**	.604**
	Sig. (2-tailed)		.001	.000	.000	.004	.000
	N	31	31	30	31	31	31
werverdelingV	Pearson Correlation	.579**	1	.337	.449*	.027	.168
	Sig. (2-tailed)	.001		.069	.011	.886	.367
	N	31	31	30	31	31	31
Ik weet wat de mogelijkheden van het oefenportaal zijn binnen de behandeling van mijn patienten	Pearson Correlation	.766**	.337	1	.720**	.540**	.577**
	Sig. (2-tailed)	.000	.069		.000	.002	.001
	N	30	30	30	30	30	30
Ik ben voldoende op de hoogte van de inhoud van het oefenportaal om het goed toe te kunnen passen in de behandeling van mijn patiënten	Pearson Correlation	.825**	.449*	.720**	1	.432*	.442*
	Sig. (2-tailed)	.000	.011	.000		.015	.013
	N	31	31	30	31	31	31
Over het algemeen beschikken mijn patiënten over voldoende kennis en vaardigheden om het oefenportaal thuis te gebruiken	Pearson Correlation	.497**	.027	.540**	.432*	1	.493**
	Sig. (2-tailed)	.004	.886	.002	.015		.005
	N	31	31	30	31	31	31
Ik beschik over de nodige vaardigheden om het oefenportaal te gebruiken	Pearson Correlation	.604**	.168	.577**	.442*	.493**	1
	Sig. (2-tailed)	.000	.367	.001	.013	.005	
	N	31	31	30	31	31	31

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 55 Reliability statistics significant items skill set workability, Vogellanden

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.861	.855	6

Table 56 Summary item statistics within significant items skill set workability, Vogellanden

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Ik heb voldoende training gehad om mij in staat te stellen het oefenportaal op een goede manier te gebruiken	17.2000	14.028	.883	.835	.789
werverdelingV	18.1333	20.257	.404	.458	.875
Ik weet wat de mogelijkheden van het oefenportaal zijn binnen de behandeling van mijn patienten	17.5667	15.151	.795	.665	.810
Ik ben voldoende op de hoogte van de inhoud van het oefenportaal om het goed toe te kunnen passen in de behandeling van mijn patiënten	17.1333	16.257	.757	.708	.819
Over het algemeen beschikken mijn patiënten over voldoende kennis en vaardigheden om het oefenportaal thuis te gebruiken	18.2333	18.875	.517	.386	.860
Ik beschik over de nodige vaardigheden om het oefenportaal te gebruiken	18.2333	16.185	.589	.460	.854

Contextual Integration

Table 57 Intercorrelation between significant items contextual integration, Vogellanden

		Het is voor … van het oefenportaal	*In mijn organisatie … van het oefenportaal*
Het is voor mij duidelijk wat er van mij verwacht wordt vanuit de organisatie mbt het inzetten van het oefenportaal	Pearson Correlation	1	,421*
	Sig. (2-tailed)		,018
	N	31	31
In mijn organisatie zijn formeel afspraken vastgelegd door het management over het gebruik van het oefenportaal (in beleidsplannen, werkplannen etc)	Pearson Correlation	,421*	1
	Sig. (2-tailed)	,018	
	N	31	31

*. Correlation is significant at the 0.05 level (2-tailed).

Reflexive monitoring

Systematization

Table 58 Intercorrelation between significant items systematization, Vogellanden

		Patiënten zijn over … toepas in hun behandeling	*Ik heb … betrouwbaarheid van het oefenportaal*
Patiënten zijn over het algemeen tevreden als ik het oefenportaal toepas in hun behandeling	Pearson Correlation	1	,138
	Sig. (2-tailed)		,468
	N	30	30
Ik heb vertrouwen in de stabiliteit en betrouwbaarheid van het oefenportaal	Pearson Correlation	,138	1
	Sig. (2-tailed)	,468	
	N	30	30

Appendix 4. Tables significant items questionnaire combined

Table 59 Differences and similarities in significant items between Vogellanden and Roessingh. The colours show which items are similar in both rehabilitation centres.

