The Role of User Expectations in Design and Development of Personalised Health Information Websites and Portals

Ekaterina Lazarenko

Bachelor of Information Technology Honours, Russian State University for the Humanities, Moscow, Russian Federation

Master of Information Management and Systems Professional, Monash University, Melbourne, Australia

Thesis submitted in full requirement for the degree of Doctor of Philosophy
Caulfield School of Information Technology
Faculty of Information Technology
Monash University
December 2010
Dedication

To my beloved parents.
For all that you are, I love you.
# Table of Contents

LIST OF TABLES................................................................................................................................................. xiii

LIST OF FIGURES .................................................................................................................................................. xv

ABBREVIATIONS .................................................................................................................................................... xvii

ABSTRACT ............................................................................................................................................................... xix

STATEMENT OF ORIGINAL AUTHORSHIP ....................................................................................................... xxi

ACKNOWLEDGEMENTS ........................................................................................................................................... xxiii

PUBLISHED PAPERS ................................................................................................................................................. xxv

1  INTRODUCTION ................................................................................................................................................... 1

1.1 Motivation and Problem Statement ................................................................................................................ 1

1.2 Purpose of Study .................................................................................................................................................. 2

1.3 Research Background ...................................................................................................................................... 3

1.3.1 Personalisation of Health Websites ........................................................................................................... 5

1.3.2 Adoption of User-Centred Design to Deliver Personalised E-health Services ........................................... 7

1.3.3 User Expectations from Personalised Health Websites .............................................................................. 8

1.4 Research Approach and Methodology ........................................................................................................... 9

1.5 Significance of Study ...................................................................................................................................... 11

1.6 Organisation of Thesis ................................................................................................................................... 11

2  RESEARCH BACKGROUND ............................................................................................................................. 15

2.1 Introduction ....................................................................................................................................................... 15

2.2 Theoretical Grounds of Study ......................................................................................................................... 15

2.2.1 User-Centred Design Philosophy .............................................................................................................. 16

2.2.2 Expectation Disconfirmation Theory ......................................................................................................... 17

2.3 Context of Study: Health Websites ............................................................................................................... 20

2.3.1 Issues with Health Websites ....................................................................................................................... 22

2.4 Personalisation as a Concept ........................................................................................................................ 26

2.4.1 Perspectives and Dimensions of Personalisation ....................................................................................... 28

2.4.2 Personalisation of Health Websites .......................................................................................................... 32

2.4.3 Personalised Features of Health Websites ................................................................................................. 34
2.4.4 Issues with Personalised Features of Health Websites ........................................ 36
2.5 User Expectations ............................................................................................................. 38
  2.5.1 Expectations in Information Systems Literature .............................................. 41
    2.5.1.1 Requirements Engineering Literature ...................................................... 41
    2.5.1.2 User-Centred Design Literature ................................................................. 44
    2.5.1.3 Service Quality Literature ............................................................................. 49
  2.5.2 Synopsis of Information Systems Literature on Expectations .......................... 54
    2.5.2.1 Context of Use of Personalised Health Websites ..................................... 55
    2.5.2.2 Personal factors as Determinants of User Expectations ........................... 58
2.6 Discussion ....................................................................................................................... 61
2.7 Conclusion ....................................................................................................................... 64

3 RESEARCH APPROACH .................................................................................................. 65
  3.1 Introduction .................................................................................................................... 65
  3.2 Design Theories ............................................................................................................. 65
    3.2.1 The Notion of Design as a Science .................................................................... 66
    3.2.2 Design Science Research: Theoretical Grounds .............................................. 67
    3.2.3 Hevner’s et al Guidelines for Design Science Research ................................. 69
      3.2.3.1 Design as an Artifact .................................................................................. 70
      3.2.3.2 Problem Relevance .................................................................................... 71
      3.2.3.3 Design Evaluation ...................................................................................... 72
      3.2.3.4 Research Contributions ............................................................................. 75
      3.2.3.5 Research Rigor .......................................................................................... 75
      3.2.3.6 Design as a Search Process ....................................................................... 76
      3.2.3.7 Communication of Research ..................................................................... 79
    3.2.4 Research Epistemology ......................................................................................... 79
  3.3 Research Design of the Study ...................................................................................... 80
  3.4 Data Collection Techniques ......................................................................................... 85
    3.4.1 Semi-Structured Expert Interviews Technique ............................................... 86
    3.4.2 Think-Aloud Method/Technique ....................................................................... 89
    3.4.3 Competitive Analysis Method ........................................................................... 92
5  COMPETITIVE ANALYSIS OF HEALTH WEBSITES................................. 126

5.1 Introduction .................................................................................. 126

5.2 Competitive Analysis Approach.................................................... 126

5.2.1 Competitive Analysis Procedure ............................................... 128

5.3 Selection of Health Websites.......................................................... 130

5.4 Selection of Personalised Features ............................................... 134

5.5 Analysis of Personalised Features ................................................ 137

5.5.1 Health Tools/Calculators .......................................................... 137

5.5.1.1 Symptoms Checker.............................................................. 138

5.5.2 Personalised Search .................................................................. 139

5.5.3 Find a Doctor ........................................................................... 142

5.5.4 Personalised Newsletter ............................................................ 144

5.5.5 Drug Interactions Checker ......................................................... 145

5.6 Discussion .................................................................................... 145

5.7 Conclusion ................................................................................... 146

6  THINK-ALOUD SESSIONS ............................................................. 147

6.1 Introduction .................................................................................. 147

6.2 Think-Aloud Approach ................................................................. 147

6.2.1 Think-Aloud Procedure ............................................................ 149

6.2.2 Think-Aloud Questions and Scenarios ....................................... 152

6.2.3 Think-Aloud Participants .......................................................... 155

6.2.4 Conduct of Think-Aloud Sessions ............................................. 158

6.3 Results: Extracted User Expectations towards Selected Personalised Health Websites . ................................................................. 158

6.3.1 Minimised Issues with Medical Terminology ............................. 160

6.3.1.1 Term Suggestions ............................................................... 161

6.3.1.2 Related Search .................................................................. 162

6.3.1.3 Type-in Help ..................................................................... 163

6.3.1.4 Spell Checker ..................................................................... 164

6.3.2 Provision of Additional Information for and Information Required from the Users ................................................................. 165
Appendix 5    Guidelines to Extract User Expectations towards Personalised Features of Health Information Websites and Portals ................................................................. 270

GLOSSARY ......................................................................................................................... 292
LIST OF TABLES

Table 2.1 A list of issues with finding medical information online .................................................. 25
Table 2.2 Definitions of personalisation across different fields .................................................... 26
Table 2.3 Definitions of expectations across different fields ........................................................ 39
Table 2.4 Extract from the Systems Engineering Capability Maturity Model .............................. 42
Table 2.5 Data collection methods to extract user expectations .................................................... 48
Table 2.6 Types of user expectations from information systems services .................................. 52
Table 3.1 Design science research guidelines .............................................................................. 69
Table 4.1 Profiles of the interviewed experts ............................................................................. 108
Table 5.1 Health websites selected as a result of competitive analysis ........................................ 132
Table 5.2 The instrument to locate and identify personalised features of health websites ...... 136
Table 5.3 Health tools of the Aarogya website .............................................................................. 137
Table 5.4 Functional characteristics of Personalised search on selected health websites ....... 141
Table 5.5 Functional characteristics of Find a doctor feature on selected health websites ..... 143
Table 6.1 Design of think-aloud sessions for selected personalised features ......................... 151
Table 6.2 Questions developed for think-aloud sessions .............................................................. 152
Table 6.3 Scenarios developed for think-aloud sessions ............................................................... 153
Table 6.4 Demographic details of participants of think-aloud sessions .................................. 157
Table 6.5 Statistics on popularity and use of selected personalised features .............................. 159
Table 6.6 Additional information expected for the personalised feature Find a doctor ........... 169
Table 6.7 Additional substances for Drug interactions checker feature .................................... 171
Table 6.8 Information that participants expected to provide for Personalised newsletters feature .............................................................................................................................. 171
Table 6.9 Extracted user expectations towards five selected personalised features ............... 192
LIST OF FIGURES

Figure 1.1 Thesis structure........................................................................................................... 14
Figure 2.1 Basic Expectation Disconfirmation Model............................................................ 18
Figure 2.2 Preferred sources of health information ................................................................. 20
Figure 2.3 Perspectives and dimensions of personalisation.................................................... 31
Figure 2.4 Determinants of user expectations – original model ............................................ 51
Figure 2.5 Framework of user expectations.............................................................................. 53
Figure 2.6 Determinants of user expectations – modified model .......................................... 58
Figure 2.7 Determinants of user expectations – research scope of the study......................... 60
Figure 2.8 Extended research scope of the study................................................................. 63
Figure 3.1 Proposed evaluation and validation of the developed artifacts............................ 74
Figure 3.2 Semiologic ladder between physical and social worlds........................................ 77
Figure 3.3 An activity framework for design science research............................................. 78
Figure 3.4 Qualitative research design that contributes to the design science research approach ........................................................................................................................................................................................................................................... 81
Figure 3.5 Overview of the research study ............................................................................. 83
Figure 3.6 Fragment of a meta-matrix used for data analysis................................................ 97
Figure 3.7 Summary of the proposed research processes and outputs................................. 100
Figure 5.1 Proposed activities for competitive analysis........................................................ 129
Figure 5.2 Geographical distribution of personalised health websites selected as a result of competitive analysis........................................................................................................................................................................................................................................... 134
Figure 5.3 Different types of Symptoms checker ................................................................. 139
Figure 6.1 Six major categories of expectations towards personalised health websites ...... 160
Figure 6.2 User expectations related to minimisation of issues with medical terminology.... 165
Figure 6.3 User expectations related to provision of additional information and information required from the users by personalised features................................................................. 172
Figure 6.4 User expectations related to refinement of retrieved information....................... 178
Figure 6.5 User expectations related to presentation of results retrieved via Personalised search ........................................................................................................................................................................................................................................... 181
Figure 6.6 User expectations related to design of selected personalised features of health websites................................................................................................................................................................................................................................................................. 186
Figure 6.7 User expectations related to provision of help for selected personalised features .. 189
Figure 6.8 User expectations related to various aspects of functionality of personalised features of health websites................................................................................................................................................................................................................................................................. 191
Figure 6.9 Modified Framework of user expectations........................................................ 200
Figure 7.1 Framework of personal factors that influence user expectations......................... 204
Figure 8.1 Outcomes and contributions of study................................................................. 226
ABBREVIATIONS

EDT  Expectation Disconfirmation Theory
IS   Information Systems
RE   Requirements Engineering
TA   Think-Aloud
UCD  User-Centred Design
ABSTRACT

Health consumers are becoming increasingly reliant on health information websites and portals to provide basic health information and yet, these websites are not meeting the expectations of most health consumers. Personalisation is one area which could improve the health consumers experience; however, health consumers remain dissatisfied, reportedly because their expectations towards personalised health information websites and portals are not met.

The research undertaken for this thesis investigated the role of user expectations in the design and development of health information websites and portals. It identified and addressed gaps in the theoretical and practical knowledge related to the notion of user expectations, and in particular, their role and operationalisation in the design and development of personalised health information websites and portals.

An extensive literature analysis and empirical study that involved systems designers, developers and health information consumers confirmed the importance of the chosen topic. During this research a number of factors, or determinants of user expectations, that influence the formation of user expectations, were identified. Given the e-health context of the study, this research emphasised determinants of user expectations, such as personal factors; which are defined as individual user characteristics that affect user expectations. The identified personal factors, namely personal experiences, values, beliefs, intentions and affective components were conceptualised in a form of a theoretical Framework. This theoretical Framework was used as a foundation for the development of a structured approach to the extraction of user expectations using think-aloud method in combination with interviews and observations. This approach was empirically tested and documented in a form of Guidelines for systems designers and developers to help them extract user expectations towards personalised health information websites and portals.

The conducted research draws attention to the problem of the neglect of user expectations and their role in the design and development of online systems, namely personalised health websites. This study sheds the light on user expectations, provides significant contributions to both theory and practice and identifies directions for the future research in the e-health domain.

The central contribution of this study is that it offers a structured, well-defined and theoretically based approach to the extraction and formalisation of user expectations towards personalised health information websites and portals. Furthermore, this structured approach that can be incorporated into systems design and development practices. A theoretical Framework that
incorporates a list of personal factors that influence the formation of user expectations is an important contribution to theory. Given the lack of empirical research of the problem of user expectations, namely what personal factors influence the formation of user expectations, it is believed that this contribution provides a valuable insight in the explored problem and extends the body of knowledge in the domain relating to user expectations.

The developed set of Guidelines on how to extract user expectations towards personalised health websites is the major contribution to practice. The Guidelines represent a structured, formalised approach to the extraction of user expectations that can be subsequently incorporated into online systems design and development practices in the e-health domain.
STATEMENT OF ORIGINAL AUTHORSHIP

This thesis contains no material that has been accepted for the award of any other degree or diploma in any educational institution and, to the best of my knowledge and belief, it contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signed: 
10th December, 2010

The research for this thesis received the approval of the Monash University Human Research Ethics Committee (Reference number: CF10/0302 – 2010000122)

Notice 1
Under the Copyright Act 1968, this thesis must be used only under the normal conditions of scholarly fair dealing. In particular no results or conclusions should be extracted from it, nor should it be copied or closely paraphrased in whole or in part without the written consent of the author. Proper written acknowledgement should be made for any assistance obtained from this thesis.

Notice 2
I certify that I have made all reasonable efforts to secure copyright permissions for third-party content included in this thesis and have not knowingly added copyright content to my work without the owner's permission.
ACKNOWLEDGEMENTS

I would like to thank my supervisors Professor Frada Burstein and Associate Professor Julie Fisher for their support and advice during the process of my research and thesis writing.

My thanks also go to my colleagues and fellow PhD students at Monash University, Faculty of IT. In particular, I would like to thank Professor Ron Weber for his advice and guidance. I also would like to thank Dr Joze Kuzic and Mr Martin Atchison for their encouragement and support of my AFL club, Western Bulldogs. To Joanne Mihelcic, Leisa Gibbons, Flora Dily Salim, Rebecca French, Ambica Dattakumar and Grace Xie, thank you for your faith in me and advice. I greatly appreciate it.

I would like to thank Leisa Gibbons for proofreading this work and providing editorial advice on grammar and punctuation of this thesis.

And last but not least, I would like to thank my family and close friends for always being there for me and for supporting me over the last three years of thesis writing. You are amazing and I am truly blessed to have you in my life.
PUBLISHED PAPERS


1 INTRODUCTION

If we knew what it was we were doing, it would not be called research, would it?
Albert Einstein

1.1 Motivation and Problem Statement

The increasing amount of medical resources on the Internet and the growing number of people who use this medium to access these resources suggest that the nature of health information provision is shifting toward online methods of delivery. Online systems, such as health information websites and portals, provide access to a plethora of medical information. The main aim of these online systems should be:

“to develop and evaluate interventions that can maximise the positive effect of the Internet; harness the power of information and communication technology for patients (users) who want it, without disadvantaging those who have difference preferences; and to evaluate these innovations” (Eysenbach 2003, p.369).

In order for health information websites and portals to achieve this stated aim, it is important to facilitate the retrieval of information which would better meet the individual information needs of users (Burstein et al. 2005a). Such tailored provision of the right information to the right people at the right time is called personalisation, and health information websites and portals that implement such functionality, are called personalised (Burstein et al. 2005b).

It is argued that an effective partnership between designers and developers of online systems, and users of these systems, enables implementation of health information websites and portals that are more satisfactory for a user (Esposito and Seker-Guzel 2007; Lee et al. 2009; Thompson 2006). Such user involvement in the online systems design and development is in-line with user-centred design philosophy which advocates for consideration and inclusion of user needs and expectations in the systems design and development processes (Moran and Carroll 1996; Nielsen 2000; Norman 1998; Pearrow 2007; Preece et al. 2002; Shneiderman et al. 2009).
While both user needs and expectations are claimed to be important for effective online systems design and development (Nielsen 2000; Pearrow 2007; Shneiderman et al. 2009), limited research has been conducted to explore user expectations and investigate their role in systems design and development processes.

It is the purpose of this research to explore the role of user expectations in the design and development of personalised health information websites and portals. Moreover, this research identifies a number of factors that influence the formation of user expectations and suggests a combination of techniques that allows effective extraction of user expectations towards personalised health information websites and portals.

The chapter presents an overview of the conducted research and structure of the thesis. The chapter starts with the outline of the research questions before proceeding to the background of the study and a discussion of research approach and methodology. The significance of the research and its contributions is discussed and followed by an organisation of the thesis.

## 1.2 Purpose of Study

The main research question of this study was, ‘How can user expectations be incorporated in the design and development of personalised health information websites and portals?’ This research question was subsequently divided into a number of sub-questions that provided a detailed perspective on the main questions.

1. **What is important to know about user expectations in the design and development of personalised health information websites and portals?**

This sub-question was investigated from both theoretical and practical perspectives. From the theoretical perspective, it was important to determine what was understood of user expectations in the context of design and development of personalised health information websites and portals. The formalisation of this knowledge will to contribute to practice by providing a clearer understanding of the concept of user expectations for systems designers and developers.

2. **What factors influence the formation of user expectations towards personalised health information websites and portals?**

It was important to investigate what factors influenced the formation of user expectations towards personalised health information websites and portals. The factors were identified
through an analysis of various information systems (IS) and medical literature in order to investigate the link between personalised features of health information websites and portals, user expectations, and factors that influence the formation of these expectations. The conceptualisation of that knowledge provides a contribution to the empirical body of IS knowledge in the e-health domain. For the purpose of this study, the identified factors were subsequently used to provide the theoretical grounds for the next and last sub-question.

3. How can user expectations towards personalised health information websites and portals be extracted and incorporated in the systems design and development processes?

The last addressed aspect was related to development and identification of a combination of user-centred design methods which could be used to extract user expectations towards personalised health information websites and portals. Consequently, it was established how those methods could be incorporated into the entire process of design and development of personalised health information websites and portals. The findings were presented in a structured manner. Such representation can support designers and developers in their work and can be seen as a major practical contribution of this study.

1.3 Research Background

_E-health_ is a term that collectively refers to health-related services provided via information and communication technologies (Maheu et al. 2001). E-health products, systems and services include health information networks, electronic health records, telemedicine services, health information websites and portals, and other information and communication technology-based that help prevent, diagnose, treat and monitor health-related issues (Commission of the European Community 2003). As defined by Eysenbach (2001, p. e20),

“_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_”.

E-health is a fast-growing area that provides a number of health-related services and opportunities for its users (or health consumers) (Lankton and Wilson 2007). The wide adoption
of e-health has changed the way people acquire health information as new channels, such as the Internet, have been introduced to obtain medical information (Wilson 2006). As a result, the use of e-health products, systems and services has made healthcare more accessible and convenient to the health consumer (Gonzalez et al. 2006).

One of the e-health initiatives is health information websites and portals that provide users with medical information via the Internet (Lee 2008). Health information websites can be defined as a collection of web pages that accumulate health related information and services. It is a virtual place that brings together information on health, lifestyle and medical conditions (Cline and Haynes 2001; Williams et al. 2002). Health information portals are gateways that provide users with easy access to a variety of medical information online. They accumulate health related information and deliver a one-stop-for-all service when health consumers are looking for medical information online (Whitehouse 2004).

Health information websites and portals are a tool that:
- enhances efficiency of the healthcare in general;
- enhances health promotion by making medical information more accessible;
- supports the community of care by improving communication between healthcare establishments (Esposito and Seker-Guezel 2007).

Apart from providing various medical information, health information websites and portals offer a variety of advanced e-health services such as communication channels, newsletters, different means to search for health information and personal support (Klein 2007; Wilson and Lankton 2009). The downside to reliance on health information websites and portals is related to:
- inaccurate or incomplete medical information, offered by some health information websites and portals;
- inability of the users to find relevant medical information;
- influence of the advertisements and marketing campaigns, following which is not necessarily beneficial for the users (Rideout 2005).

However, it is believed that despite the disadvantages of health information websites and portals, they add value to the health consumers by facilitating access to medical information and resources and by improving the quality of information provision services they offer (Nazi 2002).

An important aspect of health information websites and portals is that they enable users to get actively involved in making health decisions related to their conditions, to monitor their health status and to find medical information relevant to their needs. Therefore, through the exposure
to the growing amount of health information available on health information websites and portals, health consumers are becoming equipped, enabled, empowered and engaged in their own healthcare decision making. This phenomenon is also known as user empowerment (Brender et al. 2000; Ferguson 2007).

The number of health consumers who are willing to take more responsibility in managing their own health and making their own health-related decisions steadily grows (Bliemel and Hassanein 2007). A health consumer who is playing a proactive role in monitoring his/her health issues by using information services, provided by various health information websites and portals, can be regarded as “a participant and partner in the flow of information” related to his/her own health care (Masys et al. 2002). In fact, provision of enhanced access to information and resources and empowerment of health consumers to make informed healthcare decisions, are two major benefits of health information websites and portals (Gonzalez et al. 2006).

The third major benefit of health information websites and portals is the provision of timely information tailored to individual needs of health consumers (Esposito and Seker-Guezel 2007). As health information websites and portals offer different categories of information to their users, they need to provide a means of delivering relevant information to different health consumers in order to better satisfy their information needs (Kisilowska 2004). The ability of websites to provide tailored medical information to health consumers is called personalisation (Correia and Boavida 2001). Personalisation is discussed in detail in the next section.

1.3.1 Personalisation of Health Websites

Personalisation can be defined as one of the services that aims to meet user information needs by providing a means to deliver relevant information in timely manner (Blom 2000; Preece et al. 2002; Zimmermann et al. 2005). According to Vollman (2008), the introduction of personalisation on health information websites and portals is an important initiative aimed to improve the user experience in searching for medical information online.

Personalisation of health information websites and portals is normally implemented through a range of personalised features, defined by Steinmetz and Wolf (1997) as features that refer to an adjustment of the service in order to suit individual needs and preferences. Personalised features provide users with a number of functions and services that help retrieve desirable information based on individual needs and preferences (Ardissono et al. 2002). Provision of personalised features is an effective strategy that enables health consumers to become proactive and efficient in managing their health issues (Wilson and Lankton 2004). Features of health information
websites and portals, such as personalised search, find a doctor, personalised newsletter and symptoms checker are examples of personalised features offered by a number of health information websites and portals to their users.

The concept of personalisation and the introduction of personalised features directly relates to the “consumer-driven health care system” (Niederdeppe et al. 2005, p.4) where meeting user information needs is a high priority to the providers of medical information.

There are numerous stakeholders such as consumers, clinicians, administrators and politicians, who are actively involved in e-health initiatives (Alvarez 2003). According to Esposito and Seker-Guezel (2007), health consumers are the most important group of users who should be involved in the design and development of personalised health information websites and portals. However, the health consumers’ perspective is the one that is often missing or not considered enough (Bliemel and Hassanein 2007). According to Wilson (2007), health consumers comprise a large and growing constituency of e-health users and their interests and needs should guide e-health initiatives, including design and development of personalised health information websites and portals.

The effectiveness of personalisation is linked to the concept of patient-centeredness that advocates for identification of the needs, requirements and expectations of health consumers in order to produce personalised features, more satisfactory for the users (Beadle-Brown 2006).

Patient-centeredness as a concept focuses on provision of health consumers with relevant medical information and effective e-health services that:

- are responsive to the information needs of health consumers;
- adhere to the health consumers’ perspective and experiences in care planning and decision-making;
- are developed with the consideration of health consumer characteristics and expectations.

Patient-centeredness offers opportunities for patients to increase their autonomy and involvement in their care and treatment (Holmström and Röing 2010). According to Wilson (2007), patient-centeredness advocates for involvement of health consumers in the e-health initiatives, which makes them primarily an object of the interaction rather than just an active participant.

Patient-centeredness of e-health (Thompson 2006) has led to the adoption of user-centred design that advocates for consideration and inclusion of user needs and expectations in the design and development of personalised health information websites and portals (Moran and
1.3.2 Adoption of User-Centred Design to Deliver Personalised E-health Services

User-centred design is an approach to systems design and development which views knowledge about users and their involvement in the design process as a central concern (Preece et al. 2002). Wilson (2008) argues that patient-centred e-health applies user-centred design principles to e-health development in order to introduce e-health services that:

- meet needs and expectations of health consumers;
- focus on supporting health consumers and their information requirements;
- enable health consumers to effectively retrieve relevant information;
- are easy to access and understandable.

Therefore, user-centred design (UCD) is critical for the development of e-health services that can enhance user experiences with e-health initiatives in general (Niman et al. 2006).

UCD also relates to the concept of user empowerment, as discussed earlier. When health consumers are involved in the development processes it gives them an opportunity to influence the design and functionality of the delivered e-health services and technologies. According to Brender et al (2000), e-health professionals acknowledge the importance of creating an environment where health consumers are empowered to actively participate in their own healthcare through an involvement in e-health design and development activities. Through such involvement, UCD professionals seek to understand health consumers, their needs and expectations (Constantine 2004). Overall, UCD in e-health refers to a process that incorporates user viewpoints and learns about the real needs and expectations of health consumers, and ensures that they are met (Constantine 2004; Wilson 2006).

Esposito and Seker-Guezel (2007) state that the main goal of any personalised health website should be the provision of value to its users. The true value can be achieved by making health consumers a part of the development process. While healthcare professionals and other stakeholders should contribute their expertise to the design and development of health information websites and portals, the major contribution should be from the regular users of personalised health information websites and portals (Esposito and Seker-Guezel 2007). Gilmore and Pine (1997) state that value of any online service lies in the identification of consumer expectations towards its features. Personalised features of health information websites and portals are no exception. According to Montgomery and Smith (2009), value of
personalisation refers to the user “expectations for personalised features” (p.3). Therefore, the importance of user expectations and their role in the design and development of personalised health information websites and portals should not be underestimated.

### 1.3.3 User Expectations from Personalised Health Websites

Wilson (2007) argues that in order to meet the expectations of health consumers, it is essential for developers to identify user expectations towards e-health services. *User expectations* can be defined as beliefs about a future event that is based on information gathered directly by the health consumers through personal observation, or indirectly through attention to information provided by others (including websites and portals), or is inferred, based on information or observation of some related occurrence (Coye 2004; Fishbein and Ajzen 1975; Olson and Dover 1979; Yuan and Woodman 2007). Knowing the expectations of health consumers can help deliver better personalised health information websites and portals and, as a result, improve the user’s e-health experience in general (Murray 2003). Unmet user expectations, in turn, can provoke various reactions from health consumers, from mild disappointment to extreme anger, resulting in the user never using the website again (Bliemel and Hassanein 2007; Murray 2003).

Following UCD principles, user expectations are one of the key criteria that need to be considered for successful design and development of personalised health information websites and portals (Mao et al. 2005; Mao et al. 2001). Good understanding of the health consumers’ expectations facilitate more successful e-health initiatives and better user interaction with personalised health information websites and portals (Murray 2003).

Empowerment of health consumers and their access to various e-health services has subsequently led to the rise of user expectations towards personalised health information websites and portals (Bliemel and Hassanein 2007). According to Lim and Tang (2000), raising standards of personalised services in general has also contributed to an increase in user expectations towards personalised services, provided by health information websites and portals. Given the role that user expectations play in delivering better e-health services, including personalised features of health information websites and portals, it is important to determine how user expectations can be effectively extracted and operationalised in order to be included in design and development of personalised health information websites and portals.

In order to extract user expectations it is important to identify what factors influence the formation of these expectations, however, the knowledge on the nature of such factors is rather limited (Diaz-Martin et al. 2000a). Nevertheless, the question of the nature of user expectations
towards e-health initiatives, and factors that influence the formation of these expectations, has raised certain interest from the research community. For example, Lankton and Wilson (2007) identified that such factors as self-efficacy, past experiences (participation, knowledge, and Internet experience), and affective factors (prior satisfaction and enjoyment) influence user expectations towards e-health services. Their findings suggest that these factors are important contributors to user expectations and can provide early guidance to the development of successful e-health services. Evaluation of these factors has established that the identified antecedents explain 57% of the variance in user expectations. Therefore, Lankton and Wilson (2007) determined some, but not all, factors that influence the formation of user expectations. Moreover, they did not aim to identify what factors influence user expectations towards personalised services of health information websites and portals specifically, but instead they emphasised e-health services in general.

This research recognises the importance of identifying a range of factors that influence the formation of user expectations towards personalised health information websites and portals. The identification of such factors is crucial in order to successfully identify, extract and operationalise user expectations towards personalised health information websites and portals. It is believed that the identification of such factors is an interesting and challenging research matter, especially given the important role and growing expectations of the users towards personalised health information websites and portals.

In summary, while user expectations are claimed to be an important user characteristic that affects user satisfaction with personalised health information websites and portals, little is known about what constitutes user expectations towards personalised health information websites and portals, and how these expectations are incorporated in the design and development of these websites. This study sets out to make a contribution to the body of knowledge in this area by identifying factors that influence the formation of user expectations towards personalised health information websites and portals and by exploring how this knowledge can facilitate extraction, formalisation and incorporation of user expectations in the design and development of these websites.

1.4 Research Approach and Methodology

A detailed description of the research approach and methods is outlined in Chapter 3. The research was divided into three main stages:
The first stage involved analysis of IS and medical literature in order to identify the current state of research related to the e-health initiatives. It was important to understand the nature of e-health, given that it is the domain in which the research was conducted. A thorough analysis of health information websites and user interaction with personalised features of these websites was conducted in order to determine the factors that influence the formation of user expectations. Further exploration of IS and medical literature identified a number of determinants of user expectations, including personal factors, that were not extensively researched in the IS domain. Further analysis of the categories of determinants of user expectations, derived from the IS and medical literature, led to a conceptual representation, a Framework, that represented personal factors that affected the formation of user expectations towards personalised health information websites and portals.

The second, interpretative, stage was the main body of the conducted research. In order to better understand the practical reality of the inclusion of user expectations in the design and development practices, a set of interviews with systems designers and developers were conducted to establish:

- their state of knowledge of the nature of e-health domain;
- their understanding of the concept of user expectations in relation to the design and development practices;
- how and whether the extraction of user expectations was incorporated in their work practices;
- the methods they used to extract user expectations;
- whether there were any developed Guidelines or instructions in relation to incorporating the extraction of user expectations in the design and development processes in general, and in e-health domain specifically.

The interviews were followed by competitive analysis of personalised health information websites and portals in order to identify their personalised features. The identified personalised features were subsequently used in the think-aloud sessions, the goal of which was to extract user expectations towards the selected personalised features of health information websites and portals.

The think-aloud sessions provided a large set of data, analysis of which involved interpretation of the received user feedback, its conceptualisation and subsequent formalisation of the set of applied methods to extract user expectations. The identified methods and processes of extraction of user expectations were formalised as a set of Guidelines on how to extract user expectations towards personalised features of health information websites and portals.
The final stage of the research was an evaluation stage, where two confirmatory interviews with experts in systems design and development were conducted in order to evaluate, verify and modify the developed Framework and Guidelines.

1.5 Significance of Study

This research draws attention to the problem of neglecting user expectations in the design and development of online systems, namely personalised health information websites and portals. The conducted study provides theoretical grounds and empirical evidence of how user expectations can be extracted based on consideration of a number of personal factors that influence the formation of user expectations in the applied e-health domain.

The central contribution of this study is that it offers a structured, well-defined and theoretically based approach to extraction and formalisation of user expectations towards personalised health information websites and portals that can be incorporated in the design and development practices.

Contribution to theory: the developed Framework of user expectations towards personalised health information websites and portals incorporates a list of determinants, personal factors, which influence the formation of user expectations in the e-health domain, is the major contribution to theory. Given the lack of empirical research of the problem of user expectations, namely what personal factors influence the formation of user expectations towards personalised health information websites and portals, it is believe that this contribution provides a valuable insight of the explored problem and more broadly extends the body of knowledge of the user expectations domain.

Contribution to practice: the developed set of Guidelines on how to extract user expectations towards personalised health information websites and portals is the major contribution to practice. The Guidelines represent a structured formalised approach to the extraction of user expectations that can subsequently be incorporated into the online systems design and development practices in the e-health domain.

1.6 Organisation of Thesis

This thesis described the undertaken activities in eight chapters.
Following this introductory chapter, Chapter 2 presents the literature review of this study. Theoretical grounds for this research, followed by a detailed analysis of current research in the e-health domain, health information websites and portals in particular, are established. The chapter continues with the exploration of personalisation as a service provided by health information websites and portals. The discussion is followed by an investigation of the reasons for user dissatisfaction with personalised health information websites and portals that links user satisfaction with meeting user expectations. Particular emphasis of this chapter is given to the notion of user expectations and their formation that leads to the development of the initial version of the Framework of user expectations, tested further in this study.

Chapter 3 is focused on the research design. It starts by explaining why this research falls under the design science research paradigm and sets out the research design for this study. The data collection techniques used and data analysis methods are discussed further in the chapter, followed by some concluding remarks.

A set of semi-structured interviews conducted with the designers and developers of online systems, is discussed in Chapter 4. The interviews were conducted in order to establish a practical perspective on the identification, extraction and incorporation of user expectations in the systems design and development practices. The results of the interviews are presented. They provide a blue print for subsequent research activities, discussed in the next two chapters.

Chapter 5 presents the result of the competitive analysis of personalised health information websites and portals. The competitive analysis was conducted in order to establish a set of personalised features that were subsequently used in the think-aloud sessions, discussed in the next chapter.

Chapter 6 reports on the results of the think-aloud sessions, conducted in order to extract user expectations towards personalised features of health information websites and portals, identified in the previous chapter. The outcomes of the think-aloud sessions include the list of extracted user expectations, followed by a discussion on the applicability of the proposed approach to extracting user expectations, and of the modified Framework of user expectations in the e-health domain.

Chapter 7 is a synopsis of the conducted research. Theoretical and practical contributions of this study are discussed in-depth, along with the evaluation of the research outcomes. Namely, the Framework of user expectations is re-introduced as a contribution to theory by providing theoretical grounds for the developed Guidelines on how to extract user expectations. The chapter concludes with an overview and presentation of the results of the confirmatory
interviews performed with two experts, which were conducted in order to validate the theoretical Framework and developed Guidelines on how to extract user expectations towards personalised health information websites and portals.

Chapter 8 is the concluding chapter of the thesis. It emphasises the findings of the research, research contributions to theory and practice; outlines the scope and limitations of the study and presents further avenues for research in this area.

Figure 1.1 presents a graphical representation of the thesis structure.
Chapter 1 – Introduction of Research
Motivation and Problem Statement
Purpose of Study
Background
Significance of Study
Research Approach and Methodology
Thesis Structure

Chapter 2 – Research Background
IS Literature Analysis
Medical Literature Analysis
Determinants of User Expectations
Framework of User Expectations

Chapter 3 – Research Approach
Research Framework
Research Design
Data Collection Techniques
Data Analysis Techniques

Chapter 4 – Semi-structured Interviews with Experts
Method Application
Analysis of Results
Discussion and Conclusions

Chapter 5 – Competitive Analysis of Health Websites
Method Application
Analysis of Results
Discussion and Conclusions

Chapter 6 – Think Aloud Sessions
Method Application
Analysis of Results
Discussion and Conclusions
Modified Framework
Guidelines

Chapter 7 – Research Artifacts and Evaluation
Confirmatory Interview 1
Confirmatory Interview 2
Modified Guidelines

Chapter 8 – Conclusion
Research Motivation
Research Contributions
Research Limitations
Future Research

Figure 1.1 Thesis structure
2 RESEARCH BACKGROUND

What information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention, and a need to allocate that attention efficiently among the overabundance of information sources that might consume it.

Herbert Simon

2.1 Introduction

This chapter is concerned with establishing the context of the research presented in this thesis. The purpose of this chapter is to provide theoretical grounds of the study that are essentially related to the user-centred design philosophy and expectation disconfirmation theory. Through an investigation of the current state of personalised health websites, this chapter examines the reasons for user dissatisfaction with these websites and provides an interpretation of the role that user expectations play in the design and development of online systems. The relationship between user expectations and user satisfaction is discussed in detail, followed by an exploration of the factors that influence the formation of user expectations in the e-health domain.

2.2 Theoretical Grounds of Study

This work is grounded in (1) the user-centred design philosophy that advocates for the inclusion of users in the design and development processes of systems (Norman 1988), and (2) expectation disconfirmation theory that links user satisfaction with various systems to the ability of such systems to meet user expectations (Oliver 1977). It is important to establish the theoretical grounds of the study up front in order to better understand the rationale of the conducted research. This study looks at the extraction and inclusion of user expectations in the design and development of personalised health information websites and portals (often referred to as online health systems) to deliver more satisfactory results. Theoretical grounds provided
further in this section help understand the research problem, goals and theoretical assumptions that underpin the conducted research.

2.2.1 User-Centred Design Philosophy

User-centred design (UCD) is both a broad philosophy and a set of methods and techniques that claim the importance of user involvement in the process of information systems design (Norman 1988; Pearrow 2007; Preece et al. 2002; Shneiderman et al. 2009). Such involvement makes users the main participants of projects, allowing them to choose what informational areas are to be prioritised and paid particular attention to when developing systems (Shneiderman and Plaisant 2005). It also allows designers to analyse user reactions and feedback during the design process, assess the accuracy of the deliverables and identify user satisfaction with the elements of the system (Preece et al. 1994; Shneiderman and Plaisant 2005).

The term UCD has been introduced by D. Norman in mid-1980s who recognised the needs and the interests of users and the importance of the inclusion of user needs and interests in the systems design processes (Norman 1988; Norman and Draper 1986). One of the main principles that underlies the UCD philosophy is an understanding of users and their characteristics (Nielsen 2000; Nielsen and Loranger 2006; Preece et al. 2002; Shneiderman et al. 2009). Designers need to identify who the potential users of the systems are, because without such understanding designers and developers will be creating systems based on their own perceptions of how such systems should function, what they should deliver and in what form (Norman 1988; Shneiderman et al. 2009). Most likely, such perspectives will substantially differ from that of the intended users of the system. Thus, there is a high chance that the product or service will fail to satisfy users, which might result in the non-use of the system (DeLone and McLean 1992; Eason 1987; Shneiderman et al. 2009). That is why identification of the intended users of the system is vital. Re-iterating this point, Pearrow (2007) states that when the system is viewed from the designers’ perspective, there is a danger that the designers might emphasise the technical aspects ignoring others. However, the system success is not necessarily about the technological innovations and their incorporation in the systems design but about delivering the right product or service to the intended users (Norman and Draper 1986; Shneiderman and Plaisant 2005).

In the UCD philosophy, identification of the intended users is substantiated by an understanding of user needs, goals, and expectations that might affect characteristics of the system (Bødker and Grønbæk 1996; Norman 1998). It is important that the designers’ perceptions of user needs and expectations often differ from the actual user needs and expectations. This difference of
perception may play a dramatic role in the effectiveness of the systems design. Therefore, it is important to explicitly ask users about their preferences, goals, needs and expectations, and incorporate these in the design processes (Nielsen and Loranger 2006; Preece et al. 1994). It certainly does not mitigate the role of the designer, as the concept ‘the users know best’, is not necessarily always effective (Nielsen 1993). However, professional designers and developers should be able to identify potential improvements of the system from both development and user perspectives (Norman 1998). In order to identify these potential improvements effectively, they need to identify user goals, needs and expectations and transfer these into an effective blueprint for systems design and development (Nielsen 1993; Young 2004).

Another aspect that needs to be taken into consideration in order to design better systems is, according to the UCD philosophy, an understanding of the context, i.e. the environment in which the system will be used (Mao et al. 2005; Preece et al. 1994). According to Norman (1988), an understanding of the system context is vital, as it gives designers a better idea about the actual purpose of the system, its intended use and its role for the users.

This research is concerned with the inclusion of user expectations, as one of the user characteristics, in the design and development of personalised health information websites and portals. It draws on the UCD philosophy. In fact, following the UCD philosophy in the design and development of personalised systems has been advocated by a number of authors (Blom 2004; Burstein et al. 2005a; Kramer et al. 2000). According to Blom (2004), it is important to consider a user-centred perspective in order to effectively implement personalisation in a portal. It is argued that personalised websites and portals need to be implemented with user needs and expectations in mind in order to provide users with tailored medical information and to satisfy their information needs in timely manner (Blom 2000; Preece et al. 2002; Zimmermann et al. 2005). Further discussion of the role of user expectations in the UCD philosophy, their consideration and methods of extraction are presented in Section 2.5.1.2.

2.2.2 Expectation Disconfirmation Theory

This research is grounded in the expectation disconfirmation theory (EDT, sometimes it is also called ‘expectation confirmation theory’) (Oliver 1977). EDT elaborates on the role that user expectations play in relation to user satisfaction (Oliver and DeSarbo 1988). While UCD philosophy provides the grounds and justification for consideration of user expectations in the design and development of online systems, EDT provides the link between user expectations and user satisfaction by explaining how consideration of user expectations in the design and development of online systems might affect user satisfaction with such systems.
Expectation disconfirmation theory originates from a marketing field where the problem of user satisfaction and its dependence on user expectations has been extensively researched (Ives et al. 1983). EDT was first examined in the context of consumer satisfaction with products and services where expectations were defined as an additional determinant of satisfaction (Oliver and DeSarbo 1988; Rushinek and Rushinek 1986). Oliver (1981) defines user satisfaction as “the summary psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the consumer’s prior feelings about the consumption experiences” (p.29). User satisfaction is mediated through positive or negative (dis)confirmation between expectations and service performance; the (dis)confirmation occurs when the users compare their perceptions of service performance against their expectations towards that service (Oliver 1980). If perceived performance exceeds or meets user expectations then the user is satisfied; if not, then the user stays dissatisfied (Oliver 1977; Spreng et al. 1996). Confirmation occurs when perceived performance meets user expectations while disconfirmation occurs when it does not (Walker and Baker 2000), see Figure 2.1.

![Figure 2.1 Basic Expectation Disconfirmation Model (adapted from Oliver 1980)](image)

In an IS context, the concept of user expectations in relation to user satisfaction was introduced by Rushinek and Rushinek (1986) who claimed that fulfilled user expectations had a positive effect on user satisfaction with information systems and services. In line with those findings, Conrath and Mignen (1990) stated that “when actual service is positive in comparison to initial expectations, users report high levels of satisfaction. On the other hand, when perceived service is below that expected, users are very likely to be dissatisfied” (p.9).

The importance of user satisfaction with information systems was extensively discussed by DeLone and McLean (1992) who claimed that user satisfaction is one of the six dimensions or categories of the IS success along with the system quality, information quality, use, individual impact and organisational impact. According to DeLone and McLean (1992), success of any IS
can be measured in terms of user satisfaction with the system, however, they did not elaborate on the range of user characteristics that should be considered when measuring user satisfaction.

Application of EDT in the IS context was further extended by Bhattacharjee (2001; Bhattacharjee and Premkumar 2004) who argued that EDT could be used to successfully predict users’ intention towards continuous use of information systems and technologies. According to Bhattacharjee (2001) user satisfaction with IS can be determined through positive or negative (dis)confirmation between user expectations towards IS and IS performance, where confirmation is defined as “a cognitive belief (the extent to which users’ expectations of IS use is realised during actual use) derived from prior IS use” (p.366). To that end, EDT provides a complimentary perspective on the matter by linking user satisfaction with user expectations and explaining the importance of meeting user expectations in order to deliver better and subsequently more satisfactory IS.

It is important that, despite its wide adoption, EDT has been extensively criticised by marketing and IS researchers. According to them, (Fazio and Zanna 1981; Hunt 1977; Oliver 1980; Oliver 1981; Szajna and Scamell 1993; Yi 1990) EDT as a theoretical framework lacks consideration of user attitudes and emotions but they are believed to affect both user expectations and satisfaction. Moreover, EDT use does not address the dynamic nature of user expectations and ignores the fact that the expectations change along with user experiences. Taking note of the criticism of the EDT, it was still believed to be the most appropriate approach to use as one of the key theories of the study because of its applicability and high research profile.

The conducted study draws on EDT to justify the relationship between user expectations towards such online systems as health information portals and websites and subsequent user satisfaction with these systems. This relationship is an important factor that justifies further research on user expectations in the IS field claiming the importance of user expectations and their strong relationship with user satisfaction that might subsequently affect success of the developed IS (Bhattacharjee 2001; DeLone and McLean 2003; DeLone and McLean 1992). The conducted research intends to explore the dynamic nature of user expectations and address it in relation to the design and development of health information websites and portals. It also aims to investigate how user attitudes and emotions influence the formation of user expectations and, subsequently, user satisfaction with online health systems, such as health information portals and websites.
2.3 Context of Study: Health Websites

The Internet has become a popular means for providing health information online (Ball and Lillis 2001; Coiera 2000; Cop 2008; Eysenbach 2000; Ferguson 2007; Fisher et al. 2008; Fox 2005; Fox 2006). When searching for medical information, a vast number of people choose the Internet as their first option over such information sources as family, friends, doctors and nurses, print and media resources, and fellow patients suffering from the same symptoms or diagnosed with the same disease (Baker et al. 2003; Eysenbach 2000; Ferguson and Frydman 2004; Raupach and Hiller 2002). Figure 2.2 highlights sources most preferred by Americans when they are looking for information about health- and wellness-related topics (Elkin 2008).

<table>
<thead>
<tr>
<th>Health Information Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet</td>
</tr>
<tr>
<td>Doctor</td>
</tr>
<tr>
<td>Relatives/Friends/Co-workers</td>
</tr>
<tr>
<td>Newspapers/Magazines</td>
</tr>
<tr>
<td>Television</td>
</tr>
<tr>
<td>Pharmacist</td>
</tr>
<tr>
<td>Nurse/Nurse practitioner</td>
</tr>
<tr>
<td>Someone else with the same problem</td>
</tr>
<tr>
<td>Pharmaceutical companies</td>
</tr>
<tr>
<td>Disease associations/Support</td>
</tr>
</tbody>
</table>

*Figure 2.2 Preferred sources of health information (adapted from Elkin 2008)*

According to Rozmovitis and Ziebland (2004), people who go online for medical information are searching for quick answers to their health-related questions, reassurance, alternative opinions, support or anything that will help them make better decision about particular medical issues. According to various sources, users often find that online medical information:

- is more discreet in nature and easy to access due to the popularity and availability of the Internet (Ferguson 2002);
- provides guidance as the health-related information the users find online is often “more complete and useful” (p.1148) comparing to the information they obtain from their doctors (Ferguson and Frydman 2004);
- offers certain convenience by having access to medical resources from their computer or even a mobile phone comparing to the need of scheduling an appointment with their doctor or waiting over the phone (Fox 2005);
- gives a sense of being in control of their health conditions by obtaining the resources with alternative views on health problems, treatments and drugs, including an opportunity to buy drugs online (Ball and Lillis 2001).

Similar findings were revealed by the Pew Internet & American Life Project (http://www.pewinternet.org/) who examined the social impact of the Internet and analysed online health search behaviour of American Internet users (Fox 2006). According to them, the users find that searching for medical information online:
- is convenient (they can search for it any time in any suitable place) – 93%;
- provides useful information – 92%;
- helps finding various opinions on medical topics – 83%;
- identifies new information on health issues – 81%.

In summary, provision of medical information via online systems and technologies offers a wide range of advantages appreciated and acknowledged by the users (Ball and Lillis 2001; Ferguson 2002; Fox 2005).

Delivery of information and health services via the Internet or related technologies is called e-health (Sillence et al. 2008). E-health technologies include health information networks, electronic health records, telemedicine services, wearable and portable monitoring systems, and online health systems such as health information websites and portals.

Health information websites and health information portals are one means for the distribution and delivery of health information to a vast number of users. Health information websites can be defined as a collection of web pages that accumulate health related information and services. It is a virtual place that brings together information on health, lifestyle and medical conditions (Cline and Haynes 2001; Williams et al. 2002). Health information portals are gateways that provide users with an easy access to a variety of medical information online. They accumulate health related information and deliver a one-stop-for-all service when people are looking for medical information online (Whitehouse 2004).

