The use, usability and persuasiveness of PAZIO, an online healthcare portal

Rianne Immink – van Boven

UNIVERSITEIT TWENTE.

August 2013
Master Health Sciences
Health Technology Assessment
University of Twente

Supervisors:
University of Twente: Dr. J.E.W.C. van Gemert-Pijnen; N. De Jong, MSc.
University Medical Center Utrecht: J.C.J.A. Janssen, MSc. product / project manager PAZIO

Abstract

Background – Patients are increasingly interested in using internet-based technologies to communicate with their providers, schedule clinic visits, request medication refills, and view their medical records electronically. A patient portal is an online environment where these kinds of services are offered. There are a lot of portals developed the last fifteen years. These healthcare portals are developed to improve the accessibility of healthcare, quality of care, communication and patient satisfaction. However, in practice, a lot of problems with regard to diffusion, adherence, finances and knowledge play part, which result in a sub-optimal impact of these portals.

Objectives – In this study, the usability and persuasiveness of a personalized interactive patient portal are investigated, since these factors turn out to be predictors of adherence. To evaluate the uptake of the PAZIO patient portal, the use is analyzed and a possible influence of a change agent in the form of a promotional team is investigated.

Methods – Survey (n=365), usability tests (n=15) and analysis of log file data (n=140) of patient portal PAZIO is performed in two general practices, both including two different locations, to provide insight in the use, usability and persuasiveness of the portal. The influence of a promotional team on the reach and traffic is investigated through comparison of two general practices.

Results – The patient portal is widely used in the practice where the patient portal is implemented since December 2012; 70 percent of the registered users of the portal actually use it. Nevertheless, only a few of them utilize the entire portal, resulting in a lower depth of use. An effect on the reach of the portal by a change agent isn't found, although the traffic to and within the portal seems to be increased. Most important seems to be the usability; this is even more than persuasiveness a predictor of adherence to and satisfaction with the portal. Overall a positive judgment is given to the separate services, regarding simplicity, velocity, clarity, support, practical outcome, recommending and satisfaction. A lot of insight is obtained in possibilities to improve these.

Conclusion – A usable system with a persuasive design has the potential to enthuse users, creating traffic in the full range of different services, since the need and willingness of such patient portals is high and the aimed goals of improved access of care, quality of care and comprehensive care could be realized. To create a usable system, a perfect coherence with the needs, expectations and view of the healthcare consumers is necessary; guiding the end-users to and through the system, observing struggles and successes, a perfect fitting help-menu and constant evaluations. A change agent, in form of a promotional team, can improve the actual use of the portal. On top of that, to improve patient-centered healthcare, which is the aim of the portal and desire of the end-user, the portal has to expand, offering other services and including more healthcare providers.

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Introduction

Background

Patients are increasingly interested in using internet-based technologies to communicate with their providers, schedule clinic visits, request medication refills, and view their medical records electronically (Wakefield, et al., 2010; Woods, et al., 2013). According to a definition of Osborn et al. (2013), patient portals are "*secure Internet-based platforms that offer patients the ability to view their personal health information (PHI), and some portals also allow for 2-way secure messaging between patients and health care providers, and the ability to schedule medical appointments and request prescription refills.*" Patient portals, with web-based services that allow communication between the patient and the healthcare provider are becoming the standard of care (Schickedanz, et al., 2013). In most cases it is a (personal) online environment, where the patient logs in through a personal username and password. From the start page, a lot of different services and features are offered to the patients. Some services are interactive, these communications typically include some combination of secure e-mail, appointment scheduling and medication refill requests. In addition, systems may also support patient communication of clinical data (e.g.: blood pressure and blood glucoses) to the provider and allow patients to electronically view parts of their medical records (Wakefield, et al., 2010), or search for trustworthy health information, which have no particular interactive character.

Portals with a medical record offer several benefits for both healthcare consumers and healthcare professionals (Tang, Black, & Young, 2006). These healthcare portals are developed to improve the accessibility of healthcare (Fortney, Burgess, Bosworth, Booth, & Kaboli, 2011). They are also aimed at improving quality of care, communication and patient satisfaction (Kittler, et al., 2004; Ralston, et al., 2007). Portals which provide interactive services and give insight in the medical record can result in more patient empowerment through enabling the patient to be informed and take part of their own healthcare management instead of their current passive role (Demiris, et al., 2008), which can lead to improved healthcare outcomes (Emani, et al., 2012).

In patients with chronic illnesses, the use of a portal which allows communication between patient and physician resulted in a significant improvement of the effectiveness of care (Zhou, Kanter, Wang, & Garrido, 2010).

Summarizing, web-based patient portals can allow interactive communication, insight in a personal medical record and self-management. Among others, these portals tend to improve patient empowerment, satisfaction and ultimately result in improved healthcare outcomes.
However in general, people and institutions do not like change; it might be difficult and inconvenient (Cain, 2002). Cain and Mittman (2002) studied diffusion of technology in healthcare. One of the factors that can play a major role in the diffusion of innovations is a change agent. According to Cain and Mittman, a change agent is "an individual who influences clients' innovations-decision in a direction deemed desirable by a change agency." An example of such a change agent can be a promotional team, active during the introduction of the new patient portal. It is important for both the developers and a possible change agent that they, among others, understand the end user of the new technology, inform people about the innovation correctly, monitor the innovation cautiously to detect possible problems and understand current behaviors and values (Cain, 2002).

Another point is that the impact of these patient portals is still sub-optimal due to a low level of exposure(Van 't Riet, Crutzen, & De Vries, 2010), regulatory restrictions (Santana, et al., 2010) and a disregard of the needs of patients and professionals, social-cultural habits and the complex nature of healthcare systems (Nijland, 2011). Healthcare professionals are sometimes reluctant to share all available medical information with the healthcare consumer, influencing the great effects this full sharing could achieve (Woods, et al., 2013). It is essential that patients have the skills to use a web-based portal (Norman & Skinner, 2006). The usability of the system is crucial in the acceptance and diffusion of such technology (Demiris, et al., 2008). User studies showed that such medical record applications have major weaknesses regarding usability, like a complex navigation, inconsistency between different data entry elements and too many details. As a result of that, these portals seem to be barely used in practice (Peters, 2009).

Another related issue is that the large proportions of start-up costs of development and implementation of an e-health intervention do not directly result in financial benefits. Nevertheless, the European Union stated e-health to be a promising opportunity to improve effectiveness and efficiency of healthcare and wants to use it to maximize social and economic benefits (European-Commission, 2012). The National Implementation Agenda eHealth (NIA) confirms this statement and has a serious focus on the assurance of future-proofing e-health applications on scientific and financial levels (KNMG, 2012).

After implementation, introduction and initial use of the new portal, adherence to web-based interventions is a well-known problem and this has been the subject of research for some time.

Kelders investigated whether intervention characteristics and persuasive design affect adherence to the web-based intervention (in particular for online treatment platforms for chronic illnesses) (S. Kelders, 2012). The characteristics that predicted a better adherence were increased interaction with a counselor, more frequent intended usage, more frequent updates and more extensive employment of dialogue support (S. M. Kelders, Kok, Ossebaard, & Van Gemert-Pijnen, 2012). These factors are part of a persuasive design, a predictor for adherence of web-based interventions (S. M. Kelders, et al., 2012). Oinas-Kukkonen and Harjumaa distinguish 4 categories for persuasive system principles: primary task-, dialogue-, system credibility- and social support (Oinas-Kukkonen, 2009).

So, despite all the potential benefits, the required skills of healthcare consumers, often bad usability, high start-up costs and resistance in diffusion of the new technology lead to a low exposure and adherence of the patient portals. These problems of resistance in diffusion of the technology, selective adherence and unknown effects of a developed portal should be further investigated.

Casus

To investigate the problems of resistance in diffusion of the technology, selective adherence and unknown effects of a developed portal, the portal PAZIO is used in this study.

PAZIO (Patient Oriented Healthcare Information Environment) is developed through a cooperation between the University Medical Center Utrecht (UMCU), Imtech, Mediportaal, Leidsche Rijn Julius Gezondheidscentra, VitalHealth Software en VitaValley. Several services for primary, secondary and tertiary care will be combined. Currently, a healthcare consumer in the primary care is able to regulate different care issues like scheduling a medical appointment (e-Afspraak, fig. 1, no. 2), communicate with their healthcare providers (e-Consult, no. 3), request prescription refills (e-Recept, no. 5) and review lab results (e-lab, no. 4). These services are fully integrated in the electronic system of the general practice. Also chronic disease self-management (e-Ketenzorg, fig. 1, no. 1) and searching for trustworthy information (Thuisarts, no. 6) are part of the portal. This can all be done by a single login, safely using DigiD. DigiD is a system that allows governments to verify someone's identity. The self-made username and password are linked with the unique Social Security number (DigiD, n.d.). To achieve the most secure login procedure, authentication by text message is added; a user has to confirm the login procedure with a code received by mobile phone.

The different services are presented as applications (number 1-6) in the portal as can be seen in figure 1.

Figure 1 - screenshot of home page of patient portal PAZIO. 1=service chronic disease management; 2=service e-appointment; 3=service e-consult; 4=service e-lab; 5=service e-prescription; 6=service health information; 7=tab general practitioner; 8&9=portals other healthcare providers; 10=personal portal; 11=profile with personal data; 12=help-menu; 13=feedback button.

In addition, there is space for other primary, secondary and tertiary healthcare, like the hospital, physiotherapist and healthcare insurer, which offer the same kind of services in the form of applications (fig. 1, no. 7-9). A healthcare consumer can add all healthcare providers with whom he/she has a therapeutic relationship, who are also connected to PAZIO, and all services of interest, to create a personalized portal (fig. 1, no. 10). The personal data by profile (fig. 1, no. 11) is linked to the municipal personal records, the help-menu (uitleg) contains a lot of extra information to guide users through the portal (no. 12) and lastly, feedback can be given or questions about the portal can be asked by no. 13, a feedback button.

Interaction of the portal is through the service e-consult (fig.1, no. 3) and the feedback option (no. 13), with which there is communication back and forth between healthcare provider and consumer. The other services (no. 1, 2, 4 - 6) are not interactive, but no. 1, 2 and 4 enable unilateral communication; the healthcare provider adds some personal information, or the healthcare consumer orders some medicines or appointments. Nevertheless, the other person cannot react immediately, except using an e-consult (consumer) or other message (provider) for the inbox of the consumer achievable in within the menu of the services.

In summary, the portal PAZIO is a personalized, white-label and interactive portal, offering insight in a personal medical record, enabling communication with the healthcare professional, managing chronic illnesses and offering online organizational features like ordering a face-to-face appointment and a repeat prescription. The PAZIO portal is a kind of portal described by Osborn (2013), but is expanding to even a more complete, integrated and personal portal by adding more features and healthcare professionals.

Objectives

Now that PAZIO is implemented in 4 locations of general practices and is going to be implemented in other locations of general practices, insight in the *users* of the portal should be obtained. This is important to be able to evaluate the use and to obtain insight in the characteristics of the users. Further research into the *persuasiveness* and *user-friendliness* of the portal is needed, since these factors are not studied yet and are, among others, predictors of adherence (S. M. Kelders, et al., 2012).

Another unanswered question is the effect of a *promotional team* on the reach and traffic of the portal. This promotional team is deployed to function as a change agent to improve the diffusion of the technological innovation (Cain, 2002). It is important to evaluate if the intended effects are achieved. The final results of the analysis can function as a benchmark to future implementation processes.

In summary, the research objectives are:

- Obtain insight in the **use and users** of healthcare portal PAZIO in primary care.
- Investigate the **influence** of a **promotional team** on the use (reach and traffic) of PAZIO in primary care.
- Investigate the **user-friendliness and persuasiveness** of the portal in primary care.

Methods

The study is established and implemented from the following perspective.

According to Eysenbach (2001, p. 1), e-health is "*an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology*."

This means that e-health does not only refer to specific products or applications, but that it implies a process of improving health care.

The CeHRes Roadmap (figure 2) is a holistic framework for the participatory development of e-health technologies in an effective and efficient way (van Gemert-Pijnen, et al., 2011).