Vogellanden			Roessingh		
Stelling	**t**	**Sig.**	**Stelling**	**t**	**Sig.**
Patiënten zijn over het algemeen tevreden als ik het oefenportaal toepas in hun behandeling	7,5	,000	Door het inzetten van het oefenportaal verandert de werkverdeling tussen mij en mijn collega's.	-4,8	,000
Ik heb voldoende training gehad om mij in staat te stellen het oefenportaal op een goede manier te gebruiken	6.0	,000	Ik weet wat de mogelijkheden van het oefenportaal zijn binnen de behandeling van mijn patiënten	4,2	,000
Ik kan zelf bepalen of ik het oefenportaal ga gebruiken	5,7	,000	Binnen mijn afdeling bestaat voldoende flexibiliteit in hoe en bij wie ik het oefenportaal in kan zetten	-3,8	,001
Ik vind het oefenportaal de moeite waard	5,3	,000	Ik denk dat het oefenportaal meerwaarde voor de mantelzorger kan hebben	-2,8	,009
Door het inzetten van het oefenportaal verandert de werkverdeling tussen mij en mijn collega's.	-4,9	,000	Ik begrijp hoe het inzetten van het oefenportaal verschilt van mijn gebruikelijke manier van werken	2,7	,011
Ik weet wie er binnen mijn organisatie is aangewezen voor het coördineren van de invoering van het oefenportaal	4,8	,000	Ik ben voldoende op de hoogte gebracht van de ontwikkelingen rondom het oefenportaal in mijn organisatie	2,6	,012
Ik verwacht dat door het inzetten van het oefenportaal de productie omlaag zal gaan	-4,3	,000	Ik weet wie er binnen mijn organisatie is aangewezen voor het coördineren van de invoering van het oefenportaal	2,5	,017
Ik weet wat de mogelijkheden van het oefenportaal zijn binnen de behandeling van mijn patiënten	4,2	,000	Ik heb voldoende training gehad om mij in staat te stellen het oefenportaal op een goede manier te gebruiken	2,5	,019
Ik ben voldoende op de hoogte gebracht van de ontwikkelingen rondom het oefenportaal in mijn organisatie	3,6	,001	Ik ben voldoende op de hoogte van de inhoud van het oefenportaal om het goed toe te kunnen passen in de behandeling van mijn patiënten	2,3	,027
Ik ben voldoende op de hoogte van de inhoud van het oefenportaal om het goed toe te kunnen passen in de behandeling van mijn patiënten	3,9	,001	Het is voor mij duidelijk wat er van mij verwacht wordt vanuit de organisatie m.b.t het inzetten van het oefenportaal	2,1	,041
Het is voor mij duidelijk wat er van mij verwacht wordt vanuit de organisatie m.b.t. het inzetten van het oefenportaal	3,3	,003			
Ik weet wat mijn verantwoordelijkheden zullen zijn als ik het oefenportaal toepas in de behandeling van mijn patiënten	3,1	,004			
Ik ben voldoende betrokken geweest bij de ontwikkeling van het oefenportaal	2,9	,007			
Mijn leidinggevende(n) staan achter de invoering van het oefenportaal in mijn organisatie	2,8	,010			
In mijn organisatie zijn formeel afspraken vastgelegd door het management over het gebruik van het oefenportaal (in beleidsplannen, werkplannen etc.)	2,8	,011			
Over het algemeen beschikken mijn patiënten over voldoende kennis en vaardigheden om het oefenportaal thuis te gebruiken	2,6	,014			
Ik heb vertrouwen in de stabiliteit en betrouwbaarheid van het oefenportaal	2,5	,019			
Ik vind het bij mijn functie horen om het oefenportaal te gebruiken	2,5	,020			
Het gebruik van het oefenportaal verstoort de relatie tussen mij en de patiënt	-2,4	,021			
Het inzetten van het oefenportaal zal mijn huidige manier van werken beïnvloeden	-2,4	,023			
Ik sta achter de invoering van het oefenportaal in mijn organisatie	2,3	,026			
Ik beschik over de nodige vaardigheden om het oefenportaal te gebruiken	2,2	,035			
Het oefenportaal is geschikt voor (een deel) van mijn patiënten	2,1	,046			