Health information websites and portals, referred to as ‘health’ and ‘medical’ websites from now on, are a tool that provides a number of options to find relevant medical information online. The options include:
- use of specialised search engines;
- browsing through various topics and health news;
- glancing through frequently asked questions about specific diseases, syndromes and remedies;
- accessing medical dictionary to look specific medical terms up;
- booking appointments online;
- checking symptoms via interactive tools;
- subscribing to news alerts, and more.

Users searching for health information online are often referred to as *e-patients*, also known as health consumers, Internet patients or Internet-savvy patients, who represent “the new breed” (p.ii) of Internet users gathering information about a medical issue of particular interest to them (Ferguson 2007). The term also encompasses those who seek online guidance for themselves, friends or family members (Ferguson and Frydman 2004; Lester et al. 2004). According to Ferguson (2007), *e-patients* are individuals who are “equipped, enabled, empowered and engaged in their health and health care decisions” (p.ii). E-patients are equipped with the set of skills required to obtain online information about their conditions, enabled and empowered to make choices based on the retrieved online information, engaged in the healthcare processes and often providing fellow e-patients and family members with assistance and support. For the purpose of this research, in the discussion about medical websites specifically, the terms ‘users’ and ‘e-patients’ will be used interchangeably. The next section of this chapter is concerned with the issues that e-patients experience with various health websites when they search for medical information online.

### 2.3.1 Issues with Health Websites

Initially health websites were introduced to help e-patients quickly find medical information they could trust, thus aiming to address four main problems that, according to Gustafson et al (2008), e-patients face when they look for health information. These problems are related to:

- vast amount of time required to find trustworthy and reliable medical information;
- confusion when dealing with many health websites at the same time;
- inability to find relevant information;
- slowness of the response/retrieval time.

The reliability of medical information available via health websites is an important matter in relation to the quality of health information available online (Craigie et al. 2002; Eysenbach et al. 1998; Gustafson et al. 2001). There is empirical research that indicates that users often find information obtained via health websites to be inaccurate or even misleading (Childs 2004; Fritch 2003), and the quality of health information online to be unregulated (Morahan-Martin 2004). According to Morahan-Martin and Anderson (2000) “virtual access to some of the best health information in the world is counterbalanced by access to inaccurate information and even
scams, and it can be hard to distinguish between the two” (p.732). The fact that medical information obtained via health websites frequently lacks information on credibility and is of poor quality (Berland et al. 2001; Kunst et al. 2002), makes it difficult for e-patients to identify information they can trust (Sillence et al. 2004; Zeng et al. 2004).

It is stated that while Internet materials influence people in their decision making, the users are often attracted to glitz rather than quality of the health websites and the information provided (Bader and Strickman-Stein 2003; Eysenbach and Köhler 2002). There is little doubt that in such a critical matter as health, lack of information quality might potentially lead to fatal outcomes (Eysenbach and Köhler 2002). Therefore, by aiming to provide trustworthy information, health websites prevent e-patients from accessing low-quality, unreliable medical information and from making bad decisions (potentially) (Eysenbach 2000). While reputable health websites aim to improve information quality control in order to provide e-patients with high-quality and reliable information, others fail to do so (Marshall and Williams 2006).

Another problem that causes confusion comes when dealing with many health websites at the same time. This can be referred to as information overload, a concept traditionally associated with a vast quantity and (often) poor quality of online information (Christensen and Griffiths 2000; Fisher et al. 2008; Lazarenko and Burstein 2006; Vermaas and Wijngaert 2005). Information overload is the state that e-patients are at when they are no longer able to process the retrieved information effectively due to its volume (Chen et al. 2003). E-patients often experience confusion and anxiety caused by the virtually unlimited amount of available medical information (Eysenbach and Jadad 2001). Thus, the amount of retrieved information can be overwhelming for the users (Skinner et al. 2003) and overburden them (Eysenbach et al. 2002).

Finding appropriate and relevant health information is often very difficult for the users (Childs 2004). The number of online resources about various health topics keeps growing (Baker et al. 2003; Cline and Haynes 2001). As a result, e-patients often retrieve a large number of medical resources more or less relevant to their case. However, they frequently fail to familiarise themselves with all of the retrieved resources due to their volume, which makes it hard for e-patients to find relevant health information online (Gustafson et al. 2008). According to Fox (2006) such situations leave:
- 25% of e-patients overwhelmed by the amount of information;
- 22% feel frustrated by a lack of information or an inability to find what they have been looking;
- 18% are confused by the information they have found online.
There are significant other reported problems with health websites related to their usefulness, readability, commercialisation and incompleteness of medical information they provide. According to Vermaas and Wijngaert (2005) e-patients frequently find Internet based medical information not particularly useful to them. E-patients also often find that health information is difficult to read, mostly due to the vast amount of medical terminology included (Sillence et al. 2004). Additionally, some of the health information presented across medical websites is, in fact, commercial, even though it is not identified as such (Morahan-Martin 2004). Incompleteness of medical information across health websites is another serious problem (Berland et al. 2001; HON 2006). Empirical research of the quality of health websites conducted by Eysenbach et al (2002) revealed that around 90% of health websites had medical information the researchers classified as “incomplete” (p.2697). According to Morahan-Martin’s findings (2004), even relevant health information presented by medical websites it is often incomplete even when accurate.

To sum up, while health websites aim to solve the problem of finding relevant information and information overload through emphasis on medical resources and provision of internal search engines that search within the resources allocated to or indexed by health websites, there still seems to be room for improvement. Even though access to health information is empowering and helps e-patients lead healthier lifestyles, facilitates more informed decision making and enables detection of potential medical problems early (Mittman and Cain 1999; Morahan-Martin 2004), the research demonstrates that e-patients are still dissatisfied with medical websites (Christensen and Griffiths 2000; Fisher et al. 2009; Sillence et al. 2004; Zeng et al. 2004). Users find health websites confusing and chaotic at times, especially when they are struggling to find medical information relevant to their needs (Fisher et al. 2007).

Various surveys and observations have revealed that a majority of e-patients from countries such as Australia (Peterson et al. 2003), United States of America (Berland et al. 2001; Hansen et al. 2003; Provost et al. 2003), Canada (Skinner et al. 2003), Germany (Eysenbach and Köhler 2002), as well as Europe (Provost et al. 2003), use web search engines such as Google, AltaVista, Lycos, and Yahoo, not health websites directly, to find medical information. Fox’s research (2006) shows that 60% of e-patients prefer Google to health websites when searching for medical information online as they find it more fulfilling. These findings imply that e-patients are not fully satisfied with existing health websites search tools, and this might also explain why there is preference for alternatives, such as web search engines, to locate medical information online.

The list of issues that e-patients face when they search for medical information via health websites is summarised in Table 2.1.
Table 2.1 A list of issues with finding medical information online

<table>
<thead>
<tr>
<th>Issues</th>
<th>Researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor quality and incompleteness of health information online</td>
<td>(Christensen and Griffiths 2000; Silence et al. 2004; Zeng et al. 2004)</td>
</tr>
<tr>
<td>Retrieved information is inaccurate or misleading</td>
<td>(Childs 2004; Fritch 2003)</td>
</tr>
<tr>
<td>Retrieved information is not useful</td>
<td>(Vermaas and Wijngaert 2005)</td>
</tr>
<tr>
<td>Difficulty in finding information in timely manner</td>
<td>(Burstein et al. 2005a; Huntington et al. 2003; Williams et al. 2002)</td>
</tr>
<tr>
<td>Difficulty in finding relevant information</td>
<td>(Fisher et al. 2009; Zeng et al. 2004)</td>
</tr>
<tr>
<td>Usability effectiveness and ease of use are poor</td>
<td>(Childs 2004; Fisher et al. 2004)</td>
</tr>
<tr>
<td>Poor interface and organisation of the websites</td>
<td>(Zeng et al. 2004)</td>
</tr>
</tbody>
</table>

To conclude, the growth of health websites leads to increased volumes of medical information that is not always of high-quality (Christensen and Griffiths 2000; Coiera 2000). Poor search tools often make it difficult for e-patients to find accurate and relevant information they want and leaves them confused and frustrated (Childs 2004; Lewis et al. 2005b). To that end, even though ideally health websites are supposed to guide e-patients in their information search by providing one-stop-for-all for their enquiries, there are still a number of issues related to quality, search and delivery of information that need to be addressed (Coye 2004; Eysenbach et al. 1998; Lazarenko and Burstein 2006). Therefore, there is a strong need to improve capabilities of health websites to help users with their search for relevant information in timely manner (Burstein et al. 2005b; Gustafson et al. 2008; Lazarenko and Burstein 2006). This research investigates the ways to address the identified issues in order to deliver improved health websites that would be more satisfactory for the users.
2.4 Personalisation as a Concept

One of the solutions that provides users with relevant information in a timely manner is *personalisation* (Montgomery and Smith 2009; Park et al. 2003). Personalisation has been introduced across various entertainment, financial and shopping websites and portals, such as YouTube, Yahoo!, Amazon, personal banking systems in order to better meet the information needs of the users.

*Personalisation*, as a concept, can be defined as an “impulse” (p.180) to alter environments, tools, and products to fit the unique concerns of the individual (Fan and Poole 2006). There are a number of fields that study personalisation and its effects on humans and their behaviour, such as sociology (Cummings et al. 2002; Wellman 2002), e-commerce (Ardissono et al. 2002; Blom and Monk 2001; Sadeh 2002; Wu et al. 2003), marketing (Peppers and Rogers 1993; Rubini 2001), management (Amoroso and Reinig 2003; Tochtermann 2003; Zimmermann et al. 2005) and information technology (Blom 2000; Fan and Poole 2006; Hirsh et al. 2000; Vesanen 2007). Depending on the focus of each of the mentioned fields, their definition and perspective on personalisation vary. Table 2.2 provides definitions of personalisation for each of the fields and lists synonyms used in conjunction with the term ‘personalisation’ across these fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Sample Definitions</th>
<th>Synonyms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sociology</td>
<td>“Technology that provide experiences that bridge cultures, languages, currencies, and ideologies” (Brooks 2001, p.14)</td>
<td>Individuation, individualisation</td>
</tr>
<tr>
<td>E-commerce</td>
<td><em>Personalisation</em> is the way to tailor e-commerce interactions between a business and a customer by combining the use of technology and customer information (Consortium 2003)</td>
<td>Customisation</td>
</tr>
<tr>
<td>Marketing</td>
<td>“<em>Personalisation</em> is about building customer loyalty by building a meaningful one-to-one relationship; by understanding the needs of each individual and helping satisfy a goal that efficiently and knowledgeably addresses each individual’s need in a given context” (Riecken 2000)</td>
<td>Consumer-centric, one-to-one relationship</td>
</tr>
<tr>
<td>Management</td>
<td>Personalization is the use of technology and customer information to facilitate interactions between a business and each individual customer (Tochtermann 2003)</td>
<td>One-to-one relationship</td>
</tr>
<tr>
<td>Information Technology</td>
<td>“<em>Personalisation</em> is the capability to provide users, customers, partners, and employees, with the most relevant web experience possible” (Kasanoff 2001, p.15)</td>
<td>Customisation, adaptation</td>
</tr>
</tbody>
</table>
tasks, and the context in which the user accomplishes tasks and goals” (Karat et al. 2000, p.50)

“Personalisation is a toolbox of technologies and application features used in the design of an end-user experience” (Kramer et al. 2000, p.44)

“Delivering to a group of individuals relevant information that is retrieved, transformed, and/or deduced from information sources” (Kim 2002, p.30)

“… a way to close the gap between the user and a computer” (Fan and Poole 2006, p.183).

Process that changes functionality, interface, or information content of a system to increase its personal relevance to an individual (Blom 2000; Blom 2002b)

As can be seen from Table 2.2, there are various definitions of personalisation depending on the context it is used in. This research, conducted in the broad context of IS, adopts the definition given by Karat (2000), who states that personalisation is as an understanding of “the user, the user’s tasks, and the context in which the user accomplishes tasks and goals” (p.50).

Personalisation is often viewed as a way to close the gap between a user and a computer by catering for user’s individual needs rather than generic requests (Fan and Poole 2006). Whilst websites and portals integrate a wide range of data, personalisation provides an efficient access point to create relevant and structured context, as well as the ability to analyse information and create a personalised user interface (Murray 2002; Zimmermann et al. 2005).

In an e-health context, personalisation implies that e-patients are able to obtain medical information tailored to their information needs in timely manner (Burstein et al. 2005b). Personalisation tailors a users’ individual information needs and helps e-patients search for medical information by providing a set of extra parameters, subsequently decreasing the redundancy of the search results and retrieving more relevant information online (Gustafson et al. 2008). It is reported that provision of tailored health information to e-patients has had a greater impact on users than provision of de-contextualised, generic or impersonal information (Cawsey et al. 2007). Moreover, there is empirical research which demonstrates that personalisation of health websites also facilitates the formation of e-patients’ trust judgments about medical information contained in the website (Briggs et al. 2004) and implies good management of the medical information available online (Egger 2000).

According to Chen et al (2003), personalisation is a successfully adopted concept for a number of progressive and popular health websites that aims to satisfy e-patients’ expectations towards
decision support. Thus, being a common phenomenon, personalisation is becoming expected by users when they engage with health websites in order to find relevant information within a reasonable timeframe and to make their searching or browsing experience productive and enjoyable (Fierz 2004; Isern et al. 2003). Personalisation is also a multi-dimensional construct that can be viewed from a number of perspectives, as discussed in the next section of this chapter.

2.4.1 Perspectives and Dimensions of Personalisation

There are three major perspectives on personalisation identified by Blom (2004) – system-centred perspective, business-centred perspective and user-centred perspective. The system-centred perspective focuses mainly on identification of various implementation methods for personalisation, such as implicit or explicit ones, their benefits and technological aspects (Blom 2004; Kobsa et al. 2001). The second perspective, business-centred, is based on marketing principles related to users and the identification of their preferences in order to turn them into loyal customers (Blom 2004; Peppers and Rogers 1993). The third perspective, user-centred, is dedicated to a better understanding of the role that users play in the development of personalised technologies (Blom 2004; Fan and Poole 2006).

System-centred perspective in personalisation emphasizes on technological and technical aspects of personalised features, and is well researched (Fan and Poole 2006). There are various aspects of websites that can be personalised, such as content, interface and website functionality (Blom 2004; Fan and Poole 2006; Hirsh et al. 2000; Tochtermann 2003; Zimmermann et al. 2005). There are also different types of personalisation, discussed further in this section.

From a system-centred perspective, personalisation can be group and individual one. While individual personalisation is oriented towards the needs of a single user, group personalisation allows generalising functions or properties among groups of users and makes suggestions based on a ‘like-minded people’ approach (Cingil et al. 2000). An example of individual personalisation is provided by My Yahoo! Portal (http://my.yahoo.com/), where users can select from hundreds of modules, such as news, stock prices, weather, and sports scores, and place them on one or more web pages to create a personalised view. The content of the modules is updated automatically so the users receive current information (Manber et al. 2000). Group personalisation is illustrated by such medical websites as Health on the Net Foundation (http://www.hon.ch/) where the user has to identify oneself as a patient/individual, medical professional or a web publisher when accessing the website. Depending on the chosen option, the content, layout and interface changes.
Personalisation can also be explicit and implicit. Depending on the chosen type of personalisation, the collection of information about users and their preferences will be conducted either explicitly (by asking users about their preferences) or implicitly (by gathering data about the users through analysis of their online behaviour). This collected information is used to create user profiles (individual personalisation) or user categories (group personalisation), which then provide users with the most suitable and relevant content for them (Ardissono et al. 2002). Explicit personalisation relies heavily on predefined users and user groups, which is why this approach often requires high level interaction with users at the design and implementation stages (Fan and Poole 2006). Explicit personalisation significantly enhances the value of a website or a portal to the users as it allows a high degree of personalisation based on users’ preferences and promotes user involvement (Wu et al. 2003). Implicit personalisation draws conclusions based on users’ online behaviour (for example, delivering certain content because users have clicked particular links or visited certain pages). This type of personalisation relies heavily on technical aspects, such as IP addresses, browsing history, user logs and cookies and requires programming and implementation of various algorithms on a server side (Correia and Boavida 2001). Certain advantages of this type of personalisation is that users are not questioned by the website to provide their preferences, details, etc (Aggarwal and Yu 2000). Preferences are then derived on the basis of the users’ previous Internet experiences and logs (Eirinaki and Vazirgiannis 2003). Due to the implicit data collection, when a user is not aware of their data being gathered, such type of personalisation raises security and privacy concerns (Brar and Kay 2004). One of the potential solutions to stop non-sanctioned changes of the websites and portals is to explicitly ask for user’s approval before introducing functional optimisation of any sort (Blom 2000). It is important to add that some of the websites and portals use both implicit and explicit types of personalisation in conjunction, for example Yahoo! (http://yahoo.com/) or Amazon (http://www.amazon.com/), in order to provide users with the best user experience (Adomavicius et al. 2008; Manber et al. 2000).

A business-centred perspective on personalisation is based on marketing principles aimed to improve customer (user) experiences in relation to products or services. In marketing and e-commerce, personalisation is recognised as an important aspect of customer relationships and web strategies (Fan and Poole 2006). According to Pearrow (2007), a dollar spent on advertising in 1998 by the USA travel companies produced $5 in total revenue, whereas a dollar spent on customer experience improvements, including personalisation initiatives, produced more than $60. Therefore, personalisation proved to be effective in terms of the monetary value for the company as it provided customers with better services and products (Pearrow 2007).
In marketing, personalisation provides the means for selling the right products and services to the right audience (Montgomery and Smith 2009; Vesanen 2007). To that end, if companies are able to identify the target audience, i.e. intended users, for their services, the companies will spend less money and time on gaining the target audience’s attention and loyalty. In this way, the companies save a significant amount of money and potentially gain more customers as:

- the cost of the research activities is lower than the cost of vast marketing campaigns;
- the customers would get the information they are or might be potentially interested in;
- the customers would not be overwhelmed with the amount of offers as they would get a limited list of products and services they might be interested in (Clemons 2008; Montgomery and Smith 2009; Vesanen 2007).

The monetary value that personalisation contributes to a company’s revenue may explain why personalisation, as a concept, is well researched in marketing comparing to other fields such as psychology, IT, architecture and sociology (Blom 2004; Blom and Monk 2001).

According to Wantland et al (2004), personalisation, when implemented successfully, is a major advantage of a website or a portal as it insures that users will return. The main challenge is to turn prospects into users who spend their money, so it is vital that the interaction is personal, relevant, valuable and timely. By creating a one-to-one experience for their customers, companies gain loyalty and trust (Murray et al. 2003). Therefore, it is no surprise that for many companies implementation of personalisation is one of the keys for success (Chou and Chou 2002).

A user-centred perspective on personalisation is grounded in a user-centred design philosophy, discussed in Section 2.2.1. In order to deliver effective personalisation users need to be placed in the centre of the design and development processes; they need to be explicitly asked about the effects of personalisation on their online experiences, and how the websites should be altered to lead to the desirable results (Blom 2002a; Cosley et al. 2003; Ho and Kwok 2002). The role of user-centred perspective in design and development of websites is further discussed in Section 2.5.1.2.

Dimensions of personalisation are related to particular aspects of the website that need to be personalised. This might include personalisation of interface design and layout (graphics, colours, layout), content (what information a user or group of users prioritise), and functionality (provision of a set of functions and parameters that have to be defined by the users) (Fan and Poole 2006; Hirsh et al. 2000). Depending on the adopted technology, personalisation can modify portal content or layout depending on the user characteristics or preferences, re-order/prioritise information available to the users, restrict/hide information from the user based
on the user profiles (often requires user registration), adjust certain functionality in accordance with the user preferences.

To sum up, personalisation is a complex phenomenon often viewed from a number of perspectives (Blom 2004) and dimensions (Fan and Poole 2006), as discussed above. The perspectives on personalisation identify major areas that influence implementation and adoption of personalisation in the IS, IT and marketing domains. For example, in the IS domain, the dimensions of personalisation signify implementation choices in relation to what aspects of the websites or portals need to be personalised (content, interface, functionality), for whom (an individual or a group of users) as well as how (implicitly or explicitly). Figure 2.3 summarises personalisation.

![Diagram of Perspectives and Dimensions of Personalisation](adapted from Blom 2004; Fan and Poole 2006)

Personalisation is currently predominantly viewed from a system-centred perspective that places emphasis on the technological aspects (Blom 2004). Such an approach can be highly subjective, ineffective and restrictive by its very nature, especially due to the fact that there is a lack of research on effectiveness of different personalisation technologies and their applicability for various types of portals (Fan and Poole 2006). Blom (2004) states that the current focus on technical ‘know-how’ applicability and capability of various technologies needs to be shifted from ‘how to do personalisation’ to ‘how to do personalisation effectively and well’, which inevitably requires user involvement. From Blom’s perspective, the involvement of users will help:

- facilitate better understanding of the value of personalisation for the users;
- define the extent to which personalisation contributes to establishing one-to-one relationship with the users;
- outline the problems that users face when they access personalised websites;
- find the ways to solve these problems.
These processes are vital when considering the increasing trend in use of personalisation technologies (Fan and Poole 2006; Riecken 2000). Blom (2004) concludes that a user-centred perspective on personalisation needs further exploration as it is important, but not particularly well-presented in the current academic literature. This study takes user-centred perspective on personalisation and aims to explore how certain user characteristics, namely user expectations, can contribute to better design and development of personalised health websites.

2.4.2 Personalisation of Health Websites

Personalised health websites aim to provide e-patients with the right information at the right time (Burstein et al. 2005b). In theory, personalisation should be able to not just locate relevant information but also suit e-patients’ requirements of the level of difficulty of the information and its layout, and also provide metadata about retrieved information (Burstein et al. 2005b). Provision of metadata can help clarify whether the discussed issue is controversial or not, whether the information is up to date, etc. (Deci et al. 1994; Gustafson et al. 2008; Shapiro 2007). Eysenbach (2003) states that ideally personalisation has to help “… develop and evaluate interventions that can maximize the positive effect of the Internet; harness the power of information and communication technology for patients who want it, without disadvantaging those who have difference preferences” (p.358).

In reference to personalised information provision, many e-patients report such effects as better health information and services, and different, but not always better, relationships with their doctors (Ferguson and Frydman 2004). According to Ferguson (2007):

- 72% of the e-patients search for medical info just before or after doctor’s visit;
- 70% note that online information influence their medical decisions;
- 51% noted that online information has affected the way they are (and their attitude towards the doctors’ visits).

Further literature analysis demonstrates that a doctors’ perspective on their patients’ ability to acquire information on medical conditions and get medical advice online is rather controversial (Jacobson 2007; Shapiro 2007). According to Shapiro (2007), not all the doctors are happy when patients are seeking for online information as it is often of poor quality. Doctors are also concerned with the reliability of information on the Internet and misinterpretation by e-patients (Eysenbach and Jadad 2001).

Doctors are not always willing to spend time on clarifying what medical information obtained by their patients online is inaccurate and why (Ferguson 2000). Doctors are also critical when e-patients find medical information online that is unknown to the health professionals or
contradicts their recommendations (Eysenbach and Jadad 2001). Such situations, particularly when the e-patients bring extra information found online to the consultations, are often seen as a challenge of a doctor’s authority (Jacobson 2007). However, medical professionals realise that, if misinformed, e-patients may lose trust in their doctors and take actions that undermine the effectiveness of their treatment (for instance, by taking substances that interact in a negative way with their prescribed medications) (Eysenbach and Jadad 2001).

On the positive side, doctors feel that when e-patients access medical websites searching for health information, consultations can become more interactive (Eysenbach and Jadad 2001). Doctors agree that it is easier to talk to patients if they come prepared, e.g. familiar with the terminology and treatment options. Because better informed patients may ask better questions, manage their disease more effectively and even monitor and intervene to improve their care (Gustafson et al. 2008; Gustafson et al. 2001). According to Murray et al (2003), some doctors find it beneficial when patients bring accurate, relevant online information in and welcome it. Therefore, improving the accuracy and relevance of online information available to patients may potentially enhance outcomes of patient-doctor communication and health care outcomes in general.

Taking on e-patients’ perspective, Ferguson (2000) states that the information needs of e-patients have to be as precise as possible as “they’ll spend hours and hours on the Internet learning about their condition, communicating with other patients and clinicians who share their interests, and tracking down every lead they can find on the best treatments” (p.1130). To that end, accuracy and precision of information obtained are very important as they may save both doctor’s and patient’s time by improving outcomes of doctor-patient interaction and reduce amount of stress e-patients are exposed to (Murray et al. 2003).

Personalisation of health websites is one of the ways to address user information needs through the provision of tailored information in a timely manner (Cawsey et al. 2007; Lazarenko and Burstein 2006). It is claimed that “de-contextualised, impersonal and generic information” (Cawsey et al. 2007, p.466) has less impact on e-patients compared to the tailored information. Therefore, it is important to make sure that health websites provide a range of features that facilitate provision of tailored resources to meet e-patients’ information needs. Such features are called personalised features and they are discussed in the next section.
2.4.3 Personalised Features of Health Websites

Personalisation of health websites is normally implemented through a range of personalised features that aim to better understand e-patients’ tasks, needs and goals. Personalised features are defined by Steinmetz and Wolf (1997) as features that refer to an adjustment of the service in order to suit individual needs and preferences. Personalised features provide users with a number of functions and services that help retrieve desirable information based on individual needs and preferences (Ardissono et al. 2002).

Personalised features are particularly important in the health context, as in order to find relevant medical information online, e-patients have to be as specific as possible in their search to “assemble and understand the retrieved information in the context of their personal health concerns” (Lewis et al. 2005b, p.4). The intention of personalised features is to help e-patients with the task. If personalisation is a service that the website provides in order to deliver users relevant information in timely manner, then personalised features are the way to implement that service (Gauch et al. 2007).

Examples of personalised features of health websites are:

- health tools and calculators that are essentially stand-alone applications or modules that provide specific services such as calculation of e-patient’s body mass index or the amount of calories they consume in a given timeframe, quizzes to assess fitness level, and more;
- personalised search that enables the initial search and filtering of retrieved information by various categories;
- find a doctor that allows e-patients locate a health practitioner by providing such parameters as postcode, name, language;
- personalised newsletter that enables users subscribe for a newsletter where they can specify health conditions they would like to get the information about;
- drug interactions checker that compares interaction of two and more drugs with each other and with other substances such as food, alcohol and caffeine.

The implementation of personalised features is normally based on a number of implicit and explicit methods of obtaining user information (Fan and Poole 2006). Implicit methods include the use of techniques, such as information filtering, log analysis, provide content filtering, which are often without direct user involvement (Ardissono et al. 2002). Given narrow implementations of such techniques across health websites, they are of limited relevance to the conducted study. This research emphasizes explicit methods of gathering information from and
about the website users to develop and implement personalised features that would cater for individual needs of e-patients as users of health websites.

Using explicit methods, information about e-patients can be collected at various stages:
- at the start of design and development of personalised features;
- during the process of user interaction with the health website (i.e. when e-patients are using the personalised features);
- after (via the feedback that the users provide about personalised features they have used).

At the start:
At the very start of building health websites, the developers choose their target audience and identify what types of information need to be gathered from and about e-patients in order to design and develop personalised features. Traditionally, user-centred design offers various techniques used for these purposes, such as interviews, surveys, focus groups, and others (Bødker and Grønbæk 1996; Shneiderman and Plaisant 2005). Obtained information is later classified to create individual or group user profiles. These profiles allow filtering information delivered to e-patients in accordance with their profiles, which incorporate a range of criteria specified and identified during the information gathering process (Sieg et al. 2007).

During e-patients work with the health websites:
There are a number of personalised features that explicitly ask users to specify or identify particular parameters in order to get relevant results. For instance, if e-patients want to get their health checked, they are asked to provide certain parameters, such as pulse, location of the injury, and others. The fact that the feature explicitly requires certain parameters in order to generate relevant information (to meet e-patients’ information needs) makes it personalised.

After the interaction:
E-patients might be asked for their feedback after an interaction with personalised features. Once this feedback is received and analysed, the features can be altered to better suit user needs for the future interactions with the health websites.

There are studies which demonstrate that e-patients tend to prefer personalised health websites to generic ones (Cawsey et al. 2007; Sillence et al. 2007; Sillence et al. 2008). Such tendency can be explained by the advantages of personalised features. Firstly, they deliver tailored information that caters for individual needs, which sorts the problem of information overload and relevance of the resources (Lazarenko and Burstein 2006). Empirical analysis of existing
medical websites demonstrates that such personalised features as personalised search, for example, classify medical information in accordance with:

- different stages of certain diseases;
- different timeframes (chronic diseases or basic conditions);
- different levels of awareness (expert/non-expert);
- different health conditions/emotional state (depressed/non-depressed);
- different representation of information (plain/scientific);
- different types of users (information for a friend/relative/kid);
- different age of the user (kid/adult/senior);
- different gender (information for males/females)

Secondly, features, such as personalised search and symptoms checker consider complexity and volume of medical terms and jargon, and help e-patients use ‘simple’, non-scientific terms in order to find relevant information (Hoey and Hoey 2002).

To conclude, personalised features implemented across various health websites are a valid and important initiative that aims to provide users with relevant information in a timely manner. This ‘tailored’ approach to information provision reduces information overload, frustration and confusion of e-patients who search for medical information online. However, there are a number of issues related to personalised features that leave users dissatisfied with personalised health websites. These issues are discussed in the following section of this chapter.

2.4.4 Issues with Personalised Features of Health Websites

Personalised features of health websites “open the way to more patient-centred sources of information and potentially more effective means of achieving the health education goals” (Cawsey et al. 2007, p.469). There is empirical evidence that e-patients are increasingly seeking for personalised health advice (Sillence et al. 2007). They are searching for personalised health websites that match their own social identity, sites to which e-patients feel they can relate and that are “written for people like themselves” (Sillence et al. 2004, p.668). However, statistics (Sillence et al. 2007) demonstrates that the percentage of e-patients who use personalised health websites is still relatively small (27%), which can be explained by a number of issues related to user dissatisfaction.

Firstly, e-patients are reluctant to use personalised health websites if they suspect that their personal medical information might be accessible by others (Cawsey et al. 2007). Therefore, personalised health websites need to carefully address the issues of privacy, security and trust,
and clearly state whether/how they intend to collect any information obtained during the interactive sessions. While the legal issues of trust and privacy are out of scope of this study, nonetheless, it is important to acknowledge these problems. Secondly, the interaction of e-patients with health websites tends to be emotionally charged due to the fact that e-patients are often unwell or stressed when they search for medical information online (Sitzia and Wood 1997). That is why personalised health websites need to consider an e-patient’s emotional state and attitude in order to provide effective one-to-one interaction (Green 2005). Finally, e-patients want to be more in control of the information they obtain via personalised health websites in order to use them more effectively, and thus to have more satisfactory interaction with the online system (Cawsey et al. 2007). According to Eysenbach and Köhler (2002) the quality of health websites can be measured by the gap between user expectations and the features and services that a website provides. In fact there are a number of researchers that link the problem of user dissatisfaction with unmet expectations in healthcare services (Meredith et al. 1993; Sitzia and Wood 1997; Thompson and Sunol 1995; Williams 1994).

Stimson and Webb (1975) are one of the first researchers who suggested that satisfaction was related to the extent to which healthcare products and services meet patients’ expectations. Later on, based on conducted empirical research in the healthcare field, a number of researches (Meredith et al. 1993; Thompson and Sunol 1995; Williams 1994) confirmed that patient expectations are the key to understanding the reasons for patients’ dissatisfaction. Sitzia and Wood (1997) also claim expectations to be one of the most significant “subject characteristics” (p.1840) that determine a patient’s satisfaction in the healthcare sector. They (1997) also believe that from patients’ point of view, quality of healthcare and subsequent satisfaction with it may most simply be seen in the framework of patients’ expectations versus actual experiences. To that end, expectations seem to be one of the important determinants of user satisfaction, at least in the healthcare field. According to Crow et al (2002), satisfaction can be measured against an individual’s expectations, needs or desires. Therefore, it can be concluded that while user expectations are not the only determinant of e-patients’ satisfaction with health websites, they are important.

An e-patient expectation is the provision of personalised features that enable health websites to deliver tailored medical information in timely manner (Ball and Lillis 2001; Burstein et al. 2005b; Hawkins et al. 2008). Ball and Lillis (2001) predicted that the nature of online health would shift towards tailoring to individual needs of e-patients. They also stated that the real challenge for those developing personalised health websites would be keeping pace with user expectations, implying that user expectations would inevitably grow in regards to having personalised features designed, implemented and functioned properly.
Another factor that influences the growth of user expectations towards personalised features of health websites is the wide implementation of personalisation across various websites and portals, such as financial (e.g. personal banking websites), entertainment (e.g. Yahoo!, MyGoogle) or shopping (e.g. Amazon) ones (Riecken 2000). Being commerce or business driven, they often offer higher quality personalised features compared to health websites. Extensive and efficient provision of personalised features across such publicly available websites makes users expect the presence of personalised features across health websites (Ball and Lillis 2001; Hawkins et al. 2008).

Overall, there is a little doubt that with the technological improvement and development of e-health initiatives, user expectations towards health websites will keep growing (Jones et al. 2007). However, does it mean that e-patients want to ‘have it all’, including some complex personalised features implemented across various health websites, or do they prefer specific personalised features to be installed? What are the expectations of e-patients in regards to health websites and their provision of personalised features? How such expectations can be identified and extracted? These are the gaps in the current knowledge of personalised health websites that this study aims to fill.

To conclude, analysis of e-health literature demonstrates limited research on user expectations towards the healthcare field in general, and personalised features of health websites in particular (Ball and Lillis 2001; Cawsey et al. 2007; Hawkins et al. 2008). Further research of the problem of user expectations and their role in the design and development of personalised health websites is needed in order to address a number of issues faced by e-patients. These issues are related to:

- the continuous difficulty of finding relevant information in a timely manner;
- the ease of use and interface issues of personalised health websites;
- consideration of user emotional state for effective interactions;
- provision of users with more control over retrieved information (Cawsey et al. 2007; Green 2005).

The next section of this chapter explores the notion of user expectations in the IS field by analysing IS literature and identifying contemporary research related to the user expectations towards online systems.

2.5 User Expectations

The literature analysis demonstrates that the concept of user expectations is rather complex and diverse. There is a significant body of literature in such fields as psychology, sociology, social
policy, health care services and management, marketing, and information systems development (Baumeister 1999; Georgescu-Roegen 1958; Gilbert et al. 1992; Linder-Pelz 1982; Sitzia and Wood 1997; Szajna and Scamell 1993; Yi 1990; Yuan and Woodman 2007) that is concerned with the user expectations. The variety of definitions of expectations across various fields is presented in Table 2.3.

**Table 2.3 Definitions of expectations across different fields**

<table>
<thead>
<tr>
<th>Fields</th>
<th>Sample Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychology</td>
<td>Baumeister (1999) state that expectations are the conviction that one can successfully execute the behaviour required to produce certain outcomes.</td>
</tr>
<tr>
<td>Sociology</td>
<td>“. . . the state of the mind of a given individual with respect to an assertion, a coming event, or any other matter on which absolute knowledge does not necessarily exist” (Georgescu-Roegen 1958, p.12)</td>
</tr>
<tr>
<td>Social policy</td>
<td>“. . . beliefs that a given response will be followed by some event; an event has either a positive or negative valence or affect” (Linder-Pelz 1982, p.587).</td>
</tr>
<tr>
<td>Health care services</td>
<td>“. . . basic yardstick people use to evaluate the attractiveness and desirability of outcomes, events, people, products, services, and the like” (Gilbert et al. 1992, p.47)</td>
</tr>
<tr>
<td></td>
<td>Sitzia and Wood (1997) define expectations as beliefs about the probability of certain attributes being associated with an event or object, and the perceived probable outcome of that association.</td>
</tr>
<tr>
<td>Management</td>
<td>Yuan and Woodman (2007) state that expectations are individual’s subjective beliefs in the probability that a given state either does or will exist.</td>
</tr>
<tr>
<td></td>
<td>“Expectations are assumptions grounded in the anticipation of a likely outcome” (Grondin 1990, p.371)</td>
</tr>
<tr>
<td>Marketing</td>
<td>Yi (1990) defines expectations as perceptions that the users have in relation to a product or a service, i.e. users’ anticipations of what the product or a service performance would be like.</td>
</tr>
<tr>
<td>Information systems development</td>
<td>“. . . a set of beliefs held by the targeted users of an information system associated with the eventual performance of the IS and with their performance using the system” (Szajna and Scamell 1993, p.494).</td>
</tr>
</tbody>
</table>

Despite a variance across the vast number of fields that research expectations, Sitzia and Wood (1997) state that while the term ‘expectations’ is frequently used, as a concept it is difficult to examine analytically and, as a result, it is rather poorly understood and controversial. Thompson
and Sunol (1995) re-iterate the point stating that expectations are not clearly defined or conceptualised and that there is a need for more theoretical development related to the notion of expectations as such.

For the purpose of this research, expectations are defined as beliefs about a future event that is based on information gathered directly by the users through personal observation, indirectly through attention to information provided by others (including websites and portals), or is inferred, based on information or observation of some related occurrence (Coye 2004; Fishbein and Ajzen 1975; Olson and Dover 1979; Yuan and Woodman 2007).

One of the aspects that contribute to the complexity of the notion of expectations is their dynamic nature and variety of factors influencing their formation (Shou et al. 2007). It is believed that new information learned within a dynamic environment is incorporated by the users to define new expectations (Gilbert et al. 1992). This corresponds to the theories of adaptation (Helson 1964) and exchange (Thibaut and Kelley 1959) where expectations are linked to the experiences that users gained in the past. Many expectations are likely to be epiphenomenal, taking and changing shape as the experiences unfold (Denzin 1983). Sitzia and Wood (1997) state that expectations vary according to the users’ prior experiences, a phenomenon that relates to the dynamic nature of user expectations as they tend to change with accumulating experiences. Taking into consideration the fact that expectations are a part of a dynamic interaction of the users with the environment (Thompson and Sunol 1995), both the environment and the users’ perceptions of reality influence user expectations over time (Gilbert et al. 1992). Thus it is important to address user expectations, including user expectations towards personalised health websites, not as a static, but as a dynamic concept.

Another aspect that needs clarification is the occasional confusion between the terms 'needs' and 'expectations' in the literature. According to Harrington (1991), user needs often set the high level standards of the system performance, services or product quality, thus they are easier to determine. The user needs are paramount and must be met in order for people to value the services they get; the needs also normally change more often than expectations (Harrington 1991). Schers et al (2004) state that while user needs are more straightforward and, as a result, easier to extract, user expectations are rooted in the actual experiences and require more effort to be identified or extracted. However, there is not much known about how to extract user expectations in order to incorporate them in the design and development of online systems, such as personalised health websites, which is another gap this study aims to fill. Analysis of user expectations in the information systems literature is presented in the following section.
2.5.1 Expectations in Information Systems Literature

Analysis of information systems literature revealed that there are three major areas that explore user expectations, their role and inclusion in the systems design:
- requirements engineering;
- user-centred design;
- service quality

It is important to note that user expectations are also mentioned in the works on information system success by DeLone and McLean (2003; 1992) as previously discussed in Section 2.1.2. However, these authors only mention user expectations as one of the factors contributing to the system success and do not elaborate on the role of user expectations in detail. DeLone and McLean (2003; 1992) do not reveal the factors that influences user expectations, or facilitate the formation of user expectations towards the information systems. Thus, the literature on information system success was not of particular interest for this study.

The aim of the literature analysis of the three identified areas: requirements engineering, user-centred design and service quality, was to determine the current state of research on user expectations, namely on the role and inclusion of user expectations in the IS design and development along with the methods of extraction of user expectations.

2.5.1.1 Requirements Engineering Literature

*Requirements engineering* (RE) is an area within a broader field of systems and software engineering focused on eliciting systems’ requirements, “statements that identify a capability, characteristic, or quality factor of a system in order for it to have value and utility for a user. A requirement is well defined and more specific than a need, which is a capability desired by a customer to solve a problem or to achieve an objective” (Young 2004, p.45).

Elicitation of system requirements is essential in order to “determine and refine real customer and user needs and expectations of the delivered system” (Young 2004, p.2). Given that building any online system, including health websites, is fundamentally an engineering process, it is important to provide analysis of the role that RE envisages for user expectations in such processes.

According to Young (2004), “gaining an understanding of the customers’ and users’ needs for the planned system and their expectations of it” (p.4) is an important activity embedded in the RE initiatives. Traditionally, RE initiatives are outlines in the Systems Engineering Capability
Maturity Model (SE-CMM) developed and patented by Carnegie Mellon University researchers (http://www.sei.cmu.edu/). This model is widely adopted and used across organisations for system development processes (Lindgaard et al. 2006).

The SE-CMM serves as a guide for software process improvement as it provides a framework for prioritising actions required to increase the maturity of the business key processes (Paulk et al. 1995). It essentially provides elements of enhanced processes that ultimately aim to produce better systems by integrating user needs and expectations, business activities and technological solutions (Bamberger 1997).

According to the SE-CMM, user satisfaction is defined as an indicator of the degree to which a delivered product or service meets or exceeds customer expectations. One of the components of the model is the process area 06: ‘Understand customer needs and expectations’. The customer here is “the individual(s) or entity for whom a product is developed or service is rendered, and/or the individual or entity who uses the product or service” (Paulk et al. 1995, p. 2-12). The process area 06 defines the purpose to elicit, stimulate, analyse and communicate customer needs and expectations, and translate them into a verifiable set of requirements (Young 2004). This component of the model conceptually corresponds with the concepts of Six Sigma developed by Motorola Company (Morgello 1991), in particular in relation to understanding of user needs and expectations (see Table 2.4).

### Table 2.4 Extract from the Systems Engineering Capability Maturity Model

<table>
<thead>
<tr>
<th>Six Sigma Model</th>
<th>SE-CMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify your customers</td>
<td>PA 6: Understand Customer Needs and Expectations</td>
</tr>
<tr>
<td>Identify needs</td>
<td>PA 6: Understand Customer Needs and Expectations</td>
</tr>
</tbody>
</table>

The SE-CMM (Curtis et al. 1995) states that “the purpose of understanding customer needs and expectations is to elicit, stimulate, analyse, and communicate customer needs and expectations to obtain a better understanding of what will satisfy the customer. Understand customer needs and expectations involves engaging the customer or surrogate in ongoing dialogue designed to translate his/her needs and expectations into a verifiable set of requirements which the customer understands and which provide the basis for agreements between the customer and the systems engineering effort” (p.4-59).

The SE-CMM lists the best base practices related to user expectations that play an important role in good systems engineering (Curtis et al. 1995):
- **BP.06.01** Elicit the customer's needs, *expectations*, and measures of effectiveness.
- **BP.06.02** Analyse the customer's needs and *expectations* to develop a preliminary operational concept of the system.
- **BP.06.03** Develop a statement of system requirements (p.4-59).

In relation to personalised features of health websites, these principles can be interpreted as:

- Elicit the e-patients needs and expectations towards personalised features of health websites (BP.06.01)
- Analyse e-patients needs and expectations to develop a preliminary list of personalised features to be included in the website (BP.06.02)
- Develop a statement with the functional requirements of personalised features of health websites (BP.06.03)

Further exploration of Section BP.06.01 reveals that frequently customer needs and expectations are poorly identified, even though they have to be clearly identified and prioritised for successful requirement engineering (Curtis et al. 1995). However, neither the section nor the entire model provides any techniques that could be used for extracting user expectations, just the user needs.

Section BP.06.02 emphasises the analysis of the operational environment and various factors that might affect user needs and expectations depending on the system context. It also states that the customer needs and expectations should be prioritised correctly (Curtis et al. 1995). In relation to personalised features of health websites, Section BP.06.02 can be interpreted as the need to analyse and define the specialties of the health context, and identify in what ways the context affects e-patients expectations.

Section BP.06.03 states that once a complete set of customer needs and expectations is available, it can be translated into the top-level system requirements (Curtis et al. 1995). Once the expectations of e-patients towards personalised features of health websites are identified, they need to be translated into the functional requirements of personalised features.

Overall, the SE-CMM applied to the design and development of personalised health websites, requires:

- elicitation of e-patients’ expectations in a given healthcare context – e-health;
- analysis of the context itself to see how it might affect user expectations,
- translation of these expectations into functional requirements of personalised features of health websites.
However, the SE-CMM does not provide any practical guidance on how user expectations can be extracted to initiate the processes outlined above.

To sum up, RE acknowledges the role and importance of identification of user expectations for effective development of online systems, such as health websites. RE also signifies the importance of the system (website) context and implies that user expectations will vary depending on the nature of the system (website). RE also links the notion of user expectations to prospective user satisfaction with the system. Exploring RE literature further, a number of researchers state the need to work with users in order to practice effective RE (Hull et al. 2005; Sommerville and Sawyer 1995; Young 2004). However, none of these researchers list any practical examples of such work or provide any guidance on how this work can be carried out. There are no recommendations, guidelines or techniques on how to extract user expectations and incorporate them in the design and development processes, or suggestions about effective methods for extracting user expectations towards the systems that are to be built.

2.5.1.2 User-Centred Design Literature

User-centred design is another area of IS literature that talks about inclusion and role of user expectations in the design and development of various IS systems. The notion of UCD as a philosophy is discussed in detail in Section 2.2.1 of this chapter. The first part of this section will concentrate on International Standards that designers have to adhere to in order to follow user-centred design philosophy, and to what extent these standards elaborate on the role of user expectations in the design and development processes. The second part of the section will investigate UCD methods and techniques for extracting user expectations.

The importance of identification of user needs and expectations towards a prospective system in order to translate these needs and expectations into concrete terms that become the blueprint for effective systems design or redesign is reiterated in the UCD literature (Moran and Carroll 1996; Nielsen 2000; Norman 1998; Pearrow 2007; Preece et al. 2002; Shneiderman et al. 2009). According to these authors, user needs and expectations have to be formalised into the design requirements that can be defined as a set of concrete guidelines that specify the steps for design and development of personalised systems. There are a number of International Standards (ISO) that facilitate the process of design and development information systems in accordance with the UCD philosophy.
(1) ISO Standards

The ISO standards are developed to provide guidance on how to achieve certain goals related to the use, usability and design of user-friendly systems, concentrating on specific approaches to design, development or evaluation of such systems (Bevan and Curson 1999). The main benefit of these ISO standards is that they provide a powerful tool to assure user-centred design principles; moreover, the comprehensive nature of these standards make them the most authoritative starting point for human centred design education, training, and practice (Earthy et al. 2001).

There are two ISO standards that talk about user satisfaction with systems and the importance of user expectations for successful systems design and development – ISO 9241-110 (former ISO9241-10, deprecated) and ISO 9241-11. While ISO 9241-110 deals with general principles which apply to the design of dialogues between humans and information systems, namely:

- suitability for the task;
- suitability for learning;
- suitability for individualisation;
- conformity with user expectations;
- self-descriptiveness;
- controllability;
- error tolerance.

ISO 9241-11 explains how to identify information that is necessary to take into account when specifying or evaluating usability in terms of measures of user performance and satisfaction. ISO 9241-11 provides guidance on how to describe the context of use of the product (hardware, software or service) and on the required measures of usability in an explicit way (ISO_9241-11 1996; ISO_9241-110 2006)

ISO 9241-11 – Concept of Usability, defines three requirements for successful systems (ISO_9241-11 1996):

- Efficiency: criteria whereby the attainment of a minimum level of effective performance may be determined;
- Effectiveness: criteria whereby the success or failure of task performance may be determined;
- Satisfaction: criteria by which the users may be judged to have interacted with the system to their internal degree of sufficiency.

Satisfaction is defined here as freedom from discomfort and positive attitudes to the use of the product (ISO_9241-11 1996).
ISO 9241-110 – Dialogue principles (ISO_9241-110 2006), elaborate further by identifying seven factors that need to be taken into consideration in order to deliver and sustain effectiveness, efficiency and satisfaction stated by ISO 9241-11. These seven factors are: 
- suitability for the task;
- self-descriptiveness;
- suitability for learning;
- controllability;
- error tolerance;
- suitability for individualisation;
- conformity with user expectations (ISO_9241-110 2006).