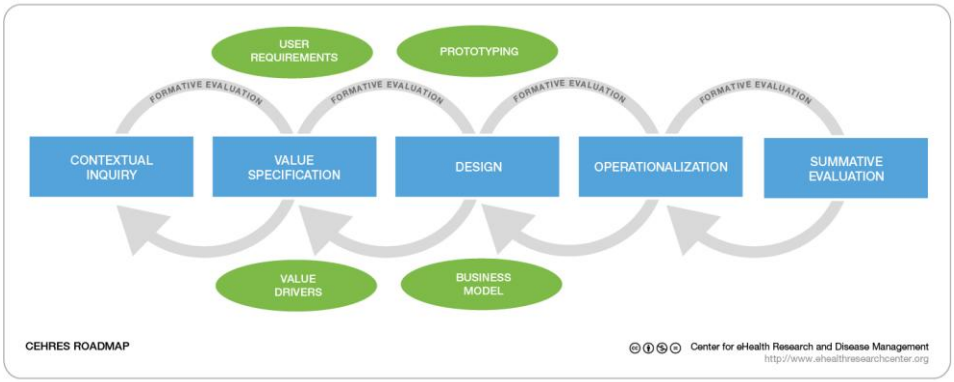

Figure 2 - CeHRes Roadmap for development of eHealth technologies

The CeHRes Roadmap aims to, among others, solve problems of selective adherence. The holistic approach is used to ensure that e-health technologies are effective and efficient, addressing the full range of human and organizational factors (Kukafka, Johnson, Linfante, & Allegrante, 2003). One of the working principles is that "e-health Technology Development is a Participatory Process," which implies that all stakeholders and intended users need to be involved in the full development process in order to create the technology in a persuasive and effective way (van Gemert-Pijnen, et al., 2011). The development of the PAZIO portal is achieved through close collaboration with healthcare provider and consumers (figure 2, phase 1-3). The changes that the portal entails for the different stakeholders are taken into account and a small evaluation regarding expectations and usability is performed among early adopters (Julianus, 2012; PAZIO, 2012; Verrips-Zweistra, 2012), which tend to be moderately complete. This research project is mostly part of the summative evaluation,

regarding the uptake of PAZIO, but is also formative evaluation of the design of the portal, regarding the usability.

Three methods will be used to answer the following research questions:

1. How is the patient portal being used?
2. Is the use of the patient portal influenced by the employment of promotional activities?
3. What are the opinions of the users with regard to the perceived persuasiveness and the usability of the portal?

All respondents are users of the portal, or have registered to the portal to start using it. No healthcare professional are included, only healthcare consumers, because the vast majority of the end-users is a healthcare consumer and the initial aim of the portal and the general practice is to generate reach and traffic among this group, making it important to focus on them. Three different general practices are used to investigate the research questions. Table 1 describes the status with regard to the portal of the practices and the research methods that are used within each practice.

Table 1 - Characteristics of the three general practices used in the research project

General practice	Corresponding methods	Started with the portal
1. Healthcare Center Maarssenbroek Containing 2 locations Boomstede and Spechtenkamp	Survey and usability tests	December 2012
2. Leidsche Rijn Julius Healthcare Centre location Terwijde	Log files	February 2013
3. Leidsche Rijn Julius Healthcare Center location Veldhuizen	Log files	February 2013

Three different methods are used to answer the research questions. These different methods strengthen each other by their different characters (quantitative vs. qualitative) and might confirm or deny the results of one another.

The methods used and combined to answer the three research questions are described in table 2.

Table 2 - Description of used methods per research question

Research question	Method	Measured	Goal
1 - How is the patient portal being used?	Survey	- The characteristics, with regard to age, gender, educational level, chronic illness, visits to the general practitioner, computer and internet access and use, of the respondents of the survey - How many respondents did use the portal (breath of use) - How many different services are done by the respondents that used the portal (depth of use) - The use of the different services by the respondents - How many respondents did not use the portal - Why respondents did not use the portal	Insight in the extent of use
2 - Is the use of the patient portal influenced by the employment of promotional activities	Log files	- The average of times the users log in to the portal - Moments of the day that users log in to the portal - How many users only log in (and off) - How many users watched/used 1 service per session - How many users watched/used more than 1 service per session - How many users also logged off (so a duration of a session can be determined) - The average duration of a session, measured with the patients who also logged of - Percentage of users (of group that does log off) that visits the portal again - Time between different visits by the same users - Patterns of visits of the users (those who do log off) and similarities and differences.	Insight in the extent and manner of use
	Log files	- Outcomes of the checked characteristics of comparability - Quantity of users of the patient portal per practice - Percentage of users of the total scope (total possible user group) per practice - Ratio of male/female users of the portal and percentage of total scope per practice - Ratio of age groups between users of the portal and percentage of total scope per practice - Quantity of unique user log ins per month and percentage of total scope per practice - Percentage of services that are used per practice - Quantity of use of the different services per practice	Insight in the effect of a promotional team on the reach of and traffic in the portal
3 - What are the opinions of the users with regard to the perceived persuasiveness and the usability of the portal?	Survey	- Judgment of the login procedure, home page and the five services on the seven themes mentioned in table 4. - Judgment of the 4 categories of perceived persuasiveness.	Insight in opinions and perceived persuasiveness
	Usability tests	- Characteristics of the participants of the usability tests - Example of development of the code scheme - Frequency of given codes to the quotes - Quantity of failed scenario's - Analysis of frequency coded	Insight in usability of the portal

The three different methods are described in more detail, regarding the participants, procedure and data-analysis.

Survey

A survey is used to answer research question 1 and 3.

1. How is the patient portal being used?

3. What are the opinions of the users with regard to the perceived persuasiveness and the usability of the portal?

Participants

The target population is the group of users of general practice 1. The group of 844 users consists of all healthcare consumers that have registered to use the patient portal, independent of whether they have already used it. Healthcare professionals and employees of the developed portal are excluded, because they are not within the focus of the study. The respondents are recruited via an email with a link to the internet survey. Two weeks after the first email, a reminder email was send to all users (excluding the ones who left their details in the survey or via email indicated their participation). 357 of the 844 healthcare consumers (42.3%) have participated in the survey.

Procedure

The survey is developed by the research on the basis of existing surveys and/or literature. The survey contained 48 questions, which are described in the table below.

Table 3 - Content survey questions

Question	Content	Theoretical foundation
1 – 2	Questions about the use of the portal and specific services.	Frequency categories based on (Lehto, 2012)
3 – 12	Questions about the login procedure, the home page and 5 services of the portal on the basis of screenshots.	Based on (Lilholt, et al., 2006), (Nijland, van Gemert-Pijnen, Kelders, Brandenburg, & Seydel, 2011)
13 – 37	Persuasiveness questions, based on available survey: 'Perceived Persuasiveness Questionnaire.'	Adapted from (Lehto, 2012)
38 – 39	Questions about reason and expectations of non-users	Based on (Ross, et al., 2005)
40 – 47	Questions about user characteristics like age, gender, chronic illness, computer and internet use, education and average visits to the general practice per year.	As used by (van der Vaart, Drossaert, Taal, & van de Laar, 2012)

The questions about the login procedure, the home page and the 5 services of the portal e-appointment, e-consult, e-prescription, e-lab and health information (table 3, question 3-12), are based on concepts of service and usability and contained per service the same questions about 7 constructs presented in table 4 below.

Table 4 – Content of survey questions 3 – 12 per service (login procedure, home page, e-appointment, e-consult, e-lab, e-prescription and health information)

Themes	Content
Simplicity	If it is simple to use the service
Velocity	If working with the service is fast
Clarity	If navigating and walking through the service is clear
Assistance	If the service helps them in the activity they want to do or felt guidance through the service
Practical outcome	If they think that having this service will lead to less contact with the general practice
Recommending	If they should recommend this service to others
Satisfaction	The overall satisfaction of the service.

These constructs are based on available research on usability (Lilholt, et al., 2006) and patient portals (Nijland, et al., 2011) and literature about e-service quality, mentioning the constructs ease of use, functionality, order (Collier & Bienstock, 2006), ease of understanding, intuitive operations, information quality (Loiacono, Watson, & Goodhue, 2007), process, enjoyment (Bauer, Falk, & Hammerschmidt, 2006) and much more. The questions can be answered on a 5-points Likert scale; 1=totally disagree until 5=totally agree or inapplicable. Several questions can be complemented with comments. Respondents only have to fill in the questions that are applicable to their situation. If some services are not used, they do not have to fill in questions about that service.
If they have never used the portal, they are automatically referred to the questions about the reason of non-use and expectations of the portal and user characteristics.

The questions about persuasiveness are based on an available survey 'Perceived Persuasiveness Questionnaire' developed by Lehto et al. (2012) and adapted to the respective patient portal. The concepts measured through the questions about perceived persuasiveness, as developed by Lehto et al. (2012) are given in table 5.

Table 5 – Content of survey questions 13 – 37 based on Perceived Persuasiveness Questionnaire (Lehto, 2012)

Constructs	Content	Sources
Primary task support	The portal provides with means to regulate health issues. The portal helps to regulate health issues. The portal helps to change regulation of health issues.	Developed by (Lehto, 2012), based on (Oinas-Kukkonen, 2009)
Dialogue support	The portal provides appropriate feedback. The portal provides appropriate counseling. The portal encourages.	Developed by (Lehto, 2012) based on (Fogg, 1997), (Klein et al. 2002), (Oinas-Kukkonen, 2009)
Perceived credibility	The portal is trustworthy. The portal is reliable. The portal shows expertise. The portal instills confidence. The portal is made by health professionals.	Developed by (Lehto, 2012) based on (Corritore, Kracher, & Wiedenbeck, 2003), (Oinas-Kukkonen, 2009), (Wathen & Burkell, 2002).
Design aesthetics	The screen of the portal (i.e. colours, layout, presenters, etc.) is attractive. The general appearance of the portal is appealing. The portal provides a nice visual experience.	Adapted from (Cyr, Head, & Ivanov, 2006)
Perceived persuasiveness	The portal has an influence on me. The portal is personally relevant for me. The portal makes me reconsider my health issues.	Developed by (Lehto, 2012) based on (Cacioppo, Kao, Petty, & Rodriguez, 1986; Crano & Prislin, 2006), (Wood 2000)
Unobtrusiveness	Using the portal fits into my daily life. Using the portal disrupts my daily routines. (Reversed item) Using the portal is practical / convenient for me. Finding the time to use the portal is not a problem for me.	Developed by (Lehto, 2012) based on (Ayygari et al. 2011), (Hensel et al. 2006), (Karahanna et al. 2006), (Karahanna, Agarwal, & Angst, 2006; Oinas-Kukkonen, 2009)
Intention to continue using the system	During the next few weeks … 1. I plan to use the portal. 2. I expect to use the portal.	Adapted from (Bhattacherjee, 2001)

The survey is filled in by the respondents between the 22th of March and the 4th of April 2013.

Data analysis

Data analysis of the survey is mostly done through descriptive statistics using frequencies, means and 95 percent confidence intervals, describing the group of users, used services and judgment of the services and persuasiveness themes. For the analysis, the program IBM SPSS Statistics version 20 is used. The judgments of the different services of the portal are presented in the results including a 95% confidence interval, to provide insight into possible divisiveness.

Log files

Log files are used to answer research question 1 and 2.

1. How is the patient portal being used?

2. Is the use of the patient portal influenced by the employment of promotional activities?

Participants

The target population of the log file investigation consists of the portal users of general practice 2 and 3. These practices have started with the patient portal in the end of February 2013. From that moment on, healthcare consumers are recruited to register to the portal and use the services. This is done by the healthcare professionals, and in general practice 2 this is complemented by a promotional team. The promotional team consists of one employee of the portal, who is present two day parts per week in the general practice for four to six months. The employee is selected on enthusiasm, the ability to work both in a team as independently, insight into patient portals, the ability to signal particularities and an open attitude. The goal of the promotional activities is to generate interest in the portal; to increase the overall use of PAZIO. The activities are: speaking to, enthuse and stimulate healthcare consumers to register for PAZIO; support healthcare consumers in registering; stimulate the use among healthcare consumers and answering questions raised by the e-mail helpdesk.

Healthcare consumers, who sign in to the portal, are automatically followed anonymously through the log files; only birthdates and gender as personal characteristics are given. A total of 140 healthcare consumers are included in the study.

Procedure

The log files are generated and analyzed from the start of the portal during 2.5 months. No personal information is available through the log files; clicking behavior (signing in/off and the click on the button of the available services) can be shown. This information is linked to the gender and age of the user. Actual use of the services per practice per month is also collected. To evaluate the influence of the promotional team, a study with a posttest only control group design is conducted.

User statistics of general practice two (intervention group) are compared to data of general practice three (control group) that implements the portal without a promotional team. On top of that, the log files will complement the use statistics of the survey.

Data analysis

The log files and statistics of used services are analyzed by using the program IBM SPSS Statistics version 20. Descriptive statistics (frequencies and means) are used to describe the population and use of the services. Chi square tests (or Fisher's exact tests when conditions are not met) are used to test whether the differences found between the reach and traffic of the portal where significant with regard to the practice without promotional team and to test whether the two practices are comparable ($p \leq 0.05$ is significant). The characteristics mentioned in table 6 are chosen to ensure comparability, because these factors might determine the character of the general practice (quantity

registered healthcare consumers and households), the possible need for a portal (quantity of visits and chronic illness) and possible adherence differences (age groups and foreign origin).