Appendix 5. Barriers interview

Time

Time is, in different ways, frequently seen as a barrier in the use of eHealth as well as Telerevalidatie. The majority of the respondents appointed the lack of time as impediment factor. '*We hebben de tijd er gewoon niet voor'* and *'Er was eigenlijk ook weinig tijd'* is mentioned by therapists when was asked what stops them start or maintain using the portal. Furthermore, learning how to use the portal is experienced and expected as time-consuming. There were not noticed any differences within this element between therapists of both organisations. Furthermore, there is also not noticed any difference between using and non-using therapists. The barrier is acknowledged in different layers in both organisations. Managers of both organisations and the project leader of Roessingh mention time as essential factor in the shortage of use from the portal. The fragment of a manager of Vogellanden below illustrates this:

> *"Weetje, je hebt altijd prio's, dus geeft je medewerkers geen tijd om eu in dit geval Telerevalidatie goed te implementeren dan zou dat natuurlijk met een minder grote snelheid gaan".*

eHealth is not part of protocol

The use of the portal, and eHealth generally, is not part of a protocol within both organisations. A part of the respondents pointed this as a barrier. The portal is not offered in standard clinical pathways which impedes the use of it. A therapist of Roessingh states the following:

> *"Dan ben je op een gegeven moment een periode aan het werken en kom je erachter dat medewerkers er eigenlijk niet zoveel gebruik van maken. En als je dan als nieuwe medewerker hierbinnen komt en ze maken er niet zoveel gebruik van dan heb je de neiging om in datzelfde patroon mee te gaan."*

Another therapist and user of the portal mentioned the following: *"Dat staat nog niet op ons therapievoorschrift, eu eRevalidatie"*. This makes it hard to integrate it in daily practice.

Managers of both centres mention integrating innovations, and the portal, within the clinical pathways is important to make it part of daily practice. Although, they both mentions as well this is not present yet. The following fragment is a quote of the manager of Roessingh:

> *"Ja, wat over het algemeen een hele grote hobbel is dat ook zo'n oefenportaal van de theorie, of vanuit euu.. is er van alles mogelijk, maar dan de laatste stap naar de praktijk dat het echt geïmplementeerd wordt dus een vast onderdeel van zorgpaden, van onze zorg … dat zie ik dus nog niet. En daar ligt een hele grote hobbel"*

Additionally, the project leader declares as well eHealth is not yet part of the processes. An answer to the question whether the portal is already integrated within the clinical pathways, the project leader answers '*Nee, dat zou wel moeten, maar dat staat er nog niet echt in'.* Both rehabilitation centres agree eHealth should be integrated in these pathways, but this is not what they are doing at present.

Priority

A recurring theme during the interviews was about the portal not being a area of concern in daily practice and not recognised enough. The majority of the respondents mentioned it as a barrier in the usage of the portal. A non-user of Roessingh mentioned the portal has never been a project in their team: *"Ik weet wel dat het er is, maar er is nooit een project of iets van gemaakt binnen ons team om daarnaar te kijken en wat kunnen we ermee".* It was not part of one of the priorities of the team *"prioriteiten hebben op andere dingen gelegen".* Another

therapist, user, also indicates it is not a standard priority of employees. Therapists do not make the time to integrate it. '*Die maken de tijd er niet voor'* and *'het leeft nog niet zoals het zou moeten'* are quotes of this therapist.