However, both Standards provide no definition of what is understood by user expectations, or what methods would be most effective for extracting user expectations depending on the system context. There are no recommendations on how to deal with the design and development of personalised systems or explanation regarding the dialogue principles that are applicable to them.

According to Bevan (2009), one of the problems with the ISO Standards is that they provide guidelines that constitute an immense body of knowledge. Such standards are not very easy for designers to use as they do not provide a great deal of detail, or practical presentation on how to apply the guidelines in various system contexts (Bevan 2009; Carter 1999; De Souza and Bevan 1990). To that end, on the one hand, the ISO Standards advocate for involving users in systems design and development as these standards can define levels of personalisation needed for adequate interface design, layout, and content representation. For example, the users might help designers identify:
- what extra parameters should be implemented for getting effective and efficient search results;
- what aspects of the system are critical from their perspective;
- what number of steps in relation to particular action is considered to be sufficient;
- what is an acceptable degree of personalisation for various tasks.

The ISO Standards also emphasise the importance of the extraction of user expectations in order to produce systems that will keep users satisfied with the final results.

On the other hand, the ISO Standards fail to provide any detailed information on how user involvement can be achieved, as well as what methods should be used to extract user expectations, what steps or actions need to be undertaken to implement such methods and how to incorporate extraction of user expectations in the design of personalised health websites. Failure of the ISO Standards to suggest effective methods for extracting user expectations can potentially be explained by the fact that even more specific UCD literature does not identify
what methods are the most effective to extract user expectations. See the next section for further discussion

(2) Methods to Extract User Expectations

The UCD advocates for clear understanding of user characteristics through active involvement of users in the IS design and development processes (Maguire 2001). Clear identification of user characteristics, such as user needs and expectations, can enhance the acceptance of and commitment to the new system as the users tend to gain the feeling that the system is being designed for them, rather than being imposed on them (Damodaran 1996). There are a vast number of UCD methods that can be used to capture user characteristics, such as needs and expectations, for subsequent development of personalised online systems such as websites and portals (Eagan 2006).

The UCD methods are essentially modular or identifiable processes of the UCD practice based on active involvement of the users in the IS design and development processes (Mao et al. 2001). All UCD methods vary depending on their applicability, i.e. when to use certain methods in order to reveal various user characteristics; how many sessions are needed and their length; approach to the method; and different levels of formality across various methods (Maguire 2001). The choice of UCD methods, number of sessions and length of the sessions often depend on what user characteristics need to be extracted, while the conduct of the sessions often vary from one facilitator, i.e. the person who runs the sessions, to another (Hackos and Redish 1999; Preece et al. 1994).

In regards to the level of formality, all UCD methods can be divided into formal/more structured and informal/less structured methods (Mao et al. 2005). Mao et al (2001) analyses both of these types of UCD methods and concludes that informal/less structured methods are used more widely than more formal/structured ones. For example, such methods as informal usability testing and card sorting are used more often than focus groups and interviews. Interestingly, both these types of UCD methods have been mentioned as applicable to extract user expectations (Mao et al. 2005). However, while there are various UCD methods that potentially can be used to extract user expectations, there is a lack of information about what methods are the best to use to extract user characteristics, including user expectations, and how they need to be carried out (Mao et al. 2001). The brief characteristics of various UCD methods that can be used to extract user expectations are listed in Table 2.5.
Table 2.5 Data collection methods to extract user expectations (adapted from Constantine and Lockwood 1999; De Troyer and Leune 1998; Hackos and Redish 1999; Mao et al. 2005; Mao et al. 2001; Nielsen 1993; Vredenburg et al. 2002)

<table>
<thead>
<tr>
<th>Method</th>
<th>Definition</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus groups</td>
<td>Focus groups are a form of activity that involves various participants and encourages them to share their thoughts, ideas and attitudes on a certain subject.</td>
<td>Focus groups are considered to be a valuable means to gather ideas for design. They produce non-statistical data and are a good means of getting information about a domain (e.g. what peoples’ tasks involve).</td>
</tr>
<tr>
<td>Usability testing</td>
<td>Usability testing is a technique used to evaluate systems by testing it on users. The users are often asked to perform a series of tasks while a moderator takes note of any difficulties they encounter. Following think-aloud protocols – when users are asked to talk as they go through the process - can be a part of the session.</td>
<td>Usability testing help identify the most likely usability problems with the system. It can generate both non-statistical and statistical data.</td>
</tr>
<tr>
<td>Card Sorting</td>
<td>It is a technique used to establish the initial structure of a site or product. Participants are asked to come up with a usable information design using and sorting the cards that relate to the pages of the site. The results are further combined and analysed statistically.</td>
<td>Card sorting provides a good means suggesting categories for a site's content and deriving its information architecture. It can be used generate statistical data.</td>
</tr>
<tr>
<td>Participatory design</td>
<td>Participatory design is approach to a systems design that actively involves users in the design and decision-making processes when working on a system.</td>
<td>Participatory design is effective for generating prototypes that feed into an overall project's design process.</td>
</tr>
</tbody>
</table>
| Questionnaires        | Questionnaires are pre-defined set of questions used to generating statistical data that can subsequently be analysed and used in the systems design.                                                                 | Questionnaires are usually employed when a design team:  
- can only gain remote access to users of a portal;  
- is seeking a larger sample size than can be realistically achieved through direct contact.                                                  |
| Interviews            | Interviews are a data collection method in a form of a conversation between the designer and the user. During the interview participant's unique points of view can be explored in detail and any misunderstandings can be clarified during the conversation. The output of an interview is mostly non-statistical. | Interviews are normally used at an early stage of the design process in order to gain a more detailed understanding of specific issues/topics.                                                        |
| Think-Aloud method    | The think-aloud method a form of outsider observational analysis that can be applied to extract user views on certain aspects of various systems.                                                               | The think-aloud method involves users verbalising their thoughts and actions as they perform a set of specified tasks.                                                                               |
UCD methods can be used in combination to achieve better results (Nielsen and Mack 1994). However, there is a lack of information about what combination of these methods is the best to extract user expectations regarding online systems.

To sum up, UCD literature states the importance of careful consideration of the context, users, their values, needs, goals, tasks, experiences and expectations when developing online systems. It also provides a range of UCD methods related to working with users in order to extract user characteristics and to gather requirements about the prospective systems. However, it fails to specify what UCD methods, or combination of methods, should be used to effectively extract user expectations towards online systems. Also, the guidelines provided in the form of ISO Standards are generic and do not necessarily provide a substantial level of guidance on how to extract user expectations and what data collection methods are best to use for it.

2.5.1.3 Service Quality Literature

Service quality literature discusses the role that user expectations play in the quality of various services provided by IS. The first part of the section will emphasise the various determinants, identified by Parasuraman et al (1988; 1985), that influence the formation of user expectations. The second part of the section will investigate user expectations as a multilevel construct derived predominantly from the service quality literature.

Service quality literature derives from marketing and builds on the expectation disconfirmation theory (EDT is discussed in Section 2.2.2 of this chapter) to develop measures of service quality (Hubbert et al. 1995; Mudie and Pirrie 2006; Pitt et al. 1995). A widely used measure of the IS service quality, the SERVQUAL model, was developed in the marketing field in mid-1980 by Parasuraman et al (1988; 1985). SERVQUAL is a multi-item scale developed to assess customer perceptions of service quality in service and retail businesses (Parasuraman et al. 1988). The extrapolation of this model into the IS service quality domain was suggested by Conrath and Mignen (1990), who concluded that IS can be seen from the perspective of service provision. Thus, the match between user expectations and the quality of such services is the second most important component of user satisfaction after the actual quality of service itself. It is by revealing user expectations and perceptions of what they think they are getting, developers are able to identify what users really want from the service (Conrath and Mignen 1990; Rushinek and Rushinek 1986).

In their series of work on the SERVQUAL model, Zeithaml, Pasuraman and Berry (Parasuraman et al. 1993; Parasuraman et al. 1991; Parasuraman et al. 1985; Zeithaml et al.
Zeithaml et al. (1990; Zeithaml et al. 1993) identified that there were certain factors influencing the formation of expectations. These factors are called determinants of expectations. Such determinants relate to a potentially vast number of clues that may influence users’ assessment of the system’s activities (Coye 2004). Zeithaml et al. (1990) conclude that such determinants are different in nature and important for understanding of user expectations and their formation and they can be divided onto various types.

(1) Determinants of User Expectations for the Information Systems Quality

In their work, Zeithaml et al. (1993) derive a number of so-called determinants of expectations, i.e. sources (internal or external to users), that influence formation of user expectations. They state that identification of these determinants can lead to enhancement of the IS services via a better understanding of user expectations and their nature (Parasuraman et al. 1993). Walker and Baker (2000) reiterate this point stating that, “expectations are the standards against which customers evaluate service quality, it is important to understand the nature of customers’ expectations” (p.412). Zeithaml et al. (1993) look at the IS quality and identify such determinants of expectation as:

- word of mouth communications;
- personal needs;
- past experiences;
- communications with the service provider (developer).

Ryker et al. (1997) further explore the determinants classifying them into three categories:

- internal (personal needs, word of mouth communication);
- external (communications with the service provider/developer, communication with vendors and advertisements, the latter included by Pitt et al. (1995));
- past experiences as a separate category due to the fact that in organisational settings user experiences can be affected by or derived from both – internal and external sources (see Figure 2.4).
Communications with the service provider/developer

Communications with the vendor/Advertisements

Past experiences

Word of mouth communications

Personal needs

User Expectations

Satisfaction

External Sources

Internal Sources

Figure 2.4 Determinants of user expectations – original model (adapted from Ryker et al. 1997)

There is one extra category of the determinants of user expectations that has not been widely explored in the IS quality or marketing literature. This category relates to personal (individual) characteristics (factors) of users. It has been introduced by Oliver (1980), who states that user individual characteristics, context and a product (or a service) itself affect user expectations. This category of determinants that influence the formation of user expectations is both context-and user-dependent as discussed further in Sections 2.5.2.1 & 2.5.2.2.

(2) Types of User Expectations from Information Systems Services

In order to better understand the formation of user expectations, it is important to explore the existing types of user expectations identified in marketing and IS quality literature. Zeithaml, Berry and Parasuraman (Parasuraman et al. 1993; Parasuraman et al. 1991; Parasuraman et al. 1985; Zeithaml et al. 1990; 1993) identify two major types of expectations in relation to the user satisfaction with the IS services, predictive (adequate) and desired expectations. Walker and Baker (2000) have similar findings derived from their exploratory study of various services and conclude that user expectations towards services can be classified into the same broad categories, predictive (adequate) and desired expectations.

Predictive (adequate) expectations are defined as estimates of an anticipated level of system performance (Coye 2004; Prakash 1984; Swan and Trawik 1980; Thompson and Sunol 1995; Zeithaml et al. 1993). Desired expectations are defined as the wanted level of system performance (Olshavsky and Kumar 2001). Thus, while predictive (or adequate) expectations are related to what the users define as acceptable level of performance, desired expectations represent the level of service the users want to get (Parasuraman et al. 1988; Walker and Baker 2000; Zeithaml et al. 1993). Internally, desired expectations are sub-categorised into ideal and
normative ones, while predictive expectations are sub-categorised into actual and minimum tolerable. In fact, many researchers have been working on identification and analysis of various sub-categories of predictive (adequate) and desired expectations as summarised in Table 2.6.

Table 2.6 Types of user expectations from information systems services

<table>
<thead>
<tr>
<th>Types of Expectations</th>
<th>Definitions</th>
<th>Researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>(HIGH)</td>
<td>Ideal</td>
<td>May be referred to as an aspiration, desire, want or preferred outcome, as they are all essentially concerned with an idealistic state of beliefs, which match the user's perspective of the potential for a service.</td>
</tr>
<tr>
<td></td>
<td>Normative</td>
<td>Expectations that represent what customers ideally want, that is what they believe should be rather than would be provided. It is related to a subjective evaluation of what is deserved in a situation, and to some extent is also a socially endorsed evaluation.</td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>Expectations related to the outcome the users actually anticipate</td>
</tr>
<tr>
<td></td>
<td>Minimum Tolerable</td>
<td>Expectations related to the minimal level of performance that will be tolerated or considered acceptable. These expectations comprise the ‘low end’ of predictive expectations</td>
</tr>
</tbody>
</table>

According to Walker and Baker (2000), desired expectations tend to remain relatively stable over time, while predictive expectations change relatively quickly. Thompson and Sunol (1995) conclude that it is important to aspire to desired expectations in order to deliver the best service, however, identification of the predictive expectations helps provide adequate service to keep users satisfied.

Another classification of user expectations that is accepted and discussed in the IS literature is offered by Ojasalo (2001). He suggests another classification of user expectations (see Figure 2.5) and associates their formulation from imprecise to a precise state with such activities as focusing, revealing and calibrating labelled as expectations management processes.
According to Ojasalo (2001), user expectations are often dictated by user experiences and activities they are involved in. Nonetheless, the users do not always have a clear understanding of what they want from particular products or services, hence they have fuzzy expectations. However, once the specialists are aware that such expectations exist, they can tease them out and make them more precise. Implicit expectations are not self-evident, so the users often do not realise they have them until these expectations are not materialised. Thus, it is very important to reveal these expectations and formulate them into explicit ones to avoid users’ disappointment.

The other type of expectations is unrealistic ones. Despite the fact that these expectations cannot materialise yet (up until a particular moment), the marketologists have to be aware of them, as they might potentially help the websites gain competitive advantage once these expectations are calibrated into the realistic ones (Ojasalo 2001).

Another example of a classification of the user expectations towards healthcare services is offered by Thompson and Sunol (1995) who identify four main types of user expectations:

- ideal expectations may relate to users’ aspirations, desires, wants or preferred outcomes as they are all essentially concerned with an idealistic state of beliefs, which match the user's perspective of the potential for a service;
- predicted expectations are variously described as the realistic, practical, or anticipated outcomes, and in this sense they match what users actually believe will happen in a service encounter. These are likely to result from personal experiences, reported experiences of others, and other sources of knowledge such as in the media;
- normative expectations represent what should or ought to happen. They could be equated with what users are told, or led to believe, or personally deduce that they ought to receive from health services. These expectations are related to a subjective evaluation of what is deserved in a situation, and to some extent they are also socially endorsed;
- unformed expectations occur when users are unable or unwilling to articulate their expectations for various reasons, e.g. because they do not have any, or find it too difficult to express, or do not wish to reveal their feelings, or due to fear, anxiety or conformity to social norms. This may be just a temporary phenomenon prior to
experience and gaining of knowledge that might also include attributes of healthcare that are “taken for granted” (Thompson and Sunol 1995, p.131).

To conclude, there are a variety of approaches to classification of user expectations across marketing, psychological and IS literature (Fitton and Acheson 1979; Miller 1977; Boulding et al. 1993; Coyle 2004; Leventhal 2008; Mudie and Pirrie 2006; Ojasalo 2001). As was revealed in the conducted review, there was a lack in a unified understanding or uniform classification of user expectations offered in the literature. There was no unified classification or analysis of user expectations that identify, determine and formalise determinants of user expectations towards online systems. The demonstrated diversity of classification related to user expectations, represents an interesting phenomenon to be researched. However, it lies outside of the scope of this study. Hence, for the purposes of this study, user expectations are approached from a generalised perspective.

The conducted analysis demonstrated that user expectations area is a multi-level construct with a variety of types and components. While further exploration of the complexity of such a construct is out of scope of this research, it certainly is an interesting direction for future work.

2.5.2 Synopsis of Information Systems Literature on Expectations

The analysis of the requirements engineering, user-centred design and service quality literature signifies the importance of user expectations and the need for their consideration in the design and development process of the online systems such as health websites. As building a website is essentially an engineering process, the requirements engineering perspective is important to understand the role of user expectations in this process, along with the role of the system context and its influence on the user expectations, their formation and extraction. User-centred design also acknowledges the importance of user expectations for successful systems design and development, stating the importance of the context in which the online systems built. It also provides a range of data collection methods that can potentially be used to extract user expectations (see Table 2.5). The service quality literature views personalisation as a service provided by online systems such as websites and portals and re-emphasises the relationship between user satisfaction and user expectations. Service quality literature also suggests that user expectations can be presented as a multi-facet construction with a number of determinants that influence the formation of user expectations.

To sum up, in the conducted analysis of the IS literature the importance of the context in which the system is going to be used and encouraged analysis and exploration of the context prior to
any work with the users, is acknowledged. The revealed concept of determinants that influence the formation of user expectations towards systems and services they provide, including services provided by personalised features, is investigated. Given that the focus of this study is on the role that user expectations play in the design and development of personalised health websites, it is important to continue with the analysis of the context in which personalised systems are to be used, and establishment of the role that determinants of user expectations play in the formation of user expectations towards personalised health websites.

2.5.2.1 Context of Use of Personalised Health Websites

The underlying principle of personalisation is to provide users with the information or services that would be relevant to them, which requires fundamental understanding of user preferences and the provision of services that fit these preferences (Slovic 1995; Tam and Ho 2006). Bettman et al (1998) state that such “preferences will often be highly context dependent” (p.188), which re-emphasises the importance of the e-health context for further exploration of user expectations. According to Fan and Poole (2006, p.181), “personalisation means different things to different people in different fields”. Riecken (2000) reiterates this point stating that, “personalisation is about understanding the needs of each individual and helping satisfy a goal that efficiently and knowledgeably addresses each individual's need in a given context” (p.27). Therefore, context does matter in relation to the personalised features of health websites.

According to a number of researchers (Baker et al. 2003; Cop 2008; Ferguson 2000; Jacobson 2007; Sitzia and Wood 1997; Thompson and Sunol 1995), health context is distinctive from other contexts due to the private nature of the healthcare field. Such distinctiveness is caused by three major factors:

- health consumers tend to have long-term interactions with health websites they use when searching for medical information. Such long-term interaction can be explained by the fact that health consumers tend to need medical information on a regular basis and on various occasions, especially if they or their family members suffer from chronic diseases (Thompson and Sunol 1995);
- the interaction itself tends to be emotionally charged, as the person searching for information might be in pain, distressed, frustrated, or be in any other state dictated by or related to health issues (Sitzia and Wood 1997);
- the general aim of the health websites is to cut delivery time of required information to health consumers by being effective and user-driven, as opposed to other (e.g. commercial) websites that tend to prolong users’ visits for as long as possible (Abramowitz et al. 1987; Sitzia and Wood 1997). Thompson and Sunol (1995) agree that, “…health care provides a number of unique or specifically different
considerations for users, as distinct from other services even, let alone goods markets” (p.13). Therefore, the nature of health services and health websites is different from others and the private nature of the healthcare field affects the interaction between health websites and e-patients.

Cawsey et al (2007) conclude that due to the very private and non-trivial nature of health related problems, e-patients often have two types of perceived needs, informational and emotional ones. Both these needs have to be taken into consideration when developing personalised health websites. When e-patients do an online search for medical information, it often implies a specific type of interaction, combined with heightened emotional levels (anxiety, fear, pain), particularly if the health issue is relatively serious (Cawsey et al. 2007). Thus, personalised features should not just cater for the information, but also consider the emotional needs of users in provision of information. It is also important that developers acknowledge the possibility of a gap between their professional technical competence in delivering personalised features, and e-patients’ understanding of how such features should work. Hoey and Hoey (2002) state that e-patients have particular experiences in relation to the search and related features which is why “careful integration of these features into the user interface is required. In particular, the interface needs to provide a way to explain what the system is doing to personalise the experience as well as to undo the personalisation” (p.51) to satisfy users. Thus, from an e-patients perspective, it is vital when designing personalised health websites in the health related context.

Given the important role that context plays in both development of personalised health websites and in identification of e-patients’ expectations, it is argued here that the determinants of expectations model offered by Ryker et al (1997) should be modified (see Figure 2.6).

The first proposed modification relates to the exclusion of such factors as ‘communications with the vendors’ and ‘communications with the service provider/developer’. Given the business context of the original model, these two factors are unlikely to affect an e-patient’s expectations towards personalised health websites and thus, they can to be eliminated for the purpose of this research. However, such determinant as ‘advertisements’ is still a factor that might affect user decision making in the health context, therefore, it needs to remain in the model. ‘Word of mouth communications’ factor can be transferred from internal to external sources due to the health context settings versus organisational ones.

Secondly, the new category of determinants of user expectations, personal factors, needs to be added. Personal factors are mostly related to the “user context” (p.475) that can be transferred into experiences, social and environmental stimuli that affect user expectations (Oliver and
Winer 1987). Cox and Fisher (2009) state that, “personal characteristics are additional factors that will affect expectations” (p.50). According to Thompson and Sunol (1995), personal factors have significant influence on the formation of user expectations, particularly in a health context. Moreover, personal factors determine user behaviour in an isolated, private environment that is somewhat similar to situations when e-patients search for health information online (Ryker et al. 1997; Thompson and Sunol 1995). Interestingly, a number of researchers, such as Ryker et al. (1997), Winer (1985) and Zeithaml et al. (1993), acknowledge the importance and influence of personal factors on the formation of user expectations, however, they do not elaborate any further on the matter, but simply admit to the existing lack of research in this direction and classify it as future work. This research intends to fill this gap with an emphasis on personal ‘individual’ characteristics of users and the role personal characteristics play in the formation of user expectations towards online systems.

Lastly, ‘past experiences’ are excluded as a separate category and incorporated into the personal factors. Such modification can primarily be explained by the fact that past experiences, by nature, are internal to the user in the health context, but they are external to the user in the organisational context. According to Ryker et al. (1997), past experiences in the organisational context may refer to the experiences of the organisation that provides the service, not the user as such. Robertson (1970) claims that an e-patient’s physiological and psychological characteristics, as well as their moods, values and past experiences, are classified as personal factors, i.e. what the individual brings to the situation in a given context. Thus, past experiences become an internal source that influences e-patient’s expectations. Furthermore, by being distinguished and dependent on context and an e-patient’s individuality, past experiences become a part of personal factors, a newly added category that affects user expectations.
Further analysis of the personal factors that influence the formation of user expectations is presented in the next section.

### 2.5.2.2 Personal factors as Determinants of User Expectations

As stated previously in this chapter, user satisfaction cannot be viewed as a stand-alone concept, but as a concept influenced by user expectations and their determinants (Fitzpatrick 1984; Zeithaml et al. 1993). Determinants of expectations are cognitive elements that influence formation of expectations (Zeithaml et al. 1990) and they vary in their nature and are context-dependent (Walker and Baker 2000; Zeithaml et al. 1993).

One of the first identified determinants of expectations related to the health field are so-called affective components (Oliver and Winer 1987). Westbrook (1987) defines affective components as factors that influence satisfaction, depending on the state that the e-patient holds; they can be positive, such as joy, delight, interest and others, and negative, such as anger, frustration, disappointment, etc. In fact, a number of researchers acknowledge the importance of the consideration of emotional state in e-patients when the latter face certain health problems and then conduct a search for medical information (including online search), to solve it (Fitzpatrick 1984; Sitzia and Wood 1997). According to Oliver (1993), this determinant affects user expectations via influencing a user’s attitudes and the perceived desirable outcomes. Oliver (1993) also concludes that affective components are important in analysing the level of...
satisfaction via meeting user expectations across various areas, including service provision such as personalisation. Thompson and Sunol (1995), in their study, re-emphasise the importance and the role of affective components in formation of user expectations related to the health field.

Another important determinant of user expectations is past experiences, as user expectations are derived from their previous experiences and change as their experiences change (Gilbert et al. 1992; Linder-Pelz 1982; Ryker et al. 1997; Thibaut and Kelley 1959; Thompson and Sunol 1995). It is important that personalised features that are widely implemented across various websites and portals are also easily accessible to users. Thus, even if e-patients do not necessarily have any experience in dealing with the personalised features of health websites as such, they are still likely to have some experience in working with personalised features of other online systems (e.g. personal banking). This experience is likely to form user expectations towards personalised features in general, which is why previous experience is an important determinant. Also, past experiences strongly correlate with system performance (Woodruff et al. 1983). Performance, while not a personal factor as such, does affect expectations. Based on the system performance, people make an assessment of what a system can deliver judging by the provided functionality. Therefore, it is important to carefully analyse what functionality is available to e-patients across various health websites in order to extract expectations. In relation to personalised health websites, it is important to identify what personalised features are available to e-patients across various health websites and then determine what users see as positive and negative aspects of such features.

A number of researchers (Coye 2004; Fishbein and Ajzen 1975; Oliver and Winer 1987; Thompson and Sunol 1995) define beliefs as an important determinant that influences the formation of user expectations. Linder-Pelz (1982) defines beliefs as proper, accepted grounds for seeking or claiming a particular outcome. Scheibe (1970) notes that, “beliefs about future occurrences are often important determinants of those occurrences, for they influence the choices that are made, the chances that are taken, and the hypotheses that are adopted as working assumptions” (p.26). Therefore, user beliefs need to be considered when extracting user expectations towards personalised health websites.

User values and intentions are believed to be other important determinants of user expectations (Sitzia and Wood 1997; Thompson and Sunol 1995). Thompson and Sunol (1995) define values as motives that influence actions and state that values “summarise past experience, are normative in nature and are linked to the dimension of ”goodness-badness”, they provide frameworks for comparison with present experience. Values determine attitudes and behaviours, they are usually relatively stable, although they do change over a life-span due to socialisation and other life experiences, but they are not affectively neutral” (p.135). Intentions involve a
commitment and link an action tendency to a conscious plan, which may help in the formation of predictions of the outcomes (Boulding et al. 1993). Information from various sources, direct or indirect, and interest in a particular relationship also add to the development of expectations (Thompson and Sunol 1995). To that end, an e-patient’s expectations and perception of personalised features will depend on what the users intend to achieve as a result of the interaction with these features. Intentions are dictated by and dependent on users’ individuality and a situational context.

Thompson and Sunol (1995) in their work also identify such determinants as valencies and perceptions that might affect user expectations. However, these determinants do not appear in the works of other authors. This might signify that more research is needed in order to establish the legitimacy of valencies and perceptions as determinants of user expectations, which is why they were not considered in this study. The refined model of the determinants of user expectations is presented in Figure 2.7.

Figure 2.7 Determinants of user expectations – research scope of the study

It is important to re-emphasise and further clarify that the model, proposed in Figure 2.7, builds on the EDT (see Section 2.2.2, Chapter 2) as the conducted study explores an extension of EDT proposed by Zeithaml, Pasuraman and Berry in their works (Parasuraman et al. 1993; Parasuraman et al. 1991; Parasuraman et al. 1985; Zeithaml et al. 1990), building on their theoretical findings and addressing issues labelled by them as further research. Therefore, the proposed model (Figure 2.7) views personalisation in the perspective of service provision (Conrath and Mignen 1990; Parasuraman et al. 1988) and identifies a number of determinants that affect the formation of user expectations and subsequent user satisfaction with the provided personalised services (Zeithaml et al. 1993).
The need for further modification and extension of the EDT is explained by the fact that the EDT, as a theoretical framework, lacks consideration of user attitudes and emotion, which are believed to affect both user expectations and satisfaction (Fazio and Zanna 1981; Hunt 1977; Oliver 1980; Oliver 1981; Szajna and Scamell 1993; Yi 1990). Therefore, further modification of the EDT was required in order to identify and explore certain factors, including personal factors that influence the formation of expectations (Parasuraman et al. 1993; Parasuraman et al. 1991; Parasuraman et al. 1985; Zeithaml et al 1990).

As it can be seen from Figure 2.7, the formation of user expectations is affected by a number of determinants of expectations related to users’ personal factors, such as past experiences, beliefs, affective components, values and intentions. The conducted research presented here claims that in order to extract user expectations, it is important to consider these personal factors and incorporate them into the process of design and development of personalised health websites. While determinants of user expectations, such as ‘personal needs’, ‘advertisements’ and ‘word of mouth communication’ are important in their influence of the formation of user expectations, alongside personal factors, they are out of scope in this research. This study emphasises on the role that personal factors play in the formation of user expectations towards personalised health websites.

2.6 Discussion

E-health initiatives have gained popularity as a growing number of people go online searching for medical information (Ball and Lillis 2001; Coiera 2000; Cop 2008; Eysenbach 2000; Ferguson 2007; Fisher et al. 2008; Fox 2005; Fox 2006). Despite the fact that health websites have a range of advantages over generic websites in the provision of medical information, as they are specific and precise in targeting health resources, they are still not widely used as e-patients seem to be dissatisfied with personalised services these websites offer. A number of researchers link the problem of an e-patient’s dissatisfaction with personalised health websites to unmet expectations users have towards such websites.

Personalisation of health websites relates to three main elements:
- portal interfaces;
- functionality;
- information content (Blom 2004).

Personalisation can be viewed from three perspectives: business-, system- and user-centred ones (Blom 2004). Arguably, a user-centred perspective is the less researched perspective compared
to the others, but is also the most promising in the context of a user-centred design philosophy. User-centred perspective on personalisation emphasises user needs, goals, expectations and other characteristics. Understanding of these characteristics contributes to the establishment of an effective one-to-one relationship between users and online systems, and development of personalised health websites that will measure up to the user expectations. The conducted research further explores user-centred perspective on personalisation aiming to understand what expectations users have towards personalised features of health websites and how these expectations can be extracted.

Building online systems, such as health websites or portals, is fundamentally an engineering process, which is why analysis of the requirements engineering literature was important in order to establish a better understanding of systems design and the development processes. It was concluded that user expectations play an important role in RE processes as there is a strong link between the extraction and consideration of user expectations and subsequent incorporation in to RE processes and user satisfaction with the built systems. RE literature also acknowledges the role of a system context in defining user expectations, as the system context defines the future use of a system.

User-centred design literature also acknowledges the role of user expectations and claims that conformity with user expectations is one of the key principles of effective and satisfactory design (ISO_9241-11 1996; ISO_9241-110 2006). User-centred design provides a number of techniques and methods that can be used in order to extract user expectations. However, there is not enough research on what methods are the most effective to extract user expectations. There is also a lack of formal guidelines that could help the designers and developers extract user expectations. Thus, the need for a provision of methods that can be used to extract user expectations and guidance on how to incorporate these methods in the design and development processes in order to deliver systems catering for personal information needs of users, is justified.

Service quality literature about user expectations and their influence on user satisfaction derives from marketing concepts and theories, such as expectation disconfirmation theory, and claims the importance of user expectations to provide better system services. Expectations are analysed from the perspective of their determinants, i.e. factors that influence the formation of user expectations. It is believed that in order to deliver effective personalisation, viewed as a service provided by a health website, it is important to identify determinants that influence the formation of user expectations in a given health context.
Despite the stated importance of user expectations, they are only considered in 20% of IS studies on the service provision (Crow et al. 2002). It is important to address this gap and provide further research on what influences the formation of user expectations, i.e. determinants of expectations, and how the expectations can be extracted. There is also a need to identify what influences the formation of user expectations towards personalised health websites and how this knowledge can be operationalised. This need for further exploration of user expectations and their role is expressed by Thompson and Sunol (1995) stating, “…we feel there is a need for an in-depth interpretative study of how expectations are conceptualised and articulated by patients or clients, probably using a variety of qualitative techniques, through the medium of patient narratives” (p.139). The conducted study emphasises personal factors, i.e. individual user characteristics that are considered to be particularly important in the context of the health field, and yet are less well researched (Ryker et al. 1997; Winer 1985; Zeithaml et al. 1993).

According to Eysenbach (2003), the real challenge of health websites is to “…develop and evaluate interventions that can maximize the positive effect of the Internet; harness the power of information and communication technology for patients who want it, without disadvantaging those who have difference preferences; and to evaluate these innovations” (p.360). This research, being grounded in the UCD philosophy, aims to investigate how to extract user expectations in order to facilitate the design and development of towards personalised health websites, and potentially keep users more satisfied with these websites. This study investigates the role of determinants of expectations, namely personal factors, in the formation of user expectations and how identification of these personal factors can facilitate the extraction of user expectations. Conceptually, the research scope of this study is presented in Figure 2.8.

Figure 2.8 Extended research scope of the study
Thompson and Sunol (1995) state that an understanding of a phenomenon of user expectations requires theoretical grounds upon which relevant and valid policies and recommendations for various health related products and services can be formulated. Enhancing this understanding is one of the key aims of this research and form the contribution to theory. The developed Framework of personal factors that influence the formation of user expectations (see Figure 2.7) will be empirically tested to establish its validity. The identified determinants of expectations, namely personal factors, will be empirically tested by running sessions with users in order to extract user expectations towards personalised features of health websites. This knowledge will be operationalised in order to incorporate the process of extraction of user expectations in the design and development of personalised health websites.

2.7 Conclusion

Chapter 2 provided an overview of IS literature related to the concepts of user expectations and identified a range of problems that the conducted study aimed to address. Through an analysis of the IS literature, a number of determinants that influence the formation of user expectations towards personalised health websites, have been identified. The scope of the study was narrowed down to the investigation about personal factors, namely past experiences, affective components, intentions, values and beliefs, represented as a Framework of user expectations towards personalised health websites. The next chapter is concerned with the research design for empirical testing of the proposed Framework.
3 RESEARCH APPROACH

One of the principal objects of theoretical research in my department of knowledge is to find the point of view from which the subject appears in its greatest simplicity.

Willard Gibbs

3.1 Introduction

The aim of this chapter is to outline the research design of this study and to justify the choice of a design science paradigm. The chapter starts with a discussion on the applicability of design science concepts to the study and is continued by an explanation of how this study follows the Hevner’s et al (2004) guidelines for design science research. The chapter ends with a comprehensive outline of the research activities undertaken and includes details on chosen methods of data collection and data analysis.

3.2 Design Theories

Theoretical research in IS and its applicability to practice have been debated for over two decades (Benbasat and Zmud 1999; Burstein 2002; Cecez-Kecmanovic 2001; Davenport and Markus 1999; Gregor 2002; Markus et al. 2002; Nunamaker et al. 1991; Walls et al. 1992; Weber 1987; Willem 1990). One of the most serious problems of IS research per se is the high level of abstraction from practice and the ‘real’ issues that require solutions in the world of practitioners (Benbasat and Zmud 1999; Rosemann and Vessey 2008). Such ‘real-world’ problems often relate to the design of new systems, artifacts, solutions, methodologies and techniques where the importance of design lies in the increasing number of areas that are subject to a human initiative (Friedman 2003).

Design is an activity that often involves groups of people with different backgrounds and different motivation for participating in the process of changing the environment and life conditions (Bødker and Grønbæk 1996). There is a constant need for a change, where old techniques need to be altered or modified in order to improve quality of life. There is also a need for new solutions to old problems and for new artifacts. These processes often involve or relate to design. The goal of design is in “solving problems, meeting needs, improving situations, or creating something new or
useful” (Simon 1981, p.129), which explains its high relevance to the ‘real world’ practice and wide use across various fields.

Looking at the notion of design and its applicability to the IS field, March and Smith (1995) claim that “research in information technology (IT) must address the design tasks faced by practitioners. Real problems must be properly conceptualized and represented, appropriate techniques for their solution must be constructed, and solutions must be implemented and evaluated using appropriate criteria” (p.251). This statement links design to the world of science and proclaims design initiatives should be viewed through a scientific lens.

### 3.2.1 The Notion of Design as a Science

The motivation for a scientific frame for design came from Buckminster Fuller’s call “…for a ‘design science revolution’ based on science, technology, and rationalism…” (Baldwin 1996 cited in Cross 2001, p.50), and from Herbert Simon’s (1981) statement to study the science of design in order to facilitate the liberal education of scientists and engineers. There are a number of researchers who have been involved in exploration of the ground principles and rationale between design and science in order to understand their interrelation (Cross 1982; Cross 2001; March 1984; Simon 1981; Zimmerman et al. 2007). Given that designers use and apply scientific knowledge and methods in their practice, their work can be considered similar to a scientific study, with potential contribution to theory and practice (Cross 2001; Zimmerman et al. 2007). To that end, design can be seen as a reflective practice, where designers take actions to not just solve the real world problems, but also to improve design methodology and underlying theories (Schön 1983).

Willem (1990) states that design and science, in fact, intertwine as “science in the form of scientific knowledge is intimately involved in design as science creates and formalises the knowledge needed for a change, while design uses this knowledge to produce the change” (p.44). Therefore, science becomes visible through design; and while science is primarily concerned with analysis of phenomena and formalisation of the knowledge, design is oriented toward synthesis (Walls et al. 1992).

Looking at the problem from a scientific perspective, March and Smith (1995) determine descriptive and prescriptive types of research. Descriptive research aims to understand the very nature of IT, it is derived from natural science and its main goal is to produce new formalised, generalisable knowledge (Hempel 1966). Prescriptive research aims to improve IT performance, it is derived from engineering disciplines and its main goal is to apply the existing knowledge to solve the existing problems; its knowledge-using activity of prescriptive research corresponds to the scientific view of design theories (Simon 1981).
Theories with the purpose to predict and (or) explain a phenomenon provide the underlying grounds of science (Dubin 1978). Walls et al (1992) claim there has been a well-developed need for IS design theories based on scientific grounds. These IS theories would state how the design processes can be performed in an effective and feasible way, where feasibility is to be defined by the extent to which it embodies the principles of the theory. Such theories embed design and science in IS research, making them theoretically grounded and applied to the same dimensions of IS development. This way design scientists, rather than producing general theoretical knowledge, use and apply the existing knowledge to real life problems in order to create new effective artifacts (March and Smith 1995). Ultimately, this allows classification of design theories as a unique type of scientific research with its own characteristics.

The underlying characteristics of design theories are defined by Walls et al (1992):
- design theories are theories of procedural rationality. Their objective is to prescribe both the methods of the artifact construction and the properties it should have to achieve certain goals (Simon 1981). Therefore design theories involve both the application of scientific theory and the use of scientific method to test them;
- design theories must deal with goals as contingencies;
- design theories never involve pure explanation or prediction. Both explanation and prediction are related to the artifact, its properties prescribed by the theory and its ability to achieve certain goals dictated by the theoretical assumptions;
- design theories are prescriptive;
- they comprise theories from mathematics, natural and social sciences;
- design theories tell ‘how to/because’ as they are strictly goal oriented;
- design theories show how explanatory, predictive, or normative theories can be put to practical use to achieve the required goals.

Transformations within scientific research should be seen as an active growth and development (Bartneck 2009). They should be considered to enable design’s ongoing improvement (Bartneck 2009). To conclude, design theories have their own set of well-defined principles that explain their unique nature and certain theoretical basis they provide for the IS field. The theoretical basis of this study and the relevance of design science approach for this research are discussed in the next section.

3.2.2 Design Science Research: Theoretical Grounds

Design science refers to an “explicitly organised, rational and wholly systematic approach to design; not just the utilisation of scientific knowledge of artifacts, but design in some sense of a
scientific activity itself” (Cross 1982, p.122). Design science research has become firmly established as a research paradigm in several disciplines related to information sciences, information systems and technologies; the design science research community believes that it involves creating, constructing, studying and evaluating innovative artifacts such as constructs, frameworks, models, methods, and systems as well as the study of methods, behaviours, and processes related to design (Cecez-Kecmanovic 2001; Gregor 2002; Hevner et al. 2004; Kuechler and Vaishnavi 2008; March and Smith 1995; Markus et al. 2002; Niehaves and Stahl 2006; Peffers et al. 2008; Purao 2002; Walls et al. 1992; Zimmerman et al. 2007).

The concept of design science is controversial, challenged by the designers and design theorists (Bertelsen 2000; Carroll 2006; Cross 2001). Grant (1979) wrote, “most opinion among design methodologists and among designers holds that the act of designing itself is not and will not ever be a scientific activity; that is, that designing is itself a non-scientific or a-scientific activity” (p.46). Conversely, following Hansen (1974) statements, the aim of design science is to recognise laws of design and its activities, and develop rules that can subsequently contribute to practical knowledge and the growing theoretical scientific body of knowledge based on the applicability of design principles. This statement is re-iterated by Walls et al. (1992), who also claim that the information systems design theory has two distinctive characteristics: a theoretical basis and explicit guidance for practitioners, and that design science contributions should cater for both.

Hubka and Eder (1987) claim that “design science comprises a collection (a system) of logically connected knowledge in the area of design, and contains concepts of technical information and of design methodology... Design science addresses the problem of determining and categorizing all regular phenomena of the systems to be designed, and of the design process. Design science is also concerned with deriving from the applied knowledge of the natural sciences appropriate information in a form suitable for the designer’s use” (p.124). To that end, design science can be extended beyond scientific design by including a systematic knowledge of design process, methodology and the scientific and technological underpinnings of design of artifacts (Cross 2001).

Walls et al (1992) state there are a number of ‘kernel’ theories that derive from natural or social sciences that underlie information systems design theory and “govern design requirements” (p.42). These are academic theories (e.g. cognitive psychology) and practitioner theories-in-use (Sarker and Lee 2002). Bertelsen (2000) states that as design artifacts mediate across design and research fields and throughout the multiple dimensions of design itself. This phenomenon of mediation explains the variety of ‘kernel’ theories that are feeding the design science practices, from cognitive science and psychology to engineering and architecture.

The notion of design science, informed by other types of theories, is extensively discussed by Gregor (2002), in her broad investigation of the nature of theory in the IS field with emphasis on
design science theory. Gregor (2002) classifies theories onto 5 categories depending on their primary purpose:

- theory for analysing and describing;
- theory for understanding;
- theory for predicting;
- theory for explaining and predicting;
- theory for design and action.

Design science forms a well-defined and grounded theory that can be informed by various ‘kernel’ theories and as a result, looks at how to undertake the building of an artifact (development process knowledge) and what the artifact should look like when built (design principles) (Gregor 2002; Walls et al. 1992). The artifacts created as a result of this research and their significance are discussed in the next section of this chapter.

### 3.2.3 Hevner’s et al Guidelines for Design Science Research

Hevner et al (2004) developed a set of guidelines that inform the community of IS researchers and practitioners of how to conduct, evaluate, and present design science research. According to them, the design-science paradigm seeks to extend the boundaries of human and organisational capabilities by creating new and innovative artifacts. Therefore, both design science paradigm and design science research are problem solving and oriented at finding a solution to real world issues. However, irrespective of its practical role, Hevner et al (2004) claim that design science research needs to follow a set of scientific rules and principles that assesses its evaluation and contribution from a scientific perspective. These guidelines are presented in Table 3.1 and their significance and applicability to the current research are discussed in detail further in this section.

**Table 3.1 Design science research guidelines (adapted from Hevner et al. 2004)**

<table>
<thead>
<tr>
<th>Guideline</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guideline 1: Design as an Artifact</td>
<td>Design-science research must produce a viable artifact in the form of a construct, a model, a method, or an instantiation.</td>
</tr>
<tr>
<td>Guideline 2: Problem Relevance</td>
<td>The objective of design-science research is to develop technology-based solutions to important and relevant business problems.</td>
</tr>
<tr>
<td>Guideline 3: Design Evaluation</td>
<td>The utility, quality, and efficacy of a design artifact must be rigorously demonstrated via well-executed evaluation methods.</td>
</tr>
</tbody>
</table>
Guideline 4: Research Contributions
Effective design-science research must provide clear and verifiable contributions in the areas of the design artifact, design foundations, and/or design methodologies.

Guideline 5: Research Rigor
Design-science research relies upon the application of rigorous methods in both the construction and evaluation of the design artifact.

Guideline 6: Design as a Search Process
The search for an effective artifact requires utilizing available means to reach desired ends while satisfying laws in the problem environment.

Guideline 7: Communication of Research
Design-science research must be presented effectively both to technology-oriented as well as management-oriented audiences.

3.2.3.1 Design as an Artifact

Artifacts are innovations that define ideas, practices, technical capabilities, and products through which analysis, design, implementation and use of information systems can be effectively and efficiently accomplished (Denning 1997; Hevner et al. 2004; Tsichritzis 1998). March and Smith (1995) claim that “rather than posing theories, design scientists strive to create models, methods, and implementations that are innovative and valuable. Design science consists of two basic activities, build and evaluate. These parallel the discovery-justification pair from natural science. Building is the process of constructing an artifact for a specific purpose; evaluation is the process of determining how well the artifact performs” (p.254).

The outcome of design theories is artifacts with certain attributes. These artifacts can be tested to verify their ability to meet the prescribed goals. According to (Walls et al. 1992) “a hypothesis that a certain method will result in an artifact which meets its goals can be verified by using that method to build the artifact and testing the artifact to see whether it satisfies its goals” (p.41).

Moreover, the very nature of design science research provides a number of activities and opportunities that might result in a contribution to both theory and practice. Firstly, design researchers might identify opportunities for new technology or for advancements of current technology when they design and evaluate an artifact; the researchers might discover some
unanticipated effects and provide a template for bridging the general aspects of the theory to a specific problem space, context of use, and target audience (Zimmerman et al. 2007). Secondly, through the exposure to the ideas in the artifacts, the practice community can easily observe the value of different theories, models, and technology which can motivate them to explore the original research and see how it can be used in design practices more extensively (Cross 1999; Zimmerman et al. 2007). Lastly, the variety of kernel theories underpinning design science research, help analyse the researched issues from intersecting and conflicting perspectives, which might contribute to a more extensive research of the artifact and the system as a whole (Walls et al. 1992; Zimmerman et al. 2007).

In summary, in design science research the artifacts are created to address a specific problem, often from various perspectives, and they might be used as a catalyst to researching other problems (Chung et al. 2004; Zimmerman et al. 2007). However, irrespective of the role and importance of the produced artifacts, design science research is a process that needs to be addressed from a scientific perspective rather than the practical one.

This research has sought to find and conceptualise the processes of extraction and incorporation of user expectations in the design and development of personalised health information websites. The research findings were conceptualised and presented as a Framework of user expectations and a set of Guidelines (based on the developed Framework) to extract user expectations. The first created artifact, the Framework of user expectations, represents a model of user expectations with set of personal factors that play the role of constructs used to build the Framework. The developed Framework provided theoretical grounds for the second artifact, the Guidelines on how to extract user expectations. The Guidelines are essentially a set of actions required to extract, formalise and incorporate user expectations in the design and development of personalised health websites.

3.2.3.2 Problem Relevance

It is vital that design science research explores and provides solutions to unsolved and important development problems through a construction of innovative artifacts (Hevner et al. 2004). The focus of this research is on the notion of user expectations and its importance in the online system (health websites) building and provision of services (personalisation) in a given context (e-health). The main research question of this study is:

*How can user expectations be incorporated in the design and development of personalised health websites?*

The sub-questions are:
- What is important to know about user expectations in the design and development of personalised health websites?

- What factors influence the formation of user expectations towards personalised health websites?

- How can user expectations towards personalised health websites be extracted and incorporated in the systems design and development processes?

An empirical analysis of the literature about user expectations in the IS/medical field (see Chapter 2) demonstrated a lack of theoretical perspective on what influences the formation of user expectations, in particular in relation to personalised health websites. It also demonstrated a lack of practices (i.e. well defined methods or developed Guidelines) that systems designers and developers could follow to extract user expectations. It is important that designers understand the human activities and factors that can contribute to their designs (Carroll 2006). However, the research demonstrated a lack of such understanding in relation to user expectations towards personalised health websites. The formalisation of user expectations and their incorporation in the design and development processes, which is why this research is believed to be relevant to both research and design communities.

### 3.2.3.3 Design Evaluation

Evaluation is a critical component of design science research (Hevner and Chatterjee 2010). The applicability and efficacy of an artifact can be rigorously demonstrated via well-selected evaluation methods (Basili 1996; Hevner et al. 2004; Kleindorfer et al. 1998; Zelkowitz and Wallace 1998). Gregor (2002) states that different artifacts can be evaluated with respect to various metrics depending on their nature, use and design, which is why the evaluation stage leaves an element of creativity towards produced artifacts.