Table 6 – Checked characteristics of two practices to ensure comparability

Characteristic	Analysis
Quantity of registered healthcare consumers	Chi-square test
Quantity of households	Chi-square test
Average quantity of visits per healthcare consumer	Chi-square test
Ratio of age groups	Chi-square test
Quantity of healthcare consumers with a foreign origin	Chi-square test
Quantity of healthcare consumers with a chronic illness (DM, COPD and VRM)	Chi-square test

Usability tests

Usability tests are used to answer research question 3.

3. What are the opinions of the users with regard to the perceived persuasiveness and the usability of the portal?

Participants

The target population of the usability tests is the group of users of general practice 1. Participants are recruited through the survey. The last question of the survey contained an invitation to participate in further research in the form of an interview. Respondents of the survey could leave their details (email address and/or telephone number) if they would be willing to participate. 117 respondents (32.8%) did leave their details in the survey. Selection of the participants is done through stratified random sampling, using stratums to include both men and female, chronically ill and non-chronically ill, different age groups, healthcare consumers that did and did not use the portal and with different levels of education. With regard to age groups, the distinction is made in between <55, 55-65, >65). This ordering is chosen because the volunteers for a usability test could be evenly divided into these groups and in the Netherlands 65 and over in general don't do paid work anymore, which might cause another view on new web-based interventions. A total of 30 healthcare consumers are invited and 15 of them participated in the interview. Participants received a voucher of ten Euro as a token of appreciation for volunteering in the research project.

Procedure

Explanation is given to the participants and an informed consent document is signed by all participants. After consultation with healthcare providers and developers of the portal to confirm the correctness of the 9 real task-oriented scenarios, set up by the researcher, the scenarios were presented to the participants in random order, including all the features that are possible with the portal, to test the usability of the overall portal and the specific services. For example, one assignment was to sign in and another was to make an appointment with the general practitioner for

questions about diabetes. The description of all scenarios and the design of introduction and evaluation questions are given in appendix 1.

The usability tests are performed by 2 different persons: the researcher and an employee of the patient portal, further both called *the researcher.* To be aware of the possible lack of intra-rater reliability, the first three usability tests were performed by the two researchers together, after which consultation has taken place and arrangements have been made for the continuing of the interviews. During the usability tests, which lasted about 45 to 60 minutes, the researcher observed whether a task is successfully finished and looked for possible struggles or enabling factors in it. Furthermore, some questions about personal characteristics, use of the portal and the computer and satisfaction were added. The participants were asked to think out loud, to provide insight in the way of thinking and working and enable further analysis. The usability tests were recorded on audio. The interviews are held in the period between the 24th of April and the 8th of May.

Data analysis

Interviews are transcribed verbatim, quotes are extracted and coded.

The usability tests afford 1273 quotes. Table 7 gives an overview of the quantity of codes per respondent and the amount of codes per scenario to ensure that these are approximately equally distributed.

Table 7 - Quantity of quotes per respondent and scenario (n = 1273)

	Respondent															Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Experienced +/-	+	+	-	-	-	+	+	+	-	-	-	+	+	+	-	
Scenario																
Login	8	6	9	8	7	7	6	7	6	7	7	9	7	7	6	107
Home page	3	0	2	3	2	3	4	2	8	2	2	2	2	3	2	40
e-Appointment	16	16	11	19	8	8	8	10	7	8	11	13	8	6	9	158
e-Consult	12	12	14	9	11	15	8	11	6	7	14	11	7	7	16	160
e-Prescription	18	9	7	9	8	6	9	8	7	3	6	8	8	6	10	122
e-Lab	9	10	4	6	7	5	6	13	7	4	8	5	6	9	6	105
Medical record	8	14	6	5	6	10	4	17	6	5	5	7	4	9	9	115
Health information	22	11	7	10	9	12	12	7	9	5	9	14	9	9	7	152
Help menu	9	15	5	4	10	8	7	14	10	5	6	10	2	6	7	118
Change personal data	8	5	12	4	12	11	5	7	12	5	5	4	6	5	7	108
Logout / general opinion	4	4	2	4	6	9	4	12	5	4	8	7	2	10	7	88
Total	117	102	79	81	86	94	73	108	83	55	81	90	61	77	86	1273

The average amount of quotes extracted from the interviews per respondent is 85. There are 7 respondents who have more than 85 quotes and 8 respondents who offered less than the average. The respondents who did have experience with the portal and did not have experience with the portal are not fully equally distributed over these two groups. Of the experienced respondents 5/8 (62.5%) had quotes above the average opposed to the group of non-experienced respondents where 2/7 (28.6%) had an amount of quotes above average. It has to be taken into account that the group of experienced respondents might bias the results slightly by having more influence with the given quotes.

The quotes are coded using a code scheme with 35 codes (appendix 2), divided into 8 categories which are: system, content, effectiveness, efficiency, skill, use, expectation and evaluation. The code scheme is set up after the usability tests; the researcher was guided by the quotes and scenarios. The first 5 themes system, content, effectiveness, efficiency and skills are used because these themes are found in literature about patient portals and usability as described in the introduction and perfectly fit within the used scenarios; knowing where to be in a situation with a specific need like searching for information and satisfying this need by walking through the service in a good way. The other 3 themes, use in practice, expectation and evaluation are used because the participants gave a lot of input about current use, intention, opinions and suggestions, which are very valuable for the further development of the portal and insight in the end user.

An example of the quotes, reasoning and given code is presented in table 8.

Since the data set was too large to have it reviewed independently by two researchers, a random selection of 5% of all coded fragments was coded by a second independent researcher. The inter-rater agreement was substantial (Cohen's Kappa = .80) (Landis & Koch, 1977).

Data analysis is done by using descriptive statistics, by using the program IBM SPSS Statistics version 20, in describing the frequency of the codes, user characteristics and explanation of failed scenarios and other problems.
The usability tests will also function as a confirmation of the patient satisfaction and perceived persuasiveness.

Table 8 – Example of quotes, reasoning and given codes

Scenario	Quote (translated to English)	Reasoning	Theme	Code description	Code
Changing personal information	*(Hint researcher home page):* left top corner,... profile. Oh, wait, look, .. I was looking for this one indeed.	First of all, the respondent did not complete the task without help and second, he had seen this page before, but could not remember how to get to it.	Effective	Respondent does not complete independent. Respondent did not remember placing.	SS- RP-
e-Prescription	For this, I use GCM, which I find just such a beautiful system. Yes, all my prescriptions, they are presented very nicely.	The respondent says something about the current use of this service and gives a positive opinion about the service.	Use Evaluation	Respondent indicates having used the service before. Respondent is satisfied.	U+ S+
e-Appointment	I click on appointments and actions. Eehm. Let's look. I want to view an appointment, no. I want to make an appointment. 'Make an appointment,' that's the one I must have.	The respondent first clicks on the wrong button and she does not know exactly where to go to.	Efficient System	Respondent performs unnecessary actions to complete scenario. Respondent does not know directly where to navigate.	SE- SS+
Login procedure	It would be more logical when you could click on this word 'log on' instead of beside.	The respondent succeeded to login. He tends to mention a negative point, but makes in particular a suggestion to make it even easier.	Evaluation	Respondent has a suggestion for improving the portal / service.	SI+
e-Lab	And what does it mean 'put in archive?' Can I get it back again? Because when I put it in the archive, I do not see it back.	It is not clear to the respondent what the function 'archive' means and what he can do with it. He has questions about it and gives a wrong statement about not seeing it back from the archive.	Content	Respondent makes a comment or asks a question showing the service and/or possibilities are not clear.	IG-

Results

Research question 1: How is the portal being used?

Survey

357 of the 844 invited users (42.3%) of the patient portal in the concerning general practice (with a total of 14,571 healthcare consumers), filled in the survey.

The characteristics of the group of respondents are described in table 9.

844 users divided by a total of 14,751 healthcare consumers result in a reach of the portal of 5.8 percent. The total of patients <55 years old of the general practice is 10,750; 3.6 percent of them is reached to use the portal. The total amount of patients between 55 and 65 years old is 2120; 12.9 percent of them is reached to use the portal. The last category, 65 years and older consists of 1700 healthcare consumers; 10.7 percent of them is reached to use the portal.

When the respondents of the survey with or without a chronic illness are distributed the same as the overall users, 6.38 percent of the chronic ill healthcare consumers are reached vs. 1.0 percent of the non-chronic ill healthcare consumers.

Table 9 – Characteristics of 357 respondents of the survey

Characteristic	Filled in questions	Distribution	n	%	% of user group
				n=357	n=844
Age	322*	<55 years old	129	40.1	45.9
		55-65 years old	125	38.8	32.5
		>65 years old	68	21.1	21.6
Gender	318*	Female	162	50.9	51.4
		Male	156	49.1	48.6
Educational level	312*	Lower education	12	3.8	
		VMBO/MAVO/LBO	68	21.8	
		HAVO/VWO/MBO	100	32.1	
		HBO/WO	132	42.3	
Chronic illness	317*	Yes	208	65.6	
		No	109	34.4	
Visits to the general practitioner (average per year)	320*	Never: 0 visits	4	1.3	
		Sometimes: 1-2 visits	106	33.1	
		Regularly: 3-5 visits	132	41.3	
		Often: 6 or more visits	79	21.9	
		Don't know	8	2.5	
Computer at home	321*	Yes	319	99.4	
		No	2	0.6	
Internet at home	317*	Yes	314	99.1	
		No	3	0.9	
Internet use	319*	(Almost) never	3	0.9	
		< 1 day per week	2	0.6	
		1 day per week	7	2.2	
		Several days per week	17	5.3	
		(Almost) every day	290	90.9	

* Not all questions are filled in by all 357 respondents, the questions about personal characteristics where not compulsory.

Almost everybody who uses the portal and filled in the survey has a computer and access to internet at home. A vast majority uses internet (almost) every day. Other variables are quite well distributed between the categories; this multilateral group of respondents should have a well-balanced view on the results.

70.6 percent of the respondents did use the portal. Figure 3 shows the amount of different services the users have used within the portal. The available services at that moment are: e-appointment, e-consult, e-prescription, e-lab or medical record and health information.

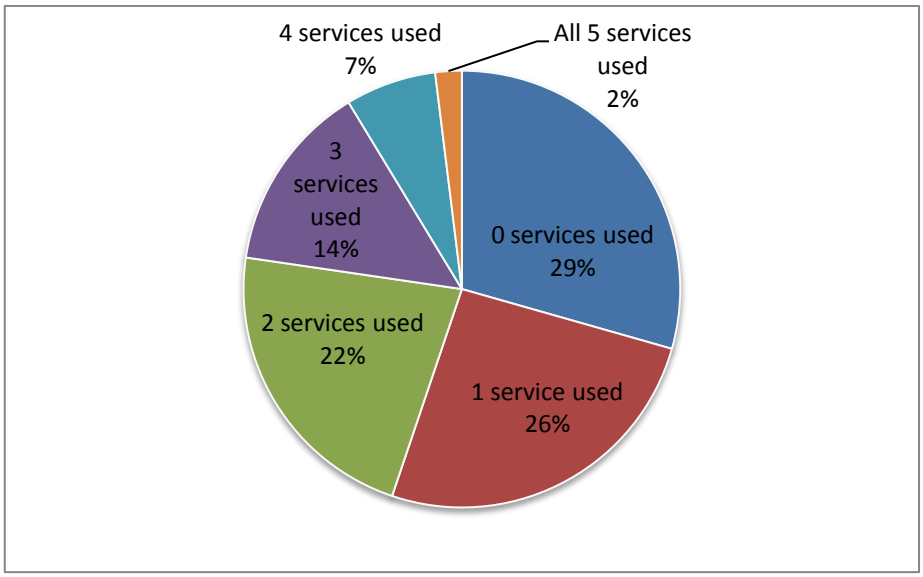

Figure 3 – Amount of different services used by the 357 respondents

As can be seen in figure 3, most of the respondents used 1 or 2 different services. A minority of them utilized all or almost all of the services the portal offers.

As defined by Couper (2010) the breath is a summary measure of access to all activity on the website. The breath of the use of the services of this patient portal is quite high; 70.6 percent of the respondents did use the patient portal. Nevertheless, the depth (which states how deeply individuals engage in the portal) of the use of the services is not optimal; only 13% used (almost) all services.

The distribution of all services used in general by the respondents, not per session, is given in table 10.