A therapist from Vogellanden, non-user, mentioned he was not sufficiently involved with the developments of the portal and the implementation of it: *"We zijn er wel over geïnformeerd, maar euu.. Daarmee zijn we het in ieder geval wat betreft mij ook wel wat aan de zijlijn blijven staan."* Next to this, a user of the system quotes the following:

> *"Want een heleboel mensen hebben een tijd geleden ooit een keer uitleg gehad. Dan konden ze een half uurtje even kijken, maar in twee jaar is er natuurlijk enorm veel veranderd en zijn er dingen in gekomen. Maar de meeste medewerkers zijn daar niet van op de hoogte op dit moment"*

User-friendliness

Another barrier in the use of the portal appears the user-friendliness of the portal. A major part of the employees of both centres point out that factors that make the portal less easy to use play a part in the reduced usage of the portal. Therapists that are non-users have the idea the portal is not that easy to use through earlier experiences with eHealth. Users support this idea through their practices in the usage of the portal. For example, a therapist said the following *"het portaal is wel heel traag".* A manager of Vogellanden and therapist of Roessingh stated that the missing connection and link with other systems, like the electronic patient dossier (EPD), declines the user-friendliness.

Lack of information/knowledge

A lack of information about the portal is stated by employees of Roessingh at different levels of the organisation as a barrier. These employees mentioned it several times in the interview, so it seems to be an important aspect for them. The lack of knowledge and information seems to manifest itself in different ways. A non-user of rehabilitation centre A pointed out the lack of knowledge of the portal. The therapist there was no introduction of the portal, the therapist did not receive any information about the usage of it. "*Ik weet niet wat de mogelijkheden zijn*' was, for example, something a therapist said. Another quote of this therapist is:

> *"Ik denk dat het gewoon echt een stukje kennis missen is. Want ik weet ook niet in hoeverre het nu al tijdens de behandeling hier gebruikt zou kunnen worden. Dat weet ik eigenlijk ook niet. Want dan is het misschien ook best wel een toevoeging ook in de behandeling. Geen idee.."*

Another therapist and user of the portal recognizes this lack of knowledge for some therapists and states it as an important factor in the shortage of use of the portal. The following is a quote of this therapists:

> *"Als nieuwe medewerker heb ik misschien een halfuurtje uitleg gekregen van hoe het portaal werkt, maar ik kan me voorstellen dat bestaande medewerkers misschien ook een keertje een halfuurtje uitleg hebben gehad. Maar voor heel veel mensen is dat gewoon onvoldoende zon oefenportaal zich helemaal eigen te maken"*

A supervisor acknowledges this and tells previous intern research indicates the lack of information provision in the usage of eHealth in general.

Furthermore, managers and supervisors also miss information about the way they can support therapists in using the portal. The following quote illustrates this:

"Management probeert daarin te ondersteunen, maar zitten ook met de handen in het haar omdat ze informatie missen over uren, over formatie. Dus dat is een hele moeilijke situatie. Het maakt dus ook dat het de boel eigenlijk frustreert en remt"

Respondents of rehabilitation centre B did not mention the lack of knowledge literally as a barrier. Although, a therapist from Vogellanden, non-user, tells he does not see the added value of using the portal in comparison with face-to-face contact. "*Ik geef net zo snel, net zo lief de oefeningen op papier mee dan dat ik ze zon ingewikkeld via zon portaal laat inloggen en dat daar de oefeningen op staan" is a quote of this therapist.* This seems to depend on the lack of knowledge of this therapist about the practical use of the portal.