According to Hevner and Chatterjee (2010), all evaluations can be broadly classified into two major categories – objectivist and subjectivist. An objectivist approach is derived from a logical-positivist philosophical orientation; it is based on numerical measurements and involves use of quantitative methods (Friedman and Wyatt 1997; Hevner and Chatterjee 2010). A subjectivist approach, on the other hand, derives from an intuitionist-pluralist philosophical position and says that “what is observed about a resource depends in fundamental ways on the observer” (Friedman and Wyatt 1997, p.54). In a subjectivist approach, the merit and worth must be explored in context and through the study of the created artifacts in their environment, hence verbal descriptions and other qualitative data can be used (Hevner and Chatterjee 2010). Given the interpretative nature of this study, it was decided to follow a subjectivist approach in the evaluation and validation of the developed artifacts, as discussed further.
(1) Validation of the Framework of User Expectations towards Personalised Health Websites

The developed Framework of user expectations towards personalised health websites consisted of a number of determinants, namely personal factors that affect the formation of user expectations. Given that this study was not concerned with the psychological processes that influence the formation of user expectations, it was unnecessary to analyse the Framework with the evaluation methods used in psychology. Instead, it was decided to use IS methods to evaluate:

- the research itself to establish its quality and validity;
- the developed Guidelines that used the created Framework as theoretical grounds.

This approach to validating the theoretical Framework of user expectations, via the evaluation of the research process and the developed Guidelines, is believed to be sufficient to establish validity of the created Framework.

Guba and Lincoln (1994) propose four criteria for judging the soundness of qualitative research:

- **credibility** (similar to internal validity in quantitative research). *Credibility* requires research participants to evaluate the outcomes of the study as it is believed that their feedback and interest in the delivered outcomes is the only legitimate assessment of the *credibility* of the results;
- **transferability** (similar to external validity in quantitative research). *Transferability* is concerned with generalisability and use of the created artifacts in other contexts;
- **dependability** (similar to reliability in quantitative research). *Dependability* emphasises on the adjustment of the created artifacts to the dynamic settings of the reality;
- **confirmability** (similar to objectivity in quantitative research). *Confirmability* refers to the degree to which the results could be confirmed or corroborated by others.

(2) Evaluation of the Guidelines on How to Extract User Expectations towards Personalised Health Websites

Following a subjectivists approach in the evaluation of the developed artifacts (Hevner and Chatterjee 2010), it was decided to use a strategic framework for evaluation proposed by Pries-Heje et al (2008). In the strategic framework for design science research evaluation, developed by Pries-Heje et al, it is required to determine:

- **when** evaluation takes place;
- **what** research artifacts are essentially evaluated;
- **how** these artifacts are evaluated.

According to Pries-Heje et al (2008), artifacts can be evaluated ‘ex ante’ and ‘ex post’, i.e. before or after the artifact is created. They propose an ‘ex-ante’ approach for the evaluation of the design process and an ‘ex post’ approach for the evaluation of the artifact. An ‘ex post’ evaluation of the Guidelines on how to extract user expectations towards personalised health websites was conducted.
as it was required to evaluate the artifact, i.e. a product. Furthermore, a descriptive evaluation was performed based on the concept of an ‘informed argument’ (Benbasat and Zmud 1999). According to this concept, the developers (practitioners) should evaluate the Guidelines, built on the basis of the developed theoretical Framework, to address a set of criteria. The criteria are:

- relevant;
- interesting as a proposed solution;
- applicable;
- current (novelty);
- accessible (usable).

This set of evaluation criteria was suggested by Benbasat and Zmud (1999), March and Smith (1995) and Gregor (2002).

In summary, it is argued that the best approach to validate the created Framework of user expectations towards personalised health websites lies in evaluation of the research that produced the Framework and the Guidelines that were based on that Framework. The proposed evaluation is conceptualised in Figure 3.1.

![Figure 3.1 Proposed evaluation and validation of the developed artifacts](image)

Two confirmatory interviews with the systems design and development experts were conducted in order to evaluate the Guidelines. However, these Guidelines were not tested in a real life situation as such, which is why the conducted evaluation was more “artificial” than “naturalistic” (Venable 2010, p.112). Further details on evaluation of the developed artifacts are presented in Chapter 7.
3.2.3.4 Research Contributions

There are two artifacts that represent the research contribution of this study:
- a Framework of user expectations towards personalised health websites;
- Guidelines on how to extract user expectations.

These artifacts define the contribution to both design theory (body of scientific knowledge) and practice. According to Hevner et al (2004), design-science research holds the potential for three types of research contributions based on the novelty, generality, and significance of the designed artifact. This research argues for:
- novelty as the problem of user expectations, related to personalised health websites, their extraction and formalisation has not been addressed before (in particular in relation to the personal factors that affect the formation of user expectations);
- significance as expectations are claimed to be important to design better and more satisfactory online systems;
- generality as to a certain extent (considering the constraints of the given e-health context) the Framework along with the developed Guidelines can be used to extract and formalise user expectations for other online systems, not just in the context of e-health.

3.2.3.5 Research Rigor

Hevner et al (2004) have stated that research rigor must be addressed through the choice of appropriate research methods in construction and evaluation of the constructed artifact. The problem of research rigor versus relevance in design science is discussed by Benbasat and Zmud (1999) who conclude that IS researchers tend to emphasise research rigor than relevance, which inevitably leads to a situation when practitioners lose interest in empirical work in the IS field. Astley and Zammuto (1992) believe that academic work should:
- impact practice through the development of tools and techniques;
- emphasise on research outputs rather than inputs (i.e. research methods and conceptualisations);
- strive for relevance rather than rigor.

Bertelsen (2000) in turn claims that design science artifacts will eventually be used in the real world, so their relevance should be valued over scientific rigour. Therefore, Hevner’s et al guideline related to research rigor needs to be addressed carefully and thoughtfully, with the notion of the importance of both, rigor and relevance, and with the realisation that for certain artifacts one concept prevails over another.
Hevner et al (2004) claim that rigor must be assessed with respect to the applicability and generalisability of an artifact. The applicability of the created artifacts lies in their very purpose. The Framework of user expectations has been developed to solve the practical problem related to design and development of personalised health websites. The set of Guidelines built on the theoretical grounds provided by this Framework, grants the practical applicability of the developed Framework within the stated context (e-health). However, generalisability of both artifacts is restricted due to their unique nature and context dependency that contributes to the relevance of the artifacts to the chosen IS fields. Such a trade off between the effectiveness and generalisability is not new. According to Bartneck (2009), in design processes specific solutions usually work better than generic ones, however, they come at the price of having to create a solution for each problem. Therefore generalisability, since the knowledge produced is often based on the individual designers, is often the weakest area of design science research (Bartneck 2009).

This research aimed to find the right balance between generalisability and relevance of the created artifact designed to solve a specific problem in a given complex context. It can be argued that in this research generalisability of the artifact can be traced through the approach to user expectations per se (i.e. consideration of personal factors, their identification and role in the process of formation and elicitation of expectations). It can also be argued that the created Framework of user expectations, developed specifically for personalised health websites, can be generalised across the entire e-health field, i.e. it can be applied to extract expectations related to a broad range of medical systems of various purpose and use.

3.2.3.6 Design as a Search Process

Design scientists distinguish themselves not through their methods, but through the phenomena they investigate (Bartneck 2009). Purao (2002) claims that design science acts as an intervener into the external world to produce an artifact. Stamper (1996) states that the design of every artifact starts with the initial notion of what information an artifact is dealing with, and later, what information is required to build it. The notion of information required for artifact creation is illusive compared to the technological principles that are relatively easy to grasp. After analysis of this dichotomy, Stamper (1996) suggested using the sign as the initial basic construct, “a concrete primitive” (p.351) derived from semiotics, the science about signs. In his interpretation, information can be represented via a range of signs related to two major categories, human information functions and IT platforms (see Figure 3.2).
Figure 3.2 Semiologic ladder between physical and social worlds (adapted from Stamper 1996)

Stamper (1996) argues that the six levels presented in Figure 3.2 provide the complete range of possibilities for research in the IS field, from the purely technical perspective (physical world, hardware and software design, program codes to produce certain artifacts) to the social one (interpretation of behaviours, intentions, communications, beliefs, expectations, essential to produce certain artifacts that would be used by humans in a certain context). These levels also correspond to Lyytinen's (1987) six research contexts, suggested as a part of a systems development approach, where the two lowest levels correspond to the technology context and the three levels above correspond to the organisational and social contexts.

The important part of this representation is that changing one level harnesses the capabilities of the levels below, and changing the capabilities at one level affect the levels above (Purao 2002), which is why it is important to address:

- the constraints from the lower levels when trying to realise goals or improve potentialities at higher levels (i.e. how user expectations can influence the design and development of personalised health websites);
- the effect of the levels above on the lower levels.

The semiologic representation (see Figure 3.2) justifies the use of design science for creation of artifacts – Framework of user expectations and Guidelines on how to extract user expectations - based on the human information functions for the conducted research. The presented research explored expectations (social world level) via the means of communication (pragmatic level) and assigned particular meaning to the derived information (semantic level) that was later represented as propositions (semantics, Guidelines) and a formal structure (syntactics, Framework). The research was also concerned with searching for understanding and consideration of how the information at a higher level affected the levels below (e.g. how the expectations could be extracted via the means of a conversation) and how constraints from the lower level affected the levels above (e.g. to what extent the expectations could be extracted via the means of conversations), which explains why the conducted research was essentially a search process.
Another perspective on the research as a search process is identified in a work of Bartneck (2009), who claims that different research problems require different levels of problem decomposition into simpler sub-problems in order to find an appropriate solution. Such processes should take into consideration the role of given research context and ‘kernel theories’ that contribute to the investigation and (or) design process itself (Bartneck 2009). Venable (2006) provides a framework that accommodates the research needs of design science and identifies the major steps of research activities, see Figure 3.3.

![Figure 3.3 An activity framework for design science research (adapted from Venable 2006)](image)

This research follows the Venable’s framework by:
- identifying the problem (a lack of framework or practical guidance on how to extract, formalise and incorporate user expectations in the design and development of personalised health websites);
- using ‘kernel theories’ such as user-centred design and expectation disconfirmation theory to build a Framework of user expectations;
- creating a Framework and using it as a theoretical basis to develop a set of Guidelines on how to extract user expectations;
- validating the Framework and evaluating the Guidelines by involving the experts in the evaluation process.

According to Hevner et al (2004), effective design requires knowledge of both the application domain (e.g., requirements and constraints) and the solution domain (e.g., technical, social or organisational). This research incorporated significant literature analysis (see Chapter 2) to develop the Framework of user expectations, and involvement of practitioners (see Chapter 4) to identify possible constraints and specify requirements and conditions related to the extraction of user
expectations in the systems design and development processes. The research also involved users (see Chapter 6) to provide perspective from the user domain and to test the Framework of user expectations and its applicability, and to assess the developed Guidelines on how to extract user expectations towards personalised health websites from a practitioners’ perspective. It is important to note that the aim of a practitioners’ involvement in assessing the adequacy, relevance and applicability of the proposed solutions (i.e. developed artifacts) in the practical field, i.e. in the environment it was created for.

3.2.3.7 Communication of Research

The developed Framework of user expectations was used as a theoretical basis for the created Guidelines on how to extract user expectations towards personalised health websites. Both artifacts were presented in a detailed and concise way in the form of Guidelines that incorporated:
- the relevance of the problem of extraction and formalisation of the user expectations to the e-health field;
- the developed Framework and its elements;
- the sequence of actions required to be performed in order to achieve the desirable results;
- a list of examples of the questions and previously extracted user expectations.

It is expected that such precise Guidelines will enable designers/developers and managers to see and appreciate both a theoretical and practical role of this research and its contributions in the form of developed artifacts.

3.2.4 Research Epistemology

In the IS discipline, there are two major epistemological research paradigms, positivism and interpretivism (Fitzgerald and Howcroft 1998; Jones 2004; Lee 1991; Mingers 2001; Probert 2001; Russo and Stoltermann 2000; Walsham 1995; Weber 2004). A paradigm is understood as a distinct worldview based on certain epistemological and also ontological assumptions (Niehaves and Stahl 2006).

Positivist researchers apply research methods used in the natural sciences to the social sciences; interpretive researchers emphasise the meanings made by people as they interpret the world (Williamson et al. 2002). According to Klein and Myers (1999), interpretive research aims to understand human thought and action in social and organisational contexts thus providing an insight into human involvement in information systems phenomena such as information systems design and development. Interpretive researchers strive to understand and describe the context of the information systems, the social component, and the process whereby the information systems
influence and are influenced by its context and its users (Cecez-Kecmanovic 2001; Walsham 1993).

The main assumption for interpretivists is that most of the human knowledge is gained or filtered through a number of social constructions such as language, consciousness and shared meanings (Niehaves and Stahl 2006). Interpretive research does not predefine dependent and independent variables, but focuses on the complexity of human sense making as the situation emerges (Kaplan and Maxwell 1994). Interpretivists attempt to understand the phenomena through the meanings that people assign to them (Boland 1985; Boland 1991; Myers and Klein 2001; Orlikowski and Baroudi 1991)

The epistemological perspective of this research project is interpretivism. Interpretivists do not test hypothesis but develop propositions grounded in the perspectives of the research participants (Williamson et al. 2002). The conducted research aimed to facilitate systems design and development processes by involving users in it and by gaining an understanding of what factors influence the formation of user expectations. Such factors should be considered when extracting user expectations to subsequently formalise the process of extraction of user expectations and incorporate this process in the design and development of personalised health websites. The conducted research looked at the human social interpretation of the health websites on an individual basis (interviews with the designers and developers, see Chapter 4) that developed a set of meanings that construct subjective reality (the processes of the online systems design). Therefore, this research project belongs with the interpretive tradition and is an exploratory research in nature (Chua 1986; Niehaves and Stahl 2006; Orlikowski and Baroudi 1991).

3.3 Research Design of the Study

The underlying premise of interpretivism is that “individuals act towards things on the basis of the meanings that things have for them, those meanings arise out of social interactions, and those meanings are developed and modified through an interpretive process” (Boland 1979, p.260). As this research was essentially about the interpretation of user expectations on the basis of the extracted factors that influence the formation of these expectations (i.e. the developed Framework), a more human-centred research approach was adopted with the involvement of qualitative research methods.

Qualitative research implies a certain research design that comprises a number of phases (Williamson et al. 2002). Figure 3.4 illustrates how these phases contribute and relate to the reasoning process in the design science research chosen for this study.
Figure 3.4 Qualitative research design that contributes to the design science research approach (adapted from (Williamson et al. 2002) and (Vaishnavi and Kuechler 2004))

The choice of ‘topic of interest’ related to the identification of a certain problem within the design process, namely the problem of extraction, formalisation and incorporation of user expectations towards personalised health websites in the design and development processes. Suggestions on how the stated problem could be approached was grounded in an extensive literature review (see Chapter 2) and expressed through a set of research questions (see Section 3.2.3.2 of this chapter), followed by the development of a theoretical Framework of user expectations towards personalised health websites (artifacts from the design science perspective). Design of the research plan, data collection and analysis led to the development of another artifact, a set of Guidelines on how to extract user expectations towards personalised health websites. The next step included the evaluation of two developed artifacts and an analysis of the research contribution to both theory and practice.

The stage ‘defining sample’ related to the need of a certain phenomenon to be placed in certain settings (places and persons). It could be argued that the design science research cycle is already within a defined range of settings dictated by the chosen problem, namely the problem of extraction, formalisation and inclusion of user expectations towards personalised health websites in the design and development processes. To that end, the defining sample stage (for the purpose of the conducted research) contributed to the awareness of the problem. However, the data collection stage required particular sampling of participants even though such sampling was influenced by the topic of investigation (see Chapters 4, 6 and 7).
The principle methods used to collect the data for the conducted research were:

- Literature analysis was used to establish the state of theoretical knowledge of expectations in the IS/medical field and to determine what influenced the formation of user expectations in the e-health context. An initial Framework of user expectations towards personalised health websites was developed.

- Interviews with the designers and developers were conducted to determine what role user expectations played in the design and development of online systems from the practical perspective, and to establish how the user expectations were currently approached in practice (see Section 3.4.1).

- Competitive analysis of existing health websites aimed to determine the set of mostly implemented personalised features (see Section 3.4.3).

- Think-aloud sessions (see Section 3.4.2) helped test the developed Framework of user expectations about the personalised features of health websites identified at the previous step. The developed Framework was further modified based on the data analysis and presented in Chapter 7.

- Confirmatory interview with two experts, a Canadian and an Australian one, were conducted to evaluate the developed artifacts, namely the Guidelines and theoretical Framework (see Section 3.4.1). The Guidelines were further modified and presented in Appendix 5.

Figure 3.5 provides an illustrative overview of the approach taken in this research.
2. Literature review:
Identified:
- role of expectations
- factors that influence the formation of expectations in the e-health context
- initial framework of user expectations

3. Interviews with designers and developers:
Results are used to identify methods to analyse personalised features and to extract user expectations
Key characteristics of user expectations are identified
Initial framework of user expectations towards personalised health websites is developed

4. Competitive analysis:
Results are used for inclusion to the next step of Think Aloud sessions with the users

5. Think Aloud sessions:
- tested the developed framework of user expectations
- identified user expectations towards personalised health websites
Guidelines for designers and developers on how to extract user expectations are developed
The framework of user expectations is modified

6. Guidelines
Modified framework
Used for the capstone interviews

7. Capstone interviews:
- Evaluation of the created artifacts – i.e. framework and guidelines
- Interview with experts

8. Final guidelines

9. Contributes to understanding:
- What factors influence the formation of user expectations
- What the user expectations are in the design and development context
- What methods can be used to extract user expectations
- Existing user expectations towards personalised health websites

Figure 3.5 Overview of the research study
**Literature review.** The initial phase involved an extensive IS/medical literature review in order to establish understanding of the phenomenon of user expectations. Several disciplines were explored, such as user-centred design, requirements engineering and IS service quality. Relevant concepts and theories were reviewed, such as expectation disconfirmation theory, the concept of user satisfaction and expectations, and the factors that influence the formation of user expectations. The focus of the study was established, the research topic was verified, central and associated research questions were formulated, the research design was chosen along with relevant research methods.

**Interviews with designers and developers.** Several semi-structured interviews with the website designers and developers were conducted in order to establish the notion of user expectations in the design and development processes. Given that the notion of user expectations in relation to the practice of the online systems design and development is not well covered in the literature, it was decided to conduct a set of interviews to develop better understanding of the concept of user expectations and its applicability in the design and development processes. This phase was designed to enrich both the problem and the contextual understanding within the chosen area of research. The semi-structured style of interviews allowed clarification of certain aspects of the research problem by occasional elaboration and drawing on the provided responses. The interviews provided the initial grounding for the study. The major outcomes of the interviews were:

- better understanding of the notion of user expectations in practice;
- identification of the range of methods further used in the study to determine a range of personalised features that were subsequently analysed;
- identification of methods to extract user expectations.

**Competitive analysis of personalised health websites.** This phase included conduction of competitive analysis of a number of personalised health websites in order to establish the variety and typology of personalised features currently available to e-patients. The main aim of the analysis was to develop an understanding of the research context per se and to establish the grounds for the next research phase, i.e. think-aloud sessions. This included identification of personalised features during the competitive analysis that were subsequently used for the think-aloud sessions with the users.

**Think-aloud sessions.** This phase was based on the results of the previous two phases. Suggestions from the website designers and developers in relation to the extraction of user expectations, coupled with the identified personalised features of health websites, led to the development of a set of interview questions and scenarios. The questions were in interview form and the scenarios were developed for the think-aloud technique featured user observations. The
users were asked a set of semi-structured questions related to the identified personalised features of health websites and were asked to perform a few scenarios with the nominated personalised features. The outcome of those research activities was the verification of the Framework and development of the Guidelines for designers and developers of health websites.

**Confirmatory (evaluation) interviews.** This phase consisted of two semi-structured interviews with the experts in systems design and development in order to evaluate the research outcomes. The experts were sent the Guidelines that contained information about the research topic, the Framework of user expectations and a list of activities required to extract user expectations towards personalised health websites. The results of the think-aloud sessions were summarised and included in the Guidelines so the experts could gain a better understanding of the conducted research. The expert evaluation allowed for the establishment of practical relevance and applicability of the developed artifacts to ‘real world’ practices.

With the detailed coverage of the research approach chosen for the study, it is important to establish the relevance of the chosen data collection methods to the proposed research activities. Such justifications are provided in the next section of this chapter.

### 3.4 Data Collection Techniques

From the methodological point of view, it is important to legitimise how the knowledge can be created and to justify the choices of particular methods and techniques (Myers 1997). In a philosophical sense, a methodology can be understood as an overall strategy of conceptualising and conducting an inquiry and the construction of scientific knowledge (Cecez-Kecmanovic 2001). A methodology refers to the research methods or techniques, to their epistemological assumptions, and to how linked they are in a specific research context (Cecez-Kecmanovic 2001).

The research process identified in the previous section demonstrated that the present study used a range of data collection techniques to examine human behaviour in relation to the social, cultural and political contexts (Salkind 2003). The data collection techniques were:
- semi-structured and expert interviews;
- think-aloud sessions that incorporated semi-structured interviews and observations;
- a competitive analysis.

The brief analysis and justification of the chosen data collection methods and techniques is provided in the next section.
3.4.1 Semi-Structured Expert Interviews Technique

The interview technique was chosen in recognition of the need to clarify the current attitude towards user expectations and their role in the website design and development. The interviews allowed the researcher to ask ‘why’ and ‘how’ questions to clarify contemporary issues on user expectations from the practical perspective. It provided a ‘real world’ view on the problem, its importance and applicability. The interviews were also chosen as they claimed to give a broad view of the phenomenon of interest, which was user expectations (Flick 2002; Rossman and Rallis 2003; Taylor and Bogdan 1984).

For the purpose of interviewing the designers and developers of online systems, it was decided to conduct semi-structured expert interviews. A list of open-ended questions was prepared. Open-ended questions allowed the researcher to clarify and lead on certain discussion points when needed (Williamson 2002). The semi-structured style of interviews was also incorporated in the think-aloud sessions (see Section 3.4.2 for more details).

The semi-structured style of interviewing was also chosen for the evaluation stage to conduct confirmatory interviews with the experts (Guion 2001) to explore their views, feelings and perspectives on the developed Guidelines (see Chapter 7 for more details).

(1) Key Characteristics of Semi-Structured Expert Interviews

The key characteristics of the semi-structured interviews are:

- open-ended questions where the respondent does not simply provide a yes or no response, but elaborates on the topics;
- conversational manner where the primary role of the interviewer is to be a listener and to provide a smooth transition from one topic to the next;
- semi-structured format that makes the conversation flow and enables the interviewer to clarify certain points if needed;
- seeking for understanding and interpretation;
- the research interests are clear and well-defined so the researcher is clear about what needs to be discussed and/or evaluated and how;
- the research depends on a broad range of settings or people which implies the need to provide a perspective on how certain individuals pursue particular research issues and/or outcomes (Denzin and Lincoln 1998; Guion 2001; Rubin and Rubin 2004; Williamson 2002).

The semi-structured style made the interviews less intrusive to those being interviewed due to the fact that semi-structured interviews enabled a two-way communication with an opportunity
to guide the conversation and clarify certain aspects when required. It also allowed the interviewer to add new questions and clarify certain points made by the interviewee (Seidman 2006). The interviewees were allowed (and sometimes encouraged) to ask the interviewer questions, which led to a bi-directional structure of a discussion close to a conventional conversational manner. Such manner allowed the interviewer (and the interviewees) to rephrase or reformulate the questions to confirm their understanding of certain topics or aspects that required further clarification (Rubin and Rubin 2004).

The choice of semi-structured interviews for the initial research phase correlated with Lewis et al (2005a), who proposed that researchers had to explore diverse resources such as literature reviews, case studies, interviews or their combination when facing a relatively unstudied situation. Benbasat and Zmud (1999) stated that conducted IS research should be relevant to practitioners that required a dialogue with the practitioners in order to identify their research interests and problems, and to establish relevance of the research outcomes. There was little information available on how user expectations could be extracted, formalised and incorporated in the design and development of online health systems, such as health websites. The topic was partially covered by a range of user-centred design and requirements engineering literature that frequently mentioned user expectations in relation to their importance in the systems design and development process. However, the practical aspects related to the problem were not covered. Semi-structured interviews, being a qualitative research method, helped develop a broad understanding of the identified research issues.

The choice of semi-structured style for the evaluation, confirmatory interviews, provided a distinctive supply of ‘inside’ knowledge from the practical perspective and applicability of the developed artifacts in practice. The confirmatory interviews evaluated the relevance and applicability of the research outcomes, namely the developed Framework of user expectations towards personalised health websites and Guidelines on how to extract user expectations.

(2) Advantages and Disadvantages of Semi-Structured Expert Interviews

There are a number of advantages of semi-structured expert interviews (Mack et al. 2005; Williamson 2002):

- face-to-face interaction can motivate the interviewees to provide high rapport and establish good communication channel;
- the fact that the interviewees are observed by the interviewer might lead to gaining extra information about the problem via body language, tone of the voice, etc;
- the interviews allow the interviewer to elicit detailed responses with all their nuances and contradictions;
the interviewees often provide interpretive perspective on certain issues and environments that enriches the understanding of both the researched phenomenon and its context;
- they provide a good opportunity to assess the validity and relevance of the research outcomes (for evaluation);
- such interviews often provide rich data enhanced by the opportunity to have a conversation rather than a one-way communication.

The main disadvantage of the semi-structured expert interviews is that the interviewer cannot necessarily establish whether all the provided information is accurate or unbiased or whether the description of the situation is correct (Mack et al. 2005). A potential solution for this was careful observation of the interviewees and subsequent clarification of unclear moments either later in the same conversation or the following conversations with other interviewees.

(3) Conditions for Adoption of Semi-Structured Expert Interviews
Taylor and Bogdan (1984) propose five circumstances when the researcher should conduct semi-structured expert interviews:
- the research interests are relatively clear and well-defined;
- settings or people are not otherwise accessible;
- the researcher has time constraints;
- the researcher depends on a broad range of settings or people;
- the researcher wants to illuminate subjective human experience.

With the present study, the research interests and objectives of the interviews were well-defined. The semi-structured expert interviews were conducted to extract and discuss past experiences, attitudes and assessments that were not accessible otherwise. The interviews provided a subjective human perspective on the research topic with a significant contextual description, which justifies their use for the evaluation of the outcomes of this research.

To sum up, the adoption of semi-structured expert interviews for the data collection and subsequent evaluation of the designed artifact was well justified. It is believed that semi-structured expert interviews were an appropriate choice of data collection method as it was effective in providing sufficient data to understand the context and issues related to the notion, extraction and formalisation of user expectations in the systems design and development processes. There were six interviews conducted with the designers and developers of online systems (including personalised health websites) conducted in order to gain a better understanding of the role that user expectations play in the development processes. A set of the interview questions (13 questions overall) covered four themes related to:
- the professional experiences of the interviewed experts;
- their perspectives on the role that the user expectations play in the website design and development processes;
- experts’ perspective on user satisfaction with the developed systems and the role of user expectations in their development;
- whether the interviewees had or needed any Guidelines on how to extract user expectations in their work.

The full set of questions can be found in Appendix 1 while more information on the interview procedures and participants is provided in Chapter 4.

The use of semi-structured expert interviews to validate the created Framework via the evaluation of the developed Guidelines was justified as well. Two confirmatory interviews were conducted in order to evaluate the usefulness and completeness of the created Guidelines. The interview questions are presented in Appendix 2 while more information on the interviews and their analysis can be found in Chapter 7.

### 3.4.2 Think-Aloud Method/Technique

Think-aloud method/technique was originally described by Duncker (1945) in his work in experimental psychology where he studied productive thinking. Later on the think-aloud technique and protocols were pioneered by De Groot (1965) and Newell & Simon (1972) in the study of puzzles and games, and it proved to provide vivid insights into strategic intentions and flow of thoughts (Ericsson and Simon 1984). In the 1980s, think-aloud became the central empirical, formative evaluation method in such fields as human computer interaction, scientific communities of psychology and computer science, and (subsequently) in user-centred design, particularly in relation to the usability (Carroll 1997; Mack et al. 1983; Wright and Converse 1992).

The think-aloud (TA) method was extensively researched by Ericsson and Simon (1984) who grounded their work in the theoretical findings of behaviourists and cognitive psychologists. Ericsson and Simon (1984) proposed to use the think-aloud method for various aspects of cognitive psychology. It soon became popular in various engineering fields including usability engineering (Denning et al. 1990; Nielsen 1993; Sanderson 1990). It is interesting that while traditionally the primary focus of the TA method was on the cognitive aspects and processes, with the use of the method in diverse fields its focus had shifted from the purely cognition elements (Boren and Ramey 2000).
Ericsson and Simon (1984) defined two primary levels of verbalisations which they considered to be reliable data for behavioural and other types of research. Level 1 data are verbalisations that do not need to be transformed during the task performance. Level 2 data are verbalisations that must be transformed before being verbalised during the task performance, such as abstract concepts (Ericsson and Simon 1984). Level 3 data relate to the subjective interpretations of the participants, their likes and dislikes, and are considered to be excessive. Ericsson and Simon (1984) advocated against using level 3 data in cognitive research. However, there are a number of researchers who argue that for such a field as usability engineering level 2 and 3 data is more important than level 1, as they provide greater insight into the participants ideas, feelings, thinking processes, preferences, needs and expectations (Boren and Ramey 2000; Bowers and Snyder 1990; Dumas and Redish 1994; Nørgaard and Hornbæk 2006; Sienot 1997).

In usability engineering, the focus of the TA method is primarily on:
- gaining insights into the participants’ thinking processes via obtaining level 3 data;
- identifying various system deficiencies;
- building usable and efficient systems (Boren and Ramey 2000; Nørgaard and Hornbæk 2006).

Using the interaction with the system as the context, the TA method can provide valuable data that helps assess usability of the system along with other aspects such as user needs, expectations and behavioural patterns, which make the TA “the single most valuable usability engineering method” (Nielsen 1993, p.195).

The use of the TA technique to investigate user’s thoughts on certain issues related to different aspects of the online systems is advocated by Nielsen (1993). Nielsen (1993) applies the TA technique mostly to the usability testing and states that it is useful for obtaining user’s perspective on certain aspects of the websites, including user needs and expectations. The use of the TA technique to extract user expectations has been suggested by designers and developers of online systems during the interviews (see Chapter 4). Given both the theoretical justification of the use of the TA methods to extract user expectations (Nielsen 1993) and the practical advice from the experts, it was decided to use the TA sessions to extract user expectations towards personalised health websites.

(1) Key Characteristics of Think-aloud Technique
There are a number of characteristics of the TA technique (Crellin et al. 1990; Vainio-Larsson 1990):
- TA used in many empirical investigations;
- TA is an effective means to collect qualitative data;
- TA allows to collect information on users’ reasoning related to certain aspects of user preferences or behaviour;
- TA sessions are often conducted with a relatively small number of participants, for instance, Nielsen (1994) advocates from five to ten participants.

(2) Advantages and Disadvantages of Think-aloud Technique

There are a number of advantages related to the use of TA technique:

- TA allows participants to use their own language, choose their own words, the sequence of sentences and topics, which makes the enquiry process easy on them (Van Someren et al. 1994);
- TA provides more insight into the reasoning behind certain actions and processes (Ericsson and Simon 1984; Kuusela and Paul 2000; Nisbett and Wilson 1977);
- Henderson et al (1995) study on comparison of logged data, questionnaires, interviews and TA, has shown that TA technique is the most effective single method at highlighting problems related to the use of software and websites (portals), and their usability as TA technique identifies a number of issues that cannot be identified via use of other techniques;
- Dix et al (1997) state that TA is a relatively simple technique to execute and its usefulness is seen as “…largely dependent on the effectiveness of the recording method and subsequent analysis” (p. 427);
- Hackos and Redish (1998) regard TA as a straightforward technique that allows to elicit user inferences, expectations, intuitions, mental models, reasons, decisions while doing the task. They claim that “by recording the verbal protocol, you will be able to…detect cognitive activities that may not be visible at all” (p. 259).

As for the main disadvantages, it is argued that the data collected with the use of TA technique needs to be evaluated and analysed carefully as not all the users are trained to effectively verbalise their thoughts (Vainio-Larsson 1990). Another problem relates to audio-recording and monitoring of the TA sessions, as such activities, while essential for TA, may have a negative effect on user behaviour and lead to some behavioural biases (Crellin et al. 1990). Vainio-Larsson (1990) states that TA is more intrusive than pure observation, and as a result “many users have difficulty in acting and reflecting simultaneously” (p.325).

To sum up, think-aloud techniques, combined with the elements of interviews and user observations, were used to extract user expectations towards personalised health websites. For the purpose of this study, seven TA sessions were conducted until the saturation was reached. Each of the sessions lasted for 1 – 1.5 hours and was broken down into two to three sequential cognitive steps. The number of cognitive steps varied from one personalised feature to another.
depending on the characteristics of the tested features. Overall, five personalised features were analysed during each TA session. Further details on the conduct and details of the TA sessions can be found in Chapter 6. Additionally, a sample of the questionnaire used and the Guidelines are included in Appendix 5.

### 3.4.3 Competitive Analysis Method

The present study also adopted competitive analysis to establish the range of personalised features of health websites that had to be analysed in order to construct TA sessions. As a technique, competitive analysis is used to examine the strengths and weaknesses of competitors’ similar products or services (Fleisher and Bensoussan 2007). This method facilitates the identification of similar services, innovative ideas and winning strategies that can be adopted to accelerate success and growth (Fleisher and Bensoussan 2003). Competitive analysis provides the means to investigate how the business is done by the competitors, to identify where it is done differently or better, and to determine whether and how certain strategies can be adopted to enhance business, services or products in order to satisfy customers (users) better (Henczel 2002).

For the purpose of the conducted study, competitive analysis was used to identify competing personalised health websites in order to conduct a thorough and systematic review. This analysis facilitated an investigation of the current state of health websites and identified a range of personalised features available to the users. This method was needed for a deep analysis of the features of health websites in order to provide a better understanding of the research context. Competitive analysis provided a ground base for the think-aloud sessions, as suggested by the online systems designers and developers, as it detected and identified the most widely implemented personalised features of health websites. Those identified features were subsequently used for the think-aloud sessions (see Chapter 6). In consideration of the theoretical value and recommendations from the practitioners to use competitive analysis prior to the think-aloud sessions, its choice for this study is justified.

#### (1) Key Characteristics of Competitive Analysis

The key characteristics of competitive analysis are (Kenny 2005):

- competitive analysis has originally been derived from marketing, but subsequently used for strategic planning across a number of fields (including IS);
- it determines competitors objectives and strategies;
- competitive analysis results in a report providing overview of the market, analysis of strong and weak aspects of competitors’ initiatives, and a set of recommendations for future actions.

(2) Advantages of the Competitive Analysis
The main advantages or benefits that competitive analysis provides, are (Fleisher and Bensoussan 2007; Henczel 2002):

- it adds value to intelligence by identifying direct competitors and conducting in-depth but centralised assessment of the current market;
- competitive analysis answers the ‘real time’ questions as it deals with the current markets, sometimes even on ad-hoc basis;
- competitive analysis allows, by analysing the market, to gain a better understanding of potential weaknesses that the websites (portals) have by carefully framing and analysing acquired data (as studying competitors offers an opportunity to find out how users can be served better);
- it also facilitates understanding of the strengths that the websites (portals) have and using this information for the strategic purposes;
- competitive analysis reveals new ideas available in the market that might be considered for subsequent analysis and implementation (as a part of a strategic plan);
- competitive analysis, when conducted accurately, helps determine the list of factors that drive success in the current market space. It is particularly important as the factors might significantly vary from market to market, and differ from what is originally expected.

The major disadvantage of competitive analysis is that it needs to be well coordinated and targeted at specific, well-defined areas, in order to deliver benefits (Kaiser et al. 1980). If competitive analysis is conducted on a broad spectrum of issues, it could be ineffective and subsequently might not justify the resources spent on it.

To sum up, competitive analysis allows for the identification of actions that need to be performed in order to improve the competitive position of the company in the market by providing services that meet user needs and expectations. Competitive analysis was chosen for the conducted study in order to provide the ‘real life’ perspective on the current development of personalised health websites and to establish a solid base for the think-aloud sessions with the users. For the purpose of the study, 14 personalised health websites from Australia, the USA, India, Singapore, Canada and the European Union were analysed. Please refer to Chapter 5 to see more details on how the competitive analysis was conducted.
3.5 Data Analysis

Data analysis is an important stage that allows researchers to make sense of the data that has been collected and present the results in a form most appropriate for the subsequent decision making activities (Creswell 2009). Analysis of qualitative data is a complex process that tends to “overload the researcher badly at almost every point” (Miles 1979, p.590). As raw notes rarely mean anything to anyone apart from the researcher, it is important to segment the data and classify it into categories. According to Rossman and Rallis (1998) data analysis is an ongoing process that involves constant reflection on the data collected, asking analytical questions and going back to the data to find the answers. Merriam (1988) and Marshall and Rossman (1989) state that data analysis and data collection activities should be a simultaneous process as it enables critical thinking and allows asking various questions to gain extra data and to obtain missing information.

Glaser (1941) being one of the first researchers who acknowledged that effective data analysis requires critical thinking and implies persistent efforts to examine any belief or form of knowledge in the light of the evidence that supports it. He identified three main aspects of critical thinking:
- persistence as the issues should be analysed carefully and more than once;
- evidence that either supports or rejects certain beliefs or view points;
- consideration of implications of where the belief or viewpoint leads and what conclusions might follow.

According to Bowel and Kemp (2001) and Thomson (2001), in order to conduct successful data analysis, it is also required for the researcher to think analytically. The researchers who think analytically tend to:
- examine the data in detail from various angles;
- check the logical flow, consistency and conciseness of the performed research activities;
- look for possible flaws in the reasoning, the evidence, or the way that conclusions are drawn;
- change the viewpoints to analyse the same issue;
- be able to see and explain why different people come up with different conclusions;
- be able to argue why one set of opinions, results or conclusions is preferable to another;
- anticipate and identify hidden assumptions and biases.
Awareness of the need for thinking critically and analytically to perform better data analysis helped me as a researcher undertake the data analysis activities for the present research, guided by the viewpoints indicated above.

### 3.5.1 Semi-Structured Expert Interviews Analysis

All the interviews were tape recorded and subsequently transcribed. Data analysis was conducted in accordance with the meta-matrix method of Miles and Huberman (1994) who claim that construction of matrix displays is the most economical way to see the relationships between the segments of data. Matrices can be defined as criss-crossed boxes in which one set of variables forms the rows and incidents from the columns or vice versa (Tesch 1990).

A meta-matrix approach was used along the guidelines proposed by Miles and Huberman (1994) using a manual cut and paste approach outlined by Bogdan and Biklen (1992). Miles and Huberman (1994) stress the importance of defining the unit of analysis when analysing the data using the meta-matrix approach. Miles and Huberman (1994, p.10) state that data analysis consists of “three concurrent flows of activity:

- data reduction;
- data display;
- conclusion drawing/verification”.

(1) Data reduction refers to the process of selecting, focusing, simplifying, abstracting and transforming data that appears in the transcribed notes. It is an important part of the data analysis as it helps sharpen, sort, focus, discard, and organise the data in a way that allows for the conclusions to be drawn and verified. The data can be reduced and transformed through such means as selection, summary, paraphrasing, or through being subsumed in a larger pattern (Miles and Huberman 1994).

For the purpose of this research, the transcribed interview data was analysed to establish its holistic view and to ensure that each of the transcribed sentences makes sense. The data was also complimented with the notes from the observations.

(2) Data display is the second major flow of activity that aims to represent data in a certain compressed way so that conclusions can be drawn more easily. Miles and Huberman (1994) state that “humans are not powerful processors of large amounts of information,” and that “extended text can overload humans’ information-processing capabilities” (p.11) and that good displays are, “a major avenue to valid qualitative analysis” (p.11).
For the purpose of this research the data was presented in the form of the meta-matrices. The chosen unit of analysis was the entire sentences, entered into the matrices, rather than words or phrases. Each of the conducted interviews with the experts was textually categorised in accordance with the themes identified in Chapter 4. For each of the identified themes, a meta-matrix was developed. Each of the matrices consisted of a few (up to nine) columns with identified topics, for every expert being interviewed. Each piece of data was coded according to its relationship to each of the topics. The cell data was then copied into an intersection of the interviewee who made the comment and the topic the comment related to. See Figure 3.6 for an example of a fragment of a completed matrix.
<table>
<thead>
<tr>
<th>Expert 1</th>
<th>I think you do need a guideline to do that [extract expectations]. First, you need to define what it is exactly; you need to deliver something concrete, something feasible not just a concept. And I think it is context based. Maybe there are some general rules but for the developers if you are talking to them to incorporate this kind of expectations in your design, you do need to give them some concrete practical guidelines or principles on how to identify expectations and how to get aware of this kind of issue. Even though there might not be a solution to the problem but at least they are aware of it for the future discussion.</th>
<th>Yes [would use them] if it can improve the performance of the application, if it can help attract more users, and if it is feasible, definitely yes</th>
<th>No because the user expectations are really kind of new to the developers group.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert 2</td>
<td>I do not think you can do it [develop such guidelines] [...] It is that kind of knowledge that… people don’t know this, they can’t say it when they are asked. It is not a conscious knowledge. Guidelines are often less helpful than templates and things. Guidelines tend to be the stick things whereas templates and good ideas that you get from other people are more of a carrot. I would definitely not mind taking a look at it but I will probably rearrange it to fit myself very-very heavily as I tend to do it even with the stuff that I get from very respectable sources.</td>
<td>There is some basic underlined theme about understanding user expectations. But that’s a generic one rather than a specific one related to a particular job. And we are always referring back to that sort of understanding of how the users use website. That’s core knowledge for a designer. &lt;but no specific guidelines for the expectations were mentioned&gt;</td>
<td></td>
</tr>
<tr>
<td>Expert 3</td>
<td>Yes sure [would use such guidelines]. It depends on the scope of the work but if we have time to do some pre-design analysis I’d definitely take a look at them.</td>
<td>Not really</td>
<td></td>
</tr>
<tr>
<td>Expert 4</td>
<td>Yes, I would.</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Expert 5</td>
<td>It would be good to have. I think you’ve got to have those. […] If there are things out there that people could be guided through, through different levels of expectations that would be fantastic […] If you can help your experts to have guidelines and to teach them how to research properly, that would be great.</td>
<td>Yes [I would use such guidelines], for me continuous education in this arena is great. It is just finding the time to do it, of course.</td>
<td>I don’t know if there are any guidelines</td>
</tr>
<tr>
<td>Expert 6</td>
<td>Yes</td>
<td>That would be far better [than the ISO standards]. Yes.</td>
<td>I don’t think so</td>
</tr>
</tbody>
</table>

*Figure 3.6 Fragment of a meta-matrix used for data analysis*
The display format adopted for the present study provided a range of advantages (Miles and Huberman 1994):

- it enabled the significant responses of the interviewees to be displayed on one large sheet;
- it enabled comparison between responses and interviewees.

(3) Conclusion drawing and verification is the final analytical activity where the researchers begins to decide which derived issues/concepts are important and which are not. The researchers do this by noting regularities, patterns (differences/similarities), explanations, possible configurations, causal flows, and propositions. However, it is important to keep thinking critically and analytically and this hold the preliminary set of conclusions lightly, while maintaining both openness and a degree of scepticism. The results of the final stage of the data analysis for the semi-structured interviews with the experts and the confirmatory interviews are presented in Chapters 4 and 7 respectively.

### 3.5.2 Think-Aloud Method/Technique Analysis

Ericsson and Simon (1993) state the importance of careful transcripts of verbal data and observation notes straight after the data collection stage. Data presented in the digital format can be easily codified and subsequently analysed (Young 2005). According to Payne (1994), there are two main approaches to coding data collected via the think-aloud sessions:

- code instances in which certain types of thought seem to occur within a protocol. The frequency of occurrence of different types of reasoning can then be computed across problem types or individuals;
- break the protocols up into short phrases or segments. Each phrase should refer to what constitutes as single task or subject. These segments can then be subsequently coded and analysed.

For the purpose of this research, the second option was chosen. Once the coding was performed, the notes were analysed using the meta-matrix approach developed by Miles and Huberman (1994) as discussed in the previous section. The results of the final stage of the data analysis for the think-aloud sessions are represented in Chapter 6.
3.5.3 Competitive Analysis

Competitive analysis incorporated two stages:
- representation and analysis of the findings in the form of matrices and figures;
- the final conclusive summary of findings including suggestions regarding a set of actions that needed to be undertaken (Brown 2006).

The chosen data representation types were:
- Descriptive tables (descriptions containing of certain features, etc);
- Visual schemas & diagrams (e.g. to illustrate the functionality of certain features).

The selected representation of the collected data facilitated better decision making. The final analysis (summary of findings) identified a list of personalised features that were included in the think-aloud sessions to be analysed by the users.

3.6 Pilot Studies

In order to test the applicability of the chosen research method and to determine whether it provides the desirable and expected outcome, it was important to conduct a pilot study prior to the main data collection activities. In social science research, a pilot study is a “small scale version[s], or trial run[s], done in preparation for the major study” (Polit et al. 2001, p.467). Its main advantage is that a pilot study might point out or give an advanced warning where the research project could potentially fail, and indicate whether the proposed methods of research are appropriate, i.e. whether these methods allow extracting the desirable information and provide answers to the stated research questions (De Vaus 1993).

Given the importance of the pilot studies, they were conducted prior to the semi-structured expert interviews and think-aloud sessions, see Chapters 4 and 6 for more details.

3.7 Ethical Considerations

The integrity of the present research relied on a strong approach with participants. Standard procedures were taken to ensure that the privacy of the research participants was protected during the course of the current study. Monash University Human Research Ethics Committee (MUHREC) reviews all research involving human participants at the University and primarily
considers issues that constitute integrity, respect for persons, justice, consent, research merit and safety. This research was classified as low risk and ethics approval was granted to proceed for each of the stages of the data collection that involved human participants. An example of an explanatory statement and a consent form for the conducted activities can be found in Appendix 3.

3.8 Conclusion

The purpose of this chapter was to outline the underlying principles of design theories and to justify the use of the design science research paradigm for the conducted study. The proposed research activities are summarised in Figure 3.7.

Figure 3.7 Summary of the proposed research processes and outputs

This chapter was concerned with the sequence of research steps, their significance, role and elements that constituted each of the discussed steps. Hevner’s et al guidelines (2004) were applied to the research process to validate the research and to signify its rigor and completeness. Research outcomes and contributions were discussed along with the role of the created artifacts in the design practice. The description and justification of the research methods, namely semi-structured expert interviews, think-aloud sessions and competitive analysis, were provided, coupled with their brief characteristics, and a list of advantages and disadvantages of each method. Data analysis techniques were discussed in a dedicated section followed by a section dedicated to the research outcomes and contributions. The last section of the chapter was dedicated to ethics, ensuring that all required ethical permissions had been guaranteed to
proceed with the low risk research. The next chapter contains an analysis of the semi-structured interviews with the experts, i.e. designers and developers of online systems including personalised health websites.
4 SEMI-STRUCTURED INTERVIEWS WITH EXPERTS

The practical man is the adventurer, the investigator, the believer in research, the asker of questions, the man who refuses to believe that perfection has been attained.... There is no thrill or joy in merely doing that which any one can do.... It is always safe to assume, not that the old way is wrong, but that there may be a better way.

Henry R. Harrower

4.1 Introduction

This chapter is concerned with the investigation of real life insights in relation to user expectations and consideration of user expectations in the current practices of portal and website design and development. Six semi-structured interviews, conducted with usability experts, designer and developers of portals and websites, are described. The purpose of these interviews was to gain some practical perspective on user expectations and their role in the design of health websites. The interviews identified a number of issues, described in detail in Section 4.4. The discussed findings informed the latter stage of the present study, such as the competitive analysis and think-aloud/observations sessions. The findings also informed the development of the Guidelines on how to extract user expectations (see Chapter 7 and Appendix 5 for more information).

4.2 Semi-Structured Expert Interviews Approach

Semi-structured expert interviews are considered an important instrument for qualitative research (Seidman 2006). The aim of these interviews is to gain an understanding of a phenomenon and to extract meanings, description of a situation and perspectives on certain issues. The latter, according to Rubin (2004), is extracted with an investigative interviewing
style that is narrowly focused to learn about specific instances, situations or activities. This type of interview process requires researchers to perform qualitative interviews on a narrow topic and to be precise about the themes they are willing to investigate.