Table 10 – Total use of the services (n=252 respondents of the questionnaire that did use the portal) and percentages

Service	n	%
e-Appointment	87	34.5
e-Consult	69	27.4
e-Prescription	146	57.9
e-Lab	103	40.5
Health information	49	19.4

E-Prescription is the most popular service, more than half of the respondents did use/uses this service to order a repeat prescription.

29.4 percent of the respondents never used the portal. The reasons vary, but are mostly (44.5 percent) because a situation where they could use the portal had not yet occurred. Also, not knowing how to use the portal and not liking to use the portal are mentioned. In the other category, respondents mention that they: have to search for their DigiD code to login (2), their partner regulates the health issues (2) or can't use it for a son/daugher (1), say that the question is not applicable (1) or give an answer that has nothing to do with the question (1). The distributions of the reasons why the portal is not used (yet) is given in table 11.

Table 11 - Reasons why the portal is not used (yet) of 136 respondents of the survey

Reason	n	%
Recently signed up for the portal	19	14.0
There was no reason for use yet	60	44.1
Don't know how to use the portal	19	14.0
Not convenient to use	21	15.4
Not pleasant to use	10	7.4
Other	7	5.1

Log files

De log data consist of data of 138 users, followed from the start of the implemented portal for a maximum of two and a half months. A session is defined as a login action of a user, which may or may not be followed by clicking other services and is ended with a logout action or a new session is counted when a user logs in a next time. The users logged on, an average of 1.9 times per person, with a substantial amount of people logging in once (50.1 percent) and outliers containing 8 and 9 sessions. A total of 258 sessions is counted.

43.5 percent of de logins where outside office hours (2.5 percent Monday to Friday before 8 am; 25.1 percent Monday to Friday after 5 pm and 15.9 percent in the weekend).

Figure 4, 5 and 6 presents the amount of services used and/or watched in all the first and possible second and third sessions of the 138 users. The portal of the healthcare consumers followed through the log files consist of 3 services and 6 subpages (like profile, the help menu and contact information). The trend observable in these figures is that the users expand the portal in a more extensive way, over time; they use/watch more services when they visit the portal for a second or a third time.

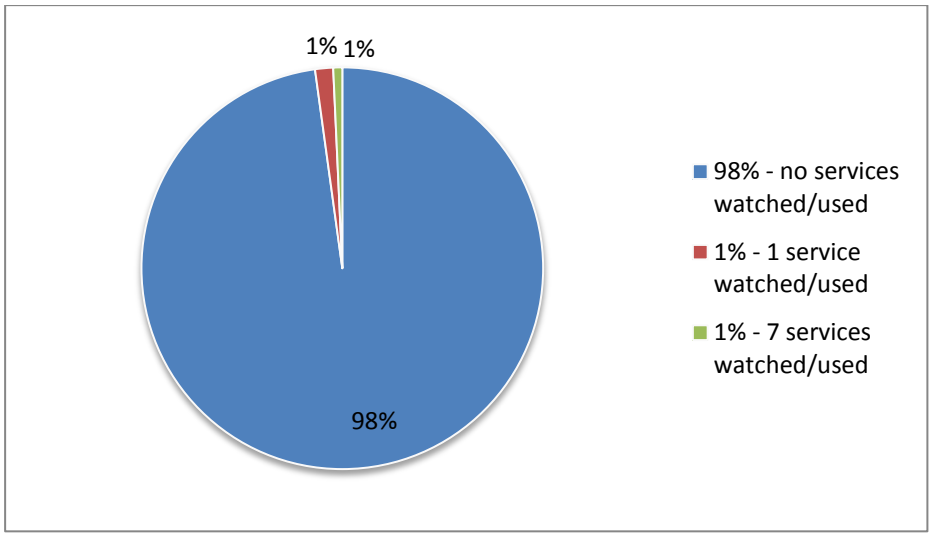

Figure 4 - Amount of services watched/used in the first session (n=138)

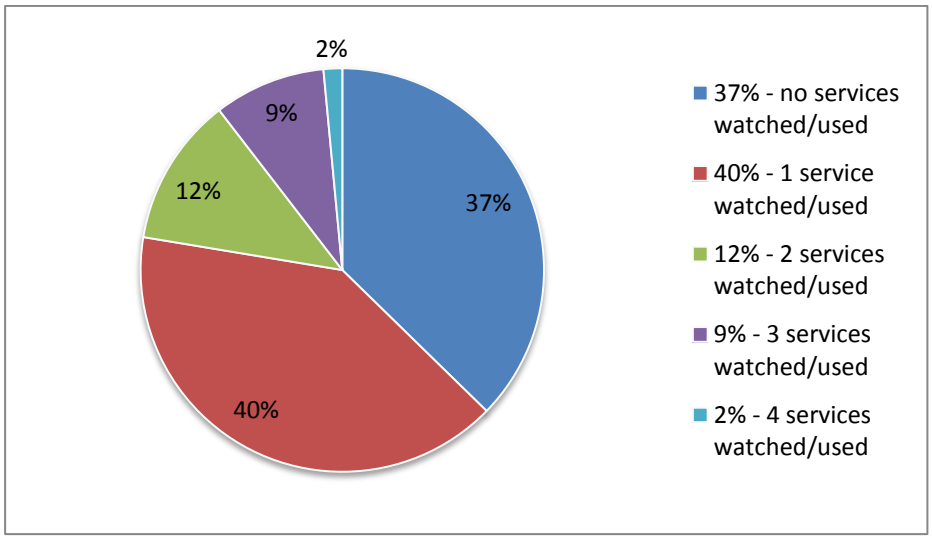

Figure 5 - Amount of services watched/used in the second session (n=67)

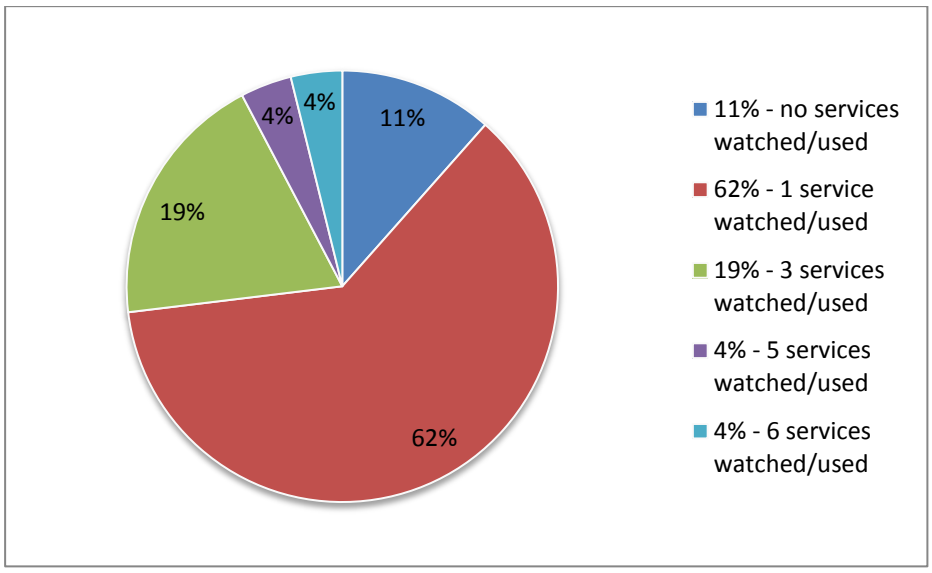

Figure 6 - Amount of services watched/used in the third session (n=25)

49.1 percent of the sessions ends with a log out (84 different users), which makes it possible to define an average duration of those sessions. An average visit to the portal takes 4:39 minute. The average time between the first and the second session is 6 days (n=67, range 0 – 47 days). The average time between the second and third session is 4 days (n=25, range 0-19 days).

Of the 97 sessions that that do not contain only a login and logout, but where an action is done, most sessions started with a click on the button e-appointment or e-consult. The distributions of the first services that are clicked on in all the first and possible second and third sessions are given in table 12 - 14.

Table 12 - The first clicked service in the first session: frequencies and percentages (n=138)

Service	n	%
No service clicked	135	97.8
e-Appointment	2	1.4
e-Consult	0	0
Health information	1	0.7
Total	138	100%

Table 13 - The first clicked service in the second session: frequencies and percentages (n=67)

Service	n	%
No service clicked	25	37.3
e-Appointment	28	41.8
e-Consult	13	19.4
Health information	1	1.5
Total	67	100%

Table 14 - The first clicked service in the third session: frequencies and percentages (n=25)

Service	n	%
No service clicked	3	12.0
e-Appointment	10	40.0
e-Consult	11	44.0
Health information	1	4.0
Total	25	100%

The button of e-appointment is placed on the home page in the left corner of all buttons of services. Apparently, this button is easily found; quite a lot of users have entered the service e-appointment. Searching for trustworthy information seems not to have a big interest of the users. When users are followed in the time, a typical observation is that most of them do nothing with the portal the first time. When a second and third session is done, more services are used/watched; it might be the case that then the portal is being discovered or actually used.

Comparing table 15, which gives an overview of the frequency of total used/watched services in all sessions, with the results of the survey, results in a confirmation of the distribution of use. The

respondents indicate in table 10 that e-appointment is the most used service (38.2%), followed by e-consult (30.3%) and some low (but nonetheless higher) scores for health information (21.5%).

Table 15 - Total services used/watched, frequencies and percentages (n=283 sessions)

Service	n	%
e-Appointment	90	31.8
e-Consult	67	23.7
Health information	14	4.9

Research question 2: Is the use of the patient portal influenced by the employment of promotional activities?

Log files

The data of the two practices are checked on several factors, but none of them showed significant differences between the two practices (p>0.05). Table 16 presents the outcomes of the chi-square tests of the checked factors of comparability. General practice 2 and 3 are two comparable practices, both a part of the same organization in Utrecht, which consists of two more locations. The implementation and introduction of the portal proceed at the same time and is done with the same strategy and vision and by the same person. The possible differences in social economic status cannot be studied yet, since the district of general practice 2 is new and data about the citizens is not yet available. The only difference now observable is the deployment of a promotional team.

Table 16 - Outcomes of tests of several characteristics for comparison of both practices

Characteristic		General practice 2	General practice 3	Chi-square
Quantity registered	healthcare consumers	7759	8165	p=0.157
	households	3192	2952	
Average quantity of visits	per healthcare consumer			p=0.157
	Total	35967	36065	
	Per healthcare consumer	4.93	4.80	
Ratio of age groups				p=0.247
Origin (%)				p=0.224
	Dutch	64.7	72.2	
	Moroccan	7.3	7.0	
	Turkish	5.2	2.9	
	Antillean	5.7	5.3	
	Non-western	7.5	4.3	
	Western	9.6	8.2	
Percentage of healthcare consumers with a chronic illness (DM, COPD and VRM)				p=0.199
	Diabetes	2.52	2.82	
	COPD	0.44	0.49	
	VRM	1.85	2.30	

Table 17 describes the reach of the portal within both practices and the characteristics of the users.

Table 17 – Quantity and characteristics of the registered users and percentage of the total scope of the 2 general practices

	Practice with promotional team		Practice without promotional team	
	n	% (total n=7759)	n	% (total n=8165)
Quantity of users	124	1.6	127	1.6
Gender	57 females	1.76	64 females	1.65
	50 males	1.23	48 males	1.32
Age				
<55 years old	91	1.41	88	1.34
55-65 years old	8	2.21	11	2.59
>65 years old	8	1.69	10	1.88

So, in the table it can be seen that the promotional team does not cause a difference in the reach of the patient portal, since this is the same between the two practices. Two other important issues are if the target group is reached and whether the portal is actually used and continue to be used. Table 18 presents the actual use of the portal.

Table 18 - Use of the portal and if possible the percentage of the total scope of the 2 general practices

	Practice with promotional team		Practice without promotional team		
	n	% (total n=7759)	n	% (total n=8165)	Chi-square
Patients that have logged in					p<0.001
to the portal in February	2	0.026	1	0.012	
March	5	0.064	2	0.024	
April	37	0.477	10	0.122	
May (until 21th)	21	0.271	15	0.184	
Use of the services					p=0.0153
e-appointment	16	0.206	7	0.086	
e-consult	11	0.142	8	0.098	

An effect of the promotional team on the scope of the portal cannot be found, but the people that are reached to use the participants is considerably more. A significant difference can be found in the amount of unique patients logging in per month (Chi-square: p<0.001) and the use of the services e-appointment and e-consult (Chi-square p=0.0153).

Research question 3: What are the opinions of the users with regard to the persuasiveness and the usability of the portal?

Survey

All of the services are judged positively, which fits in the general expectation of a survey, although respondents are quite critical and offer a lot of recommendations. Figure 7-12 gives an overview of the ratings given to the login procedure, the home page and the four interactive services (e-appointment, e-consult, e-prescription and e-lab). The black sticks represent the 95% confidence intervals around the scores.