Lack of management support

In Roessingh, the lack of support from the management appears to be a barrier. At different levels of the organisation the management support is pointed out during the interview. There seems division in opinions in the role management should adopt during the implementation of innovations. A project leader innovation said she experiences little support from the management. *'… dan probeer ik dat te regelen, loop ik tegen management aan die zegt ja maar dat kan allemaal niet want daar hebben we geen tijd voor"* is a quote which demonstrates this issue. The quote beneath illustrates this once more:

"Ik merk daar weinig ondersteuning van … Management probeert daarin te ondersteunen, maar zitten ook met de handen in het haar omdat ze informatie missen over uren, over formatie. Dus dat is een hele moeilijke situatie. Het maakt dus ook dat het de boel eigenlijk frustreert en remt"

A therapist of Roessingh points out that the expectations from the management about the use of the portal are not clear. The therapist said the following:

I: En weet je of je leidinggevende het van je verwacht dat je hebt gebruikt?

R: "Nee, weet ik niet. Ik heb nooit gehoord of gelezen van dat wordt verwacht van jullie, nee"

The manager of Roessingh mentioned his possibilities to support the use of the portal were limited: "*Ik heb maar een heel beperkte rol in het eu.. ja het gaat met name over het faciliteren.. In praktische zin is mijn rol nagenoeg nihiel".*

Workload

Respondents from Roessingh indicate that due to workload and required production it is complicated to integrate eHealth in their daily work. A therapist mentions: '*je hebt best wel een aardige werkdruk hier'.* Furthermore, a lack of staff seems to contribute to this workload. *'dan hebben ze het idee dat er te kort is op de werkvloer'* indicates a project leader of the same organisation. This project leader also quotes the following:

"Ja, dat maakt dat het ook weer heel lastig is want dat is waar ik, waar jij ook tegen aanloopt nu met je interviews, daar loop ik voortdurend tegenaan met al het werk dat ik eigenlijk doe, is dat het moeilijk is om mensen uit de productie te halen. Dus om behandelaren vrij te maken voor dit soort projecten"

A manager from Roessingh does not recognize this and mentiones he facilitates as good as possible. The quote beneath is of this manager:

"Als dan 'person x' een idee heeft en zij heeft uren gekregen via de raad van bestuur, dan zoekt zij pionnetjes en dan kom je in de sectoren. Ja, wat ik dan kan doen is de afspraak met 'person x' maken. Waar nodig ook even die contacten leggen en eu

dan weer probeer ik dat wel maximaal te faciliteren. Want techniek in de algemene zin is heel ja, dat is toch wel een belangrijk speerpunt van dit centrum. En we vinden dat eHealth daarbij hoort. Dus ik faciliteer dat zo veel mogelijk, maar dan moet het al praktisch aangereikt worden"

Beliefs

According to a project leader of Roessingh, there appear to be a number of beliefs that restrain employees in the use of the portal. For example, therapists fear of losing their job due to eHealth, '*ze zijn bang hun baan te verliezen'*. The following quote illustrates this:

"Dat zullen ze ook niet zo volmondig zeggen, maar ik denk toch stiekem dat dat een beetje meespeelt en dat ze denken van 'oh, dan kan ik het werk niet meer' of 'als het allemaal met die computers gaat, dat is niet voor mij en dan verlies ik mijn werk'"

Furthermore, the project leader experiences the step for therapists to use technology in their treatments frightens them because they are afraid to lose control over their treatments. Finally, the fear of care becoming impersonal appears to be a barrier in the use of the portal. See the following quote where the project leader tells about this fear from therapists:

"Zij zijn eigenlijk de zorg in gegaan omdat ze mensen contact willen hebben en niet omdat ze iets met technologie hebben. Ze hebben niks met computers… of nou ja niks, maar daar willen ze niet mee, dat is niet hun ambitie om dat in hun werk te doen. En nu worden ze gedwongen om dat meer met technologie te gaan doen, dus dat snap ik ook wel dat dat bij heel veel mensen weerstand oproept want dat wilden ze eigenlijk helemaal niet. En dat verandert gewoon. Het is minder hands-on"

Skills

The usage of eHealth asks some skills in the digital world. The lack of these skills can be seen as a barrier. Also, the courage to experiment with eHealth appears to be a shortage of therapists. See the following quote in conversation with a project leader of Roessingh:

I: En denk dat ze wel genoeg vaardigheden hebben om het portaal te gebruiken?