The focus of this research was on the notion of user expectations and their role in the design and development of personalised health websites. The major research question of this study was ‘How can user expectations be incorporated in the design and development of personalised health websites?’ In order to answer that question, it was important to gain a real life perspective on the current practices of design and development of health websites and to determine whether such user characteristics as expectations are considered in these practices.

The use of semi-structured expert interviews, mainly due to their relative flexibility as a data collection method (Myers and Newman 2007), provided the best means and grounds to answer a range of questions, such as:

- What is important to know about user expectations for the design and development of personalised health websites?
- Do website/portal developers/designers consider user expectations to be important for website design and development?
- Do website/portal developers/designers extract user expectations in their practices?
- How can user expectations towards personalised health websites be identified, extracted and formalised?
- At what stage of the online systems development do developers/designers extract user expectations?
- Are there any guidelines that help the developers/designers extract user expectations?
- Do they believe such guidelines would be useful in their work?

In summary, as the current study was focused on the use of user expectations in the design and development of personalised health websites, the use of semi-structured expert interviews helped gain experts’ perspective on the stated issues.

Semi-structured expert interviewing is a useful data collection method to facilitate initial fact finding, used for small samples (Robson 2002). The application of this method for the present study was justified, given the relatively small number of experts (six) who were interviewed to reach data saturation. Interviews allowed the experts to speak for themselves and to lead the conversation in certain aspects. As a result, a number of issues related to the role of user expectations in the design and development of health websites were identified. Overall, the use of semi-structured expert interviews as a data collection method served as a foundation for clarification of the role that user expectations play in the design and development of health websites.
4.2.1 Interview Procedure

Prior to an interview, each of the experts was sent a copy of the interview questions, glossary, consent form and explanatory statement to make sure the experts were familiar with the interview requirements and conduct procedures (see Appendices 1 & 3). Before the start of the interview, each participant had to sign the consent form, which confirmed that their participation was voluntarily, that they were aware of the fact that the interview data would be treated confidentially and securely, and that the anonymity of the participants would be preserved. The interviewees also had to provide their consent to be audio-taped during the interview.

The interviewees were given a choice of a location where they preferred to be interviewed. According to Taylor and Bodgan (1984), it is important to conduct interviews in a “private place where you can talk without interruption and where the informant will feel relaxed” (p.88). To that end, the interviewees were offered the option to either nominate a location, suitable to them, or to come for an interview to Monash University. Most of the experts chose to be interviewed in their offices, so that it did not significantly interrupt their working routine.

It was important to ensure that ethical and explanatory matters were considered prior to the interviews. For that purpose, the interviewees were sent an explanatory statement, consent form, a list of questions and a glossary of terms used, two weeks before the session. All interviews were conducted in a similar manner and followed a standard procedure:

- state appreciation for the readiness and time taken to participate;
- introduce interviewer;
- make sure that the interviewees familiarised themselves with the Explanatory statement and obtain written consent;
- check if consent is given to audio-tape the interview before recording;
- interview questions asked in the same order.

Each interview took approximately from 40 minutes to one hour. Most of the interviewees expressed interest in the research topic and expressed a desire to be informed about the research outcomes.
4.2.2 Interview Questions

The set of questions for the semi-structured interviews with the systems design and development experts was divided into four main themes.

*Theme 1* was associated with the professional experiences of the interviewees that was required to identify their competencies, involvement in the design and development processes, experience related to their work with users for design and development of online systems, including such online systems as health websites and personalised websites. It was important to obtain this information to establish the professional competency of the interviewees, their work in the researched domain, and level of expertise. It was also important to determine whether the experts were following UCD principles in their practices as this was one of the pre-requisites for the interviews.

Examples of the *theme 1* questions were:
- Have you ever been involved in the design and development of websites and portals?
- What kind of websites and/or portals?
- Did the websites/portals have any personalised features?
- Do you follow UCD principles in your work practices?

*Theme 2* related to the role and identification of user expectations in website design and development, and the experience of the interviewees in that respect.

Examples of the *theme 2* questions were:
- Do you think user expectations are important to identify in order to design/develop better websites/portals? Why?
- Do you think, in general, user expectations are hard to extract? Why?
- Do you identify and analyse user expectations when you design and/or develop a website/portal?

*Theme 3* was concerned with the correlation between user satisfaction and user expectations, i.e. whether user satisfaction would improve once user expectations were met (from the experts’ experience and perspective).

*Theme 3* question was:
- Do you think users will be more satisfied with the website/portal once their expectations are met? Why?
Theme 4 aimed to identify whether there were any existing guidelines, related to the identification and extraction of user expectations. If not, it was important to establish whether the interviewees would use such guidelines in their work practices.

Examples of the theme 4 questions were:
- Have you ever come across any guidelines on how to extract user expectations for the systems design and development purposes?
- If there were such guidelines available to you, would you use them in your work?

The complete list of the interview question can be found in Appendix 1.

4.2.3 Interview Participants

It was expected that the experts would provide some insightful comments and views on the problem of extraction and consideration of user expectations in online systems design and development processes, based on their professional experience. The participants had to satisfy a set of criteria. They had to:
- have experience in portal/website design and development;
- involve the users in their design and development practices;
- be available and willing to be interviewed.

For the purposes of this exploratory study, the ‘convenience sampling’ method was used to gather the data from appropriately qualified Australian experts. The ‘convenience sampling’ method was also chosen due to significant accessibility and co-operation considerations (Creswell 2009). Six Australian experts involved in the design and development of online systems were invited to participate in this study. All of the experts were located in Melbourne, Victoria, Australia as it was preferred to interview them face to face rather than over the phone. Those experts who agreed to participate were familiarised with the interview procedures and explained that they could withdraw from the study at any time, as outlined in the Explanatory statement (see Appendix 3).

Six experts that for the purpose of this study were labelled as Expert 1, Expert 2, etc., three of which were males and three females, were selected for the interviews and satisfied all of the stated criteria. All of the experts had a diverse expertise in design and development of online systems. Four out of six experts were involved in design and development of various health websites, from disease specific to generic ones.
The selected experts were:
- one designer of online systems;
- two usability experts/designers;
- three designers/developers of online systems.

It appeared that the majority (five out of six) experts combined the roles of either a usability expert and a designer, or a designer and a developer. An explanation of what each of the discussed roles involves is explained further in this section.

For the purpose of this study, a website/portal designer was defined as a specialist, responsible for the design and development of the information architecture of the website/portal, such as the structure of content, navigation and elements of the interface (Horton 2006; Valqui 2001; Vest 2005).

The developers were defined as specialists, responsible for the development of the portal/website functionality, as well as for programming and for running user tests (Hogan 2010; Valqui 2001). The inclusion of the developers in this study was important due to their involvement with the users at the testing stage of the system. The selected developers involved website/portal users mostly during their work on the system prototypes and during other software development processes that required users to be a part of the development process.

The usability experts were defined as specialists, familiar with the business needs of the project, for which the system is built. Their tasks normally were to identify a target audience for the project (potential users of the system), the characteristics of the target audience and a set of user requirements that had to be considered to enhance the user experience with the portal or website (Nielsen 2000; Shneiderman and Plaisant 2005).

For the purpose of this study, it was important to make sure that all of the selected experts were following UCD principles in their work. All of the chosen experts stated that they followed a UCD approach. However, the interviews revealed that half of the experts (three out of six) followed UCD principles only to a certain extent. In particular, the experts were simply aware of such principles and did “keep them in mind” (Expert 5). However, three other experts were fully involved in usability and work with the users and strictly adhered UCD principles in their work.

The interviews also revealed that the notion of UCD differed from one expert to another. Such comments as “addressing UCD principles is not something obvious” (Expert 4) and “the UCD principles are different between different people” (Expert 2) implied that the concept of UCD
was not something trivial and required further clarification from the experts. Further elaboration on the topic identified that while for some of the experts UCD was rather a philosophy (Expert 3, Expert 1), for others it was “certain techniques and design principles” (Expert 5). Nevertheless, all of the experts were aware of the UCD principles and used them in their work, even though to a different extent. The profiles of six interviewed experts are presented in Table 4.1.

**Table 4.1 Profiles of the interviewed experts**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow UCD principles</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>in their work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involve users in their</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have experience in</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>design/development of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>personalised portals/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>websites</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In summary, the interviewed experts included six specialists who:
- designed or developed information websites and/or portals;
- followed UCD principles in their work;
- involved users in their work.

Most of the selected experts (five out of six) had experience in design/development of personalised websites and portals, which was not a compulsory experience, but desirable one (for the purpose of this study).

### 4.2.4 Conduct of Interviews

#### 4.2.4.1 A Pilot Interview

The importance of pilot studies has been discussed in detail in Chapter 3. A single pilot interview, run prior to the conduction of semi-structured expert interviews, was audio recorded and subsequently transcribed. As a result of the pilot study, it was established that:
- the expert would require an explanation of terms, such as user expectations, personalisation and user-centred design in the context of the conducted study;
- the logical flow of the interview questions needed some improvement to enhance the conversational flow.
In order to address the first issue, a glossary of terms used was added to the set of documents that were to be sent out to the experts prior to the interviews. It was done to ensure that the experts would familiarise themselves with the terms used prior to the interview sessions. In order to address the second issue, the interview questions were regrouped and reformulated to enhance to logical flow of the conversation. One of the questions related to the necessity for the users to register on the portals and websites, was taken out due to its broad meaning and low relevance to the scope of the research. The altered interview questions can be found in Appendix 1.

4.2.4.2 The Rest of the Interviews

The rest of the interviews were conducted in accordance with the pre-developed interview procedure, described in detail in Section 4.2.1. Observation and careful listening to the experts during the interviews was important as it helped identify when the questions had to be slightly restructured in order to facilitate the logical flow of the conversation, which was done on a few occasions. Observation and careful listening of the interviewees also helped indicate when some of the questions had to be taken out due to the scarcity of expert knowledge in certain areas (for instance, in relation to various types of expectations, which seemed to be an unfamiliar concept to most of the interviewees).

4.3 Semi-Structured Expert Interviews Results

4.3.1 Outlook, Experience and Skills of Interviewees

It was important to establish whether the selected experts recognised the unique nature of health websites (as discussed in detail in Chapter 2) in order to understand the practical outlook on the design and development of specialised, namely health, websites. It was also required to establish what user characteristics the experts considered to be important for the design and development practises, and whether user expectations was one of them.

4.3.1.1 Nature of Health Websites

When the experts were asked about whether health websites differ from other types of portals or websites, there were two main streams of thought. From the technical or functionality perspective, half of the experts believed that health websites were no different from other types of websites and portals, as this comment illustrates:
Health information so far is probably the most in demand for the web users. However, I do not think that because of the highest interest the delivery of this kind of information will be different from the delivery of other kind of information [...] So I think it does not matter what kind of information it is, the underlying technologies and ideas are quite common (Expert 4).

However, other experts stated that health websites were different from the other types of websites and portals from a number of viewpoints:
- trust; the information, provided by health websites, needs to be trustworthy and reliable; one of the indicators of that is the Government involvement as it gives “a bit more authenticity that you would not get from a pharmaceutical company or a foreign organisation” (Expert 6); health websites “have to be factually accurate so the information the users obtain from them has to be from an authoritative source” (Expert 3);
- Personalised provision; the information search and retrieval should be personalised; “it is different for health websites and portals as they are more regarding a person comparing to other types of portals” (Expert 5).

The experts did not find that health websites differed from the other types of online systems because of their context, namely e-health. This finding confirms the general perception of treating e-health online systems as any other, despite its unique nature (see Chapter 2 for more details).

4.3.1.2 User Characteristics Considered in the Design and Development Processes

When the experts were asked to name user characteristics they normally extracted when they worked on their projects, most of them named categories of users. A few experts noted that it was important to identify what a website/portal would be used for and to establish what types (categories) of users would be accessing it. Therefore, “identification of who your users are and getting a broad brush of your user base” (Expert 1) seemed to be of paramount importance.

Other user characteristics that had to be considered for a website/portal design and development were:
- demographics (age, gender);
- geographic information “because it is about localisation” (Expert 4);
- frequency of looking at the portal/website;
When the experts were asked about what user characteristics needed to be extracted to build a health website, they mentioned similar characteristics, namely demographics (gender, age, nationality) and categories of users. One of the experts (Expert 3) mentioned personal health conditions. Expert 3 elaborated further and stated that identification of a personal health condition of a health consumer was an important factor for design of a health website, aimed to provide specific medical information relevant to that health consumer.

None of the experts mentioned anything about user characteristics, related to an emotional (affective) state of the users, their values, intentions or beliefs. The experts appeared to approach health websites from a perspective, similar to the development of any other website they worked on. Such state of affairs confirmed the statements of the IS/health researchers who claimed that, despite the importance of consideration of such user characteristics as emotional state, values, beliefs and intentions for development of health websites, there is a lack of such consideration in practice (see Chapter 2 for more details).

### 4.3.2 User Expectations and Their Role in Online Systems Development

The next section of the chapter represents an analysis of the role that user expectations play in the systems design and development processes. It was important to establish the state of expert knowledge about the user expectations, their importance and consideration in practice.

#### 4.3.2.1 The Notion of User Expectations in Online Systems Development

As the major research question of this study is concerned with the role of user expectations in the design and development of personalised health websites, it was important to determine what the experts knew about user expectations and whether they considered used expectations to be an important factor for online systems design and development?

When the experts were asked about the concept of user expectations, some of them had difficulty formulating their responses. Others stated that expectations were somewhat vague, subconscious and related to the knowledge in a user’s head.
User expectations are something rather vague. I think that when you are developing a portal application you should really focus on whether it is functioning properly and what it is supposed to do as it is crucial that the system is functioning the way it is designed to. But user expectations are something beyond that (Expert 4).

[Expectations are] why are they [users] coming to the website. That is what I would be thinking. And what kind of business transactions or what kind of processes are they trying to do [...] (Expert 6)

Some of the experts were sceptical about the extraction of user expectations as such and stated that one can only get an approximation of expectations (Expert 2, Expert 6). They also labelled expectations as “the bit that is not addressed [yet], it is what we haven’t thought of. That’s the bit where expectations are an issue” (Expert 2). On the other hand, the same expert (Expert 2) claimed the expectations were “not conscious knowledge” that could be extracted, making her viewpoint rather controversial.

However, even though the experts had trouble in clearly defining what user expectations were, conceptually, when the experts were asked whether they considered user expectations to be important for better website design, all of them agreed it was. Furthermore, in their responses, the experts linked user expectations to something the users were looking for when they accessed portals/websites:

Yes [...] user expectations are something that should be given a priority in design because you design something to meet someone’s expectations, and that is what the user expectations are to me. If someone is coming to the portal, you have to think what they are coming in for (Expert 3).

Yes. Because you are building it [a website/portal] for the user [...] so the whole point is to help the users find what they are looking for or to determine that what they are looking for is not actually there as people often do not want to find it elsewhere. So yes, it is extraordinarily important (Expert 2).

Absolutely [...] Because you want to make user experience online easy and enjoyable, [...] and to make the users] able to do what they need to do in the shortest time possible [...] So that they know that when they come there, it has everything that they need, and they know where to get the things that they need to, as quickly as possible (Expert 1).
To sum up, the experts established that user expectations were strongly linked to the needs of users to find certain information online, and to access particular resources or to do something else. None of the experts considered about user expectations in general, i.e. irrespective of a portal or website. However, the experts stated that they usually aimed to establish what users came to a website/portal for, what type of information they were searching for, etc. Therefore, according to the experts, user expectations had to be approached from within a specific context of the developed websites/portals. This finding strongly correlates with the discussion on the importance of the system context, especially the e-health context, for extraction of user expectations, in which the health websites are built (see Chapter 2).

Further analysis of the responses demonstrated that some of the experts strongly associated user expectations with user needs and subsequently referred to user needs when they were, in fact, asked about user expectations.

Another cycle starts. You detect or observe the user trying to identify the gap between the functionality delivered by the current application and what the expectations of the users, their needs, and whether they have been satisfied. So then these kinds of needs will be reposted [communicated] to the decision maker or the architect of the system. That will be discussed in order to find the most efficient way to integrate those newly detected needs into the current system (Expert 4).

To that end, when the experts were asked whether they attempted to identify user expectations in their work with the users, their answers were rather confusing, as discussed in the following section.

4.3.2.2 Identification of User Expectations and Their Complexity

Some of the experts stated that they would concentrate on user needs and functionality rather than on user expectations. Such statements were in contrast to their earlier statement about the importance of user expectations for better website/portal design and development.

You need to think about the technical components first and then by combining these components together you deliver the big picture of the future system. But when you implement the components, the details of the technical implementation will probably grab all the focus of the developer. Thus, it is hard to be reflecting on
user expectations at the first hand. Unless it has been specifically designed in the functionality list and it is what the application should deliver (Expert 4).

It is hard. It really depends on the client and the budget so [...] some things we can think about and some things that we cannot (Expert 5).

Some more restrictions, related to the reality of a business world and constraints it puts on the designers and developers, are discussed further in this chapter (see Section 4.3.2.5).

Two out of six experts stated that they were sceptical about extraction of user expectations as such claiming that it would only be possible to approximate user expectations rather than to extract them (an issue briefly mentioned in Section 4.3.2.1 of this chapter):

You can approximate those [expectations]. So [...] we approximate those with whatever information we can find out about the understanding of how the end user will use the site (Expert 2).

Some experts emphasised user needs and requirements rather than expectations. The experts also stated that they “always, absolutely always include identification of user needs and requirements, if that means expectations, I do not know” (Expert 2). Analysis of that very interview demonstrated that the expert shifted her focus from user expectations to user needs and requirements in her response, stating that expectations were “somewhere there” even though she failed to explain “where” exactly:

If you talk about it [extracting expectations] generally, then I think that I do that. Because there are user requirements, there are user needs, there are all of that sorts of things. I think you only have a problem with what I do if you only narrow the definition of expectations down to a very narrow one [...] A major part of our activities is exploring what the user requirements are (Expert 2).

A somewhat similar response was given by Expert 6 who answered “Yes” implying that he was looking at user expectations, however, when he elaborated on the matter further, he talked about “the high leverage ideas”, not user expectations per se, or their extraction.

Another expert (Expert 3) was quite controversial in her response when she firstly stated that she did extract user expectations in her work, but later she said that “I do not necessarily look at specific expectations as such. We try to determine what those expectations are so that we can meet them. [...] So we basically look at the user cases” (Expert 3).
Overall, there seemed to be a tendency for the experts to be rather confused by the notion of user expectations as a standalone concept. Their reaction to the questions, related to user expectations, was often complemented by a long pause and gaps in the logic flow (occasionally). That could imply that the experts did not really think of the problem of user expectations and their inclusion in the UCD practices as a standalone factor. One of the experts said that she “heard more about user needs rather than expectations” (Expert 4), which did shed some light on the role of user expectations and their inclusion in the online systems design and development processes. These findings signified that importance, consideration and inclusion of user expectations in the portal/website design and development had not been sufficiently explored.

A number of controversial points of view were also revealed when the experts were asked whether they thought that the extraction of user expectations was hard. The opinions were dramatically different. Some of the experts believed it was rather hard if not impossible as, “there is lack of ways to collect the data that predicts the user expectations” (Expert 4) and “I do not believe that you can get those expectations as […] the users have not necessarily thought them [expectations] through” (Expert 2). Two other experts did not have an answer to that question at all. The remaining two experts were rather controversial as they changed their opinions as they spoke. Expert 3 at first stated that it was not too hard to extract user expectations as there were “certain techniques to extract those types of user characteristics”, but later changed opinion and said that “it is hard [to extract user expectations] because users actually do not know what they want”. Another expert (Expert 6) first stated that it was not hard to extract user expectations, but later he agreed that it was not easy either and said that “it is easy to identify problems, it is difficult to identify solutions” (Expert 6).

The conducted analysis clearly demonstrates that the problem of the extraction of user expectations was not thought through in sufficient detail by the interviewed experts. It might relate to the fact that the experts seemed to associate expectations with user needs. Therefore, when the experts were asked about user expectations as a separate concept, they seemed to be confused and changed their opinions in the process of discussion of the extraction of user expectations.

### 4.3.2.3 ISO Standards and Their Principle of ‘Conformity with User Expectations’

The ISO standard 9241-110 Ergonomics of human-system interaction: Dialogue principles promote UCD and user involvement in the systems design and development processes. Provided
that all of the experts were following UCD in their practices, it was important to identify whether the experts tried to comply with that ISO standard.

When the experts were told that the ISO standard 9241-110 Ergonomics of human-system interaction: Dialogue principles, was an official document that acknowledged the importance of user expectations and their role in the design and development of websites and portals, four out of six experts said they never heard of such a standard. One of the experts was not quite sure as “there are many, many of those [standards]” (Expert 1), another expert was aware of the ISO standard 9241-110 and was familiar with it.

When the experts were explaining their unfamiliarity with and a non-use of the ISO standard 9241-110, most of them stated that the majority of the ISO standards were insufficient, vague and theory-oriented, rather than practical.

"Standards normally are just the very description of things, it is rather just pure metadata of what needs to be included, etc. [...] the standards require to tick a gazillion boxes and you end up just ticking boxes. Your focus is on ticking boxes not on doing the job and getting the end result [...] (Expert 2)"

One of the experts simply stated that he was sure that “about 80% of portal or website designers have never even heard of those standards, or they do not have time to check it” (Expert 5). By that the expert implied that he (and his team members) would not spend their time or other resources on something like the ISO standards as they were too generic to help them in their work.

Nonetheless, one of the experts acknowledged the role of the ISO standards in design and development processes and said that “there are lots of standards emerging in the software space and technology space and I think it’s a very important thing because it gives a common language” (Expert 6). However, the expert admitted to the fact that he had neither heard of the ISO standard 9241-110 nor used it in his work.

When the experts were discussing the vagueness of the ISO standards and their generic outlook on the systems design and development practices, they stated that a principle of conformity with user expectations was a good principle. However, the experts seemed to be sceptical about the application and practical use of it:

"As a principle [conformity with the user expectations], I think it is fine. How you achieve that is another matter (Expert 2)."
Well it is important [conformity with expectations]. I mean, yes but I don’t have much to say from my background or experience (Expert 5).

[As for the statement 'conformity'] It’s not informative enough [...] I would say that’s not enough. I think it is a good statement but you really need to substantiate it with some examples, and more details about what do you mean by that (Expert 6).

To sum up, the experts found the ISO standards to be hard to use in practice as these standards are highly theoretical. The experts appeared to be more enthusiastic about the resources that could help them achieve certain practical goals in their work than resources that would provide a common language or a number of generic principles to conform with.

4.3.2.4 Techniques, Methods and Questions to Extract User Expectations

The experts were asked about various techniques and methods they would use to extract user expectations. The most popular suggestions were to:

- give users scenarios to perform;
- observe them doing it;
- ask them to talk aloud as they perform a given task.

Another popular suggestion was to talk to the users in the form of an interview:

Our normal technique would be to give the users scenarios, which we previously thought of, set up particular scenarios that are considered to be core to the purpose of the site, and then try and take people through and watch what they do. And if you can get the users to talk aloud which many people are not really good at, to try and find out from that sort of observation and listening what sort of things they were really expecting to find rather than what actually was presented to them (Expert 2).

We would sit them [the users] in front of a computer and get them to run a task, and see how it works [...] think-aloud. [...] It is important to observe users, I suppose, in their natural environment when they are engaging in this application or a portal. [...] It is also that facilitating that engages users, and talking to them, talking them through those things when they have problems finding out exactly what they were expecting (Expert 3).
This is about putting things out, making the information as precise as possible so we can use paper prototypes and things like that when we can. And ask them ‘Ok, where would you expect to find it?’ and work that out, you know, to ask if that is easy to use, but more by watching them and seeing because sometimes you do not know yourself if that is easy to use or not, you have got to compare it to something [...] We have [also] used individual discussions with the users (Expert 1).

Talking to people individually, one on one (Expert 6)

Other suggestions included surveys (Expert 5, Expert 6), focus groups (Expert 3), group discussions (Expert 1, Expert 6), stakeholder interviews (Expert 3), card sorting (Expert 3), development of wireframes (Expert 3), boarding (Expert 1), log analysis (Expert 5), expert reviews (Expert 3).

The experts also implied the importance of having something to show to the users, something to work with before asking the users questions or making them think-aloud. According to the experts, it is good to show the users something concrete, have some sort of a prototype to give them “a vehicle to think with” (Expert 2) and to make them provide critical comments as “most people, if you show them, will critique” (Expert 6).

To that end, one of the experts (Expert 3) suggested paper prototyping for work with the users so that the users “do not get distracted by all the mechanics of the online things”. Expert 6 preferred when the users worked with the real implemented features, even though they might have been at development stage, while a third expert (Expert 1) used both, paper prototypes and real implemented features.

Some of the experts emphasised the importance of research to find out what is already done in the specified field and to get new ideas to enhance their work with users. One of suggested techniques was a competitive analysis. It helped experts “pitch some ideas” (Expert 5) due to the fact that “what you [users] have seen on other sites that you might want to have if you could see the way of using it. And again, it comes into the looking around at the sites. We look around at the sites to see what they are offering and to see if there’s anything interesting there” (Expert 2).

When the experts were asked about the questions they would use to extract user expectations, most of them were rather confused. Some of the experts found that question hard to
immediately respond to and admitted that (Expert 4, Expert 5). In fact, for most of the experts there was a long pause before they answered that question.

When you use the portal to find a topic, you have a question and you want to find an answer, then how many steps would you like to go through? How many you would think are acceptable? To formulate the query for search and to find the right results; and you would probably want to comment through the feedback channel. So are these steps acceptable for them? Or would they be tolerant to go through more steps to get the right answer. So we are talking about the patience of the user (Expert 4).

It is always good to have a bit of a handle to start with. Because then people can ... they have got a vehicle to think with. [...] So they start off with the design, and I would then be exploring with them... Ok, when you are in hospital, what are the things that drive you mad, what can’t you do in hospital, could the website do that for you? What would you want the website to do for you? How could it help you? (Expert 2)

‘Can you please tell us what site you like the most?’ ‘What other sites do you visit all the time?’ and including some relevant websites. Like if you are designing a health portal, tell me which health portals you like most so that’s number 1. And then you can get information from there. Number 2 is... maybe ask about some other irrelevant ones?... ‘Do you use something like Facebook frequently’, and if yes, we can pitch some ideas from Facebook into the health portal. So that sort of thing (Expert 5).

First you have got to understand your business requirements, what it is that business thinks you are going to achieve. And then you have got to translate it to the user and say ‘This is what the business thinks they are trying to achieve, is that, number one, of any use to you? If so, why not or why so? And if it is of use to you, then how do you do life in that way? What is it that you are interested in? Where do you expect to find it? Are you someone who likes having things orderly at the front and then to click through and get it in a logical way, or do you like information presented quickly on one tab and scroll down?’ (Expert 1)

Even though the experts had different ideas and proposed diverse types questions, there were common views. First, the questions that aimed to extract user expectations, had to relate to the activities the users performed when they were accessing/looking at/working with a certain
feature. The questions had to relate to the previous experiences of users (Expert 2) and their generic preferences, but in relation to some specified aspects or features (Expert 4).

Second, it seemed important not to ask users about their expectations directly, but to “lure [the users to] what they are looking for, and why they would go to that site, what they need to get from it rather than asking directly” (Expert 2) to enable them to think about their experiences and to make them formulate certain expectations that way.

4.3.2.5 Business Constraints to Identification of User Expectations

The experts mentioned that there were a number of business reality constraints (mostly related to budget and project timeframes) that would prevent them from sufficient consideration of users and user expectations in their working practice. The experts stated that at times they had to find alternative solutions to direct user involvement, like the use of business analysts instead of actual users.

*With the economic reality of the business world, you barely get to talk to the end users at least until you have got something to show them. We have done it many times with paper versions of the websites before it’s been built. But right at the start when you are planning out the site, you tend to get people from the business who can share what they know about their audiences. And a lot of the effort that we put in is in trying to elicit from them the real information rather than the stuff that they already thought of* (Expert 2).

*It would be some other person who does it, in industry it is someone like business analysts* (Expert 4).

*We often do not have time to talk to the users, to do surveys with the users or anything. We just think what they might need. [...] Sometimes the clients are very controlling and we have a very limited control over the design of the portal so sometimes it is not easy for us to do anything like that [expectations] (Expert 5).

The situation can be explained with the fact that, according to the previous findings, the importance of user expectations is not necessarily clearly defined or articulated. As a result, extraction of user expectations might be considered as something that is not always worth investing money in. One of the potential solutions could be to approach user expectations in the way proposed by Expert 4. “If expectations mean whether your application would be attractive
to your users then… to me it is about whether your application delivers certain type of service to
the users, and if the users finds that this service does not meet their expectations, you might lose
them. So fundamentally you will lose the market. So this kind of intelligent service is of no
difference to any kinds of physical products. If the users are not satisfied, they will not use it. If
they don’t use it, you lose your money and increase costs” (Expert 4).

The expert perspective on the link between user expectations and satisfaction is discussed in the
next section.

4.3.3 User Satisfaction and Its Link to User Expectations

The question of whether users would be more satisfied with the website once their expectations
were met, received five positive and one neutral response (out of six). While most of the experts
believed there was a direct link between user satisfaction and met user expectations, one of the
experts stated that “they [users] will be dissatisfied if it [website] doesn’t which is not quite the
same thing” (Expert 2).

Half of the experts acknowledged that user expectations were dynamic in nature and said that
user expectations “change over time” (Expert 2), “it’s a moving target” (Expert 6) and that “you
have got to keep up and do not assume that what they [users] expected last year was enough
[…] every year it’s changing” (Expert 1). These statements correlate with the findings, presented
in the literature review of this study (see Chapter 2 for more details).

4.3.4 Proposed Guidelines to Extract User Expectations

Majority of the experts were dissatisfied with the theoretical nature of the ISO standards (see
Section 4.3.2.3), however, they welcomed the idea of guidelines, which would help them
identify and extract user expectations in practice. All experts confirmed that they had never
come across such guidelines. Two experts stated that such guidelines were, in fact, needed:

I think you do need a guideline to do that [extract expectations]. First, you need to
define what it is exactly; you need to deliver something concrete, something
feasible not just a concept […] Maybe there are some general rules but for the
developers if you are talking to them to incorporate this kind of expectations in
your design, you do need to give them some concrete practical guidelines or
principles on how to identify expectations and how to get aware of this kind of
issue. Even though there might not be a solution to the problem but at least they are aware of it for the future discussion (Expert 4).

It would be good to have. I think you have got to have those. [...] If there are things out there that people could be guided through, through different levels of expectations that would be fantastic [...] If you can help your experts to have guidelines and to teach them how to research properly, that would be great (Expert 1).

One of the experts was sceptical about the idea of having such guidelines and stated “I do not think you can do it [develop such guidelines] [...] It is [expectations] that kind of knowledge that… people don’t know this, they can’t say it when they are asked. It is not a conscious knowledge” (Expert 2). However, later the expert added that she “would definitely not mind taking a look at them [once such guidelines were developed]” (Expert 2). Therefore, she demonstrated certain interest in the research problem.

The rest of the experts (five out of six) stated they would definitely use such guidelines in their work.

In regards to the characteristics of such guidelines, the experts stated that the guidelines would have to define user expectations in a certain way so that “the developer can easily discuss with the user. There should be some common language to share [that would help] improve the performance of the application, […] attract more users, and [be] feasible” (Expert 4).

Also, as a positive feedback, one of the experts stated that he liked how “[the researcher] make(s) a distinction between …implicit or explicit […] between requirements and expectations. I think it is a good one. And I don’t think there’s a lot of literature around expectations. There is a lot of literature about requirements gathering and a whole discipline of business analysis around that. But I think there’s a gap between that and usability kind of analysis, in which expectations, understandings and perceptions and all those kinds of things [are]” (Expert 6).

The received feedback identified the need for the Guidelines on how to extract user expectations that would help systems designers and developers in their practices.
4.4 Discussion

The objective of the expert interviews was to gain a real life perspective on the role and consideration of user expectations in design and development of online systems, such as information websites/portals (including health websites). In accordance with the research questions of this study, it was important to establish the state of knowledge about user expectations in the systems design and developing practices in general, and personalised health websites in particular.

Analysis of the expert interviews revealed that in general, the experts did not have a clear understanding of the concept of user expectations, and most claimed the concept of user expectations to be rather vague. However, a majority of the experts acknowledged the importance of user expectations and their extraction for better website/portal design and development.

Some of the experts claimed that they attempted to extract user expectations, along with user needs and requirements, in their work. However, they neither pursued the extraction of user expectations as a stand-alone activity nor had they attempted to operationalise or integrate user expectations in their practices. The experts did not appear to differentiate between their approach to design and development of health websites, as opposed to the generic ones or to the personalised ones.

Analysis of the interviews revealed the need for an establishment of user expectations as a stand-alone concept by bringing together various literature on the topic and by grounding it in the user-centred design philosophy. Justification of relevance of user expectations for design and development practices, grounded in the IS literature, appeared to be important. User expectations needed to be defined from the design and development points of view. Therefore, it was required to clearly establish why it was important to consider user expectations in design and development of online systems and to determine how user expectations could be operationalised. These issues listed above were further investigated in the literature review (see Chapter 2) and the proposed solutions to the identified issues were incorporated in the developed Guidelines (see Appendix 5).

None of the experts seemed to be aware of the specific nature of health websites in relation to the influence and role of user expectations, extraction of which could facilitate better website/portal design. The private nature of the e-health domain, in particular, how it affects the
formation of user expectations, was included in the developed Guidelines to extract user expectations for building personalised health websites (see Appendix 5).

The interviews revealed that user expectations were strongly linked to the previous experiences of users. Most experts linked user expectations to something that the users were looking for from a website after they had accessed it, not something they would have thought of beforehand (as opposed to user needs). To that end, the experts confirmed that there was a link between user expectations and past experiences. That link was already established in the literature review (see Chapter 2 for more details). The experts also acknowledged the influence of past experiences on user expectations and suggested to show users something to work with in order to extract their expectations, rather than to start with a blank piece of paper or an abstract idea. Given that the present study was concerned with personalised features of health websites specifically, the experts suggested using competitive analysis as a technique to determine widely used personalised features that could subsequently be shown to the users in the process of extraction of user expectations.

The experts also claimed that the extraction of user expectations could be performed as the starting point of systems design, when the initial systems specifications and requirements were yet to be developed. However, they also stated that such an exercise could also be useful at the stage of system testing, when users get to see a pilot of the system, or when the system needed to be re-developed. The experts believed that the extraction of user expectations towards system functionality could be incorporated in each of the three identified stages. Those comments were considered in the developed Guidelines on how to extract user expectations, provided in Appendix 5.

Another research question was related to techniques that could be used to extract user expectations. The experts suggested a number of methods that they found effective for the extraction of user expectations, such as think-aloud/observation sessions (with elements of interviews) along with a competitive analysis of websites/portals. All of the nominated methods were subsequently used in this study.

The experts revealed the need for the Guidelines that would conceptualise the notion of user expectations in relation to online systems design and development processes. The experts were dissatisfied with the ISO standards and saw them as too theoretical. The experts did not find the ISO standards to be particularly helpful for their practices so they proposed creation of guidelines that would inform their work. The interviewees also asked for an inclusion of some sort of practical examples in the guidelines to make them more useful in practice. These
requests were considered and addressed in the developed Guidelines (see Chapter 7 and Appendix 5 for more details).

The experts also emphasised the reality of the world in which they worked and stated the limitations they must confront, such as time, money and strict business requirements. These practical limitations were taken into account by making the Guidelines precise, informative and straightforward, which potentially could help justify the use of such Guidelines in the design and development of personalised health websites.

### 4.5 Conclusion

The chapter was concerned with the presentation of the insights on the role, extraction, formalisation and inclusion of user expectations in design and development of online systems in general, and personalised health websites in particular. A detailed analysis of a set of semi-structured expert interviews was provided. The experts identified the need for Guidelines to extract user expectations and acknowledged the potential value and importance of such Guidelines for the systems design and development practices. The expert suggestions for certain techniques to use to extract user expectations were subsequently used further in this study. Overall, the experts generously shared their experience, insights and knowledge of the field, all of which guided this research study further and informed its subsequent research activities.
5  COMPETITIVE ANALYSIS OF HEALTH WEBSITES

Information is a source of learning. But unless it is organized, processed, and available to the right people in a format for decision making, it is a burden, not a benefit.

William Pollard

5.1 Introduction

This chapter is concerned with the identification of personalised features of health websites that are currently available to users and analysis of the functionality of such features. A competitive analysis method was chosen on the basis of the previous findings from the expert interviews (see Chapter 4). According to these system development experts, competitive analysis is a technique that can help determine what features of personalised health websites are available to and popular amongst users. This chapter provides a theoretical outlook on the competitive analysis as a method with an analysis of its key stages. This is followed by a description of how a competitive analysis was used in this study. The results, namely the list of personalised features, was subsequently used for think-aloud sessions with users (see Chapter 6), are provided.

5.2 Competitive Analysis Approach

Competitive analysis as a data collection technique originates from marketing, where organisations use it in order to be competitive, as well as to stay at the same level with the rivals and to gain competitive advantage (Fleisher and Bensoussan 2003; Hooley and Greenley 2005). Competitive analysis is a formal evaluation, where organisations review other companies which provide similar services or products and analyse outcomes of such evaluations in order to develop effective marketing strategies (Calandro and Lane 2007). According to Cegielski et al (2005), if the company wants to be competitive and provide a better service or a product, it
needs to focus on the outward first, i.e. on the market and what it has to offer, before concentrating on its inward, i.e. its services. Therefore, an effective competitive market analysis is an essential part as it provides a good understanding of what is currently on the market. Kenny (2005) reiterates the point above and states that competitive analysis is central to an effective strategic planning and is required to support strategic objectives of a company. Competitive analysis allows companies to better understand how they match up against their competitors as a careful analysis of the rivals enables effective and efficient planning of competitive strategies (Bloodgood and Bauerschmidt 2002).

Companies engage in a competitive analysis to gain a better understanding of their competitors’ resources, capabilities and strategies (Porter 1980; Smith et al. 1992). The underlying rationale for a competitive analysis is that if a company wants to be like its competitors in certain aspects, it is important to explore and analyse these aspects in order to see why competitors are more successful and what needs to be done to reach their success (Bloodgood and Bauerschmidt 2002). To that end, it was important to establish what personalised features were already available to users of health websites in order to subsequently define which personalised features could be used for the think-aloud sessions.

Competitive analysis is also often used to analyse the environment and the market in which a website/portal will operate (Nielsen and Mack 1994). Competitive analysis needs to be specific, which means that it needs to concentrate only on the factors that are valuable and significant in order to subsequently create a certain course of actions, aimed to gain a competitive edge (MacAvoy 1983). According to Martilla and James (1977), effective competitive analysis should be precise and should be used to analyse only features and services which need to be or should be improved. In that respect, competitive analysis conducted for the purpose of this study emphasised strictly the functionality of personalised features of selected health websites.

Despite a number of matrices developed to facilitate a conduct of competitive analysis of services and products (Calandro and Lane 2007; Gory and Scott-Morton 1987; Kenny 2005; Lowy and Hood 2004; McNamee 1984; Moutinho and Brownlie 1994), there is a lack of a strategic framework that could be considered universal (Briggs and Shore 2007). Segal and Giacobbe (1994) re-iterate the point and state that applicability and conduction of competitive analysis varies from one field to another. Chen (1996) explains that approaches to strategic competitive analysis significantly depend on a market context. To that end, competitive analysis conducted for the purpose of this study was customised and structured to meet the research study needs. Such flexibility was determined by an absence of any given framework of analysis, as discussed above.
5.2.1 Competitive Analysis Procedure

A competitive analysis normally displays two critical dimensions: the competitors and the criteria, i.e. so-called ‘competitive framework’ (Brown 2006; Kaiser et al. 1980). The purpose of a competitive framework is to present the data in a way that makes it easy to compare various systems (for the purpose of this study – health websites) and their features across different criteria (Brown 2006).

The key stages of competitive analysis are (Fleisher and Bensoussan 2007; Oster 1999):

- **planning:**
  For the purpose of this study, a planning phase of a competitive analysis included pre-selection of health websites for a subsequent analysis of their personalised features. The planned activities were:
  - to determine the criteria to choose health websites;
  - to select health websites based on the criteria;
  - to short-list health websites.
  The selection criteria and short-listed health websites are presented in detail in Section 5.3.

- **collecting information:**
  The process of collecting information included identification and careful analysis of selected health websites against a pre-developed set of activities (instrument) in order to identify personalised features of these health websites. The defined set of activities was:
  - to create an instrument to locate and identify personalised features;
  - to apply the instrument to derive personalised features;
  - to short-list personalised features.
  See Section 5.4 for more details on the developed instrument and the short-listed personalised features.

- **analysis**
  The final stage of competitive analysis consisted of an examination and a cross-analysis of the identified personalised features and a representation of the results in a forms that best facilitated decision making processes (namely, descriptive tables, visual schemas and diagrams). The final stage relates to the concept of a ‘competitive framework’, mentioned earlier. The activities were:
  - to group identified personalised features on the basis of their functional characteristics;
  - to analyse similar characteristics of the selected personalised features;
to short-list health websites and their personalised features, which functional characteristics were to be subsequently used for the think-aloud sessions.

Section 5.5 is dedicated to the analysis of the identified personalised features of health websites.

The graphical representation of the proposed activities is provided in Figure 5.1

![Diagram](image)

**Figure 5.1 Proposed activities for competitive analysis**

The following sections of this chapter elaborate on each of the proposed activities in detail.
5.3 Selection of Health Websites

The first stage of competitive analysis, planning, required a development of a set of criteria in order to select appropriate health websites for subsequent identification and analysis of their personalised features. A set of criteria, used to select appropriate health websites, were:

- Health websites that focus on e-patients rather than medical professionals or health organisations, such as hospitals, medical foundations, departments and institutes. These websites normally represent context in a manner that makes it easy for e-patients to locate and access it (Cop 2008). He also states that those health websites, which have more than one centricity (i.e. on health professionals, or government policies & administrative issues), have a mixed content structure and are generally harder for the general audience to use.

- Health websites that provide generic health information, i.e. non-disease specific. It is claimed that health websites with generic health information are likely to be accessed by more people than other types of health websites (Fox 2006).

- Health websites that are in English. According Morahan-Martin (2004), English language health websites are generally more accurate and with complete health information in comparison to other health websites.

- Health websites that claim to provide personalisation (see Section 5.4).

- Health websites that are in free access and do not require registration in order to search for medical information and to browse through most of the content.

It was equally important to determine characteristics of those health websites that needed to be avoided for a competitive analysis:

- Health websites that provide mixed content even though they call themselves ‘medical’ or ‘health’ websites. These websites need to be avoided as they focus on various stakeholders, not just e-patients (see the inclusion criteria stated above). For example, a website http://www.mdexpress.com/public that provides information related to travels, financial indices, and other along with the medical content.

- Health websites that provide health news only. An example is Reuters Health http://www.reutershealth.com/en/index.html According to Sillence et al (Sillence et al. 2004), e-patients are more likely to trust health websites that present a balanced overview of the health topics, not just health news, videos, etc.
- Health websites that sole purpose is commercial, i.e. to promote and represent pharmacies, insurance or drug producing companies with no provision of health information, such as http://www.aetna.com/index.htm or https://stores.healthmart.com/rxexpresspharmacy.

According to Fogg et al (2001), “commercial implications” (p.62) of a health website negatively affect its perceived credibility amongst the users.

- Medical library websites such as http://www.lib.uiowa.edu/hardin/md/index.html

- Health websites dedicated to specific diseases (breast cancer, diabetes, etc), such as http://www.bckonline.monash.edu.au/

- Health websites that provide health-related mash-up. For instance, http://healthmap.org/en that represents a global disease alert map operated by the Harvard-MIT Division of Health Sciences & Technology.

- Health websites that offer an online storage of health information with distributed access such as Google Health (https://www.google.com/health) developed by Google Corp. or Health Vault (http://www.healthvault.com/) developed by Microsoft so that the users can keep their personal health records there.

Such websites normally require a registration that contradicts the selection criteria identified earlier in this section.

Health websites that match the characteristics identified above were found using:

- Google

Being one of the most popular search engines (Cho and Roy 2004), Google provided a vast number of search results, relevant to the query. Search terms as ‘health (information) website/portal’, ‘medical/health website/portal’ and ‘personalised health information website/portal’ were used, and first five pages of the provided results were analysed.

- Various medical forums

A number of medical forums were examined in search for threads, dedicated to health websites and their features. Such forums were:

- Consumers Health Forum of Australia Inc (CHF) (http://www.chf.org.au/)
- eHealth Forum (http://ehealthforum.com/)
- Health Boards (http://www.healthboards.com/)

- Reputable medical journals

A few medical journals were examined in search for publications, related to health websites and their features. The most closely examined journals were:

- British Medical Journal
There were 14 health websites from six countries selected on the basis of the criteria, identified above. The websites are listed in Table 5.1.

**Table 5.1 Health websites selected as a result of competitive analysis**

<table>
<thead>
<tr>
<th>#</th>
<th>Health Website</th>
<th>Country</th>
<th>URL &amp; Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>HealthInsite is an Australian Government initiative, funded by the Department of Health and Ageing. It aims to improve the health of Australians by providing easy access to quality information about human health.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The Better Health Channel website was founded in 1999 by the Victorian Government, Australia as a consumer health information website for the Victorian community. It is now Australia's most popular [2009] health and medical website.</td>
</tr>
<tr>
<td>3</td>
<td>C*Health</td>
<td>Canada</td>
<td>[<a href="http://chealth.canoe.competitive">http://chealth.canoe.competitive</a> analysis/](<a href="http://chealth.canoe.competitive">http://chealth.canoe.competitive</a> analysis/)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Health website founded by MediResource Inc, company started in Canada in 1996 as a pioneer in interactive health.</td>
</tr>
<tr>
<td>4</td>
<td>NHS Choices</td>
<td>EU/UK</td>
<td><a href="http://www.nhs.uk">http://www.nhs.uk</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The website represents the National Healthcare System (NHS) which is the world's largest publicly funded health service funded centrally from national taxation of the UK.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aarogya.com is one of the leading Indian health websites. By virtue of its popularity amongst the Internet fraternity, aarogya lends itself well to disseminate healthcare information.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>It is Singapore’s first interactive health and lifestyle resource website developed by SingHealth, dedicated to providing comprehensive, relevant and trusted health and medical information for Singaporeans and the Asian community.</td>
</tr>
<tr>
<td>7</td>
<td>WebMD</td>
<td>USA</td>
<td><a href="http://www.webmd.com">http://www.webmd.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The website is developed by WebMD, which is a leading provider of health information services to consumers, physicians, healthcare professionals based in the USA.</td>
</tr>
<tr>
<td>8</td>
<td>Healthline</td>
<td>USA</td>
<td><a href="http://www.healthline.com">http://www.healthline.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Healthline was founded in 1999 as YourDoctor.com and was re-launched as</td>
</tr>
<tr>
<td>#</td>
<td>Service</td>
<td>Country</td>
<td>Website</td>
</tr>
<tr>
<td>----</td>
<td>---------------------</td>
<td>---------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>9</td>
<td>Healia</td>
<td>USA</td>
<td><a href="http://www.healia.com">http://www.healia.com</a></td>
</tr>
<tr>
<td>10</td>
<td>MyOptumHealth</td>
<td>USA</td>
<td><a href="http://www.myoptumhealth.com/portal/">http://www.myoptumhealth.com/portal/</a></td>
</tr>
<tr>
<td>11</td>
<td>Health Finder</td>
<td>USA</td>
<td><a href="http://www.healthfinder.gov">http://www.healthfinder.gov</a></td>
</tr>
<tr>
<td>12</td>
<td>Everyday Health</td>
<td>USA</td>
<td><a href="http://www.everydayhealth.com/">http://www.everydayhealth.com/</a></td>
</tr>
<tr>
<td>13</td>
<td>Revolution Health</td>
<td>USA</td>
<td><a href="http://www.revolutionhealth.com/">http://www.revolutionhealth.com/</a></td>
</tr>
<tr>
<td>14</td>
<td>AOL Health</td>
<td>USA</td>
<td><a href="http://www.aolhealth.com/">http://www.aolhealth.com/</a></td>
</tr>
</tbody>
</table>

Figure 5.2 demonstrates the geographical distribution of the selected health websites.
It can be concluded from the figure above that most of the selected health websites were American, then Australian, followed by websites based in Singapore, India, Canada and the European Union (EU). Screenshots of the selected health websites can be found in Appendix 4.