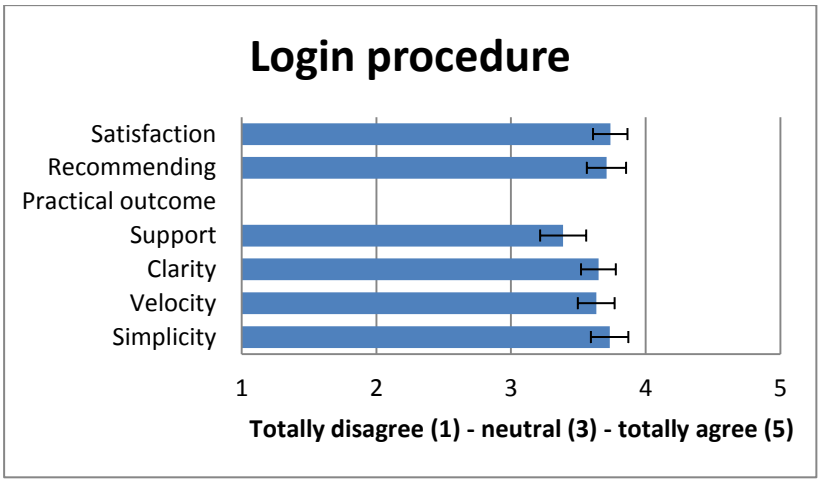

Figure 7 - Ratings of the login procedure given by the respondents of the survey (with 95% confidence interval)

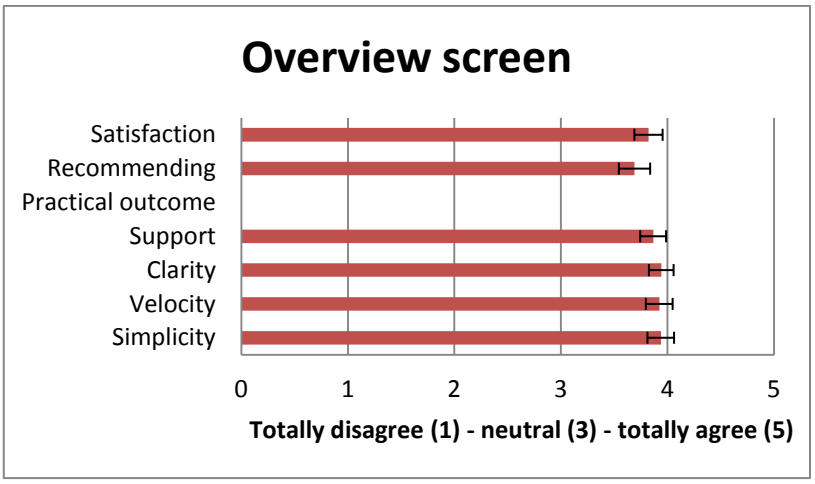

Figure 8 - Ratings of the home page given by the respondents of the survey (with 95% confidence interval)

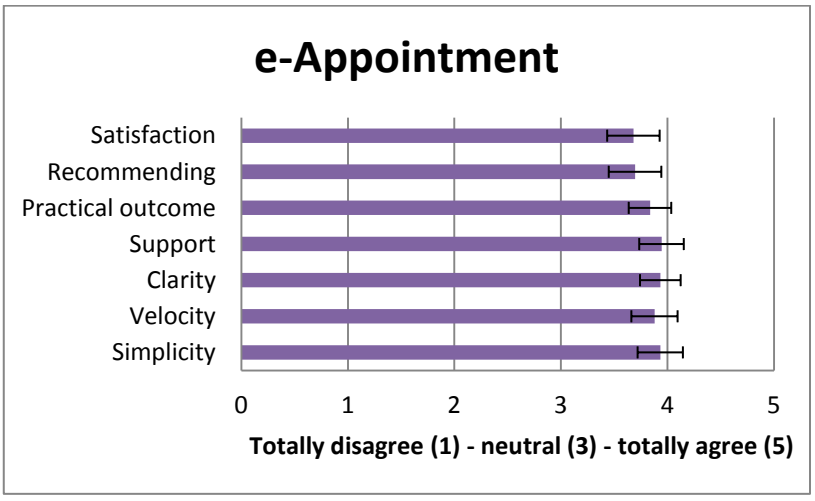

Figure 9 - Ratings of e-appointment given by the respondents of the survey (with 95% confidence interval)

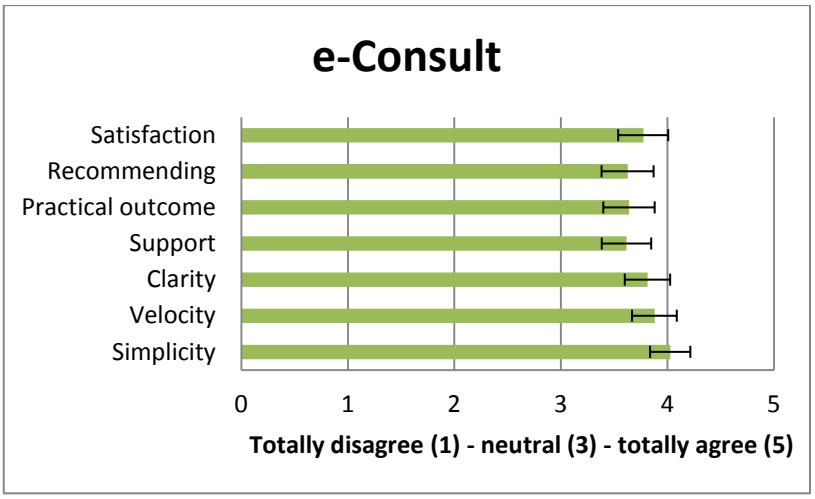

Figure 10 - Ratings of e-consult given by the respondents of the survey (with 95% confidence interval)

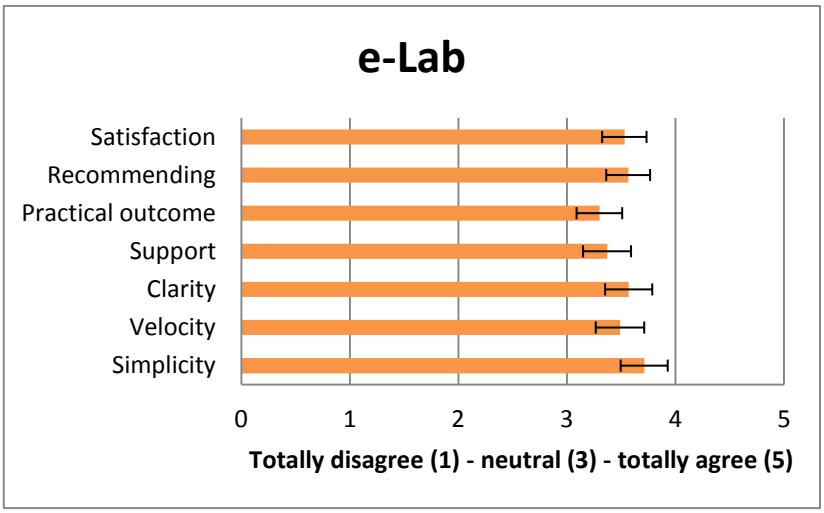

Figure 11 - Ratings of e-lab given by the respondents of the survey (with 95% confidence interval)

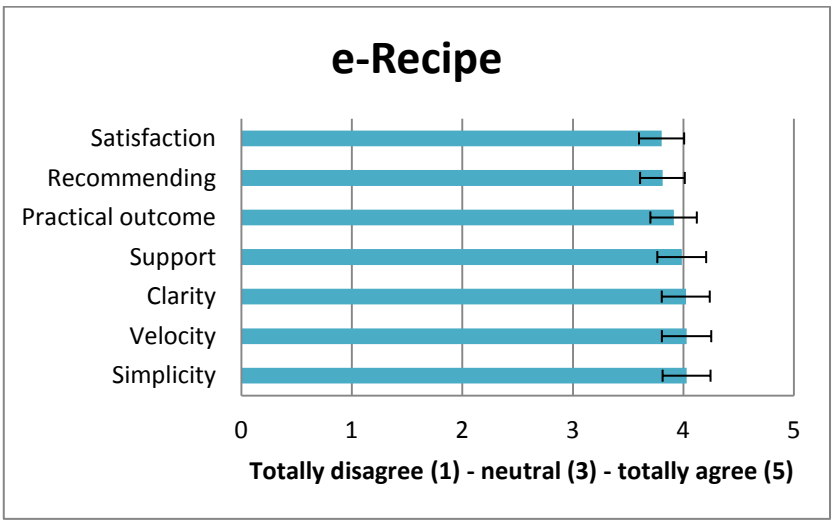

Figure 12 - Ratings of e-prescription given by the respondents of the survey (with 95% confidence interval)

What stands out is that especially e-prescription is judged positively regarding simplicity and velocity. E-lab scores a bit less in practical outcome, which means that respondents expect more or less no change in the contact they have with the general practice by using this service. Likewise, the respondents don't feel assisted when having problems with the login procedure, but it must be noted that 105 respondents (47.5%) stated that the question was inapplicable. All confidence intervals are at least 3.1, which mean that most respondents are not negative but at least neutral to positive towards the themes of the services.

Perceived persuasiveness is measured through the survey using the perceived persuasiveness questionnaire (Lehto, 2012). The four categories of Oinas-Kukkonen (2009) recur in this questionnaire: Primary Task Support, Dialogue Support, System Credibility Support and Social Support. The judgments given to the different questions are given in table 19.

Table 19 - Judgments given to the questions about perceived persuasiveness in the survey (n=210 respondents)

Category	Question	Judgment*	
		All respondents (n=210)	Experienced respondents (n=28)
Primary task support	Provides with means	3.91	4.21
	Helps	3.72	3.96
	Helps to change	3.31	3.54
Dialogue support	Provides feedback	3.60	3.93
	Provided counseling	3.75	4.07
	Encourages	3.41	3.67
System credibility support	Trustworthy	3.70	4.04
	Reliable	3.53	4.00
	Shows expertise	3.42	3.81
	Instills confidence	3.47	3.78
	Made by professionals	3.44	3.73
Design aesthetics	Attractive screen	3.57	3.44
	Appealing	3.51	3.48
	Nice visual experience	3.39	3.46
Perceived persuasiveness	Has an influence	2.72	2.68
	Personally relevant	3.41	3.65
	Makes consider	3.61	3.89
Unobtrusiveness	Fits into daily live	3.38	3.68
	Disrupts routines (reversed item)	1.99	1.84
	Practical/convenient	3.66	4.04
	Finding time is ok	3.85	4.11
Intention to continue using the system	I want to use	3.86	4.14
	I expect to use	3.84	4.01

* 1=totally disagree; 2=disagree; 3=neutral; 4=agree; 5=totally agree

Primary Task Support concerns the functionalities of the portal and the ability to healthcare consumers to control their health issues. This category is judged positive, with mean 3.65 (95%CI 3.58 – 3.71). Feedback mainly is about the extension of some services, like insight in the medical record. Also addition of more healthcare disciplines of the general practice and outside the general

practice, like the practice nurse, psychotherapist and doctors from the hospital is highly recommended.

Dialogue Support means if any coaching is possible, that the system is interactive. This is also judged positive, with mean 3.56 (95%CI 3.46 – 3.66). Hereby, feedback of the respondents is mainly about the help-menu. The respondents did expect more information and assistance, but also a clearer order confirmation of repeat prescription is mentioned a couple of times.

The trustworthiness of the system is part of the System Credibility Support. The more credible a system looks, the more persuasive it is. Also an attractive lay-out concerns this category. This is judged positive, with mean 3.50. There is some disagreement about the attractiveness of the lay-out of the whole portal. A couple of comments were made which make clear that the lay-out must be more attractive, more clear and also more unequivocal through the whole portal; the lay-out of the home page does not match with that of the services itself. On the other hand, some respondents state very explicit that the lay-out does not matter, but that it is more important whether the information is correct and that the system works good. Access with a tablet or mobile phone is appreciated and this topic concerns believe/feeling that the portal is build by professionals.

At last the Social Supports, regarding the possibility of the system to motivate the healthcare consumers to leverage social influence. The mark the healthcare consumers give to this category is averaged 3.52 (95%CI 3.47 – 3.57).

To the question if healthcare consumers are expecting and planning to use the portal in the future, a large intention is presented in an average of 3.85 (95%CI 3.76 – 3.95).

Remarkable are the results of the 2 reversed questions. When people where asked when the portal fits into their daily life, they are neutral to positive. Furthermore, when the same question from a negative perspective is asked, whether the portal disrupts their routines, they obviously disagree. The expected social desirable positive judgment betrayed itself when asking the opposite, resulting in a clear statement.