R: "Nee, dat denk ik ook niet. Maar dat is ook wel lastig, want dat kom je ook weer op allerlei persoonlijke aspecten uit. ... Maar dan heb je het ook over een beetje experimenteren en een beetje buiten de gebaande paden durven gaan en dat is heel persoonlijk. Ja, ik heb het idee dat dat in de zorg een beetje te kort schiet aan mensen die dat durven"

Also a therapist, user, of Roessingh admits that the lack of digital skills can be an barrier. Although this therapist does not experience this lack of skills himself, he can imagine this can be a barrier for other therapists. The following quote illustrates this:

"Dat is natuurlijk wel makkelijk gezegd voor een jonge knaap die met computers opgegroeid is. Maar ik kan me voorstellen dat als je 55+ bent of 60+ dat je dan zoiets hebt van 'pff, ik heb helemaal geen zin meer om het me eigen te maken en ik geeft de oefeningen wel op papier mee. Dat is de afgelopen 30 jaar ook goed gegaan dus ja' "

Besides the skills of a therapists, also the suitability of a patient can be seen as a barrier in the usage of the portal, *"er zullen doelgroepen zijn waarbij die behoefte gewoon veel minder aanwezig is of gewoon zelfs niet kan"* is a quote of a therapist that shows this.

The project leader of Roessingh also illustrates that therapists find it hard to apply the portal in their treatment, they do not have the skills to do so. See the following quote where the project leader is focusing on therapists:

> *"Die kunnen niet die verstaalslag maken van hun behandeling wat ze doen, naar een portaal en in dit geval Telerevalidatie. Dus dan komt daar niks en dan blijf je daar een beetje zo, ja je moet het gebruiken, maar je weet niet hoe, dus dan blijft het daar ergens tussen hangen".*

Licences

With Vogellanden a clear barrier is the amount of licences available for therapists. Below the quotes that support this:

> *R: "Er zijn een aantal mensen bij ons op de afdeling die een autorisatie hebben, met een eigen inlogcode. Er waren geloof ik maar een beperkt aantal codes beschikbaar en eu een beperkt aantal plaatsen beschikbaar. Er zijn een collega's die dat hebben en daar heb ik over de schouders wel eens meegekeken hoe dat in zijn werk gaat"*
>
> *I: Oke, dus je hebt het wel eens gezien, maar verder zelf nog niet gebruikt of nog niet ingezet?*
>
> *R: "Nee"*
>
> *I: Oke, en de reden daarvoor is dus ook echt, wat je net aangaf, dat er maar een paar autorisaties zijn.. Dat is de reden?*
>
> *R: "Ja, dat is de belangrijkste reden"*

The management of this organisation agrees there is a limited number of licenses available. However, she declares it was a strategy the organisation chose with purpose.

> *"Wij zijn eerst zo gestart van mensen die ook weer vanuit zichzelf goh geef mij maar zo'n licentie, want ik zie mij dat wel doen. En eu.. die maken daar nu ook echt gebruik van. Want in het begin moesten we ook nog zelfs stimuleren dat ze daar gebruik van gingen maken. Dus je moet wel draagvlak creëren ook. Nu zien we dat we dat, dat al die licenties echt gebruikt worden en nu zijn we wel toe aan uitbreiding".*

This barrier is not relevant with Roessingh, where they have unlimited licences available.

Payment system

Managers of both organisations mentioned the payment system as a barrier in the use of the portal. eHealth in general, and also the portal, is pointed as expensive. The manager of Vogellanden mentions the costs to buy licences as a barrier. The manager of Roessingh mentions the costs needed to implement and integrate as a barrier. This manager quotes the following:

"Eu.. ja dan steken ze daar tijd in en als je met ziektekosten verzekeraar niet overeen kunt komen dat daar ook een tarief voor bedongen kan worden, dan is het ten dode opgeschreven".