### 5.4 Selection of Personalised Features

One of the selection criteria for the health websites was a provision of personalisation. The next stage of the competitive analysis, collecting information, was required to identify personalised features of each of the selected health websites.

The instrument created to locate and identify personalised features, is presented in Table 5.2. It represents a list of prompts that help determine what personalised features the websites have. The sequence of prompts, or the instrument, was drawn from Luo and Najdawi’s study (2004), where the authors reviewed a number of consumer health websites to establish their trust-building measures. Luo and Najdawi (2004) initiated their analysis by exploring the home page of the websites and continued by looking at other website pages, such as ‘About us’, that could contain the required information.

The exploration of health websites with the use of the developed instrument (see Table 5.2) proved to be effective in identification of personalised features. The use of steps, indicated in the developed instrument, demonstrated that most of the analysed health websites were promoting their personalised features by making them visible on the home page. Others health websites, such as BetterHealth, made their personalised features visible via a site map and an ‘about us’ statement. Overall, the developed instrument proved to be effective as it helped identify most of the personalised features of the health websites.
Five different personalised features were identified, namely:

1. Health tools/calculators (12 out of 14 health websites)
2. Personalised search (11 out of 14 health websites)
3. Find a doctor (nine out of 14 health websites)
4. Personalised newsletter (four out of 14 health websites)
5. Drug interactions checker (two out of 14 health websites)

A more detailed description of the identified personalised features is provided further in next section of this chapter.
Table 5.2 The instrument to locate and identify personalised features of health websites

<table>
<thead>
<tr>
<th>#</th>
<th>Prompts</th>
<th>HealthInsite</th>
<th>BetterHealth</th>
<th>C*Health</th>
<th>NHS Choices</th>
<th>Aarogya Health</th>
<th>Xchange</th>
<th>WebMD</th>
<th>Healthline</th>
<th>Healia</th>
<th>MyOptum Health</th>
<th>Health Finder</th>
<th>Everyday Health</th>
<th>Revolution Health</th>
<th>AOL Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Personalised features visible from the ‘Home page’</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Personalised features that are mentioned in the ‘Help’ section</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Personalised features that are mentioned in the ‘About us’ statement</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>‘Site map’ indicates presence of personalised features</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>Search engine is personalised, i.e. whether it offers additional options to filter information out. The functionality was tested <em>(suggested search term ‘tamoxifen’)</em></td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Most of the selected health websites (five out of six) classified a symptoms checker as one of many health tools/calculators. Due to the vast amount of available health tools/calculators, it was decided to choose the most popular representative of this category, the symptoms checker (six out of 14 health websites), for a subsequent analysis.

The next stage of a competitive analysis was related to the identification of functional characteristics of each of the identified personalised features (i.e. health tools such as Symptoms checker, Personalised search, Find a doctor, Personalised newsletter and Drug interactions checker). The analysis is presented in the next section.

5.5 Analysis of Personalised Features

5.5.1 Health Tools/Calculators

*Health tools and calculators* are essentially autonomous applications or modules that provide specific services by allowing e-patients calculate their body mass index, amount of calories they consume in a given timeframe, take a quiz to assess their fitness level, and more. The analysis of these features demonstrated a difference in the names, given to these personalised features. While some of health websites use the term ‘health tools’ (Revolution Health), others prefer ‘health calculators’ (Better health, Aarogya). However, essentially it is just different terminology, with the term ‘health tools’ referring to the same modules as the term ‘health calculators’.

Being the most popular personalised feature across the selected health websites, health tools/calculators were represented across 12 out of 14 health websites, excluding HealthInsite and Healia.

There are various health tools available on health websites. Table 5.3 provides health tools/calculators offered by the Aarogya health website as an example.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Presence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol Use Disorders Identification</td>
<td>Yes</td>
</tr>
<tr>
<td>Test Body Surface Area Calculator</td>
<td>Yes</td>
</tr>
<tr>
<td>Target Heart Rate Calculator</td>
<td>Yes</td>
</tr>
<tr>
<td>Body Mass Index Calculator</td>
<td>Yes</td>
</tr>
</tbody>
</table>
The analysis also demonstrated an uneven distribution of health tools/calculators across various health websites, from two (Better Health) to 50+ (WebMD). Despite an uneven distribution of health tools/calculators, it was established that one of the most popular health tools across the selected health websites was the Symptoms checker. Analysis of this particular personalised feature is provided in the next section.

5.5.1.1 Symptoms Checker

The Symptoms checker is a health tool that enables e-patients to identify what condition they might have depending on the symptoms they experience. Essentially, a Symptoms checker belongs to the category of health tools/calculators (AOL health), even though some health websites (such as WebMD, for example) display it on the home page instead of displaying it in the list of other health tool/service.

A Symptoms checker was provided by six out of 14 selected health websites, namely:

- WebMD
- Healthline
- MyOptumHealth
- Everyday Health
- Revolution Health
- AOL Health

Further analysis of the Symptoms checker revealed that there were two major types: one with and one without a body map. A body map serves as a graphical representation of the human body and by clicking on relevant parts users can identify the areas that are in a state of discomfort.

In turn, each of the two identified types of the symptoms checkers was further classified in relation to its functionality (see Figure 5.3).
Figure 5.3 Different types of Symptoms checker

Given the popularity of Symptoms checkers that provide a body map to identify affected areas (they were implemented by four health websites out of six), it was decided to use them for subsequent think-aloud sessions with the users in order to extract their expectations towards the identified Symptoms checkers. The symptoms checkers of AOL Health and WebMD health websites, one from each of the two quadrants with a body map (see Figure 5.3), were chosen for the think-aloud sessions; more information on the think-aloud sessions can be found in Chapter 6.

5.5.2 Personalised Search

Personalised search is a feature that enables filtering of retrieved information by various categories (e.g. age, type of information, information provider, etc.) either prior to the search (e.g. HealthInsite) or after (Healia). It is believed that personalised search might help users find information, more relevant to their needs.
Personalised search is the second most popular personalised feature, represented across 11 out of 14 health websites, excluding Aarogya, Health Finder and AOL Health.

In regards to the provided functionality, personalised search demonstrated to be one of the most (if not the most) sophisticated personalised features out of five identified personalised features (see Section 5.4). Further analysis revealed there were 11 extra functional characteristics of personalised search that could:

- narrow or specify search results either before or after the search process;
- provide type-in help with complex medical terms;
- suggest alternative search terms, and others.

The full list of distribution and presence of functional characteristics of personalised search across selected health websites is summarised in Table 5.4
Table 5.4 Functional characteristics of Personalised search on selected health websites

<table>
<thead>
<tr>
<th>#</th>
<th>Functionality</th>
<th>HealthInsite</th>
<th>BetterHealth</th>
<th>C*Health</th>
<th>NHS Choices</th>
<th>HealthXchange</th>
<th>WebMD</th>
<th>Healthline</th>
<th>Healia</th>
<th>MyOptumHealth</th>
<th>EverydayHealth</th>
<th>RevolutionHealth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Presents summary of the categories in which the results are found (available categories - ask a doctor, topics, news, condition factsheets, drug factsheets, health articles, health features)</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Refine search results by the type of information (Types of information - article, personal narrative, statistics, image, video, presentation, excel spreadsheet)</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Refine results by (related) health topic - broaden or narrow search results</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Suggesting terms as typing – type-in help</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Filter search results by age (child, adult, senior)</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Limit search to: anywhere in all items, exact word/phrase only, title, description and subject keywords only, topic pages only</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Refine search results based on when the information has been added or changed (either an exact date or a timeframe are ok)</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>Choose information updated over a particular period of time (any timeframe)</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>Refine search results by language</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>Refine search results by gender</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>Refine search results by heritage</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
It was decided to extract user expectations related to all of the functionalities, provided by personalised search. Given the variety of Personalised search functionalities across selected health websites, three websites were selected in order to test all the functionalities provided, namely HealthInsite, Healia and Revolution Health, and used in subsequent think-aloud sessions with the users.

### 5.5.3 Find a Doctor

Find a doctor is a personalised feature that allows e-patients to locate a health practitioner, based on such parameters as postcode, name, language, etc (see Table 5.5 for a full list).

Find a doctor proved to be the third most popular personalised feature across nine out of 14 selected health websites, namely:

- BetterHealth
- NHS Choices
- Aarogya
- WebMD
- Healthline
- MyOptumHealth
- Everyday Health
- AOL Health
- Revolution Health

The analysis of a functionality of a Find a doctor feature identified its 11 extra functional characteristics. These functional characteristics were mostly related to the parameters that e-patients needed to provide to find a relevant specialist (see Table 5.5).

Analysis of the Find a doctor feature demonstrated that the most comprehensive representation of the feature was amongst the USA websites. There was also only one Australian website out of the selected 14 (see Section 5.3) that include the Find a doctor feature. Given that the think-aloud sessions were to be conducted with Australian residents who, it was assumed, were more familiar with the Australian postcodes and doctor specialities rather than the American ones, it was decided to choose Find a doctor feature, located on the Australian website, Better Health. However, it was decided to incorporate extra questions, related to the parameters presented by American health websites but not implemented by BetterHealth (Australia).
Table 5.5 Functional characteristics of Find a doctor feature on selected health websites

<table>
<thead>
<tr>
<th>#</th>
<th>Functionality</th>
<th>BetterHealth</th>
<th>NHS Choices</th>
<th>Aarogya</th>
<th>WebMD</th>
<th>Healthline</th>
<th>MyOptum Health</th>
<th>Everyday Health</th>
<th>Revolution Health</th>
<th>AOL Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Search by name (service or practitioner)</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Search by postcode</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Search by keyword (e.g. disease or condition)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Search by area/location</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>Search by language</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Search by health professional (e.g. dentist)</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>Search by service type (pathology)</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>8</td>
<td>How close (proximity)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>Search by doctor’s Gender</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>Search by doctor’s years of experience</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>Search by hospital affiliations</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
</tr>
</tbody>
</table>
5.5.4 Personalised Newsletter

Personalised newsletter is a feature that allows users to subscribe to a newsletter where the users can specify health conditions they would like to get the information about. Some of the personalised newsletters also offer an option of choosing how often such newsletter should be emailed to the subscribers.

Personalised newsletters were offered by four out of 14 selected health websites, namely:
- C*Health;
- Health Xchange;
- WebMD;
- MyOptumHealth.

Three out of four websites, namely C*Health, Health Xchange and WebMD, offered the same options for e-patients to choose from:
- weekly, biweekly or monthly subscription;
- range of health topics (e.g. men’s/women’s health, a short list of specific and popular diseases like diabetes or cancer).

The fourth website, MyOptumHealth, asked the users to provide such personal details as:
- date of birth;
- gender;
- full name;
- nationality.

It was decided that for the purpose of the subsequent think-aloud sessions, it was not necessary to make the participants familiar with (to demonstrate) a Personalised newsletter feature as it was considered straight forward and similar to the newsletters offered by other websites, not necessarily health ones. Instead, a range of parameters that were offered to the users by the personalised newsletters represented across the selected four health websites, was chosen. That range was subsequently used for the think-aloud sessions with the users to identify their expectations of that feature, what they would consider to be acceptable in terms of provision of their personal information in order to obtain personalised newsletters, and what information (level of details, etc.) that would envisage to retrieve as a part of the service.
5.5.5 Drug Interactions Checker

Drug interactions checker is a personalised feature that allows users to compare the interaction of two and more drugs with each other and with other substances, such as food/alcohol/caffeine.

Drug interactions checker was one of the least represented personalised features, implemented on only two of the selected health websites, namely:

- AOL Health;
- Healthline

Both implementations demonstrated slight differences in their functionality.

- Drug interactions checker of AOL health:
  - allowed checking interaction of more than two drugs;
  - provided drug suggestions if the typed name of a drug is not full or inaccurate;
  - allowed selection of substances such as alcohol, nicotine, and caffeine are drugs, and they can interact with other drugs.

- Drug interactions checker of Healthline:
  - allowed checking interaction of not more than two drugs;
  - provided both type-in help and drug suggestions if the typed name of a drug is not full or inaccurate;
  - did not have selection of substances that can interact with the drugs.

Given the differences in the functionality of the identified Drug interactions checkers, it was decided to use them both in the think-aloud sessions with the users.

5.6 Discussion

The use of competitive analysis in the study was justified through the interviews, conducted with the online systems design and development experts (see Chapter 4 for more information). The competitive analysis was undertaken as a three-staged process, where:

- 14 personalised health websites from six countries were selected, based on the identified criteria;
- the selected health websites were further analysed to identify their personalised features;
- the identified personalised features were cross-analysed in order to explore their functionality and to select a number of personalised features for the subsequent think-
aloud sessions with the users to extract user expectations towards the identified personalised features.

The competitive analysis identified the five personalised features to be explored through the think-aloud sessions. These features and the websites where the features are implemented are:

- Symptoms checker - AOL Health and WebMD;
- Personalised search - HealthInsite, Healia and Revolution Health;
- Find a doctor - BetterHealth;
- Personalised newsletter – no particular health websites but main characteristics of the feature were identified;
- Drug interactions checker – AOL health and Healthline.

Overall, it is believed that the chosen personalised features have provided a good representation of the functionality offered by various personalised health websites across the globe.

### 5.7 Conclusion

This chapter provided a detailed discussion of competitive analysis. This method was used to identify a list of personalised features and their functionality for subsequent think-aloud sessions with users to assist with extracting their expectations towards the identified features. The next chapter draws on the findings of the current chapter and provides a detailed description and analysis of the think-aloud sessions, conducted with users in order to extract their expectations towards the identified personalised features of the selected health websites.


6 THINK-ALOUD SESSIONS

I have no special talents. I am passionately curious.

Albert Einstein

6.1 Introduction

This chapter provides the results of the think-aloud sessions which were aimed to extract user expectations towards personalised features of health websites. This chapter draws on the findings of previous Chapters 2, 4 and 5. Chapter 2 presents a theoretical Framework of user expectations that has been used to develop questions for think-aloud sessions with users to extract user expectations. Chapter 4 justifies data collection methods such as think-aloud method, coupled with interviews and observations, to extract user expectations. Chapter 5 identified the list of personalised features of health websites that were analysed during the think-aloud sessions.

This chapter commences by providing a brief overview of the think-aloud method and discusses its applicability to this research, including the procedure, conduct and questions developed for the think-aloud sessions. Analysis of the results revealed six broad categories of user expectations towards five nominated personalised features (personalised search, symptoms checker, find a doctor, personalised newsletter and drug interactions checker) of the selected health websites. The chapter concludes with a critical analysis of effectiveness of the think-aloud method to extract user expectations and, based on the findings, presents the refined theoretical Framework of user expectations.

6.2 Think-Aloud Approach

This section draws on Chapter 4 where the analysis of interviews with the designers and developers of online systems revealed that effective methods to extract user expectations are think-aloud, coupled with interviews and observations.

The think-aloud method is a data collection method that can be used to gain an insight into the participants’ way of thinking and reacting when they interact with various systems (Hoppmann 2007). As discussed in detail in Chapter 3, the think-aloud method was extensively researched by
Ericsson and Simon (1984), who proposed to use this method for various aspects of cognitive psychology. Since then, the think-aloud method has been extensively used in other fields, for instance, usability engineering where the use of this method helps assess usability of the systems along with other aspects such as user needs, expectations and behavioural patterns (Nielsen 1993).

It is important to mention that use of the think-aloud method for the usability research differs from the think-aloud method used in cognitive science. In their research, Ericsson and Simon (1993) emphasise the importance of making sure that the participants constantly think aloud as if they are alone in a room. They also state the need for being neutral, i.e. do not intervene with the process apart from reminding the participants to think aloud if they get distracted. However, in usability engineering, the researchers and practitioners stop being passive observers and start playing a more active role by modelling think-aloud sessions and instructing users to a certain extent (Boren and Ramey 2000; Nielsen 1993; Tamler 1998).

Despite being a widely used method with strong theoretical grounds (Ericsson and Simon 1993), in practice the think-aloud technique has somewhat inconsistent procedures (Deffner 1990). There is no consistency or a set of guidelines in the usability literature that elaborate on how the think-aloud method should be applied in various situations (Dumas and Redish 1994; Nielsen 1993; Rubin 1994). Thus, various researchers tend to make their own decisions in regards to the application of the think-aloud method to their practices, depending on the research goals and desirable outcomes (Nørgaard and Hornbæk 2006).

Firstly, some of the researchers model think-aloud sessions and emphasise precise questions related to the real life problems that have been or about to be experienced by participants, whilst other researchers choose asking participants about hypothetical situations rather than experienced issues (Nørgaard and Hornbæk 2006). As the usability engineering literature does not sufficiently explain which of the two defined categories of questions should be used in what environments, it is one of the decisions that the researchers needs to make themselves. For the purpose of this research, it was decided to include both categories of questions and to subsequently analyse their applicability and use in the context of extracting user expectations towards personalised health websites. See Sections 6.2.2 and 6.2.3 for further details.

Secondly, there are various types of questions that researchers can ask when they conduct think-aloud sessions (Boren and Ramey 2000). Nørgaard and Hornbæk (2006) define four types of questions that can be asked as a part of the think-aloud method (questions concerned with the problems, experienced in solving tasks; speculative or hypothetical questions; retrospective questions and questions, related directly to the participants’ emotions). However, Nørgaard and Hornbæk do not explain what questions are the best to extract user expectations and what questions are the most appropriate in the e-health context. For the purpose of this research, it was decided to
test all four types of questions as a part of the think-aloud sessions. See Section 6.1.3 for further details.

Thirdly, researchers such as Nørgaard and Hornbæk (2006) and Boren and Ramey (2000) claim the importance of having a valid and systematic way of conducting think-aloud sessions. They advocate for having well-defined steps of the think-aloud sessions, where in each of the steps should have specific goals. Molich (2004) states there is a need to ask participants certain questions about their impressions from the tasks or the system itself during and after the think-aloud sessions in order to get a better insight into their experiences. For the purpose of this research, the developed think-aloud sessions had precise, well-defined steps for each of the selected personalised features. See Section 6.2.2 for further details.

Lastly, the think-aloud method is often used in conjunction with other data collection techniques, such as observations and interviews, in order to provide more rigorous data (Boren and Ramey 2000; Nørgaard and Hornbæk 2006). According to Hoppmann (2007), while the think-aloud method indicates how the tasks are solved and what emotions the participants encounter, other methods help complete the picture. Other researchers (Nielsen et al. 2002; Wilson 1994) state that it is simply risky to rely only on a think-aloud method when the aim is to get complete and accurate verbalised data, so they suggest using a combination of methods. As the main objective of the think-aloud sessions was to extract user expectations, not to conduct a usability evaluation of the system with the need to subsequently identify what actions were performed and in what order, it was decided not to video tape the think-aloud sessions. The main emphasis was on communication with the participants. Therefore, it was important to incorporate interviews into the sessions in order to be able to ask participants questions prior to and after the tasks. Moreover, the participants were observed as they were performing the given tasks. In summary, for the purpose of this research, it was decided to use the think-aloud method in conjunction with interviews and observations of participants while they were performing tasks. It was also decided to audio tape the sessions instead of videotaping them.

### 6.2.1 Think-Aloud Procedure

As mentioned earlier, the developed think-aloud sessions had precise, well-defined steps and incorporated user observations and interviews. Each of the think-aloud sessions was sub-divided onto five think-aloud sub-sessions as there were five nominated personalised features, personalised search, symptoms checker, find a doctor, personalised newsletter and drug interactions checker (see Chapter 5 for further details about the selection of these features, their characteristics, etc).
According to Young (2005), at the start of a think-aloud session it is important to make sure that the participants are stimulated for the activity and that the activity itself is broken down on a number of sequential cognitive steps. Thus each of the sub-sessions was comprised of two steps, Step 1 and Step 2, where Step 1 was comprised of an interview and Step 2 included scenarios.

The aim of Step 1 was to stimulate participants' interest in the think-aloud session. Step 1 was in a form of short interviews, when the participants were asked a few questions about a selected personalised feature.

The aim of Step 2 was to engage participants in a think-aloud session. Step 2 was comprised of two or three scenarios, some of the scenarios were hypothetical and others, actual scenarios, related to a real life problem.

Hypothetical scenarios (‘Imagine that…’) were chosen in order to make participants think about a nominated personalised feature and functionality it was supposed to provide. Participants were given a hypothetical situation and asked a set of questions about their proposed (hypothetical) actions in a form of an interview. Examples of hypothetical scenarios are provided in Table 6.3, examples of questions the participants were asked after the scenarios can be found in Table 6.2.

The use of actual scenarios was aimed to demonstrate how a participant would react to an actual personalised feature and its functionality once he or she performs a given task. Participants were asked to find certain information with the use of a nominated personalised feature. After the scenario, the participants were asked a set of questions about the performed task in order to gain a better insight about their recent experience of using a nominated personalised feature. Examples of the actual scenarios are provided in Table 6.3, examples of questions the participants were asked after the scenarios can be found in Table 6.2.

Overall, there were five sub-sessions with five nominated personalised features, used for the purpose of this research, in order to extract user expectations. As it was important to make sure that the developed think-aloud sessions had precise, well-defined steps with specific goals (Boren and Ramey 2000; Nørgaard and Hornbæk 2006), it was decided to analyse the selected personalised features in order to determine what steps were most suited for them. A number and type of selected steps of the think-aloud sessions for each of the personalised features was determined by the complexity of the functionality of that feature, as demonstrated in Table 6.1.
Table 6.1  Design of think-aloud sessions for selected personalised features

<table>
<thead>
<tr>
<th>Personalised Feature</th>
<th>Sessions</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Personalised search</td>
<td>Step 1</td>
<td>Each of the participants was asked to test two personalised searches (on different websites) so the actual scenario was repeated twice for each of the personalised searches (websites) respectively.</td>
</tr>
<tr>
<td></td>
<td>Step 2a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Scenario 1 (Hypothetical)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Step 2b</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Scenario 2 (Actual search)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Scenario 2 (Actual search)</td>
<td></td>
</tr>
<tr>
<td>2. Symptoms checker</td>
<td>Step 1</td>
<td>It was decided not to use the hypothetical scenario due to the:</td>
</tr>
<tr>
<td></td>
<td>Step 2b</td>
<td>- complexity of the feature;</td>
</tr>
<tr>
<td></td>
<td>- Scenario 2 (Actual search)</td>
<td>- variety of its implementations (with or without body map, with a list of symptoms or type-in symptoms, with or without implementation of videos, etc.)</td>
</tr>
<tr>
<td>3. Find a doctor</td>
<td>Step 1</td>
<td>The functional complexity of the feature required all steps to be performed.</td>
</tr>
<tr>
<td></td>
<td>Step 2a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Scenario 1 (Hypothetical)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Step 2b</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Scenario 2 (Actual search)</td>
<td></td>
</tr>
<tr>
<td>4. Personalised newsletter</td>
<td>Step 1</td>
<td>The feature is very simple as it simply asks the users to tick boxes and provide their email address. Due to its functional simplicity, it was decided to disregard Step 2.</td>
</tr>
<tr>
<td></td>
<td>Step 2a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Scenario 1 (Hypothetical)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Step 2b</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Scenario 2 (Actual search)</td>
<td></td>
</tr>
<tr>
<td>5. Drug interactions checker</td>
<td>Step 1</td>
<td>The functional complexity of the feature required all steps to be performed.</td>
</tr>
<tr>
<td></td>
<td>Step 2a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Scenario 1 (Hypothetical)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Step 2b</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Scenario 2 (Actual search)</td>
<td></td>
</tr>
</tbody>
</table>

As can be seen from Table 6.1, think-aloud sessions with all but one selected personalised features included Steps 1 and 2. It was decided to have Step 1 for the Personalised newsletter due to the simplicity and straightforwardness of that feature. Symptoms checker is an example of a complex personalised feature in regards to the variety of its implementations. Due to that fact, it was decided not to use a hypothetical scenario at Step 2 as various responses and complexity of the feedback.
that would depend on participants’ perceptions and previous experiences, were anticipated. Instead, it was decided to offer participants an actual scenario that involved testing of a single implemented instance of a Symptoms checker.

In relation to the sequence of the personalised features for the think-aloud sessions, it was decided to have Personalised search first as it was the most common personalised feature due to its wide implementation (see Chapter 5 for more details). It was assumed that such choice of sequence would give the participants a fair idea about what was expected from them during the sessions. As for the rest of the features, they were allocated in random order, however, once chosen, the sequence was the same for each of the think-aloud sessions.

### 6.2.2 Think-Aloud Questions and Scenarios

Questions of the think-aloud sessions, developed to extract user expectations towards personalised features of health websites, were created on the basis of the Framework of user expectations presented in Chapter 2. The Framework identified five major elements, past experiences, intentions, values, beliefs and affective components that influenced the formation of user expectations towards personalised health websites. Each of the developed questions was based on the elements of the Framework (see Table 6.2).

<table>
<thead>
<tr>
<th>Steps</th>
<th>Questions</th>
<th>Elements of the Framework</th>
</tr>
</thead>
</table>
| **Step 1 Interview**   | **When it comes to using ____________, what makes it valuable for you?**  
                          | What is important to you in the process of using it [personalised feature], apart from getting the information you are after?  
                          | □ Can you think of any characteristics of the [personalised feature] that you liked or found helpful in the past?  
                          | □ Can you think of any characteristics of the [personalised feature] that you disliked or found disappointing in the past?  
                          | **How would you envisage the feature functioning?**  
                          | **What would help you? Would this or that functionality help you?**                                                                                                                                     | Values, beliefs  
                          | Values, beliefs  
                          | Past experience, affective components  
                          | Past experience, affective components  
                          | Intentions  
                          | Past experience |
| **Step 2a Hypothetical scenario & interview** |                                                                                                                                            |                                                |
The hypothetical and actual scenarios, developed for the think-aloud sessions, were designed to be simple, precise, comprehensive, do-able, not too time consuming and they simulated real life experiences (Nielsen 2000; Nielsen 1993; Pearrow 2007). The scenarios had to provoke a response from the participants, based on the functionality that needed to be tested. For example, for the personalised search it was important to provide a scenario that would be comprehensive and complex enough to enable participants test most of the functionalities of personalised search, such as type-in help, spell checker and filtering of the results. To that end, it was decided to choose a rare case of disease, namely chicken pox in adults, and ask participants to search for its symptoms. Another example is a Drug interactions checker, where participants were asked to find two drugs with complex names and check their interactions. The complex names, namely penicillin and tetracycline, were chosen because these two medications had complex Latin names and it was important to test that aspect with participants. The full list of the developed scenarios is provided in Table 6.3 below.

**Table 6.3 Scenarios developed for think-aloud sessions**

<table>
<thead>
<tr>
<th>Personalised Feature</th>
<th>Type of Scenario</th>
<th>Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Personalised search</td>
<td>Scenario 1 (Hypothetical)</td>
<td>Imagine that your partner appears to have chicken pox, and that you are going to search for the information online using one of the health information portals or websites. You are particularly interested in the symptoms of the disease when it affects adults.</td>
</tr>
</tbody>
</table>
Scenario 2 (Actual search)  Imagine that your partner appears to have chicken pox. Please search a CERTAIN website (URL) for the information about its symptoms when it affects adults. While you do so, try to say everything that goes through your mind. You may stop once you feel you have come to a satisfying result or whenever you want to quit.

Scenario 2 (Actual search)  Imagine that your partner appears to have tonsillitis. Please search a CERTAIN website (URL) for the information about its symptoms that adults have. While you do so, try to say everything that goes through your mind. You may stop once you feel you have come to a satisfying result or whenever you want to quit.

2. Symptoms checker  Scenario 2 (Actual search)  Imagine that you are suffering from light abdominal pain. Use the symptoms checker located on a CERTAIN website (URL) to identify the condition. While you do so, try to say everything that goes through your mind. You may stop once you feel you have come to a satisfying result or whenever you want to quit.

3. Find a doctor  Scenario 2 (Actual search)  Think of a hypothetical situation when you have light back pain. You have decided to locate a health practitioner who would be able to help you by using an online tool Find a doctor.

Scenario 2 (Actual search)  Think of a hypothetical situation when you have light back pain. You have decided to locate a health practitioner who would be able to help you by using an online tool ‘Find a Doctor’ on a CERTAIN portal (URL).

5. Drug interactions checker  Scenario 1 (Hypothetical)  Imagine that you need to check interaction of such drugs as penicillin and tetracycline using an online drug interactions tool on a health website.

Scenario 2 (Actual search)  Imagine that you need to check interaction of penicillin and tetracycline using the drug interaction tool on a CERTAIN website (URL). While you do so, try to say everything that goes through your mind. You may stop once you feel you have come to a satisfying result or whenever you want to quit.
The developed scenarios tested certain aspects of nominated personalised features and enabled the participants to try out various functionalities of those features in order to extract their expectations.

During the conduct of the scenarios, the participants were asked four types of the questions that corresponded with the findings of Nørgaard and Hornbæk (2006):

- Questions concerned with problems, experienced by a participant in a process of solving a task, such as ‘What is happening?’, ‘What are you looking for?’ and so on. These questions can be asked if a participant is slowing down in their task, etc.
- Speculative or hypothetical questions, related to non-existing aspects of the system, such as ‘Would it be of interest to you (if it was here)?’, ‘Would it help you?’ and so on. These questions can be asked about hypothetical features in order to provide participants with some suggestions and wait for their response and feedback.
- Retrospective questions when the participants are asked to look back and assess certain situations. Such questions as ‘Did you notice this? Why not?’ and so on can be used to provoke a reaction to certain functionalities of a feature that went unnoticed.
- Questions related directly to the emotions, expressed by the participants. The questions like ‘Why are you laughing?’, ‘Do you like it?’ can be used to get a clear idea about the emotional responses of the participants to certain functionalities.

The appropriateness and structure of the questions was decided upon each individual session and scenarios.

6.2.3 Think-Aloud Participants

It was important to determine what categories of health consumers were using generic health websites on a regular basis in order to extract their expectations towards personalised features of such health websites. According to Thompson and Sunol (1995), when it comes to the healthcare domain, it is important to take into consideration its uniqueness and a variety of specific groups of health consumers that are searching for medical information.

In order to determine characteristics of health consumers who regularly went online in search for medical information, it was decided to analyse reports on the Internet usage of health information, conducted by three organisations around the globe:-

- Health on the Net foundation (HON) is one of most respected and reputable not-for-profit foundation, based in Geneva, Switzerland, that promotes the effective and reliable use of the new technologies in the healthcare domain around the world;
- The Pew Internet & American Life Project (PEW) is one of the projects of the Pew Research Center, a non-partisan, non-profit ‘fact tank’ that provides information on the issues, attitudes and trends shaping America’s and the world’s online behaviour;
- Better health channel, an Australian Government health website that has a good reputation among the Australian population.

(1) HON Foundation
The HON research surveys provide an outlook on health consumers’ searching behaviour. According to HON (2005), the most important characteristics of the health consumers who go online are:

- **gender**: females tend to search for health information online slightly more often than men;
- **age**: those who search for health information online are aged 30-60;
- **experience**: those who have at least four years of experience of using Internet tend to search for medical information online more often than people without such experience.

Education was one of the characteristics that were initially considered as an important factor. However, it was discarded as the information seeking trends of those with a university education proved to be very similar to the ones with only a school education (HON 2005).

(2) Pew Internet
PEW researchers collected vast amount of data related to health information seeking behaviour of Americans (predominantly) over the period of 2002 – 2009.

According to Fox and Jones (2009), there are no significant differences among health consumers of various ages (they tend to be younger than 65 though) or education levels in regards to searching for medical information online. However, females search for medical information more often than males, and health consumers with more online experience (at least 4 years) are more likely go online searching for health information (Fox 2006). Therefore, according to the PEW researchers, the main demographic characteristics of health consumers who regularly go online for medical information are:

- **gender**: females tend to search for the information online slightly more often than men;
- **age**: younger than 65;
- **experience**: those who have at least four years of experience of using Internet tend to search for medical information online more often than the ones without it.

(3) Better Health Channel
Better Health Channel (2009) states that around 27 per cent of regular Internet users in Australia seek for health information on the web and 55 per cent of these health consumers are women.
However, there is no demographic information available in regards to such characteristics as age, level of experience of using Internet or education.

Considering the fact that European and American findings about the use of the Internet for health information were somewhat similar and a lack of such statistical information for Australia, the chosen parameters for identification of the target audience of the health websites are:

- *age*; 18 – 65;
- *gender*; males and females (females slightly more);
- *experience of using the Internet*; at least four years.

In regards to the number of participants, an empirical analysis of think-aloud sessions, conducted for research and test purposes (Henderson et al. 1995; Hoppmann 2007; Nørgaard and Hornbæk 2006), demonstrated that the number of participants varied from six to 12. According to Nielsen (1994), who estimated the number of participants needed for a think-aloud session, 75% of major usability problems can be identified with four to five participants. However, the aim of this study was not to identify major usability problems of selected health websites, but to extract user expectations towards personalised features of such websites. Therefore, it was decided to run the session until data saturation, the point when the researcher starts hearing the same responses over and over again, was reached (Rubin and Rubin 2005). According to Glaser and Strauss (1967), additional sessions should not be considered once data saturation is reached, as from that point forward the researcher can only witnesses previously seen phenomena and relationships. Data saturation for the current study was reached after seven sessions. The characteristics of participants who took a part in the think-aloud sessions, are represented in Table 6.4.

<table>
<thead>
<tr>
<th><strong>Table 6.4 Demographic details of participants of think-aloud sessions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Characteristics</strong></td>
</tr>
<tr>
<td>Number of participants:</td>
</tr>
<tr>
<td>Sex:</td>
</tr>
<tr>
<td>Females</td>
</tr>
<tr>
<td>Males</td>
</tr>
<tr>
<td>Age:</td>
</tr>
<tr>
<td>18-30 years old</td>
</tr>
<tr>
<td>31-45 years old</td>
</tr>
<tr>
<td>46-65 years old</td>
</tr>
<tr>
<td>Online experience:</td>
</tr>
</tbody>
</table>

For the purpose of this exploratory study, the ‘convenience sampling’ method was used (Creswell 2009). Once the criteria for participants was defined, those who met the criteria were approached to participate in the think-aloud sessions. All of the participants were located in Melbourne, Victoria,
Australia. The fact that the think aloud sessions had to be conducted face to face influenced the choice of participants in regards to their geographical location and convenience, as the participants could not have been interviewed over the phone. It is argued that the identified sample was suitable for the purpose of the research as all of the participants met the key selection criteria for the think-aloud sessions. It is also important to re-emphasize that data saturation was successfully reached within the chosen sample.

The participants were familiarised with the procedure and explained that they could withdraw from the study at any time as outlined in the Explanatory statement (see Appendix 3). Once the criteria for participants were defined, those who met the criteria were approached to participate in think-aloud sessions (see Chapter 3 for further details on how the participants were approached).

According to Nørgaard and Hornbæk (2006), think-aloud sessions should not be performed in a laboratory-style settings as such settings would not reflect the practical realities of use of online systems. To that end, this research aimed to provide settings close to the real life situations, so participants were invited into a comfortable office with a choice of a laptop or a desktop so that they could suit themselves in where they performed the tasks. The choice to audio tape participants (after obtaining their written consent) instead of videotaping also brought the conditions of the sessions closer to the real life settings.

### 6.2.4 Conduct of Think-Aloud Sessions

A pilot think-aloud session was conducted to test out the questions and scenarios in order to make sure that the questions served their purpose and were easily interpreted. No issues were raised as a result of the pilot sessions. Therefore, there were no major changes in the questions made, apart from a change of the sequence of questions on a couple of occasions.

Six remaining sessions were run within the timeframe of a month. The collected data has been analysed and is presented in Section 6.3 of this chapter.

### 6.3 Results: Extracted User Expectations towards Selected Personalised Health Websites

This section presents the results of the think-aloud sessions, coupled with interviews and observations. The section starts with the outlook of the sessions and the major outcomes in relation to the expectations that participants have towards selected personalised features of health websites.
The section provides an analysis and overview of user expectations towards each of five selected personalised features and their functionality. It is followed by the analysis of problems, encountered by the participants when they were working with the selected personalised features. A range of emotions the participants experiences and expressed during the think-aloud sessions that indicated their satisfaction or dissatisfaction with certain functional elements, are also presented. There is a separate section dedicated to effectiveness of the methods used to extract user expectations and their relation to the Framework of user expectations, presented in Chapter 2.

Five personalised features, selected for the think-aloud sessions, were:-
- Personalised search;
- Symptoms checker;
- Find a doctor;
- Personalised newsletter;
- Drug interactions checker.

A description of these personalised features, their functionality and rationale behind the choice of this set, are presented in Chapter 5.

Prior to conducting the think-aloud sessions, the participants were asked which of the selected personalised features they were familiar with, i.e. used before. The column ‘Usage’ in Table 6.5 indicates the received responses. After conducting the think-aloud sessions, the participants were asked to rank on a scale from 1 to 5, where 1 is the lowest score (i.e. they don’t really care if the feature’s on the portal/website or not) and 5 the highest (they think the feature should be present), each of the discussed features. Their responses were analysed and presented in the column ‘Rank’ in Table 6.5.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Usage</th>
<th>Rank</th>
<th>Median</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personalised search</td>
<td>100%</td>
<td>1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Find a doctor</td>
<td>86%</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Symptoms checker</td>
<td>29%</td>
<td>3</td>
<td>4</td>
<td>3.43</td>
</tr>
<tr>
<td>Drug interactions checker</td>
<td>0%</td>
<td>4</td>
<td>3</td>
<td>3.43</td>
</tr>
<tr>
<td>Personalised newsletter</td>
<td>86%</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

As can be seen from Table 6.5, the rank of the features does not necessarily match their use. For example, while most of the participants (86%, i.e. six participants) used a Personalised newsletter before, they did not find it to be the most important or valuable feature of a health websites. However, the Drug interactions checker, which was not used by any of the participant prior to the sessions, was considered to be the fourth most valuable personalised feature.
Overall, it can be concluded that health websites do not currently cater for the needs of users specifically, as some of the features they provide regularly are of no interest to users. This can be one of the potential contributors to the reported user dissatisfaction with health websites (Fox 2008; Fox 2006).

Analysis of obtained data revealed that there were six major categories of expectations the participants had towards selected personalised features:
- minimised issues with medical terminology;
- provision of additional information and information required from the users;
- how well the results can be refined;
- presentation of the results in an informative manner;
- design of personalised features;
- what help is provided (see Figure 6.1).

These six major categories are discussed in detail further in this section. It should be noted that where the rocket systems had similar responses, the number of each participant is included in brackets stock.

### 6.3.1 Minimised Issues with Medical Terminology

The participants indicated that they expected to be helped when they dealt with complex medical terminology. In particular, this need was expressed when they were using such features as Personalised search and Drug interactions checker.
In relation to Personalised search, the participants expected help with:
- what to ask, “what topic am I asking for to get the right result” (participant #2, labelled as ‘#2’);
- the vocabulary and appropriate terms to use (#2, #3, #5, #6);
- how to spell, “I would expect the website to correct my writing if I am wrong” (#7).

In relation to Drug interactions checker, the participants stated that:

“The names, even if the person has the prescription in front of them, they still will not know how to spell it [...] People are making mistakes in what they put in. So again, the spelling and also what they put in” (#2)

“Spelling, it would be a definite issue, so unless they provide a spelling option, it can be very frustrating for people when they are getting no results” (#3)

The participants revealed certain expectations related to the provision of particular functionality that would help them deal with the medical terms. They expected to have a number of functionalities, such as:
- term suggestions;
- provision of related search;
- type-in help;
- spell checker.

The participants expressed hope that the provision of these functionalities would help them with the medical terminology when they used Personalised search and Drug interactions checker.

6.3.1.1 Term Suggestions

Term suggestions is a functional element that provides users with a number of suggestions related to a search query. So that, if a user makes a mistake, a hint will appear, for example, ‘Did you mean this …?’ Participants stated they expected to find term suggestions implemented in such personalised features as Personalised search (#1, #2, #3, #5, #6 and #7) and Drug interactions checker (#7).

(1) Personalised Search - Term Suggestions

“Term suggestions are very useful [...] suggestions like ‘Did you mean this…?’. When I am junior at some topic I am probably not sure how to formulate my query so these kinds of features or similar features can help me to formulate my query [...] It is
important. [...] The suggestions have to assume the results, for me it is a guarantee that I will receive the results from this query.” (#1)

“It needs to have some latest or possible terms there, I think that is really important. Possible spellings and possible terms” (#2)

“It gives you suggestions as well as other terms that you might want to use so it would be good if the website had it as well in terms of the search function that if you are looking for something, would give you suggestions and terms.” (#3)

“They should provide [...] the query suggestions” (#5)

“Suggestions of the search terms [would be] good” (#6)

“[Once] the website got back to me asking ‘Did you mean that?’ and that was exactly what I meant. That was very helpful. I would like to see help in both either that’s a typo or the meaning that was misinterpreted. [...] That’s the feature that I like, it corrected me, and suggested options. That’s what I want to see.” (#7)

(2) Drug Interactions Checker - Term Suggestions

“I would expect to see it saying ‘Did you mean that?’” (#7)

6.3.1.2 Related Search

Related search represents the ‘mass intelligence’ and gives users a set of searches, performed by other users with similar search query. For instance ‘You might also be interested in...’ This functionality was only expected to be implemented in Personalised search (#1, #4, #5, #6).

(1) Personalised Search – Related Search

“The search engine should be able to tell you, look you’ve found far too many results so try these other terms” (#4)

“They should provide top searches to see what the most popular searchers are” (#5)
6.3.1.3 Type-in Help

Type-in help provides a list of suggestions while users are typing their query in the search box. Type-in help was expected to be implemented in Personalised search (#1) and Drug interactions checker (#1, #5, #6).

(1) Personalised Search – Type-in Help

“When I type in the query box, during my typing they will recommend me some words to complete with, a topic […] So I do not need to complete the whole thing myself”

(#1)

Also, while not all of the participants mentioned the type-in help up front, this functionality got a lot of positive responses as the participants were performing the scenarios as the type-in help proved to be useful for them (#1, #4, #5, #6).

“I am learning from these type-in suggestions” (#1)

“First thing I think is good is that there is a type-in help as I do not know the terminology that well” (#5)

“It’s telling me how to finish the term! It is great!” (#6)

This signifies that while type-in help is not necessarily expected by the majority of health website users, they certainly appreciated its presence when they were searching for the medical information.

However, it is important that the type-in help gives users enough time to check other entries in the list and enables them to add extra terms to it (#2, #4, #5).

“It [website] provides type-in help, which is good, but then it does not give me much time to look at the options and decide which is the right one, click on it and get to the page I want. It very quickly switches to the search results page without giving me too much chance to do that” (#4)

“Yes, but it [type-in help] only comes up if you start spelling it right, if you spell it wrong it does not come up… And then it happens so quickly… If I am typing quickly I will not even notice, and I did not notice it the first time […] Type-in only works if the spelling is right. So that can be quite useful but then…” (#2)
“I do not need to press the search button and it is good. But sometimes I do not want to stop as I want add more terms to the list” (#5)

It should be noted that some of the participants indicated that once the website provides type-in help or suggested the terms option, they automatically assumed that they would most certainly receive a result from that query (#1, #3, #5, #6). That was an expectation related to the provision of the functionality itself rather than the presence of particular functional characteristics.

(2) **Drug Interactions Checker - Type-in Help**

The need for the type-in help was also expressed for such personalised feature as Drug interactions checker (#1, #5, #6).

### 6.3.1.4 Spell Checker

The Spell checker informs users whether they went wrong and where in a query. The Spell checker functionality was expected by the participants to be implemented in Personalised search (#1, #3, #6, #7) and Drug interactions checker (#3, #4).

(1) **Personalised Search – Spell Checker**

“Some search engines do not give you information about the spelling errors [...] That is really frustrating” (#3)

(2) **Drug Interactions Checker - Spell Checker**

“I would love if they had shown possible options as the spelling of the two words could be confusing” (#3)

“The spell checker would be great because of the long complex names so... having that functionality would be really important” (#4)

The key factors related to the issues with medical terminology and identified through the think-aloud sessions, are presented in Figure 6.2.
To summarise, there are four major functionalities that the participants expected to find when they worked with such personalised features of health websites as Personalised search and Drug interactions checker.

### 6.3.2 Provision of Additional Information for and Information Required from the Users

The participants expressed various expectations about the information they were willing to provide and information they expected to obtain as a result of their interaction with personalised features. They also stated that they expected certain credentials to ensure that the obtained information was trustworthy. Such expectations were related to Personalised search Symptoms checker, Find a doctor, Personalised newsletter and Drug interactions checker.

In relation to Personalised search, the participants stated that the information should be:

- relevant and of high quality (#1; #7);
- up to date and complete (#1);
- official (trustworthy) (#2)

From the Symptoms checker, the participants expected:

- to find specific and precise information (#3, #6);
- not too much medical jargon (#1, #7)
Information related to the Find a doctor feature was expected to be:
- relevant and of high quality (#2, #6);
- up to date (#3, #6)

Personalised newsletter was expected to deliver information that would be:
- up to date (#1, #3, #7);
- precise (#1);
- relevant (#2);
- specific to medical conditions (#5, #6, #7)

Drug interactions checker was expected to provide information that is:
- precise and accurate (#1);
- authoritative and trustworthy (#3, #5, #7)

The participants expected to see certain credentials of the information provided by Personalised search and Drug interactions checker. See Section 6.3.2.1 for more information.

In regards to the input, i.e. information that participants were ready to provide in order to retrieve personally relevant results, the participants had certain expectations about what was appropriate to be asked and what was not. They also expressed their concerns related to the privacy of the information they were asked for when they used Personalised newsletter. See Section 6.3.2.3 for more information.

As for the output, i.e. additional information that participants were willing to retrieve as a result of their interaction with the personalised features, the expectations were expressed towards such features as Symptoms checker, Find a doctor and Drug interactions checker. See Section 6.3.2.2 for more information.

6.3.2.1 Credentials of Medical Information

The participants expected to see some sort of guarantee that the information they obtained as a result of their interaction with the personalised features was trustworthy and reliable. Hence, they were expecting to see some form of credentials when they worked with such personalised features as Personalised search (#1, #7) and Drug interactions checker (#3, #5, #7).
(1) Personalised Search - Credentials
The participants claimed that it would be important for them to make sure that the obtained medical information was trustworthy. The participants expected certain representation of the search results that would reassure them that the retrieved information was trustworthy.

“[There should be] something about the resource of the website, what they are about, some credentials” (#1).

“[I want to see] the source is possible” (#7)

It should be noted that quite a few participants, who mentioned that the quality and trustworthiness of the information was important, tried to determine the quality of information through an analysis of the obtained search results and the health website itself. Therefore, the presentation of health websites and their results can indicate to the participants the presence of trustworthy information on the website.

(2) Drug Interactions Checker – Credentials
With the Drug interactions checker, the main issue was related to the authority of the website to provide information about the medications and to give a piece of advice to the participants.

“I am wondering if the website has an authority to say all these things, so that’s a bit of an issue here” (#3)

“Credentials about where the drugs come from” (#5)

“As long as this site is endorsed by an authority that could be considered as trustworthy, based on research, Government funded or whatever research but not some other parties, whatever they are” (#7)

6.3.2.2 Output (Information Provided to Users)

Output is related to the expectations of users towards obtaining additional information as a result of their interaction with selected personalised features. The provision of additional information was expected for such personalised features as Personalised search (#3, #4), Symptoms checker (#1, #2, #3, #6, #7), Find a doctor (all participants) and Drug interactions checker (all participants).
(1) **Personalised Search - Output (Additional Information)**
With personalised search, participants expected to obtain additional information, such as referrals to other information that might be useful, e.g. links to other websites, featured articles, etc.