The results of the questions about perceived persuasiveness are also given from the respondents that used 4 or all available services of the portal. What table 18 makes clear is that these experienced users feel more persuaded; all scores are at least 0.2 points higher than average (which is actually not a significant difference). Only the design is not judged more positive.

Usability tests

15 usability tests were performed with stratified randomly selected respondents from a group of people that filled in the survey and declared that they possibly wanted to participate in further

research. Strata that were used are gender, age, education level, experience with the portal and chronic illness, to include a wide range of different characteristics. The characteristics of the sample of respondents are given in table 20.

Table 20 – Characteristics of respondents of the usability tests

Characteristic	Distribution	n	%
Gender	Female	8	53.3
	Male	7	46.7
Age	<55 years old	3	20
	55 – 65 years old	7	46.7
	>65 years old	5	33.3
Use of the portal	0 – 1 time	2	13.3
	2 – 4 times	5	33.3
	4 – 6 times	2	13.3
	>6 times	6	40
Educational level	VMBO/MAVO/LBO	3	20
	HAVO/VWO/MBO	9	60
	HBO/WO	3	20
Chronic illness	Yes	10	66.7
	No	5	33.3

From a total of 150 scenarios, 29 (19.3%) are not succeeded without help. The failed scenarios with a possible explanation are presented in table 21.

Table 21 – Failed scenarios and a possible explanation based on quotes of the respondents

Scenario	n	%	Explanation
Login	2	13.3	Below the button 'login with your DigiD' is a button with the logo of DigiD, which refers to the general internet page of DigiD.
e-Appointment	0		
e-Consult	3	20	The difference between e-appointment and e-consult is not clear for the respondents.
e-Prescription	0		
e-Lab	0		
Medical record	2	13.3	The medical record is not discoverable from the home page. Respondents have to open a random service to get access to another menu with more possible actions, like insight in their medical record.
Health information	5	33.3	Access to health information is not possible within the screen of the interactive services and usable information Mijn GCM intends to refer to is outdated and gives an error.
Help-menu	10	66.7	The expression 'uitleg' is not very clear to all respondents, they searched for 'help.' Also the same as for health information, the help-menu cannot be opened directly from the screen of the interactive services. Four times, the respondent had difficulties getting the scenario into a relevant query.
Change of profile	7	46.7	Again, this function is not available on in the screen of the interactive services. 2 times, a respondent did search for profile, but did not remember where he/she had seen it before. The button that has to be clicked on to change the data causes also some troubles, which shows the whole service is not obvious for everyone.

Significant differences in results of succeeded/failed scenarios are only found in the quantity of use of the portal (Chi-square, p-value=0.048). Other factors that are checked turned out not to be

significant: age, gender, chronic illness and educational level. All respondents did have access to a computer and internet at home and used the internet daily.

665 quotes were about navigating to and through the services. 392 are about stimulating factors and 336 about impeding factors. Table 22 gives insight in the quotes and codes.

Table 22 - Frequency of given codes

Theme	+/-	Meaning	n	%
System	+	Knows which service directly	81	6.4
	+	Knows which service and desired content/information directly	27	2.1
	-	Not sure about which service needed and place	57	4.5
	-	Switch to other service	19	1.5
	-	Wrongly thinks having the good service	3	0.2
Content	+	Information clear to respondent	55	4.3
	+	All relevant information given	26	2.0
	+	Information logically placed	21	1.6
	-	Statement or question indicating that information is not clear	74	5.8
	-	Confusion about the information given	32	2.5
	-	Information not logically placed	22	1.7
	-	Wrongly thinks having the good information	17	1.4
	-	Wrongly ignores good information	7	0.5
Effective	+	Scenario finished without help	43	3.4
	-	Scenario not finished without help	28	2.2
Efficient	+	Walking through service correct – scenario completed	72	5.7
	-	Unneeded actions to complete service	29	2.3
Skills	+	Respondents thinks he/she is able to use in future	73	5.7
	+	Remembered placing from earlier experience	2	0.2
	-	Difficulties with translating scenario into search	15	1.2
	-	Did not remember placing from earlier experience	6	0.5
	-	Respondents thinks he/she is not able to use in future	1	0.1
Use	+	Respondent indicates intention to use	36	2.8
	+	Service has been used before	17	1.3
	-	Respondents indicates having no intention to use	27	2.1
	-	Service has not used before	27	2.1
Expectation	+	Expects having the good service	2	0.2
	-	Expects having a wrong service	29	2.3
		Respondents tells about expectation(s)	28	2.2
Evaluation	+	Respondent is satisfied	157	12.3
	+	Respondent has no suggestions to improve	52	4.1
	-	Respondent gives a suggestion to improve	80	6.3
	-	Respondent is not satisfied	33	2.6
Other		Technical error	15	1.2
		Other	60	4.7
Total			1274	100%

In most of the quotes, the respondent knows which service he/she needs and chooses this service directly (n=108). Still, there is some trouble translating the scenario into a relevant query (n=15), subtitles are scanned, a random service is tried or the respondent switched to another service (n=79). Problems during going through the services relate in particular to comprehension difficulties. Confusion arises about the information in the service, because it is not described clear enough for the respondent, it is not in a logical place or the respondent asks a question or makes a comment

indicating this (n=128). According to the respondents, this might be the reason that unnecessary steps are made or a scenario is failed (n=56).

An often heard comment made by the participants after failing a scenario was like: *'Now that I know, I think it is getting easier' (Respondent 6).* This confirms the outcomes of the perceived persuasiveness questionnaire, where more experienced people scored higher on the topics like the portal helping, encouraging and satisfies them. On top of that, it also explains the effects in traffic of the promotional team, since the task of this team is to answer question and help people in using it, among others.

Discussion

Main findings

The aim of the study was to provide insight in the use, usability and persuasiveness of a patient portal, since these aspects seem to be good predictors of adherence (Demiris, et al., 2008; S. M. Kelders, et al., 2012; Oinas-Kukkonen, 2009). Besides that, the possible effect of a promotional team on the use of the portal is investigated, to check whether this form of a change agent can decrease the resistance against diffusion of the e-health innovation (Cain, 2002).

How is the portal being used?

The portal is widely used; 70 percent of the registered healthcare consumers did actually use the portal. Nevertheless, only 13 percent of them use (almost) all services, resulting in a lower depth of use. In total, 5.8 percent of the practice is reached to register to the portal, which means the research is done among early adopters. This does not have to bias the results, since comparable research of Emani et al. showed that there were no differences between the early and late adopters regarding use and satisfaction of an interactive personal health record (Emani, et al., 2012). The portal has to be scaled up to the whole practice to confirm this assumption and the portal can be exploited more in using different available services. A general characteristic of the reached user seems to be a chronically ill, average to highly educated healthcare consumer who is between 55 and 65 years old. In part, this is also the target group of the services of the portal, since older and chronically ill healthcare consumers on average have more contact with the general practice, so a large impact can be achieved with this group regarding the quality and costs of healthcare. Even though in principal the target group consists of all healthcare consumers, this representation of the early adopters being highly educated and having more contact with the practice is found in literature (Rogers, 2003).

The logging files gave a good insight in the frequency of use and the progress in time. During a follow-up period of a maximum of two and a half month, users did login an average of two times. Where in the first session almost everybody only watched on the overview screen, possibly to see what is possible with the portal. In the second (and third) session the services where getting more and more explored and the time between those sessions becomes shorter. In about half of the cases, a user did not make a second visit to the portal. The outcomes of the service thought us that the most common reason (44.1 percent) for this, is that an occasion to use the portal (e.g. illness) did not yet occur, but also not liking to use the portal or not knowing how to use it are factors that play a part.

Is the use of the patient portal influenced by the employment of promotional activities?

An increased amount of registrations was expected in the practice where a promotional team was deployed. This was not the case; however the traffic to and within the portal was considerably higher in that particular practice. Activities of the promotional team like promoting, identifying, informing and convincing possible users, which are also described by Cain (2002) as factors that influence the diffusion of new technologies, seem to have a positive influence. This cause of this positive influence is not clear, but a possible confirmation is found in the usability tests. A frequently found pattern in the usability tests was that people clearly state that when they have seen it once, they will not make the mistake again and are enthusiastic and intended to use. The promotional team also shows the patient portal to the healthcare consumers on a tablet and people can try out the functionalities and get a first impression of the patient portal. Also difficulties and questions are answered using the tablet with the patient portal, which makes that people get use to it, struggles are offset and people are enthusiastic and intended to use.

What are the opinions of the users with regard to the perceived persuasiveness and the usability of the portal?

Overall, the portal is judged positively. There was a great involvement of the healthcare consumers in the different methods of the study: a high response rate of 42.3% in the survey, 117 healthcare consumers willing to participate in a follow-up interview and a lot of feedback and recommendations given through the survey, usability tests and in between.

System – Eleven of the failed scenarios (37.9%) where caused by the usability of the system. Double placed buttons and three menus, not containing a uniform content caused that users are confused and unable to perform what they wanted to do. This might have something to do with skills, but when focusing on a target group of older patients, a more uniform and clear system would definitely help.

Content – Twelve of the failed scenarios (41.4%) regard a confounding content of the system, mainly about used terminology. Differences between the service names ‘e-appointment’ and ‘e-consult’ could hardly be made, just like searching for a ‘help menu’ button instead of the used formation ‘explanation.’ Concluding, it is very important that the text in and titles of the services is clear, understandable and unequivocal.

Effectiveness – Almost 20 percent of the scenarios failed, which seems to be a substantial amount, nevertheless when analyzing these causes a large proportion of mistakes can be solved through minor adjustments. The other scenarios were completed effective, resulting in participants who are satisfied with the done scenarios and understanding about possible made mistakes.

Efficiency – Unneeded actions the users performed where mainly regarding the three double menu's available in the portal. Also navigating through the system caused some random clicking behavior, resulting in a non-efficient use of the portal.

Skills – The importance of the skills of the end-users has become clear; six of the failed scenario's (20.7%) where related to the skills of the participants. Some did not remember where they had seen specific information before or difficulties in translating the question into a relevant query where experienced. Nevertheless, when the system is adjusted in cooperation with the end users on their perspective and expectations, it will be even more user friendly and persuasive.

Use - Both persuasiveness and usability seem to be a predictor of adherence, since negative experiences lead to drop-outs as observed in the usability tests. Perceived persuasiveness is judged higher when people had more experience with the portal, but we must ask if it is not only the highly motivated user that continues with the portal after experiencing a moderate usability. This is found in research by Emani et al. (2012) were rejecters of a interactive personal health record reported lower scores on four factors of adoption of innovation as defined by Rogers (2003).

Expectations – A considerable number of respondents of the survey (73%) indicated that they intend to use the portal. All comments and suggestions together gave an encouraging evaluation and confirmation of the personalized, white-label, interactive portal PAZIO offers; respondents desired more healthcare providers being added into their portal and an expansion of the medical record. They also gave suggestions like desiring video communication, which shows the benevolence and creative thinking of the users.

Both the survey and the usability tests showed that the services e-lab, e-prescription and medical record where used very often and judged positively. In general these services where unequivocal, resulting in a low amount of failed scenario's and specifically e-prescription had a high difference in practical convenience between the old way of face-to-face contact or contact by telephone and completing the action by using the patient portal. The overall good judgment of all available services, observed differences in healthcare consumers and their needs and actions and the willingness to use the portal make it important for a general practice to provide an as complete as possible portal, offering different services to make the users enthusiastic about all possibilities and features. The patient portal should expand, since this is favored by the users and results in a portal which suits all needs.

Limitations

The data gathered to answer the research questions does also have some limitations. Because of this, not every statement could be optimally founded.

In the log file data, it cannot be stated that a service is actually used/finished, because only the 'start-up click' to the service can be followed through the log files. Another point of awareness is that when a user opens for example the service e-appointment, all other services are accessible from that screen by an internal menu. These actions cannot be followed through the log files, resulting in a limited insight in the actual use. Another important note that must be made is that the insight in the watched/used services can be obtained to a certain extent. The applications e-appointment and e-consult can also be reached via an additional menu within these services. Also, the medical record can be seen by using this specific menu. Unfortunately, the clicks that are done in this deeper layer of the services itself cannot be seen through the log files; the actual use of the services could fortunately be extracted from statistics gathered by the system of the general practice itself.

The comparability of the two practices seems to be ensured, but could not be compared on social economic status, which is a fourth limitation of the study.

Conclusions and future research

Among others, Peters (2009) is right about a bad use resulting from a bad usability, which is the overall main finding, confirmed by all 3 methods. The promotional team is effective through helping people and explaining the features of the portal, the perceived persuasiveness is higher when having more experience with the portal, or lower when having little to no experience, and the observations of the usability tests make clear that healthcare consumers do not make the same mistake twice and are very enthusiastic after explanation and testing all the possibilities of the patient portal.

There is a great desire for a high accessibility of healthcare; almost half of the sessions where outside office hours, which confirms the need for an improved access of healthcare. A patient portal seems to be a desirable way for practical activities like repeat prescriptions and more, just because the healthcare consumer can determine his own time.

De used mixed-methods where enriching in this first explorative evaluation; further continuation of research is needed in evaluation, redevelopment and impact assessment of the aimed effects.

More longitudinal research is needed to check whether the target group (the chronic ill patient) is reached, whether the healthcare outcomes are improved and also if these portals lead to more efficiency and lower costs of healthcare. The influence of a promotional team, among other factors that influence the uptake and use of a portal, need to be further investigated. Nevertheless, more time is needed for healthcare consumers to adopt the new technology and learn to make it part of

their daily life. It is important to cooperate with end-users in the ongoing cycle of research, giving them enough time to adopt but also responding quickly to given feedback

Implications

I believe that a usable system with a persuasive design has the potential to enthuse users, creating traffic in the full range of different services, since the need and willingness of such patient portals is high and the aimed goals of an improved access of care, quality of care, comprehensive care could be realized.

To create a usable system, a perfect coherence with the needs, expectations and view of the healthcare consumers is necessary; guiding the end-users to and through the system, observing struggles and successes, a perfect fitting help-menu and constant evaluations. On top of that, to improve patient-centered healthcare, which is the aim of the portal and desire of the end-user, the portal has to expand with other services and healthcare providers.

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Appendix

Questions survey

Vragenlijst ervaringen Mijn GCM

1. Welkom bij de vragenlijst over uw ervaringen met Mijn GCM. Het doel van dit onderzoek is om te evalueren of Mijn GCM een bruikbaar en aantrekkelijk portaal is. Daarvoor hebben we uw mening en ervaringen nodig! Deelname aan dit onderzoek is geheel vrijwillig. U kunt op ieder moment besluiten te stoppen met de vragenlijst, zonder dat u daar een reden voor hoeft op te geven. De ingevoerde gegevens zullen altijd vertrouwelijk behandeld worden en zijn anoniem.

'Ik verklaar hierbij dat ik op een duidelijke wijze ben ingelicht over de aard van het onderzoek, zoals ook uitgelegd in de begeleidende email. Ik doe vrijwillig mee aan het onderzoek, mijn gegevens blijven anoniem en worden zonder mijn uitdrukkelijke toestemming niet aan derden verstrekt.'

Hartelijk dank voor het invullen van de
vragenlijst!

Ik ga WEL akkoord met mijn hierboven beschreven rechten.
Start de vragenlijst.
Ik ga NIET akkoord met mijn hierboven beschreven rechten.
De vragenlijst wordt afgesloten.

1. Hoe vaak heeft u ingelogd bij Mijn GCM?
- Ik heb nog nooit ingelogd bij Mijn GCM.
- Ik heb 1-3 keer ingelogd bij Mijn GCM.
- Ik heb 4-6 keer ingelogd bij Mijn GCM.
- Ik heb vaker dan 6 keer ingelogd bij Mijn GCM.

Er volgt nu een aantal vragen over uw ervaringen met Mijn GCM.
Inloggen

2. Met welk doel heeft u ingelogd bij Mijn GCM? (meerdere antwoorden mogelijk)
- Ik heb alleen gekeken hoe het portaal eruit ziet en heb Mijn GCM (nog) niet gebruikt.
- Ik heb een eAfspraak ingepland.
- Ik heb een eConsult gedaan.
- Ik heb een eRecept aangevraagd.
- Ik heb mijn dossier of onderzoeksuitslagen met eLab ingezien.
- Ik heb patiëntenfolders en/of ziektebeschrijvingen bekeken.
- Anders, namelijk...

Opmerkingen over het inloggen:...

3. Als u Mijn GCM wilt gaan gebruiken, komt u via de startpagina van uw huisarts op bovenstaand scherm. Hieronder volgt een aantal stellingen over het inloggen. Geef aan in hoeverre u het hiermee eens bent. (Helemaal oneens, oneens, noch oneens/noch eens, eens, helemaal eens, niet van toepassing)

- Het is eenvoudig om in te loggen bij Mijn GCM.
- Inloggen in Mijn GCM gaat snel.
- Op de startpagina van mijn huisartsenpraktijk is de knop om in te loggen overzichtelijk weergegeven.
- Ik wordt goed begeleid als ik problemen heb met inloggen.
- Ik zou de inlog met DigiD, zoals bij Mijn GCM, aanbevelen aan familie of vrienden.
- Over het algemeen ben ik tevreden over het inloggen van Mijn GCM.

Overzichtsscherm

Opmerkingen over het overzichtsscherm:...

4. Als u succesvol heeft ingelogd bij Mijn GCM ziet u bovenstaand overzichtsscherm. Hieronder volgt een aantal stellingen over het overzichtsscherm. Geef aan in hoeverre u het hiermee eens bent. (Helemaal oneens, oneens, noch oneens/noch eens, eens, helemaal eens, niet van toepassing)

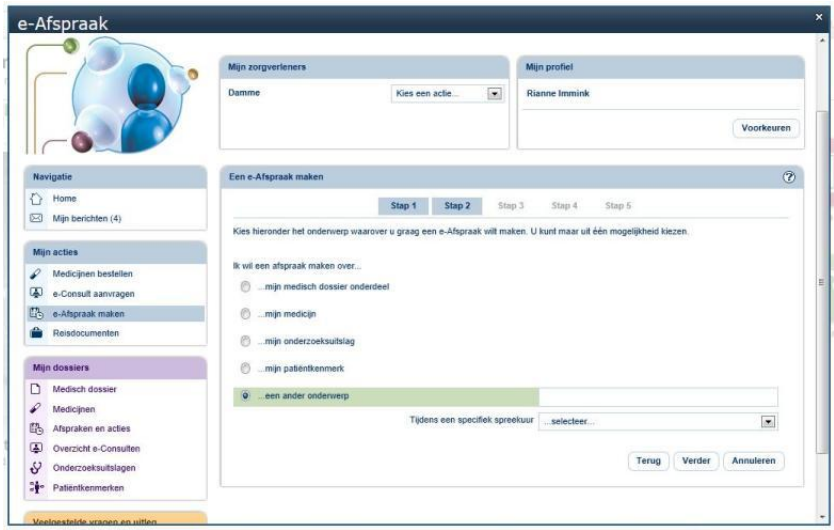
- Met dit overzichtsscherm vind ik eenvoudig de diensten van Mijn GCM die ik wil gebruiken (zoals eAfspraak, eConsult, eLab, eRecept, Patiëntenfolders en Ziektebeschrijvingen).
- Met dit overzichtsscherm kan ik snel de diensten van Mijn GCM vinden die ik wil gebruiken.
- De verschillende diensten die Mijn GCM biedt, zijn overzichtelijk weergegeven in het portaal.
- Het overzichtsscherm helpt mij om de weg te vinden naar de diensten van Mijn GCM die ik wil gebruiken.
- Het gebruik van Mijn GCM zou ik aanbevelen aan mijn familie of vrienden.
- Over het algemeen ben ik tevreden over het overzichtsscherm van Mijn GCM.

eAfspraak

5. Heeft u wel eens een eAfspraak ingepland? U krijgt dan bovenstaand scherm te zien.
   Nooit, een enkele keer, meerdere keren, regelmatig, vaak.

Opmerkingen over eAfspraak:...

6. Hieronder volgt een aantal stellingen over eAfspraak. Geef aan in hoeverre u het hiermee eens bent. (Helemaal oneens, oneens, noch oneens/noch eens, eens, helemaal eens, niet van toepassing)



- Het is eenvoudig om een eAfspraak in te plannen.
- Met eAfspraak kan ik snel een afspraak inplannen.
- De mogelijkheden op de pagina eAfspraak worden overzichtelijk weergegeven.
- De pagina eAfspraak helpt mij om een afspraak in te kunnen plannen met mijn huisarts.
- Ik verwacht dat ik door eAfspraak minder telefonisch contact zal hebben met de huisartspraktijk.
- Ik zou het maken van een afspraak via eAfspraak aanbevelen aan familie of vrienden.
- Over het algemeen ben ik tevreden over de dienst eAfspraak.

eConsult

7. Heeft u eConsult wel eens gebruikt? (U krijgt dan bovenstaand scherm te zien).
   Nooit, een enkele keer, meerdere keren, regelmatig, vaak.

8. Hieronder volgt een aantal stellingen over eConsult. Geef aan in hoeverre u het hiermee eens bent. (Helemaal oneens, oneens, noch oneens/noch eens, eens, helemaal eens, niet van toepassing)

- Het is eenvoudig om een eConsult te doen.
- Ik krijg snel een reactie op een eConsult.
- De mogelijkheden op de pagina eConsult worden overzichtelijk weergegeven.
- Ik voel me goed begeleid met eConsult.
- Ik verwacht dat ik door eConsult minder facetoface contact (ín de huisartsenpraktijk) met mijn huisarts zal hebben.
- Ik zou het doen van een eConsult aanbevelen aan familie of vrienden.
- Over het algemeen ben ik tevreden over de dienst eConsult.

Opmerkingen over eConsult: ...

eLab

9. Heeft u eLab wel eens gebruikt? (U krijgt dan bovenstaand scherm te zien).
   Nooit, een enkele keer, meerdere keren, regelmatig, vaak.

Opmerkingen over eLab:...

10. Hieronder volgt een aantal stellingen over eLab. Geef aan in hoeverre u het hiermee eens bent. (Helemaal oneens, oneens, noch oneens/noch eens, eens, helemaal eens, niet van toepassing)

- Het is eenvoudig om eLab te gebruiken om mijn laboratorium uitslagen in te zien.
- Mijn laboratorium uitslagen zijn snel in te zien in eLab.
- Mijn laboratorium uitslagen worden overzichtelijk gepresenteerd in eLab.
- Ik voel me goed begeleid bij het inzien van mijn laboratoriumuitslagen in eLab.
- Ik denk dat ik door eLab minder contact met mijn praktijk zal hebben (telefonisch of facetoface).
- Ik zou eLab aanbevelen aan familie of vrienden.
- Over het algemeen ben ik tevreden over de dienst eLab.

Anders,

eRecept

11. Heeft u eRecept wel eens gebruikt? (U krijgt dan bovenstaand scherm te zien). Nooit, een enkele keer, meerdere keren, regelmatig, vaak.

12. Hieronder volgt een aantal stellingen over eRecept. Geef aan in hoeverre u het hiermee eens bent. (Helemaal oneens, oneens, noch oneens/noch eens, eens, helemaal eens, niet van toepassing)

- Het is eenvoudig om met eRecept een herhaalrecept aan te vragen.
- Online een herhaalrecept aanvragen met eRecept gaat snel.
- De mogelijkheden op de pagina eRecept worden overzichtelijk weergegeven.
- De functie eRecept helpt mij bij het aanvragen van een herhaalrecept.
- Ik verwacht dat ik door eRecept minder telefonisch contact met mijn huisartspraktijk zal hebben.
- Ik zou eRecept aanbevelen aan familie of vrienden.
- Over het algemeen ben ik tevreden over de dienst eRecept.

Opmerkingen over eRecept: ...

Hieronder volgt een aantal stellingen over Mijn GCM als geheel.
(Helemaal oneens, oneens, noch oneens/noch eens, eens, helemaal eens, niet van toepassing)

13. Mijn GCM biedt alle functies en mogelijkheiden die ik ervan verwacht.
    Zo niet, wat mist er?
14. Mijn GCM geeft me middelen om mijn gezondheidszaken te kunnen regelen. Zoals het inplannen van een afspraak, een herhaalrecept aanvragen, online een vraag stellen en onderzoeksuitslagen, folders of het dossier inzien.
15. Mijn GCM helpt mij om mijn gezondheidszaken te regelen.
16. Mijn GCM helpt mij om de regie over mijn zorgproces in eigen handen te nemen.
17. Als ik een online een afspraak of herhaalrecept aanvraag, krijg ik een gepaste reactie en/of bevestiging.
18. Als ik online een vraag stel (eConsult), krijg ik gepaste begeleiding en/of adviezen.
19. De communicatie met mijn gezondheidscentrum die door Mijn GCM mogelijk is, moedigt me aan om Mijn GCM te gebruiken.
20. Mijn GCM is geloofwaardig.
21. Mijn GCM is betrouwbaar.
22. Mijn GCM getuigt van expertise.
23. Mijn GCM wekt vertrouwen.
24. Mijn GCM is door zorg professionals gemaakt.
25. Het scherm van Mijn GCM is aantrekkelijk. Onder andere de kleuren, layout, etc.