> “Additional suggestions maybe? That is other sites I might be able to go to or other information I might be able to seek […] it would be good to get the search results and that additional information. That would be helpful.” (#3)

> “Other featured articles that could also be useful, that would be very good too” (#4)

(2) **Symptoms Checker - Output (Additional Information)**
In relation to the Symptoms checker, participants expressed their desire for additional information when they checked the symptoms, not just a diagnosis or a list of conditions.

> “I would like to know what type of medication is available to help” (#1)

> “It’s one thing to put the information out there but people need to know what to do with it once it is out there [implying that the contact numbers of professionals to turn to might be a good idea]” (#2)

> “If that is in Australia, maybe suggest places that we could go to as well… it would be very nice if I could find the places that are close to me so you can go and get some medical care” (#3)

> “[Help] if we are trying to make a decision whether we need to seek medical help and whether we need some medicine or maybe we already have them in our cupboard” (#6)

> “Pop up windows stating something like ‘If the symptoms last for 48 hrs I need to seek for medical attention [would be good]’ …possible ways of treatment and further referrals” (#7)

(3) **Find a Doctor - Output (Additional Information)**
Using the feature Find a doctor, the participants expected to get certain information about the doctors identified through that feature (Table 6.6).
As can be seen from Table 6.6, the participants expected to be provided with a range of information about the specialists apart from their names, specialisation, and contact details such as their address. The participants also expected to obtain information related to the reputation of the practitioners (#1, #2, #4, #5, #6), which was related to the communication aspect of health websites rather than the Find a doctor feature per se, i.e. whether a health website enables or provides means for communication to its visitors or not:

“The website provides new channels for disclosure of such info about the quality of the service and the reputation of the doctor [...] I want to find someone [...] who has a good reputation so I’d love to see [...] opinions of other patients, their reviews” (#1)

“Feedback that this person does this, this person does not, this person charges way above [...] their reviews. It is word of mouth that is an interesting one when people go and choose a specialist” (#2)

“It might help if there’s a review or reflection from other people who have used it” (#6)
(4) Drug Interactions Checker - Output (Additional Information)

During the use of the Drug interactions checker, the participants expected to see the drug’s brand names along with its Latin name, drug producers and additional information related to the drug interactions and its possible side effects.

Expectations related to the presence of the drug brand name to choose from:

“Some antibiotics might have generic and brand name. So you need to be able to deal with all these different names. So it is important to be able to say what is the medication, or it might be more than one medication” (#2)

“You would also need to be able to recognise the drug, I guess, by its common retail name, the brand name because a lot of the times people don’t know what the drug actually is but they know it by the brand name” (#4)

“They need to have categories of the drugs and the brand names as you might know them better than the scientific name of the drug” (#5)

“There are so many drugs and brand names available... one drug might have up to 10 – 15 names so I would expect the website to help me identify exactly the drug I am using” (#7)

In relation to other types of information the participants expected to obtain as a result of their work with the drug interactions checker, it was mostly related to:

- Information about the producers of the drugs (#1):

  “You probably need to be able to find the information about the producers of the drugs, maybe pictures, and other information about the drugs. I would expect this to be linked to the drug centre information or something” (#1)

- More information about the interaction itself and potential side effects (#2, #4, #5, #7):

  “It says how the interaction occurs but really what you want to know is what the interaction is and what the symptoms and side effects are, if there is an interaction what will happen to you...” (#4)

  “To know whether there is a problem taking one drug after another, side effects or whatever it is [...] I am not sure whether this website will give me information about
the drugs, but I would like to have more info about particular drugs to be able to go
and investigate it further” (#7)

- Information about whether the drugs can be taken together (#3):

“I would love to know what drugs can be taken together and whether that would cause
any side effects eventually” (#3)

The participants also expected to see a number of substances the drugs could interact with, presented in Table 6.7.

<table>
<thead>
<tr>
<th>#</th>
<th>Information about…</th>
<th>Count</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alcohol</td>
<td>6</td>
<td>#1, #2, #3, #5, #6, #7</td>
</tr>
<tr>
<td>2</td>
<td>Anything (potentially) dangerous</td>
<td>5</td>
<td>#1, #2, #4, #6, #7</td>
</tr>
<tr>
<td>3</td>
<td>Food</td>
<td>4</td>
<td>#1, #2, #4, #7</td>
</tr>
<tr>
<td>4</td>
<td>Tobacco</td>
<td>2</td>
<td>#1, #5</td>
</tr>
<tr>
<td>5</td>
<td>Herbal medicines</td>
<td>2</td>
<td>#1, #2</td>
</tr>
<tr>
<td>6</td>
<td>Pregnancy</td>
<td>2</td>
<td>#5, #6</td>
</tr>
<tr>
<td>7</td>
<td>Allergen</td>
<td>1</td>
<td>#4</td>
</tr>
<tr>
<td>8</td>
<td>Health supplements</td>
<td>1</td>
<td>#4</td>
</tr>
</tbody>
</table>

6.3.2.3 Input (Information Provided by Users)

Input is related to the expectations the participants expressed when they worked with Personalised newsletter. Personalised newsletter requested the participants to provide a range of personal information (apart from their email addresses), and it appeared that the participants had certain expectations in relation to what information was appropriate to provide on such occasion (see Table 6.8), mostly due to security and privacy concerns. The participants also expected to get the personalised newsletter within given timeframes and to be asked about how often it should be emailed to them.

<table>
<thead>
<tr>
<th>#</th>
<th>Information about…</th>
<th>Count</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age (range)</td>
<td>6</td>
<td>#1, #2, #3, #4, #5, #7</td>
</tr>
<tr>
<td>2</td>
<td>Gender</td>
<td>5</td>
<td>#1, #2, #4, #5, #7</td>
</tr>
<tr>
<td>3</td>
<td>Interests/preferences</td>
<td>4</td>
<td>#2, #3, #5, #7</td>
</tr>
<tr>
<td>4</td>
<td>Postcode</td>
<td>3</td>
<td>#1, #2, #7</td>
</tr>
</tbody>
</table>
There was a range of security and privacy concerns expressed by the participants in relation to the information they were expected to provide:

“I do not like to provide my real name, not the living address or the full address [...] I don’t want to give them information they can identify me by; not the exact age but the age group” (#1)

“I would not want to [provide full address], not full name, nothing personal [that can trace back to me]” (#2)

“I would provide information but in a reasonable way and relevant to my condition. My name and address are not relevant” (#7)

Diagrammatically, user expectations towards provision of additional information and information required from the users are presented in Figure 6.3.

![Figure 6.3 User expectations related to provision of additional information and information required from the users by personalised features](image)

To summarise, there are three major types of information that the participants expected when they worked with such personalised features as Personalised search, Symptoms checker, Find a doctor, Personalised newsletter and Drug interactions checker.
6.3.3 How Well the Results Were Refined

The participants had certain expectations towards refinement of the obtained results when they worked with all five selected personalised features. The participants expected to have an option of filtering obtained results by various sets of parameters, different for each of the personalised features.

In relation to Personalised search, all participants stated the importance of and the need for a refinement/narrowing of search results:

- provide clustering of the results (#1);
- being able to refine and modify the search (#2, #3, #5, #6);
- being able to sort and narrow down the results (#2, #3, #4, #7)

The participants expected to have filtering enabled for the remaining features, i.e. Find a doctor feature (#2, #3, #5), Symptoms checker (#3, #5, #7), Personalised newsletter (#1, #2, #3, #4, #5, #6, #7), Drug interactions checker (#5, #6):

“"You have got to have some way of making the filtering when you have more results than you need [...] It should be able to have something to separate too much information, to filter it out” (#2)

6.3.3.1 Filtering of Results

(1) Personalised Search - Filtering

The participants expected to see filtering enabled for Personalised search. They wanted to be able to filter the results in various ways and by various categories are described below:

“"I can reach the search results list by specifying the filters [...]. [The search] would group the results by certain topics, i.e. the results would be filtered out firstly by [disease] chicken pox, secondly by symptoms, then I will maybe type in ‘adults’ to eliminate all the irrelevant things related to children” (#1)

“"That’s what it is, the type of information associated with the topic rather than everything. So it needs to be able to refine/filter it [...]It’s often built into the site that you can have a list of categories that can help you decide what you want [...] they are grouping information on that portal [...] That could be very useful” (#2)
“They could have some details, something like ‘chicken pox’ on the side, so you can click on it and it’ll have the links to the description, symptoms, or whatever it is [...] If you could have chicken pox symptoms, chicken pox for children, chicken pox for adults so to have these categories of things so that people can easily get to what they want” (#3)

“Being able to narrow by what type of information you want, whether that’s a journal article or a data sheet [...] The ability to cut out other certain types of articles in some way [...] Considering it’s a health page, it is interesting that they don’t have an option to limit the search to things that people commonly look for like symptoms, as people normally look for them, another thing could be medications” (#4)

“[Filter results by] categories like symptoms, treatments, whatever it is; the context in which it occurred” (#6)

“There could be filter or something that would filter out the files and sites that are irrelevant on the basis of who they were created by, some private people that are not professional in the field” (#7)

The presence of a filtering option was perceived positively by the participants:

“The filters in general are useful [...] I found the filtering of the results to be useful” (#1)

“I liked that there was a range of options, the range of functionality to limit the search” (#4)

Two participants (#6 and #7) stated that they expected to have filtering as an optional functionality, enabled after the results were delivered. This finding might imply that a filtering option needs to be offered after the first iteration of the search results and not before.

Participants indicated a number of filtering parameters to refine/narrow search results by (see above). However, their suggestions varied from one scenario to another and depended on the information the participants were looking for. This finding implies that filtering parameters might depend on the query and the information the users are after. Therefore, it might be useful for the developers to further identify what filtering parameters the users want to be present on the health websites, which ones would be most appropriate and most suitable for what types of queries.
Three participants mentioned that they wanted to be able to filter the search results by a few parameters at a time:

“Once I have found the stuff but I want to prioritise by what is more focused on age or symptoms, or chicken pox. So I can choose to filter it in a particular way, prioritise it” (#2)

“It would be better if I could filter the results by all three of them rather than what it is right now” (#3)

“This ‘refine your results’ option only allows to select one aspect at a time, right? Let’s say I want to filter by both – the type of the article and age, but it’s not allowed so… that would be good adjustment” (#5).

As can be seen, most of the participants expected to be presented with options to refine or narrow the search. All participants mentioned the need for some sort of help to deal with the retrieved information as, from their previous experience, it was often not a trivial matter to find relevant medical information.

It is also important to note that most of the participants expected to select the parameters to narrow the search after the first iteration, even when they had an option to set the parameters prior to it (e.g. when working with the personalised search of HealthInsight website). This might be explained by a major influence of Google on the search patterns of the participants, which was mentioned by five out of seven participants (#2, #3, #4, #5, #7). Therefore, it can be concluded that Google is certainly a factor in formulating user expectations, related to the search functionality.

(2) Symptoms Checker - Filtering

Provision of filtering of search results was also suggested for a Symptoms checker.

“I would expect [...] that it would consider gender, and perhaps adults, teenagers, seniors; so I expect to find that kind of information in the symptoms checker [...] They should have something like 20+ or 30+, some other range there [...]” (#3)

“I am a male, and the age… It’s a good thing they have it [to choose from]” (#5)

“I can see the structure already here, man or a woman…I like that they have it” (#7)
(3) Find a Doctor - Filtering
The participants expressed a number of expectations in relation to the provision of filtering by a Find a doctor feature:

- Filtering by a postcode/surrounding area:

  “List of the practitioners that’s showing me how far they are from my place [...] not just within the postcode but also around the area [...] I will type my post code, I do not want to type in my full address and it is really annoying sometimes as they do not really need my full address” (#1)

  “It might be better to go by location so ‘where do you live’ or a region [...] Sometimes I am willing to travel to go to the right person so if I could find out the list for broader area as well… that could be the option” (#2)

  “That you could narrow the search quite quickly to the geographic area if you want to find a doctor close to your home or work” (#4)

  “I would provide my locality [...] even if there are no results in my area, they should provide the info about the surrounding areas” (#5)

- Filtering by the type of a practitioner:

  “I [want to] choose the practitioner from the list” (#1)

- Filtering by ‘radius’, i.e. by the proximity to a specified location:

  “If they find let’s say 50 they can only show me 5 to 10 per page, and probably give me the filter again to rule out the furthest as I do not want anyone beyond 10 km or something” (#1)

  “Something like ‘less than 5 km away’ or ‘less than 1 km away’ and being able to choose that. That would be good” (#3)

(4) Personalised Newsletter - Filtering
The participants expected to get the information filtered out by their conditions and concerns, certain diseases, interests and types of information when they were testing a Personalised newsletter feature.
“I always prefer something to choose from. If I choose something too generic I would receive too much information irrelevant to me. I would want to receive things relevant on my conditions and concerns” (#1)

“I would want to choose the type of information […] I would choose the diseases, and also the perspective would be interesting too. Am I interested because I am some kind of a practitioner, or some kind of a carer, or am I interested in certain services […] I would want to filter out things that I do not need” (#2)

“First it needs to be personalised because if it is not, it does not add any value. I think it’s feasible to highlight certain areas to get the information about” (#5)

“It needs to have some way of refining or filtering out the stuff I am after […] I suspect that if people have a certain type of cancer they might want information on that specific type of cancer” (#6)

In relation to the provision of a Personalised newsletter, five participants (#2, #3, #5, #6, #7) expected to get in monthly, two (#2, #3) - fortnightly and one (#1) – weekly. All of the participants stated that they were expected to be asked about the frequency of being sent the newsletter from a health website, and that they would also want to have an option of changing their choices if needed.

(5) Drug Interactions Checker - Filtering

The participants stated the need to filter the results provided by a Drug interactions checker.

Diagrammatically, user expectations about the refinement of the obtained results are presented in Figure 6.4.
To summarise, the participants expected to see filtering of the obtained results to be implemented in all of the selected personalised features.

### 6.3.4 Presentation of Results in an Informative Manner

Even though the extraction of user expectations towards the presentation and interface of personalised features of health websites was out of scope of this research, there were a number of expectations related to the need for a meaningful presentation of results of Personalised search, expressed by all participants:

"The presentation of the results is very important. It should help me to quickly find the information I am interested in" (#1)

#### 6.3.4.1 Description of Obtained Resources

All participants expected to get some information about the resources obtained via Personalised search. Such information included a short blurb (a short statement) that indicated what the resource was about, number of obtained resources, date when the resource was last updated and indication of a relevance of the obtained results to the query.

**1) Personalised Search - Blurb**

The participants expected to see some sort of a summary that would indicate what the resource was about:
“Before I click on some interesting link, I need to get the right amount of information about this link, not too much, not too less [...][There should be ] a brief description, and probably something about the resource of the website, what they are about, some credentials, and key words, maybe [...]I like that it has the key words highlighted in the description” (#1)

“I would tend to look at the description of what’s on that page. Because often you can see the key words and so you can see what the context is, where the key words have come up in that text. And if it looks like it picked up my intent when I’d put these key words in, then I would check that website out” (#2)

“It would be good to just have some key information below the link that says what that link is about so that I know if it’s relevant to me or not [... and] highlighted key terms” (#3)

“I think with these results the summary is quite important. This little text can explain what the resource is about. So I guess it’s good to have a link and the summary there [...] I would love to have more information about the nature of an article” (#5)

“I would like descriptions and links [...] Links are direct so I can see what it is looking like, like good results. I can see directly where the page is [...] I like bolding [of the key terms] I like to know the context in which it appears” (#6)

“Usually the website comes up with like an abstract from the actual source, I tend to read it to see if it makes sense for me [...] Also the actual words I was looking for are in bold and extracted from a text and in a form of a text and help me make my choice” (#7)

(2) Personalised search - number of obtained resources

The participants also indicated that they expected to see how many resources were obtained during search:

“This is what I am talking about [...] as] there is a box here that gives you some tags and a number of results associated with it [...] When] the search result indicator says how many there are” (#1)
(3) **Personalised Search - Date When the Resource was Last Updated**

The participants stated they needed to see when the resource was last updated to be able to determine whether they were interested in it or not.

“[It would be good to have] a date when it [the resource] was last updated [...] so I know whether it is recent” (#3)

“Dates and time of creation [...] if I am looking for some new info like a press release, I would like to go through the press release and I expect it to be a recent one; the most recent press release about such matters” (#6)

(4) **Personalised Search - Relevance of the Obtained Results to the Query**

The participants stated they wanted to see some sort of an indication about the extent to which the obtained results were relevant to their query:

“In the list of results they do not have ranking or relevance. They need to indicate some sort of the relevance and dates” (#5)

“What I do like, when they tell me what the % of the match is. Something like page ranking as it helps me see how things are with the search engine. So it’s good when you can see it [...] It gives me the relevance of the page comparing to the results if they can tell me how well the results are matched.” (#6)

Diagrammatically, the user expectations towards the presentation of the results of the Personalised search are presented in Figure 6.5.
To summarise, participants expected to see a specific description of the resources obtained via Personalised search, which would help them make a decision about relevance of the resources to their information needs.

### 6.3.5 Design of Personalised Features

All participants expressed a number of expectations related to the design of such personalised features as Personalised search, Symptoms checker, Find a Doctor and Drug interactions checker. The expectations related to such aspects as location of the search box (for Personalised search), highlighting of certain aspects of selected personalised features, sponsor links and advertisements, navigation and top down structure, the presence of a visual map and a list of symptoms, and font and layout.

#### 6.3.5.1 Location of a Search Box

**(1) Personalised Search - Location of a Search Box**

The participants revealed that they expected to have a search box to be located on the home page to make the search box easily accessible (#1, #4).
6.3.5.2 Highlighting of Certain Aspects

(1) Personalised Search – Highlighting of Certain Aspects

The participants expressed an expectation to have certain aspects, such as filtering options, highlighted to make them “more colourful” in order to attract attention to them (#1, #3, #5, #6, #7). Highlighting might also help distinguish areas with the advertisements:

“They [results and ads] are only distinguished by the background colour but if someone has a vision problem the difference will not be too obvious. But it’s not distinguished any other way I would expect it would be more obvious to show the user which is which” (#1)

“I would like the results to be highlighted a little bit more […] It is the colour of the box as well, it is not something that, if you look here, it is all the same, it does not really stand out so I did not even realise that it was there [the filtering option]” (#3)

“There are also ads and they are not boxed. They might be colour coded but I cannot see it very easily. If I was in a rush I would not have seen it” (#6)

(2) Symptoms Checker – Highlighting of Certain Aspects

With the Symptoms checker, participant #5 expected highlighting to be enabled to make their interaction with the personalised feature easier:

“When they provide the symptoms they might want to highlight the ones that are chosen already. And also maybe highlight some relevant symptoms” (#5)

6.3.5.3 Sponsor Links and Advertisements

The participants expected the sponsor advertisements and links to be either removed or be disguised when working with the Personalised search.

(1) Personalised Search – Sponsor Links and Advertisements

The sponsor links and advertisements are either to be taken out or relocated to the side of the page with the presentation of the search results:

“The search results were organised below the sponsors link and Google ads […] I am not sure why they are promoting sponsor link before the search results. I would prefer that it’s not promoted ahead of the search results but probably on the side column […]

They [ads] could be some other column” (#1)
“I am not sure about the ads by Google [...] If they [ads] are there, I need to do a lot more work to find what I am actually after” (#2)

“Well maybe they need the ads for their business but they could place them somewhere else” (#5)

6.3.5.4 Navigation

The participants also expressed certain expectations towards the provision of navigation by such personalised features as Personalised search and Symptoms checker.

(1) Personalised Search – Navigation

The participants stated that they expected the navigation to be clear as they wanted to track their search experience back to be able to modify certain aspects or to be able to explore the ‘context’ of search:

“Sometimes it will take you somewhere and if I go back it takes you to the high level page and you miss all the other stuff in between when you just might want to go back” (#1)

“[Use] bread crumbs. When I am searching, when I am going to the website I like to be able to see the breadcrumbs so then I am able to go back to places [...] The bread crumbs, the navigation on the page becomes important because I do not just want to get there, I want to know here I am so I can see the context of this information” (#3)

(2) Symptoms Checker – Navigation

The participants expected to be able to track the results back:

“I cannot see what I have chosen... I have nothing to say about what I have ticked but I ticked all these boxes... there is no history, no track of what I have ticked. So I have to go back and check” (#3)

6.3.5.5 Top Down Structure

The participants expected to have a top down structure for such features as Personalised search (#3, #5), Symptoms checker (#1) and Drug interactions checker (#1, #2, #3, #5).
(1) Personalised Search – Top Down Structure
In regards to the overall presentation of the results by Personalised search, the participants stated that they expected the most relevant results to be presented at the start.

(2) Symptoms Checker – Top Down Structure
The participants stated that they expected to have the feature organised “in a granularity level (#1) so that it would be possible to go from the symptoms to a list of diseases.

(3) Drug Interactions Checker – Top Down Structure
The participants had certain expectations in relation to the listing of the results offered by a Drug interactions checker:

“The interaction I am asking for is not in the first line. I am asking about the interaction about the two but it shows me something else […] I would expect that the relationship between what I ask for would be the first one, then it would be the interaction about the level of seriousness between the drugs and other substances. Because what if there are hundreds of bad interactions so I will have to go through pages and pages to see the interaction I am after?!” (#1)

“It is actually come up with the highest severity of interaction on the top rather than the combination I have actually put in [not happy] […] I am thinking, why is it in the bottom [the result of the drug interaction]?! If I were to be in a hurry I would probably think … my initial though would be that it is not there… but it is but in the bottom” (#2)

“The main interaction is in the bottom but it needs to be on top. Also the main interaction you are after needs to be open by default and have some explanation straight away” (#5)

6.3.5.6 Visual Map
All participants stated that they expected to have a visual map enabled to enhance their experience with a Symptoms checker and Find a doctor features.

(1) Symptoms Checker – Visual Map
The participants expressed the need for some sort of a diagrammatic representation of a human body to help them work with a Symptoms checker:
“I prefer if there are some diagrams…like a visual map, just a quick way to point out on […] where the problem is…. So I would want something to be visualised” (#1)

“You would have to choose the part of body you have the symptoms related to [and the map] might help. Or at least something visual would be good” (#2)

“I would envisage mapping on the website or page which actually direct a person to a particular area on the body, how to look at it, and what to look for. It could be pictures, photos or animation” (#7)

(2) Find a Doctor – Visual Map
All participants stated that they expected to have a visual map to be in place and extendable for a Find a doctor feature.

6.3.5.7 List of Symptoms
All participants stated they expected to find a list of symptoms provided with a Symptoms checker.

(1) Symptoms Checker – List of Symptoms

“I would always prefer to select [symptoms] from a list […] I prefer selecting while typing because this option would have the general symptoms. So I prefer choosing rather than typing in myself […] the list will guarantee I will use the right terminology and that it will be complete” (#1)

6.3.5.8 Font and Layout
The participants expressed certain expectations about the font and layout for a Symptoms checker (#1, #2).

(1) Symptoms Checker – Font and Layout

“It is on relatively small area, middle box only, they should enlarge it so if I have a problem I will not see it as the font is small” (#1)

“Rather than having it as a top box I would have them together on the top, like bread crumbs. This is the initial symptom, conditions associated, and then I can drill down further. Unless they are on one page, I can’t see… the context gets lost… and that is
why I want to see, I want to see where does this fit in, in the context of all the rest [...] there is an interesting amount of the real estate on the page, and I am wondering why they are not using it” (#2)

Diagrammatically, user expectations towards the design of the selected personalised features are presented in Figure 6.6.

![Diagram of user expectations](image)

**Figure 6.6 User expectations related to design of selected personalised features of health websites**

To summarise, the participants expected to see specific design elements for all of the selected personalised features.

### 6.3.6 Provision of Help

The participants expressed certain expectations about being helped in their interactions with such personalised features as Personalised search (#2, #4, #5, #6, #7), Find a Doctor (#7), Symptoms checker (#1, #2, #4, #7) and Drug interactions checker (#4, #5, #7). The participants needed help with various categories, presented by a filtering option, and with the functionality of selected personalised features.

#### 6.3.6.1 Help with Filtering and Its Parameters

The participants expected an explanation about what was meant by various categories, provided by a Personalised search and Find a doctor options.
(1) Personalised Search – Help with Categories

“They have search tips that talk about the search and categories but they do not really go into details about what is meant by each category [...] what is ‘adult easy’ or ‘age span’ or others” (#4)

“It is also important with the personalised search has help to explain what each parameter means. For instance, ‘brief’ and ‘scientific information’, what is meant by which?” (#5)

“They gave me a list of categories that were not meaningful to me I had to guess what they meant” (#6)

“I would expect the website to prompt me and say ‘for the professionals the website is organised in the matter that unless you know specific terminology or Latin names you will not be able to understand it’. So I would expect something like that, the prompts [...] I expect the website to give me the hint what they mean [...] Probably an explanation of some terms, like pop up boxes or something.” (#7)

(2) Find a Doctor – Help with Categories

“When you have the list of professionals you want to have these subdivisions, so if you can highlight that sort of difference [who treats what], it would be good for people so they would know that they need an optometrist rather than ophthalmologist, for instance. [...] the explanation would be good” (#3)

6.3.6.2 Help with Functionality

The participants expected to have certain help provided for a Personalised search and Symptoms checker.

(1) Personalised Search – Help with Functionality

“The search engine should explain to the user how to go about it, provide suggestions, examples [...] When you make a query and search, there is an indicator that there is no result at all. The user should have some sort of clue about what caused the problem” (#5)
It is important that all participants stated that even though it would be nice to have an intuitive Personalised search, it would be important to provide clues and guidance about how to use it.

(2) Symptoms Checker – Help with Functionality
Four participants (#1, #2, #4, #7) expected to have some sort of help in their dealings with a Symptoms checker.

(3) Find a Doctor – Help with Functionality
One of the participants expected to be prompted when he made a mistake in a location he provided in a Find a doctor feature.

“When I was typing the location it was my inaccuracy in typing but it is prompting not that well. I did not realise what the problem so I would like the website to prompt me about what went wrong” (#7)

(4) Drug Interactions Checker – Help with Functionality
A few participants (#4, #5, #7) stated they needed help with a Drug interactions checker:

“When they talk about severe interaction, what do they mean by that? That might include an explanation and some examples to indicate the range of how severe it is” (#5)

“Maybe they might suggest alternatives like you can take drug after another in the state of 2 hours or so [...] hopefully maybe the dosage problems. There should be some prompts or alternatives I can choose to avoid my issue up to going and seeing my Doctor or another specialist” (#7)

Diagrammatically, user expectations towards the design of personalised features are presented in Figure 6.7.
To summarise, the participants expected to see help enabled for most of the personalised features of health websites.

6.3.7 Synopsis of Extracted User Expectations

Think-aloud sessions with the users revealed a set of user expectations related to the selected personalised features: Personalised search, Symptoms checker, Find a doctor, Personalised newsletter and Drug interactions checker.

(1) Minimised Medical Terminology

The participants indicated that they expected help with complex medical terminology, implemented as a part of such personalised features as Personalised Search and Drug Interactions Checker. The complexity of medical terms and drug names was one of major concern for most of the participants. Participants revealed that they expected a number of functionality elements to be implemented to help them with complex terminology:

- term suggestions; functional element that provides users with a number of suggestions, related to a search query if the users make a mistake – ‘Did you mean this …?’;
- provision of related search; this functionality represents ‘mass intelligence’ and gives users a set of searches, performed by other users with similar search query – ‘You might also be interested in…’;
- type-in help provides a list of suggestions related to a potential query of users while they are typing it in the search box;
- spell checker lets users know if they made a spelling mistake in a query.

(2) Provision of Additional Information for and Information Required from the Users

Given that most personalised features require users to provide certain details to obtain information relevant to their needs, the participants indicated that they had certain expectations towards what kind of personal information they would be willing to provide for Personalised newsletter, and what kind of information they expected to obtain as a result of their interaction with Personalised search, Symptoms checker, Find a Doctor and Drug interactions checker. This information can be divided onto three broad categories:

- credentials; the participants expected to see some sort of guarantee that the information they obtained as a result of their interaction with personalised features, was trustworthy and reliable;
- output; the participants expected to see certain additional information along with the information directly related to their queries;
- input; this category included personal information that participants were willing to provide about themselves in order to retrieve relevant results.

(3) How Well the Results Can Be Refined

All participants claimed that they expected to retrieve information that would be of personal relevance to them. The participants expected to have certain functionality enabled in each of the selected personalised features which would enable them to narrow the obtained results down or sort the obtained results by a number of nominated parameters. The expected parameters were different for each of the analysed personalised features. The participants expected to see filtering as a functional element of all of the personalised features as a means to refine obtained results.

(4) Presentation of Results in an Informative Manner

The participants expected to have the retrieved results presented to them in a particular way. They expected to see a certain set of elements, which would accompany the search results and make them more meaningful for the participants.

(5) Design of Personalised Features

During the think-aloud sessions, the participants indicated a number of expectations that they had towards the design of such personalised features as Personalised search, Symptoms checker, Find a Doctor and Drug interactions checker, such as navigation, structure, diagrammatic elements, and other expectations.
(6) Provision of Help

There was an expectation related to the website providing help for such personalised features as Personalised search, Symptoms checker, Find a Doctor and Drug interactions checker.

Diagrammatically, revealed user expectations are presented in Figure 6.8.

Table 6.9 presents the set of user expectations towards each of the selected personalised features. It provides a detailed list of expectations with respect to the functionality that the participants expected from each of the five selected personalised features.
Table 6.9 Extracted user expectations towards five selected personalised features

<table>
<thead>
<tr>
<th>Expectations/Personalised features</th>
<th>Personalised search</th>
<th>Symptoms checker</th>
<th>Find a Doctor</th>
<th>Personalised newsletter</th>
<th>Drug interactions checker</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Minimised medical terminology</td>
<td>Term suggestions; Related search; Type-in help; Spell checker</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Term suggestions; Type-in help; Spell checker</td>
</tr>
<tr>
<td>2. Provision of additional information and information required from the users</td>
<td>Credentials; Output (additional information) - additional suggestions, featured articles, etc.</td>
<td>Output (additional information) - type of medications that can help and possible ways of treatment, places to go to for help and further referrals</td>
<td>Output (additional information) - Doctor’s experience, credentials, gender, reputation, etc.</td>
<td>Input - age (range), gender, interests/preferences, postcode, etc.</td>
<td>Credentials; Output (additional information) - drug brand names, additional substances the drug may interact with; information about the producers of the drugs, about the interaction itself and potential side effects and whether the drugs can be taken together</td>
</tr>
<tr>
<td>3. How well the results can be refined</td>
<td>Filtering the results - by certain topics, type of results, symptoms, age, etc.</td>
<td>Filtering the results - by gender, age</td>
<td>Filtering the results - by postcode/surrounding area, practitioner, proximity to the specified area</td>
<td>Filtering the results - by conditions and concerns, certain diseases, interests and types of information</td>
<td>Filtering the results – parameters are not specified</td>
</tr>
<tr>
<td>Chapter 6</td>
<td>4. <strong>Presentation of the results in an informative manner</strong></td>
<td>Description of the obtained resources - blub, number of obtained resources, date of the last update, relevance match (%)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>**5. <strong>Design of personalised Features</strong></td>
<td>Location of the search box; Highlighting of certain aspects; Sponsor links and ads; Navigation; Top down structure</td>
<td>Highlighting of certain aspects; Navigation; Top down structure; Visual map; List of symptoms; Font and layout</td>
<td>Visual map</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>**6. <strong>Provision of help with Personalised Features</strong></td>
<td>Help with the categories; Help with the functionality</td>
<td>Help with the categories; Help with the functionality</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
6.4 Critical Analysis of Think-Aloud Method, Interviews and Observations for Extracting User Expectations

The think-aloud sessions set out to extract user expectations towards personalised features of health websites. This section analyses the applicability of the think-aloud method, coupled with interviews and observations, to extract user expectations towards personalised features and the proposed approach of the selected methods.

6.4.1 Effectiveness of Selected Methods

Think-aloud sessions incorporated three major data collection techniques, think-aloud technique, interviews and observations.

(1) Think-Aloud Technique and Observations

Think-aloud technique proved to be effective to extract user expectations as it revealed issues that the participants encountered when they used selected personalised features. This is consistent with the use of the think-aloud method, reported in literature (Nielsen 1993; Someren et al. 1994). The participants were asked to perform certain scenarios which meant that they faced a few problems while they were performing tasks. The use of scenarios proved to be an effective way to extract user expectations as their use helped recreate real life situations that the participants could face if they went online. Moreover, scenarios revealed expectations that the participants did not express in the interviews they had prior to the scenario. The scenarios however, need to be carefully designed to be effective and the context in which they are to be used is also important. A full list of developed scenarios is presented in Table 6.3. One approach the literature recommends (Ericsson and Simon 1993) is a non-interventionist approach on the part of the researcher. Of this research however, it was believed that by allowing the researcher to ask questions more was revealed and it was a more effective approach.

Coupled with observations, the think-aloud technique provided an effective means to reveal certain expectations that could be identified by various affective reactions, positive or negative, of the participants. In such situations, the participants were asked questions related to the experienced problems, such as ‘What is happening?’, ‘What are you looking for?’ and the like. Feedback, provided by participants in such situations, revealed if they had certain expectations towards the functionality of the selected personalised features. Such questions as ‘Why are you
laughing?’, ‘Do you like it?’ also helped clarify certain reactions of the participants in order to determine whether their expectations towards specific personalised features were met or not.

On a few occasions the participants were asked if the presence of certain functionality would be helpful to them or not. Such questions are called ‘speculative’ or hypothetical and normally related to non-existing aspects of a feature, ‘Would it be of interest to you [if it was here]?’ ‘Would it help you?’ The received feedback helped reveal user expectations towards missing or envisaged functionality of the selected personalised feature.

The participants were also asked to look back and assess certain situation, ‘Did you notice this? Why not?’ Such questions proved to be effective to assess the reaction to certain functionalities that went unnoticed and to reveal why they went unnoticed, i.e. whether the participants expected certain aspects to be there but did not notice them (due to the design issues, etc.) or whether the participants did not expect certain aspects to be present at all. Overall, think-aloud technique coupled with observations helped reveal user expectations related to a number of functional aspects of the selected personalised features.

Although the literature (Nielsen 1993) recommends the use of videotaping, this was not used for this research. Observations proved to be an effective replacement allowing the researcher to explore more with participants than would otherwise not have been possible and enabled the research to be conducted in a more real environment.

(2) Interviews
The interviews proved to be an effective means to gain certain feedback from the participants in relation to the selected personalised features and aspects of their functionality. The questions developed for this purpose were related to hypothetical and actual situations, as discussed in Section 6.2.3 of this chapter. The questions were created on the basis of the Framework of user expectations presented in Chapter 2. The Framework identified five major elements, past experiences, intentions, values, beliefs and affective components that influenced the formation of user expectations towards personalised health websites. Each of the developed questions was based on the elements of the Framework (see Table 6.2). It is important to mention that questions such as:

- Do you believe anything could be taken out to make the feature easier?
- Do you believe anything could be added to make the feature easier?

were initially included in the list of questions and then taken out, as the participants simply re-emphasised previously made points without provision of any new or useful information. Therefore, it was concluded that there was no specific value in adding those questions to the list.
In summary, most of the interview questions developed for the think-aloud sessions provided a useful means to extract user expectations. A couple of questions were disregarded as not effective (see above) and some of the questions were moved from the start of the think-aloud sub-session to the end. The full list of updated questions for each of the selected personalised features can be found in Appendix 5.

### 6.4.2 Applicability of Proposed Approach for Extracting User Expectations

The think-aloud sessions were commenced with the analysis of the most popular (best represented) personalised feature. Such structure of the think-aloud sessions made the participants feel more confident and provided them with a better understanding of the session. The division of each session into two sub-sessions (Step 1 and Step 2) proved to be an effective approach. The aim of Step 1 was to stimulate participants for a think-aloud session and the aim of Step 2 was to engage participants in a think-aloud session.

Step 1 was effective in making the participants think about the selected personalised feature, about how valuable or important it was to them, about the previous experiences of the use of such feature and its aspects they liked or disliked in the past. Step 2 proved to be effective as it stimulated the participants to reflect back on their experiences and think about how they would go about certain personalised features, even the ones they did not use before. The use of hypothetical scenarios at the start of Step 2 ensured that the participants refreshed their memories about their previous experiences with the selected features or triggered their thinking of the functionality the feature could provide. A combination of hypothetical and actual scenarios helped identify certain aspects of functionality the participants did not necessarily emphasise when they discussed hypothetical scenarios. For example, during Step 1 the participants stated they needed help with the medical terminology but they did not specify what kind of help. The need for such help was also re-emphasised during the performance of a hypothetical scenario but it was during the actual scenario when the participants specifically indicated their expectation to have a type-in help implemented.

Often the way users expressed their expectations was not straightforward but was expressed indirectly. For example:

- ‘I thought this feature would..’
- ‘I wanted to see…’
- ‘Where is…(certain functionality or feature)?’
- ‘That would be nice to have…’
- ‘I would always prefer…’
- ‘Oh that’s exactly what I was talking/thinking about!’
- ‘It should be …’
- ‘That would be very useful/helpful (to have)…’
- ‘Normally it’s like this/should be like this…’
- ‘It’s good but I would (want to have it this way)’
- ‘Why doesn’t it say that…?’

Therefore, a careful analysis of the data collected during think-aloud sessions is required as the participants can express their expectations in various ways. However, they often re-iterate the points made, so, as the session continues, certain points related to the expectations become obvious. It is also recommended that the analysis of the data is conducted directly after each of the think-aloud sessions while the impressions from the session, observations, expressed emotions and body language of the participants, are still fresh.

### 6.5 Modified Theoretical Framework of User Expectations

The developed Framework of user expectations provided theoretical grounds for the think-aloud sessions. The elements of the Framework were past experiences, values, beliefs, intentions and affective components. The participants referred to those elements during the think-aloud sessions. For instance, the participants regularly related to their past experiences when they answered certain questions and reminisced about their previous attempts to use certain personalised features. Therefore, it is clear that some user expectations are formed under the influence of previous experiences, which is one of the elements of the theoretical Framework.

The participants were also revealing their intentions when they answered hypothetical questions ‘How would you go about [finding information/using the feature/etc]?’ It was clear that the desire to do certain things or to take certain steps could be traced back to their intentions to obtain medical information they were after.

Some of the participants were not familiar with all of the personalised features they were asked to use. If the participants were not familiar with the feature, they were given a very brief explanation about the personalised feature, for example, when they were not sure what a Personalised newsletter was, they were given the following explanation:
‘Some health websites and portals provide an option to sign up for a personalised newsletter that would send you the information about various conditions, diseases, etc. They tend to ask you to provide some personal information about yourself and also some information about the healthcare aspects you are interested in’.

After such an explanation, the participants were asked ‘What would make such feature valuable to you? What would make it of interest to you?’ Interestingly, each of the participants was quick to formulate an answer, irrespective of whether they encountered the personalised feature before the session or not. This refers back to the values and beliefs of the participants about the role that this feature can potentially play in their attempts to obtain relevant health information online. It was decided to combine the two elements, values and beliefs, as it proved to be hard to clearly distinguish between the two in relation to the extraction of user expectations.

In regards to the expressed emotions that the participants revealed when during the think-aloud sessions, those were:

- likeness;
  “I really liked ‘to refine the results’. I think that could be developed” (#2)

  “I liked that they give you the options of narrowing down the resources” (#7)

- annoyance;
  “I will go through the first two pages and if I cannot find anything I will feel very annoyed” (#1)

  “I do not like that it comes up with the same links. And it gave me ‘signs’, it means nothing to me and it has no relevance to the topic so why did it come up? Annoying!” (#2)

- frustration;
  “It is frustrating that the resources have not been updated as yet, and I see the same results that I just saw [after refinement of the search]” (#3)

  “[You get too many results] and you do not have any suggestions as far as terms, or ways to limit it so I think, again, it is one of the most frustrating things” (#3)
- dislike;

“[after encountering a problem with filtering] I feel like it starts to waste my time and I do not like it... So why am I doing it?” (#2)

“Ok, now it is doing all this check about opening the page in the new window... I do not like this things, I have when they come up 'oh you are leaving the site, are you trusting the other site'? I just want to get to the page!” (#6)

- pleasantness;

“I see the map and it highlights different parts of the body [pleased]. Good idea” (#3)

“I also have some pictorial options so I can actually click there. It is good” (#4)

“So far I am quite satisfied with the amount of information provided so there is also a newsletter that I can sign for, which is great... They give me list of symptoms and it is great” (#7)

Overall, the influence of the affective elements on the process of searching for medical information and subsequently on satisfaction from that process, was summarised by one of the participants:

“When you go to the health portal or website, you really are not in the right state of mind most of the time, you are searching for information because you are concerned, and you should have a website that caters for that, that realises that the person might not be in the right state of mind” (#3)

This relates back to previous research that stated the importance of the affective components and their role in the users’ attitude towards the functionalities of health websites, including their personalised features (Eysenbach and Köhler 2002; Thompson and Sunol 1995).

Through the think-aloud sessions a greater understanding of factors that influence each of the elements of the Framework was possible. For example, such category as Past experiences was influenced by:

- previous searches on health matters;
- experience with medical systems and doctors;
experience of use or search using health websites.

Beliefs and values were influenced by:
- information quality/credentials;
- perceived filtering requirements;
- presentation of the results.

Intentions were influenced by:
- use of help;
- use of information;
- use of credentials;
- willingness to use/search for medical information online.

Based on the analysis of the findings of the TA sessions listed above, the Framework of User Expectations originally described in Chapter 2, has been refined and is presented in Figure 6.9. It should be noted that the identified factors, now included, relate specifically to the extraction of user expectations with respect to health websites.

Figure 6.9 Modified Framework of user expectations
The Framework presented on Figure 6.9 provides an extended list of factors that have been identified during the think-aloud sessions, and combines ‘beliefs and values’ as a single category instead of having them as two separate ones.

The analysis of the collected data revealed that the questions asked at the Step 1 were mostly referring back to the previous experiences, affective components, values and beliefs of the participants. Questions of Step 2 related to the intentions, beliefs/values, past experiences of the participants and affective components. The analysis of the questions and their relation to the elements of the Framework is presented in Table 6.2.

### 6.6 Discussion

The think-aloud sessions have demonstrated that user expectations can be extracted with a set of techniques, such as think-aloud, observations and interviews, conducted in a specific manner with clearly identified steps and formulated questions.

The use of hypothetical and actual scenarios proved to be effective in order to make participants analyse what they expected to be delivered by the personalised features as they reflected and referred back to their previous experiences, values and beliefs, intentions in the process. The participants were also expressing a number of emotions that affected their interpretation of the reality and subsequently their attitude towards certain functionalities of the selected personalised features. Therefore, the think-aloud sessions confirmed that past experiences, intentions, beliefs, values and affective components, identified in Chapter 2, were indeed important factors in the formation of user expectations towards personalised features of health websites.

Analysis of the think-aloud sessions also shed the light on what was understood by user expectations. Interviews with designers and developers of various online systems revealed that the term ‘user expectations’ was vague and poorly understood (see Chapter 4). The results of the think-aloud sessions led to the following definition of user expectations:

> “User expectations are users’ attitudes towards functionality of personalised features. Such attitudes refer to the presence or absence of certain functional elements that affect the performance of personalised features, anticipated by user. The attitudes are defined and determined by beliefs and values of the users, their previous online experiences and intentions towards the use of personalised features. The attitudes are also influenced by a number of affective
components provoked as a result of the user interaction with personalised features”

Analysis of the conducted think-aloud sessions also revealed that user expectations towards personalised features of health websites could be broadly classified into six major categories (see Figures 6.1 and 6.8) related to five selected personalised features (see Table 6.9). It is interesting that in the process of extracting user expectations, the participants sometimes acted as designers and developers themselves as they offered potential solutions to the problems they encountered with various personalised features. This indicates the need for more collaboration between users and creators of the websites as users clearly become empowered by their own experiences of using Internet. Therefore, the extraction of user expectations towards innovative personalised features might help “… develop and evaluate interventions that can maximize the positive effect of the Internet; harness the power of information and communication technology for e-patients who want it, without disadvantaging those who have difference preferences; and to evaluate these innovations” (Eysenbach 2003).

6.7 Conclusion

This chapter provided a detailed description and analysis of seven think-aloud sessions, coupled with observations and interviews, conducted in order to extract user expectations towards five selected personalised features. The use of think-aloud sessions conducted in a well-structured manner with sessions and sub-sessions, where each of the sub-sessions was comprised of two steps, proved to be an effective approach that facilitated the extraction of user expectations. The application of the methods and procedures was documented in the developed Guidelines on how to extract user expectations towards personalised features of health websites formulation of user Guidelines, discussed in detail in the next chapter (Chapter 7).
7. **RESEARCH ARTIFACTS AND EVALUATION**

*Friend to Groucho Marx: “Life is difficult!”*  
*Marx to Friend: “Compared to what?”*  
Unknown

7.1 **Introduction**

The purpose of this chapter is to present the results of the study, namely the Framework of user expectations towards personalised health websites and the Guidelines on how to extract user expectations towards such websites. The chapter commences by describing the developed Framework which provides a theoretical basis for the Guidelines. This is followed by a discussion of the validity and applicability of the developed Framework and Guidelines by systems development experts.

7.2 **Theoretical Framework of User Expectations**

The focus of the study was on the role that user expectations play in the design and development of personalised health websites. Literature review in Chapter 2 demonstrated a lack of empirical research in relation to what constitutes user expectations in the e-health domain and what factors influence the formation of such expectations.

Given the complexity of the notion of user expectations, the conducted study was researching user expectations as a ‘black box’. The concept of a ‘black box’ implied that cognitive processes that facilitated the formation of user expectations were out of scope of the conducted study (Cauer et al. 2000). This research identified factors, known as determinants of user expectations that influenced the formation of user expectations. These determinants were extensively researched in order to develop a set of steps needed to be undertaken to extract user expectations towards personalised features of health websites.

Analysis of the IS quality and marketing literature identified a number of determinants that influenced the formation of user expectations. Due to the importance and unique nature of the e-health domain that come primarily from the private nature of the interaction between e-patients
and health websites, the conducted study concentrated on a number of personal factors that were most likely to affect the formation of user expectations in the healthcare domain. Moreover, the literature analysis demonstrated that personal factors were one of the categories of the determinants of user expectations that were less well researched. Empirical analysis of the medical and health informatics literature revealed a number of personal factors that influenced the formation of user expectations in the healthcare domain. These factors were analysed and conceptualised in a Framework (see Figure 7.1).

![Figure 7.1 Framework of personal factors that influence user expectations](image)

The developed Framework provided a theoretical basis for the Guidelines developed for use by designers and developers to help them extract user expectations towards personalised features of health websites. Each of the personal factors included in the Framework provided the theoretical ground for the think-aloud sessions that incorporated elements of interviews and observations (see Chapter 6). In particular, a majority of the interview questions incorporated in the think-aloud sessions were based on the identified personal factors that influenced the formation of user expectations towards personalised health websites. Further details on how the think-aloud sessions and their questions relate to the developed Framework can be found in Appendix 5.

In order to make the developed Guidelines more practical, they were structured in a particular manner to be subsequently used in systems design and development practices. Operationalisation of such Guidelines and their applicability are discussed in detail in the next section of this chapter.
7.3 Guidelines on How to Extract User Expectations

The Guidelines on how to extract user expectations towards personalised health websites were essentially based on the developed Framework of user expectations (see Figure 7.1). The Guidelines incorporated four major sections:
- introduction;
- applicability of the Guidelines;
- terminology;
- procedure.

1. Introduction: the aim of this section is to introduce the concept of the developed Guidelines, their purpose, theoretical grounds and to define their target audience, i.e. who the Guidelines are developed for.

The introductory section starts by defining the purpose of the Guidelines, their target audience and the main goal, which is to support the designers and developers in the process of extraction of user expectations towards personalised health websites. The role of the user-centred design philosophy and its inclusion in the developed Guidelines is also explained.