26. De algemene vormgeving van Mijn GCM spreekt me aan. Onder andere de applicaties, tabbladen, etc.
27. Mijn GCM biedt een mooie visuele ervaring.
    Zo niet, hoe zou het uiterlijk van Mijn GCM aantrekkelijker kunnen worden gemaakt?
28. Mijn GCM beïnvloedt mij.
29. Mijn GCM is voor mij persoonlijk relevant.
30. Mijn GCM maakt mij bewust van de mogelijkheden ten aanzien van het regelen van mijn gezondheidszaken. Zoals het inplannen van een afspraak, een herhaalrecept aanvragen, online een vraag stellen en onderzoeksuitslagen, folders of het dossier inzien.
31. Het gebruiken van Mijn GCM past in mijn dagelijks leven.
32. Mijn GCM verstoort mijn dagelijkse routines.
33. Het gebruiken van Mijn GCM is praktisch/handig voor mij.
34. Het is voor mij geen probleem om tijd te vinden om Mijn GCM te gebruiken.
35. De komende tijd, als een gelegenheid zich voordoet, ben ik van plan om Mijn GCM te gebruiken bij het regelen van mijn gezondheidszaken. Zoals het inplannen van een afspraak, een herhaalrecept aanvragen, online een vraag stellen en onderzoeksuitslagen, folders of het dossier inzien.
36. De komende tijd, als een gelegenheid zich voordoet, verwacht ik dat ik Mijn GCM ga gebruiken bij het regelen van mijn gezondheidszaken. Zoals het inplannen van een afspraak, een herhaalrecept aanvragen, online een vraag stellen en onderzoeksuitslagen, folders of het dossier inzien.
    Zo niet, waarom niet? Welke functies wel of juist niet?

37. De laatste 3 maanden heb ik ...
    Mijn GCM niet gebruikt.
    Mijn GCM 1-3 keer gebruikt.
    Mijn GCM 4-6 keer gebruikt.
    Mijn GCM vaker dan 6 keer gebruikt.

38. Waarom heeft u Mijn GCM niet gebruikt?
    Ik heb mij nog maar net aangemeld voor Mijn GCM.
    De gelegenheid om Mijn GCM te kúnnen gebruiken heeft zich nog niet voorgedaan.
    Ik weet niet hoe ik Mijn GCM moet gebruiken.
    Ik vind het niet handig om Mijn GCM te gebruiken.
    Ik vind het niet prettig om Mijn GCM te gebruiken.
    Anders, namelijk...

39. Wat verwacht u van Mijn GCM? (meerdere antwoorden mogelijk)
    Ik verwacht met Mijn GCM een afspraak te kunnen plannen met mijn huisarts.
    Ik verwacht dat Mijn GCM informatie biedt als ik vragen heb over mijn gezondheid.
    Ik verwacht dat ik met Mijn GCM informatie omtrent mijn chronische ziekte kan bijhouden.
    Ik verwacht met Mijn GCM online contact met mijn huisartsenpraktijk te kunnen hebben.
    Ik heb geen specifieke verwachtingen van Mijn GCM.
    Ik heb andere verwachtingen, namelijk...

Ten slotte volgt hieronder een aantal vragen over uw persoonlijke omstandigheden. Uiteraard worden ook deze gegevens vertrouwelijk behandeld en anoniem verwerkt.

40. Uw leeftijd (in jaren) is:
41. Uw geslacht (man/vrouw)
42. Heeft u thuis de beschikking over een computer? (ja/nee)
43. Heeft u thuis de beschikking over internet? (ja/nee)
44. Hoevaak gebruikt u het internet? ((Bijna) nooit, minder dan 1 dag per week, ongeveer 1 dag per week, meerdere dagen per week, (bijna) elke dag)
45. Wat is uw hoogst voltooide opleiding? (Lager onderwijs, VMBO / MAVO / LBO, HAVO/ VWO / MBO (MTS, MEAO, HBS, MMS), HBO / WO (HTS, HEAO), anders,...)
46. Wat betreft uw gezondheid, heeft u één of meerdere chronische aandoeningen? Een chronische aandoening is een aandoening die lange tijd voortduurt en in de meeste gevallen niet meer weggaat. Bijvoorbeeld COPD, astma, diabetes, hart en vaatziekten, reuma, enzovoort. (Nee/ja, namelijk...)
47. Hoe vaak heeft u contact met huisartsenpraktijk Maarssenbroek (voor het maken van een afspraak, het bestellen van herhaalrecepten of ander contact?) (Nooit: geen bezoek, soms: 1-2 bezoeken per jaar, regelmatig: 3-5 bezoeken per jaar, veel: 6 of meer bezoeken per jaar, weet ik niet).

Hartelijk dank voor het invullen van de vragenlijst! Om te kijken of Mijn GCM voor u goed kan werken, zouden wij het erg op prijs stellen om een interview met u te houden. Met de resultaten kunnen we Mijn GCM verder ontwikkelen en aanpassen op uw behoeften. Het is voor deelname niet nodig om ervaring te hebben met Mijn GCM. Het interview duurt ongeveer een half uur en zal plaatsvinden in uw huisartsenpraktijk. Indien u bereid bent mee te werken willen we u vragen hieronder uw telefoonnummer en/of emailadres achterlaten. Deze gegevens zullen alleen eenmalig voor dit onderzoek gebruikt worden en met zorg behandeld worden. Als dank voor uw deelname mogen wij u een bol.com cadeaubon aanbieden. Indien u niet wilt meewerken aan dit vervolgonderzoek, hoeft u hieronder GEEN gegevens achter te laten. Alvast hartelijk dank voor uw medewerking!

Contactgegevens :
Nee, ik werk liever niet mee aan het vervolgonderzoek.
Ja, ik wil wel meewerken aan het vervolgonderzoek. Ik ben bereikbaar via:
Telefoonnummer en/of emailadres:

Design of usability tests

Table 23 - Design of usability tests: description of scenarios and questions asked after each section.

Section		Content	Questions
Introduction		Introduction, explanation research goals and study design. Informed consent.	- Gender and age of the participant - Whether he/she has a chronic illness and which one(s). - How often he/she uses internet and with what kind of device it is mostly done - How often he/she visits general practitioner per year - How communication with the practice is normally done (face-to-face, telephone or portal) - How much he/she has used the portal - If other members of the household also uses the portal - When he/she registered to use the portal and how he/she is informed about it - When the portal was used for the last time - The general opinion regarding the portal
Scenarios	Login	Login to the system.	- If he/she is able to do this scenario at home - How he/she would finish this scenario in future (face-to-face, telephone or portal) - How he/she experienced using the portal and whether he/she is satisfied with using it - If he/she has any suggestions to improve the service
	Home page	(no assignment)	- The opinion about the organization, clarity and lay-out of the home page
	e-appointment	Make an appointment for the small diabetic control.	- If the possibility to get a reminder of the made appointment is pleasant - If he/she is able to do this scenario at home - How he/she would finish this scenario in future (face-to-face, telephone or portal) - How he/she experienced using the portal and whether he/she is satisfied with using it - If he/she has any suggestions to improve the service
	e-consult	Ask a question about the medicine Metformine.	- What is the goal of an e-consult, when is it suitable to use it? - If he/she is able to do this scenario at home - How he/she would finish this scenario in future (face-to-face, telephone or portal) - How he/she experienced using the portal and whether he/she is satisfied with using it - If he/she has any suggestions to improve the service
	e-prescription	Order a repeat prescription for the medicine Sumatriptan 50mg.	- If he/she is able to do this scenario at home - How he/she would finish this scenario in future (face-to-face, telephone or portal) - How he/she experienced using the portal and whether he/she is satisfied with using it - If he/she has any suggestions to improve the service
	e-lab	Look for the last blood test results.	- If the meaning of the blood test and further recommendations is clear - If he/she is able to do this scenario at home

	Medical record	Look for your medical record.	- How he/she would finish this scenario in future (face-to-face, telephone or portal) - How he/she experienced using the portal and whether he/she is satisfied with using it - If he/she has any suggestions to improve the service - If he/she is satisfied about how and which personal medical data is given in this service - If he/she is able to do this scenario at home - How he/she would finish this scenario in future (face-to-face, telephone or portal) - How he/she experienced using the portal and whether he/she is satisfied with using it - If he/she has any suggestions to improve the service
	Health information	Search for information about dizziness.	- If the information is findable and simple to find using this service - If he/she is able to do this scenario at home - How he/she would finish this scenario in future (face-to-face, telephone or portal) - How he/she experienced using the portal and whether he/she is satisfied with using it - If he/she has any suggestions to improve the service
	Change personal data	Change your mobile phone number.	- If he/she is able to do this scenario at home - How he/she would finish this scenario in future (face-to-face, telephone or portal) - How he/she experienced using the portal and whether he/she is satisfied with using it - If he/she has any suggestions to improve the service
	Help-menu	Search for help about printing information of the portal.	- If he/she is satisfied with the given help through the help-menu - If he/she is able to do this scenario at home - How he/she would finish this scenario in future (face-to-face, telephone or portal) - How he/she experienced using the portal and whether he/she is satisfied with using it - If he/she has any suggestions to improve the service
Evaluation		Evaluation questions and anything else under discussion.	- The general opinion regarding the portal - If the portal meets the expectations of the participant - When the portal is suitable, or not suitable to use - What the advantages and disadvantages of the portal are. - If he/she has any suggestions to improve the portal - What would be for him/her a trigger to use the portal more often?

Code scheme

Table 24 - Code scheme used to code quotes extracted from the usability tests

System	
Search/teleporting *ST+*	Respondent knows exactly where in which service he/she wants to go to and fulfills his goal directly.
Search service *SS+*	Respondent knows which services he/she needs and chooses this one directly.
Search problem 1 *SP1-*	Navigational problem: Respondent does not know exactly which service he/she needs and scans the headings of the different services or tries an random option.
Search problem 2 *SP2-*	Navigational problem: Respondent switch to another service.
Search problem 3 *SP3-*	Navigational problem: Respondent thinks having the correct service, but this is not the good service.
Content	
Recognition problem 1 *RP1-*	Recognition problem: The correct information is wrongly recognized as not being relevant or wrongly interpreted.
Recognition problem 2 *RP2-*	Recognition problem: Respondents thinks having found the good information, but this is not the good information.
Information clear *IC+*	Respondent thinks the information in the service is clear.
Information not clear *IC-*	Understanding problem: Confusion about the information in the service because to the respondent this is not clear enough.
Information logical *IL+*	Respondent thinks the information is placed logically.
Information not logical *IL-*	Organizational problem: Respondent thinks the information is not placed logically.
All information given *IG+*	According to the respondent all relevant information to complete the service is given.
Not all information given *IG-*	The respondent asks a question or makes a comment indicating that the service and/or functionalities are not totally clear.
Effectiveness	
Scenario succesful *SS+*	Respondent completes the scenario independent.
Scenario not succesful *SS-*	Respondent completes the scenario after one or more hints given by the interviewer.
Efficiency	
Scenario efficient *SE+*	Respondent walks through the service in a correct way.
Scenario not efficient *SE-*	Respondent performs unnecessary actions to complete the scenario.
Skills	
Remembered	Skills of the respondent: Respondent did remember where he/she had seen

placing *RP+*	the information before.
Did not remembered placing *RP-*	Skills of the respondent: Respondent did not remember where he/she had seen the information before.
Able at home *AH+*	Respondent indicates being able to use this service at home.
Not able at home *AH-*	Respondent indicates not being able to use this service at home.
Difficult question *DC*	Respondent has difficulties in translating the scenario into a relevant search query.
Use	
Did use *U+*	Respondent says having used this service already at home.
Did not use *U-*	Respondent says not having used this service at home.
Intention to use *IU+*	Respondent is intended to use the service in practice.
No intention to use *IU-*	Respondent does not have the intention to use the service in practice.
Expectations	
Scenario can be completed *SC+*	Respondent expects to complete the scenario with the chosen service.
Scenario cannot be complete *SC-*	Respondent expects not to complete the scenario with the chosen service.
Expectation *E+*	Respondent expresses an assumption or expectation regarding the functioning of the portal.
Evaluation	
Statisfied *S+*	Respondent is satisfied with the service or gives a comment/reaction that indicates that.
Not satisfied *S-*	Respondent is not satisfied with the service or gives a comment/reaction that indicates that.
Suggestion to improve *SI+*	Respondent has a suggestion to improve the service.
No suggestions *SI-*	Respondent has no suggestions to improve the service.
Other	
Technical error *TE*	The portal gives an error, causing the respondent cannot do the actions he/she planned to do.
Other *OO*	Other