The introduction contains an explanation of how the Guidelines are grounded in the developed Framework of user expectations towards personalised health websites. The Framework represents four determinants of user expectations:
- affective components that influence user expectations depending on the emotional state the user holds, they can be both positive (likeness and pleasance) and negative (dislike, annoyance and frustration);
- past experiences of the users;
- users’ intentions;
- user beliefs and values (see Figure 7.1)

2. Applicability of the Guidelines: this section has been provided in order to outline the stages of website design and development, at which the developed Guidelines can be used. The section places emphasise on the context, for which the Guidelines are developed, namely for the personalised health websites specifically. The need for identifying targeted user groups prior to conducting think-aloud sessions with the users is also explained.

3. Terminology: this section has been introduced in order to establish the ‘language’ of the developed Guidelines. Interviews with the experts in systems design and development,
conducted at the start of this research (see Chapter 4 for more details), indicated the need to define a number of terms used in the Guidelines, including the term ‘user expectations’. Most interviewees found the term ‘user expectations’ vague and poorly understood in the context of design and development of personalised health websites. Such section aims to facilitate better understanding of the created Guidelines.

4. Procedure: The description of the procedure that needs to be followed in order to extract user expectations towards personalised health websites is presented as a separate section.

There are two categories of personalised features that can be analysed as outlined in the procedure:

- existing personalised features;
- prospective, non-existent/implemented yet, personalised features.

This section also re-emphasises three stages, at which the procedure can be carried out:

- the initial design stage when the work with the users begins;
- the test stage when the users are involved in testing the website (namely, testing the existing personalised features);
- the review stage when the website is evaluated (including testing existing personalised features).

This section of the Guidelines continues by providing further recommendations on how the think-aloud sessions with the users should be designed and conducted in order to extract user expectations. It identifies five of steps required to extract user expectations towards personalised health websites, namely:

- analyse personalised features;
- develop questions;
- create scenarios;
- conduct sessions;
- analyse results.

Two more steps:

- monitor and review;
- communicate and analyse

are recommended to adhere to when performing the five steps, identified above.

Each of the steps is discussed in detail to guide designers and developers through the process of extracting user expectations towards personalised features of health websites.
Appendices: the final section of the Guidelines consists of a set of seven appendices, where designers and developers can find further information about the Framework of user expectations and its elements. The appendices also contain examples of questions, scenarios and results used in a series of conducted think-aloud session. In particular, these think-aloud sessions provide an example of successful extraction of expectations towards five pre-defined personalised features of health websites.

Appendix G1 contains examples of personalised features of health websites and their functionality in order to illustrate what is meant by personalised features of health websites.

Appendix G2 provides examples of think-aloud sessions developed to extract user expectations towards five personalised features, namely:

- Personalised search;
- Symptoms checker;
- Find a doctor;
- Personalised newsletter;
- Drug interactions checker.

These examples illustrate how the sessions vary depending on the nature of the personalised features that need to be analysed.

Appendix G3 contains a Framework of user expectations towards personalised health websites and detailed explanation of each of the components of the Framework. There are also examples of the questions listed in the appendix. The users should be asked these questions in order to extract their expectations towards various personalised features of health websites. The listed questions are linked back to the developed Framework in order to demonstrate how the questions relate to the determinants of user expectations, namely personal factors that influence the formation of user expectations towards personalised health websites.

Appendix G4 includes a sample questionnaire used in 2010 to extract user expectations towards a pre-defined set of five personalised features of health websites (see the five personalised features listed above).

Appendix G5 aims to explain that user expectations are not always revealed in a straightforward, ‘I expect that…’ manner, but rather in an indirect manner. There are a number of examples of what to look for during the think-aloud sessions with the users and how to recognise user expectations, presented in the appendix.
Appendix G6 contains a classification of user expectations towards personalised health websites. The classification was developed as a result of analysis of a pre-defined set of five personalised features of health websites. It is argued that such a detailed classification will give the designers and developers an idea of what information and expectations can be revealed as a result of the think-aloud sessions.

Appendix G7 includes a set of questions that the users can be asked during the scenarios, which are run as a part of the think-aloud sessions.

The Guidelines are fully presented in Appendix 5.

### 7.4 Validation of Theoretical Framework and Evaluation of Guidelines

As discussed in Section 3.2.3.3 of Chapter 3, it was decided to take a subjectivist approach to the validation of the Framework of user expectations, which derives from an intuitionist-pluralist philosophical position and establishes the validity of the developed artifact through the analysis of its applicability in a given context (Hevner and Chatterjee 2010).

The theoretical Framework of user expectations consists of a number of determinants, namely personal factors that affect the formation of user expectations (Figure 7.1). The subjective nature of the determinants of user expectations was discussed in Chapter 2. Given that this study was not concerned with the psychological processes that influence the formation of user expectations, it was unnecessary to analyse the Framework with the evaluation methods used in psychology. Instead, it was decided to use IS methods to evaluate:

- the research itself to establish its quality and validity;
- the developed Guidelines that used the created Framework as theoretical grounds.

Figure 3.1 (as presented in Chapter 3) describes the validation of the developed Framework.
As described in Chapter 3, in design science research different artifacts can be evaluated with respect to different metrics, depending on their nature (Gregor 2002). The evaluation of the conducted research process in order to establish validity of the created Framework, has been based on four criteria proposed by Guba and Lincoln (1994):

- **credibility** (whether the research outcome is interesting);
- **transferability** (whether the developed artifact is generalisable or can be used in other contexts);
- **dependability** (whether the artifact addresses the dynamic settings of the reality);
- **confirmability** (whether the research results can confirmed or corroborated by others).

In order to conduct an evaluation of the developed Guidelines, which subsequently contributed to the analysis of the Framework as explained in Chapter 3, it was decided to use the concept of an ‘informed argument’ (Benbasat and Zmud 1999). Two experts were interviewed to determine whether the developed Guidelines satisfied a set of criteria, suggested by Benbasat and Zmud (1999), March and Smith (1995) and Gregor (2002):

- **relevant**;
- **interesting as a proposed solution**;
- **applicable, current (novelty)**;
- **accessible (usable)**.

Confirmatory interviews with two experts in the systems design and development were chosen to evaluate the developed artifacts. The aim of the interviews was to identify whether the experts believed that the developed artifacts, namely the theoretical Framework and Guidelines, were valid and applicable in a real life context. It was important to establish whether:
- the Framework was comprehensive enough;
- the Guidelines were comprehensive, detailed, easy to follow and applicable in practice.

The criteria identified in Figure 3.1, guided the process of structuring confirmatory interviews and provided a basis for the questions of the confirmatory interviews.

7.4.1 Background of Experts

The experts were selected from two major organisations in Australia and Canada. Both experts are experienced in the design and development of online systems, including personalised websites and portals. The suggestions provided by the experts were incorporated into the Guidelines that can be found in Appendix 5. The list of the suggestions and their inclusion in the presented Guidelines in discussed in Section 7.5.4 of this chapter.

(1) Canadian Expert

The Canadian expert (Expert A) has over 12 years of experience in the software development field and is currently a technical lead in a major international software development company with head offices in Canada and Australia. This expert’s job involves negotiations with the customers and external parties; work on the system specifications, both technical and functional ones, and involvement in the systems development processes when needed. This expert’s role also involves both external work with the customers and internal work with the team of designers and developers.

(2) Australian Expert

The Australian expert (Expert B) has been involved in systems design and usability for about ten years. Her work involves the design of user experience and evaluation of usability of existing systems, including personalised websites. Usability evaluations, provided by the Australian expert, are often used as a basis for subsequent re-design of existing systems or building the new ones. Her work also involves information design, i.e. typical information architecture, interface design, layout, process flows and tasks, as well as developing content. This expert has an extensive experience of work with personalised websites and portals, mainly intranets, and she has been involved in design of a health portal.
Chapter 7

7.5 Analysis of Confirmatory Interviews

The experts were asked a number of questions related to the developed Guidelines. A full list of questions can be found in Appendix 2. The interviews were analysed and the interview data was divided into three broad sections related to:

- the overview of the Guidelines and assessment of how they address the set of evaluation criteria outlines above;
- applicability of the Guidelines and their relevance to practice;
- suggestions for extension of the Guidelines.

7.5.1 Overview of Guidelines and Their Evaluation Criteria

The experts were asked whether they thought that the developed Guidelines on how to extract user expectations made sense, and whether they found the proposed process of extracting user expectations to be:

- comprehensive;
- understandable;
- easy to follow;
- thorough;
- doable.

Both experts found that the Guidelines made sense and provided a comprehensive logical approach to extracting user expectations towards personalised features of health websites, which confirms credibility and confirmability of the conducted research. The experts also found the Guidelines to be relevant, easy to follow, usable, useful and thorough. Expert B particularly liked the Framework, which represented personal factors that affected the formation of user expectations:

“There are a couple of things that I find useful here and I think they are very strong. For example, I was looking at these determinants [of user expectations] and I was actually thinking about my user evaluations and my sessions, when I am evaluating something or designing for something or even when I am running any sessions to elicit feedback and so on. I have noticed you have four groups [four types of determinants of user expectations] there and I think they are actually spot on. I think they are great because all of these four things are different and all of them play a part in the response that you get. So I can definitely see that someone
may have positive or negative feedback towards whatever they are using at that time, whatever personalised feature they are using. Even their emotional status either it is a long or short term relates to their past experience, their intentions, and also overall beliefs and values and also who I am as a person. I think these are four different things and they are good [...] I loved the Framework where you explain expectations, I really liked this part. The Framework makes lots of sense, it doesn’t matter what world you are coming from – industry or academia” (Expert B)

Given that Expert B in her assessment and in reference to her work in general, in a range of various dynamic contexts, confirmed the transferability and dependability of the research, which resulted in the theoretical Framework of user expectations.

When the experts answered the question as to whether the Guidelines provided a solution to the problem of extraction of user expectations, they agreed that the proposed solution was interesting:

“Yes, the answer is ‘Yes’, it is an interesting solution and I think it can be made into a Framework so what I mean is that ... I think this is a real big thing, I was excited to read it” (Expert A)

“Yes because the extraction of the user expectations is explained as a process but not just the description of what methods that you can use. Here you explain how you go about extracting the user expectations so these are definitely interesting as a proposed solution. There is no existing pathway that would tell you – these are the five things you need to do to extract user expectations. So I would definitely say ‘yes’ to this question” (Expert B)

In relation to how understandable the Guidelines were, both experts suggested that the Guidelines had to provide more diagrammatic elements. According to the experts, the diagrammatic form could facilitate better understanding of the processes involved in the extraction of user expectations.

“I think certain aspects can be visualised and conceptualised. I think you actually have it in one of your appendices, Appendix 3, one of the diagrams about how you map everything out. I think you need more of things like that when you actually see the process when there are these defined steps when you create the scenarios,
develop questions, maybe you need to find a way to put it in a some type of a diagram?” (Expert A)

“No, I do not think [that anything else should be added] ... maybe more graphics” (Expert B)

This suggestion was addressed and more tables and diagrams were included in the Guidelines, as presented in Appendix 5.

In relation to the techniques on how to determine the complexity of personalised features, Expert A was satisfied with the offered techniques aimed to analyse personalised features of health websites. In the meantime, Expert B suggested adding usability testing to the list of techniques.

“For the complexity of personalised features I would perhaps also do some usability testing to understand what is complex and what is not for use. You might even do that with the interaction with the feature itself to see the complexity of what they are doing. I think that it would be better” (Expert B)

When the experts were asked whether any steps were missing, both of them did not find any missing steps in the suggested process for extracting user expectations as presented in the Guidelines.

Expert A was satisfied with the offered definitions of user expectations and found the Framework of user expectations was comprehensive and its presence was “non-intrusive” (Expert A). Expert A also stated that the description and the structure of the Guidelines were precise and to the point. Expert B also agreed that the Guidelines were well-structured:

“The Guidelines are well written. They are strictly to the point. I think it is understandable and easy to follow” (Expert B)

Expert A believed that the Guidelines provided enough details on how to develop questions and scenarios for the think-aloud sessions with the users in order to extract their expectations. Expert B suggested some minor changes in relation to the number of participants, settings of the study and video-taping as an optional element. The suggested changes were incorporated in the Guidelines.
“In regards to conducting the session, I would say that the number of participants should be from six to eight, you have five to seven, definitely more than 5 people. In regards to conducting the sessions, we need to match it with what the user does so sometimes the laptop is not the most realistic to what people are using, mostly desktops, especially at work or at home. I would leave it to the prior enquiry to see what they use most.

I am not sure it is not recommended to ask about more than five personalised features as it really depends on the complexity of the feature, what you are trying to do and how much interaction it involves.

The video-taping might be needed for some projects as it really depends on what you are evaluating so I would leave it as an option” (Expert B)

Both experts found that the information provided in the appendices was sufficient and useful for the think-aloud sessions with the users.

In regards to the novelty of the proposed approach, it is important to reinforce that the idea to develop the Guidelines on how to extract user expectations towards personalised features of health websites, was identified as new by all the designers and developers as discussed in Chapter 4. Designers and developers of online systems expressed the need for practice-oriented Guidelines that would facilitate the process of extracting user expectations towards personalised feature of health websites. They claimed that such Guidelines would be a current and timely solution to the problem of scarcity of coherent and precise information on how to extract user expectations. Both experts, who participated in the confirmatory interviews, stated that they had not encountered or used any Guidelines on how to extract user expectations in their work.

7.5.2 Applicability of Guidelines to Practice

The experts provided some comments on the applicability of the Guidelines. Their applicability and relevance to practice was confirmed by Expert B who made the following comment:

“I think they are applicable in practice. And that’s the thing I always think about, the applicability, they [the Guidelines] are” (Expert B)

Expert A expressed the need to address the issue of various groups of users, as those groups could have different expectations. He stated that different groups were most likely to approach
the features in specific ways, which could influence the process of extraction of user expectations, as it would require alteration of the scenarios and questions for the think-aloud sessions.

“One aspect of the user expectations is that there are different groups of users. And every time when you design a system you need to think and represent various use cases [...] I think there needs to be some acknowledgment or identification, and some type of targeting of these sorts of things [...] Depending on the groups of users you might have different scenarios or questions so that is something that you might need to acknowledge [...] if there is a diverse set of targeted users, it naturally would make sense to segment user expectations along these use cases. So it is an important part and I think if you could think about it and somehow represent this in the Guidelines that would be good” (Expert A)

This point was addressed when a new section to the Guidelines titled ‘Applicability of the Guidelines’ was introduced. This section contains an explanation why designers and developers have to consider identification of various use cases and run sessions with one targeted group of users at a time to extract user expectations towards personalised features (see Appendix 5).

Another suggestion related to the applicability of the proposed Guidelines, expressed by both experts, was related to the fact that some of the designers and developers would want to extract user expectations towards personalised features that were not yet implemented.

“Some of these features won’t exist before. So you will not be able to determine how popular the feature is for the new features that the health provider might want to introduce [...] If it is something that has not existed before, how will you be able to analyse this personalised feature? [...]If the feature has not existed before then the users will have zero past experience. That would be more common. The organisations who want to put the new features online want to speak of themselves as innovators, innovating in the health industry by bringing up this new personalised feature. That’s now it works. You match your features with the competitors and then you try to innovate by providing something that competitors might not have. Or it might be determined by the Government, or legislation, or the policy or some type of an internal target. I think it is the innovation that you want to recognise as well. So I think the Guidelines would be used more if you could address that type of a scenario” (Expert A)
“You might need to consider what if there is a need for information or a service but no-one is doing it. So you might need to introduce it and you need to think about how to do it, what needs to be done in that case. It is useful to see what is out there but sometimes there’s nothing out there so it is thinking outside the box” (Expert B)

This comment was addressed in an added statement that the Guidelines could, in fact, facilitate the extraction of user expectations towards both categories of personalised features, existing and prospective (non-existent/implemented yet), personalised features.

### 7.5.3 Use of Developed Guidelines

The experts provided their views on the use of the Guidelines in industry and application of the Guidelines in different (to e-health) domains. Both experts stated that the Guidelines had the potential to be generalisable (i.e. transferability). The experts also said that the developed Framework could be modified into a ‘universal’ Framework on user expectations that could (potentially) be applicable to the personalised features of various websites, not just the medical ones.

“I think one way to achieve their implementation in industry is to replace the word Guidelines and make it ‘a Framework of extraction of user expectations’. The next level of detail would be removing the health context from it and make it apply to anything. That would be a really cool thing. So make it not just Guidelines but the actual new Framework on how to extract user expectations” (Expert A)

“I think you can even generalise that Framework. I think those four determinants define when the user gives you one response or the other. And I really like the way you structured those four things, how you represented them there […] I think they can be tweaked a little bit and then they could be applied to anything else” (Expert B)

This suggestion is also acknowledged in Chapter 8 in Section 8.6, which is dedicated to the directions of the future research.
7.5.4 Summary

In summary, the confirmatory interviews with the experts demonstrated that the research, which formed the basis for the developed artifacts, was valid and that it satisfied such criteria as credibility, transferability, dependability and confirmability. Evaluation of the Guidelines demonstrated that the Guidelines were relevant, interesting as a proposed solution, applicable, current, accessible (usable), easy to follow, useful and thorough. It is argued that the conducted evaluation is sufficient to not just ensure the quality and validity of the developed Guidelines, but also the validity of the developed Framework of user expectations. The Framework was validated through the Guidelines that used it as a theoretical basis and through the evaluation of the conducted research itself.

The confirmatory interviews also resulted in a number of changes to the Guidelines, which were incorporated in the latest version (see Appendix 5). The suggested changes were:

**Suggestion 1** - more diagrammatic form in the Guidelines (suggested by both Experts).
The suggestion was addressed as text was presented in a diagrammatic form where appropriate.

**Suggestion 2** – add techniques such as usability testing to the techniques that help determine complexity of personalised features (suggested by Expert B). Complexity here refers to the functionality of personalised features; it needs to be determined in order to specify actions, required to extract user expectations towards personalised features.
The suggestion was incorporated in the Guidelines, Section ‘4 Procedure’.

**Suggestion 3** - minor changes in relation to the number of participants, settings of the study and video-taping as an option (suggested by Expert B).
The suggested changes were made in the Section ‘4 Procedure’ of the Guidelines.

**Suggestion 4** – the need to address the issue of various groups of users who might have different expectations due to the diversities of these groups (suggested by Expert A).
The point was addressed when a section titled ‘Applicability of the Guidelines’ was introduced.
The section explained the need to choose targeted groups of users to work with.

**Suggestion 5** – the need to address the issue of extracting user expectations towards features that are not yet implemented (suggested by both Experts).
This comment was addressed through an additional statement that the Guidelines could facilitate the extraction of user expectations towards both categories of personalised features, existing and prospective (non-existent/implemented yet), personalised features.
### 7.6 Conclusion

Two artifacts developed as a result of the conducted study, the Framework of user expectations and the Guidelines on how to extract user expectations towards personalised features of health websites, were presented in this chapter. The confirmatory interviews with an Australian and a Canadian expert in the field of systems design and development, including personalised websites, were conducted to evaluate the research outcomes. The conducted research and its artifacts were evaluated through:

- the assessment of the *credibility, transferability, dependability and conformability* of the research;
- confirmation that the developed Guidelines were *relevant to practice, applicable, accessible, usable, interesting and novel as a proposed solution* to the problem of extraction of user expectations.

The problem of a lack of research on how user expectations towards personalised health websites can be extracted and how this process can subsequently be incorporated in the design and development processes has been addressed from both a practical and theoretical perspective. The practical aspect of the problem was addressed by the developed Guidelines. The theoretical aspect, signified by the lack of the empirical research on the factors that influence the formation of user expectations in the healthcare domain, was addressed by the proposed Framework of user expectations.
8 CONCLUSION

There is nothing like looking, if you want to find something. You certainly usually find something, if you look, but it is not always quite the something you were after.

J.R.R. Tolkien

8.1 Introduction

This chapter draws together information and knowledge generated from the research conducted and analysed in previous chapters. Strands and themes that emerged are tied back to the research questions, in order to define which themes have contributed to theory and practice. Thereafter, several recommendations for practice that emanated from these research findings are outlined. Limitations of the research are noted and the future avenues for further research are suggested.

8.2 Research Motivation

This thesis was motivated by the problem of the neglect of user expectations in the design and development of personalised health websites (Ball and Lillis 2001; Cawsey et al. 2007; Hawkins et al. 2008). The aim of this research was to identify and address gaps in the theoretical and practical knowledge related to the notion of user expectations, and in particular their role and operationalisation in the design and development of personalised health websites.

The growing popularity of health websites as an electronic means for the provision of medical information has resulted in a large number of health consumers (e-patients) who go online to search for health information (Ball and Lillis 2001; Coiera 2000; Cop 2008; Eysenbach 2000; Ferguson 2007; Fisher et al. 2008; Fox 2005; Fox 2006). According to Rozmovitis and Ziebland (2004), people who search for medical information online want quick answers to their health-related questions, as well as reassurance, alternative opinions, support or anything that will help them make better decision about particular medical issues. In literature review a number of problems that health consumers faced when they used health websites were identified. The major problems identified were:
- information overload when e-patients were no longer able to process the retrieved information effectively due to its volume (Chen et al. 2003);
- retrieved information was not useful (Vermaas and Wijngaert 2005);
- difficulty in finding information in timely manner (Burstein et al. 2005a; Huntington et al. 2003; Williams et al. 2002);
- difficulty in finding relevant information (Fisher et al. 2009; Zeng et al. 2004), and other.

A full list of identified problems can be found in Table 2.1 (Chapter 2). One of the goals of this research was to draw attention to the issues that health consumers face when they search for medical information online and to identify potential ways to address these issues in order to improve user satisfaction with health websites.

Personalisation, defined as the tailored provision of the right information to the right people at the right time (Burstein et al. 2005b), was aimed to address the stated problems. Nevertheless, the literature review demonstrated that personalisation was not particularly effective in addressing those problems and as a result the users were dissatisfied with the information provision of personalised health websites (Sillence et al. 2007). The problem of user dissatisfaction was explored further through the theoretical lens of expectation disconfirmation theory (EDT) (Oliver 1981).

EDT links the problem of consumer (dis)satisfaction with unmet consumer expectations (Oliver 1981). In the context of this research, this theory implies that if user expectations towards certain functionality of personalised health websites are not met, health consumers are dissatisfied with them. Given that personalisation was implemented through a range of personalised features that refer to an adjustment of the service in order to suit individual needs and preferences (Steinmetz and Wolf 1997), this research emphasised user expectations related to the functionality of such features across health websites.

Analysis of three major areas of IS literature that explore user expectations, namely user-centred design, requirements engineering and service quality literature, demonstrated that while the role and importance of user expectations for effective systems design and development was acknowledged, little was mentioned about:
- the notion of user expectations;
- whether user expectations were considered and incorporated in the systems design and development processes (including online systems such as personalised health websites);
- methods for effective extraction of user expectations.

This research aimed to address the identified gaps and provide knowledge to theory and practice with further exploration of the stated issues.
To summarise, the purpose of this research was to address the problem of consideration, formalisation and inclusion of user expectations in the design and development of personalised health websites. The main objectives of the research were formulated in the form of research questions that are discussed in detail in the next section of this chapter.

8.3 Addressing Research Questions

The main research question of the study was:

*How can user expectations be incorporated in the design and development of personalised health websites?*

It was further sub-divided onto a number of sub-questions:

- What is important to know about user expectations in the design and development of personalised health websites?
- What factors influence the formation of user expectations towards personalised health websites?
- How can user expectations towards personalised health websites be extracted and incorporated in the systems design and development processes?

The research study design consisted of an extensive literature review, semi-structured expert interviews, competitive analysis of personalised health websites, think-aloud sessions with the users to extract their expectations and confirmatory interviews with systems design and development experts to validate the research artifacts. Further discussion and outline of the research activities undertaken in order to thoroughly investigate the stated research sub-questions, is presented further in this section.

8.3.1 What Is Important to Know about User Expectations in the Design and Development of Personalised Health Websites?

This research question was addressed by means of an extensive literature review and analysis of semi-structured expert interviews with systems designers and developers.

Six semi-structured interviews with systems design and developers (see Chapter 4) identified the need for formalisation of the term ‘user expectations’ in the context of systems design and
development, as it was claimed to be vague and poorly understood. As a result of this research, user expectations were defined as:

*User attitudes towards and assumptions about the functionality of personalised features (or their interface design, content they deliver). Such attitudes refer to the presence or absence of certain functional (or design, or content) elements that affect performance of personalised features, anticipated by users. Attitudes and assumptions are defined and determined by user beliefs and values, previous online experiences of the users and their intentions towards the use of personalised features. Attitudes and assumptions are also influenced by a number of affective components, provoked as a result of a user interaction with personalised features.*

The importance of provision of a precise definition of user expectations was subsequently confirmed by systems designers and developers, who stated that they had difficulty in consciously distinguishing between user needs and user expectations, even though they are two distinct concepts.

A review and analysis of the IS service quality literature demonstrated that the formation of user expectations was influenced by a number of factors, or determinants of user expectations. Parasuraman et al (1993) stated that identification of these determinants could lead to enhancement of the IS services via a better understanding of user expectations and their nature. In the research reported on in this thesis, it was emphasised that determinants of user expectations such as personal factors, introduced by Oliver (1980). Oliver (1980) defined personal factors as individual user characteristics that affect user expectations. It was found that personal factors have a significant influence on the formation of user expectations, particularly in a health context (Thompson and Sunol 1995). Moreover, personal factors determine user behaviour in an isolated, private environment that is somewhat similar to situations when health consumers search for health information online (Ryker et al. 1997; Thompson and Sunol 1995). A number of researchers, such as Ryker et al (1997), Winer (1985) and Zeithaml et al (1993), acknowledged the importance and influence of personal factors on the formation of user expectations, however, they did not elaborate any further on the matter, but simply admitted to the existing lack of research in this direction and classified it as future work.

The research reported on in this thesis, filled the identified gap in the theoretical knowledge about personal factors that influence the formation of user expectation. Five personal factors that influence the formation of user expectations are past experiences, values, beliefs, intentions and affective components. These factors were identified through an extensive literature review
and analysis. Personal factors and their role are further explained in Section 8.3.2 of this chapter.

It is important to note that this research approached user expectations as a ‘black box’. The concept of a ‘black box’ implies that cognitive processes that facilitate the formation of user expectations were out of scope of the conducted study (Cauer et al. 2000). Applicability and relevance of such an approach to this research study revealed that it was possible to extract and operationalise user expectations without the exploration of the cognitive processes that take place during the formation of expectations.

To summarise, it was confirmed that the notion of user expectations and their aspects were explored in-depth as a result of this research.

8.3.2 What Factors Influence the Formation of User Expectations towards Personalised Health Websites?

This research question was addressed by the means of an extensive literature review and a competitive analysis of personalised health websites.

As discussed in previous section, five personal factors that influenced the formation of user expectations were revealed through an extensive literature review. Each of the identified personal factors was empirically tested via think-aloud sessions. Think-aloud sessions were focused on the five most represented personalised features of health websites, which were identified through a competitive analysis of fourteen health websites from six countries, namely the USA, Australia, Singapore, India, Canada and the European Union. The analysed personalised features were:

- personalised search;
- find a doctor;
- symptoms checker;
- personalised newsletter;
- drug interactions checker.

Analysis of the think-aloud sessions based on the identified personalised features resulted in extension of five identified personal factors.

Past experiences were influenced by:

- previous searches on health matters;
- experience with medical systems and doctors;
- experience of use or search using health websites.

Beliefs and values were influenced by:
- information quality/credentials;
- perceived filtering requirements;
- presentation of the results.

Intentions were influenced by:
- use of help;
- use of information;
- use of credentials;
- willingness to use/search for medical information online.

Affective components were comprised of:
- likeness;
- annoyance;
- frustration;
- dislike;
- pleasantness;

The identified personal factors were conceptualised in the form of a theoretical Framework (see Figure 6.9) that was subsequently validated through two confirmatory interviews with experts in systems design and development. The details of the confirmatory interviews are presented in Chapter 7.

It is important that the identified personal factors which influence the formation of user expectations were explored in the context of e-health specifically. Nevertheless, it is believed that the approach to emphasising personal factors that influence the formation of user expectations and their exploration in order to extract user expectations can be transferable to other domains.
8.3.3 How Can User Expectations towards Personalised Health Websites be Extracted and Incorporated in the Systems Design and Development Processes?

This research question was addressed by the means of think-aloud sessions with users and analysis of semi-structured expert interviews with systems designers and developers.

Interviews with the systems designers and developers (see Chapter 4), demonstrated that there was a lack of a unified understanding of what methods and techniques should be used to extract user expectations. The experts had a difficulty in identifying a method, or a combination of methods, that would be the most effective in an extraction of user expectations. This research established that the use of think-aloud technique, coupled with interviews and observations, provided an effective means to extract user expectations. Such an approach was empirically tested with seven users and the results demonstrated its applicability and relevance.

The experts in their interviews also revealed the need for Guidelines that would conceptualise the notion of user expectations in relation to online systems design and development processes. The experts expressed the need for practical Guidelines that would present a structured approach to the extraction of user expectations and would subsequently inform their work. As a result of this research, a set of practical Guidelines on how to extract user expectations was developed. The Guidelines developed referenced the Framework of user expectations as a theoretical basis. Each of the personal factors included in the Framework provided theoretical grounds for the think-aloud sessions (see Chapter 6). In particular, the interview questions for the think-aloud sessions were logically linked to the identified personal factors that influenced the formation of user expectations towards personalised health websites. In the Guidelines it was also established how extraction of user expectations could be incorporated into the design and development of personalised health websites. Further details on how the think-aloud sessions and their questions relate to the developed Framework and documented Guidelines can be found in Appendix 5.

The suggested approach for extracting user expectations with the use of think-aloud technique coupled with interviews and observations, is presented in detail in Appendix 5.
8.4 Research Contributions

The study provides sound contributions to theory and makes a significant contribution to practice. The central contribution of this study is that it offers a structured, well-defined, theoretically based and empirically tested approach to the extraction and formalisation of user expectations towards personalised health websites that can be incorporated in the design and development practices. By drawing attention to the problem of the neglect of user expectations and their role in the design and development of online systems, this research provides theoretical grounds and empirical evidence on how user expectations can be extracted, based on consideration of a number of personal factors that influence the formation of user expectations in the applied e-health domain.

In the light of adopting the design science paradigm for this research, the major contributions of this study can be presented in the context of a design science framework. In general, design science research has two main types of outcomes (Blum 1996; Gregg et al. 2001; Purao 2002; Vaishnavi and Kuechler 2004):

- artifact that represents a symbolic, manipulable representation of concepts and abstractions in a form of operational principles;
- support and control of the phenomenon of interest, provided by an artifact.

Figure 8.1 represents the outcomes and contribution of this research to both theory and practice in the context of the design science approach.

![Figure 8.1 Outcomes and contributions of study](image)

Operational principles here refer to the ways of doing things in a reproducible manner (Laudan 1984). This is the way to demonstrate how the knowledge can be operationalised. For the presented research, the aim was to demonstrate how user expectations could be extracted with
the use of a systematic approach, grounded in the developed Framework of user expectations (see Figure 6.9). Such a systematic approach was subsequently represented in a form of Guidelines for systems designers and developers. Given that the design theory application must have two major aspects, one dealing with the outcomes (theory) and one dealing with the process of design itself (practice) (Walls et al. 1992), the contributions of this research can be further sub-divided into contributions to theory and practice.

8.4.1 Contributions to Theory

This study highlighted the importance and role of user expectations in the context of user-centred design. Despite the claimed importance of user expectations, their extraction, formalisation and operationalisation for better systems design and development, these aspects have been overlooked in the IS/UCD literature (Curtis et al. 1995; Pearrow 2007; Young 2004).

A review and analysis of the IS literature, namely requirements engineering, UCD and service quality literature revealed that user expectations were classified mostly as an important factor that had to be considered in order to produce better and more satisfactory systems (Curtis et al. 1995; Norman 1998; Pearrow 2007; Young 2004). However, neither methods to extract user expectations, nor a technique/procedure on how this can be done, was covered in the researched IS literature in any substantial detail. By providing insights on how user expectations can be extracted and what data collection methods can be used, this study contributes to the UCD, and subsequently IS, theory.

Another theoretical contribution of this study lies in the extension of the existing knowledge base about user expectations, in particular, knowledge related to the formation of user expectations. This study built on existing knowledge about a range of factors (determinants) that influence a formation of user expectations. Identification and precise definition of these determinants help effectively extract user expectations towards various systems, products and services. This study further explores these factors by investigating an important category of determinants, such as personal factors. The importance of this category of determinants was claimed by a number of researchers (Cox and Fisher 2009; Oliver and Winer 1987; Ryker et al. 1997; Thompson and Sunol 1995; Winer 1985; Zeithaml et al. 1993), however, personal factors have not been explored in sufficient detail to date.

It is important to emphasise the particular importance of personal factors as determinants of user expectations in the context of e-health (Thompson and Sunol 1995). It was established that there was a limited exploration of the role that personal factors play in order to identify user
expectations in the e-health context (Ryker et al. 1997; Thompson and Sunol 1995). Through the exploration of the e-health domain, and identification of personal factors as important determinants of user expectations in this domain specifically, the conducted study also provides theoretical contribution to the e-health domain.

The identified range of personal factors that influenced the formation of user expectations in the e-health domain, was conceptualised in a form of the Framework (see Figure 6.9). The developed Framework of user expectations towards personalised health websites is claimed as a theoretical contribution of this study. Given the limited empirical research of the problem of user expectations, namely what personal factors influence the formation of user expectations, it is believed that this contribution provides a valuable insight in the explored problem and extends the body of knowledge related to user expectations in the UCD, IS and e-health domains.

The conducted study also established that user expectations can be extracted and formalised without the need of further exploration of various cognitive processes, which are involved in the process of formation of user expectations. This finding can be viewed as another theoretical contribution of this study, in contrast to the IS/UCD/psychological literature that often perceives expectations as intangible entities that are problematic to extract due to a lack of knowledge about related cognitive processes.

8.4.2 Contributions to Practice

The major practical contribution of this research is the developed set of Guidelines on how to extract user expectations towards personalised health websites. The Guidelines represent a structured, formalised approach to the extraction of user expectations. It can be argued that the approach, suggested in these Guidelines, can be used to extract user expectations not only towards the functionality of the features, but also related to interface design and the content that they provide. Furthermore, it is believed that the developed Guidelines on how to extract user expectations can potentially be applied to any feature of health websites, not necessarily only personalised ones. The developed approach can subsequently be incorporated in online systems design and development practices in the e-health domain.

The use of the think-aloud method, with the elements of observations and interviews, proved to be an effective combination of methods to successfully extract user expectations towards personalised features in the e-health domain. Consequently, the application of the think-aloud method can be viewed as another contribution of this research to practice.
A precise definition of user expectations in the context of online systems design and development is provided. The need for a clear definition of user expectations in the context of online systems design and development was expressed by the experts in the field. Therefore, a provision of such a definition is another contribution to practice.

Another practical contribution of this research is that it draws attention to the specific nature of health websites in relation to the influence and role of user expectations, extraction of which could facilitate better design of personalised health websites. The private nature of the e-health domain, in particular, how it affects the formation of user expectations, was included in the developed Guidelines, so that systems designers and developers could gain a better understanding of health websites in particular, and the e-health domain in general.

In regards to the design and development practices, another contribution of this study would be the clarification of where the extraction and formalisation of user expectations fit amongst design and development processes. In particular, what stages of the design and development could involve the extraction of user expectations.

### 8.5 Limitations of Study

The results of the conducted research provide an in-depth perspective on the conceptualisation of the process of extraction and formalisation of user expectations towards personalised health websites. However, the results of the present study should be viewed in the light of the following limitations:

The findings are presented in the context of an e-health domain and restricted to the analysis of the functionality of personalised features of health websites specifically, which imposes certain limitations in regards to the applicability of the findings to other domains. It is also important that personalised features, used for the think-aloud sessions, were restricted to a number of ‘generic’ health websites that would satisfy a set of pre-defined characteristics. It is possible that for another category of health websites, for example health websites that store personal information of e-patients online, the developed approach to the extraction of user expectations will deviate.

The developed Framework is limited to the analysis of the personal factors the influence the formation of user expectations. Other factors that were found to influence the formation of user expectations in the e-health domain, such as word of mouth communications, advertisements
and personal needs, were already well-researched and, therefore, considered to be out of scope of this study.

### 8.6 Future Research

This research demonstrated that user expectations can be extracted, operationalised and incorporated in systems design and development processes. Identification and analysis of a number of personal factors that influence the formation of user expectations in the e-health domain led to a development of a Framework of user expectations. Formalisation of the process of extraction of user expectations was conceptualised and presented in the form of Guidelines that used the developed Framework as theoretical grounds. It is believed that the developed Guidelines can subsequently be used by systems designers and developers in their practices. Some of the areas identified for further research, are:

- It would be interesting to explore whether the identified personal factors that contribute to the formation of user expectation in the e-health domain are transferable to other domains. Furthermore, the applicability of the developed Guidelines could be tested in other contexts, not just in the e-health domain.

- Further classification of user expectations into positive/predictive, fuzzy/precise, implicit/explicit, unrealistic/realistic, ideal/predicted, normative/unformed categories would contribute to additional exploration of the nature of user expectations and would facilitate management of user expectations by extraction of their pre-defined types.

- Given the dynamic nature of user expectations, it is important to identify the timeframe within which user expectations change. This will help to determine the frequency of the sessions with the users in order to identify their newly formulated expectations.

- It is important to investigate the resource and money allocation required to conduct the designed think-aloud sessions with the users in order to extract their expectations towards personalised health websites. It is believed that such information will facilitate the adoption of the proposed methodology on the extraction of user expectations in industry.

- It is possible to further research user expectations towards personalised features of health websites in order to classify the features to such categories as:
  - must have;
- might have (features not critical for the success of the health website but highly desirable);
- do not need to have (features that have become obsolete).

It is believed that such categorisation will help systems designers and developers produce better, more satisfactory personalised health websites.

- The conducted study emphasised the functionality of personalised features of health websites, however, it is important to determine what expectations health consumers have towards such aspects of personalised features as the interface and the content delivered.

- The study did not investigate user expectations related to the privacy issues and concerns. Provided that certain implementations of personalised features may include collection of the user information without the user consent, it is important to investigate what expectations users have in relation to such privacy issues.

- The conducted study did not cover personalised features that required registration in order to access. However, it is important to determine whether health consumers are willing to register on the health website in order to access certain personalised features. It is interesting to identify whether user expectations towards such ‘secure’ personalised features differ from their expectations towards other personalised features of health websites.

- It would be important to research whether the created Framework can be applicable to other features of health websites, not just personalised ones.

The provided list outlines a number of research activities that can be undertaken in the future in order to strengthen the findings of this study. However, it is by no means an exhaustive list of all future research activities that can be carried out in order to extend the conducted study.

8.7 Concluding Remarks

Health consumers are becoming increasingly reliant on health websites to provide basic health information and yet, these websites are not meeting expectations of most health consumers. Personalisation is one area which could improve the health consumers’ experiences; however, health consumers stay dissatisfied, reportedly because their expectations towards personalised health websites are not met. This thesis set out to investigate how user expectations can be incorporated in the design and development of personalised health websites and what role user expectations play in these processes in order to better satisfy health consumers.
For designers and developers of health websites, there is a challenge in identifying what it is users expect of personalised features of these websites. This study identified and addressed gaps in theoretical and practical knowledge related to the notion of user expectations and in particular, their role and operationalisation in the design and development of personalised health websites.

The findings of this research draw attention to the problem of inclusion of user expectations in the design and development processes of personalised health websites in particular, and other online e-health systems in general. The research for this thesis identified, explored and addressed issues related to the role that user expectations play in the design and development of health websites. It is believed that this knowledge is crucial for the design and development of online e-health systems that will keep health consumers satisfied. Adoption of the results of this research in the near future could lead to the improvement of health consumers’ experiences with personalised health websites as their expectations will be met.
REFERENCES


Amoroso, D. and Reinig, B. (2003), Personalization management systems, paper presented to 36th Hawaii International Conference on System Sciences, Big Island, Hawaii.


Blum, B. (1996), Beyond programming: to a new era of design, Oxford University Press, New York, NY.


Fleisher, C. and Bensoussan, B. (2003), Strategic and Competitive Analysis: Methods and Techniques for Analyzing Business Competition, Prentice Hall.

Fleisher, C. and Bensoussan, B. (2007), Business and Competitive Analysis, FT Press, New Jersey, USA.


Fox, S. and Jones, S. (2009), The social life of health information, Pew Internet & American Life Project>.

Friedman, C. and Wyatt, J. (1997), Evaluation Methods in Medical Informatics, Springer-Verlag, New York, LLC.

Friedman, K. (2003), Theory construction in design research: criteria: approaches, and methods Design Studies vol. 24, no. 6, pp. 507-522


Grant, D. (1979), Design Methodology and Design Methods, Design Methods and Theories, vol. 13, no. 1, pp. 46-47.


ISO_9241-11 (1996), Ergonomic requirements for office work with visual display terminals (VDT's) - Part 11 Guidance on usability.


Lazarenko, K. and Burstin, F. (2006), 'Health information provision can be a smarter business', in proceedings of 7th International Business Information Management Association (IBIMA) Conference, Brescia, Italy.


Miller, J. A. (1977), Studying satisfaction, modifying models, eliciting expectations, posing problems, and making meaningful measurements”, in Hunt, H. K. (ed.) *Conceptualization and Measurement of Consumer Satisfaction and Dissatisfaction*, School of Business, Indiana University, Bloomington, IN.


Montgomery, A. L. and Smith, M. D. (2009), Prospects for Personalization on the Internet *Journal of Interactive Marketing*, vol. 23, no. 2, pp. 130-137


Myers, M. D. (1997), Qualitative research in information systems, *MIS Quarterly (Discovery)*, vol. 21, no. 2, pp. 241-242.


Niederdeppe, J., Frosch, D. L. and Hornik, R. (2005), Cancer-related news coverage and information seeking: Results from a national survey, paper presented to The Annual Meeting of the American Society for Preventive Oncology, San Francisco, CA.


Skinner, H., Bisope, S., Poland, B. and Goldberg, E. (2003), How adolescents use technology for health information: implications for health professionals from focus group studies., *Journal of Medical Internet Research*, vol. 5, no. 32.


Tesch, R. (1990), *Qualitative research: Analysis Types and Software Tools*, Falmer, New York.


Wu, D., Im, I., Tremaine, M., Instone, K. and Turoff, M. (2003), A framework for classifying personalization scheme used on e-commerce web sites, paper presented to 36th Hawaii International Conference on System Sciences, Big Island, Hawaii.


Appendix 1  Semi-Structured Interviews with Expert in Systems Design and Development: Questionnaire

GENERAL EXPERIENCES
1. Could you please tell me a bit about your experiences as a website/portal developer/designer?
2. Have you ever been involved in developing websites and/or portals? What kind of websites/portals? Did they have any personalised features?
3. Do you think health information websites and portals are different from other types of websites/portals due to their health context?
4. Do you follow User-Centr ed Design principles in your work practices? Please elaborate.
5. What user characteristics do you try to determine when you design/develop websites/portals?
   a. Will these user characteristics be different if you are developing a health information website/portal? Please elaborate?

EXPECTATIONS
6. Do you think user expectations are important to identify in order to design/develop better websites/portals? Why?
7. Do you think, in general, user expectations are hard to extract? Why?
8. Have you ever heard of ISO 9241-110 Ergonomics of human-system interaction: Dialogue principles? If yes, do you follow them?
9. What do you think of their ‘conformity with user expectations’ principle when designing websites/portals?
10. Do you identify and analyse user expectations when you design and/or develop a website/portal?
    A) If Yes,
       a. What types of expectations do you try to elicit?
       b. How would you formulate questions when try to elicit expectations?
       c. Which types do you find most useful for the portal design?
       d. Which types are the hardest to elicit?
       e. What difficulties do you normally come across when elicit expectations?
       f. What techniques do you use?
g. Which ones of the techniques do you find most effective?

h. What kind of questions (structure-wise) has worked best for you? Please provide some examples.

B) If No,

i. Why not?

j. Hypothetically, how would you formulate questions if you were to elicit expectations?

k. Hypothetically, using your experience, what techniques you think would be most effective and suitable for eliciting user expectations?

**FINAL Qs**

11. Do you think users will be more satisfied with a website/portal once their expectations are met?

12. Have you ever come across any guidelines on how to extract user expectations for the systems design and development purposes?
Appendix 2  Capstone Interviews with Systems Design and Development Experts: Questionnaire

1. Do the developed Guidelines on how to extract user expectations towards personalised feature of health websites make sense?

2. Do you find the suggested process of extracting user expectations to be:
   - comprehensive;
   - understandable;
   - easy to follow;
   - thorough;
   - doable?

3. Do you believe there are any missing steps in the suggested process of extracting user expectations?

4. Are there any other techniques that can be used to:
   - identify personalised features;
   - analyse personalised features?

5. Do you believe there are enough details for those using the Guidelines on how to develop questions and scenarios for the sessions with the users in order to extract their expectations?

6. Do you think the information provided in the Appendices would be useful to conduct sessions with the users in order to extract their expectations?

7. Is there anything that needs to be added to the Appendices?

8. Are the Guidelines helpful in understanding what constitutes user expectations and how expectations can be extracted (including the offered definition of expectations)?

9. Do you have any recommendations for improving these Guidelines?
Appendix 3  Ethics: Examples of Explanatory Statement and Consent Form

Explanatory Statement (Example)

1 February 2010

**Explanatory Statement** – Website/Portal Designers & Developers

**Title:** The role of user expectations in design and development of personalised health information websites and portals

**This information sheet is for you to keep.**

My name is Kate Lazarenko and I am conducting a research project with A/Prof Julie Fisher and Prof Frada Burstein in the Department of Caulfield School of IT towards a Doctor of Philosophy degree at Monash University. This means that I will be writing a thesis which is the equivalent of a 300 page book.

**Why did you choose this particular person/group as participants?**

All participants are professional portal designers or developers aged between 18 and 60. We are interested in understanding of how user expectations are identified and extracted.

**The aim/purpose of the research**

The aim of this project is to investigate user expectations as an important part of providing better designed personalised features of health information portals.

*Health information portals* are specialised gateways to a vast number of medical resources available online. A set of portal’s features that can be customised in order to meet user’s information needs and preferences are called *personalised features*.

**Possible benefits**

By agreeing to participate in this project, you help us better understand user expectations and ways to extract them. The information you provide will help us build a framework of user expectations towards personalised medical websites/portals, and design a set of guidelines for the developers of personalised health information websites/portals that will take user expectations into consideration.

**What does the research involve?**

The study involves a set of semi-structured interviews that will be audio taped. The data collected will be analysed and aggregated according to the themes to reveal some patterns, trends, similarities and differences in approaches and thinking that participants of this study will demonstrate.

**How much time will the research take?**

Each interview will require approximately 0.5 to 1 hour of your time.
Can I withdraw from the research?
Being in this study is voluntary and you are under no obligation to consent to participation. You are free to withdraw consent and discontinue participation in the research project any time prior to the completion of your data collection session.

*Note to Monash Researchers:* advise that you do not mislead your potential participants by stating they can withdraw from a research project at any time. If the project involves the submission of anonymous (non-identifiable) material, such as a questionnaire, it should explained clearly to the participants that it will not be possible to withdraw once they have submitted.

Confidentiality
All information we receive from you will remain confidential. The information will be filed by codes as no names will be collected thus the information will not be identifiable for the researchers.

Storage of data
Storage of the data collected will adhere to the University regulations and kept on University premises in a locked cupboard/filing cabinet for 5 years on a password protected hard disk. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report.

Use of data for other purposes
The data collected in this study will be used in research, specifically for the purpose of investigating user information needs toward personalised health information portals. Also, some of the data is likely to be published in academic journals and presented at conferences. However, due to the fact that it is anonymous data, nobody will be named or identified in any way. Please keep in mind that it is sometimes impossible to make an absolute guarantee of confidentiality/anonymity, however, the researchers will undertake all required actions to ensure full confidentiality/anonymity of the collected data.

Results
If you would like to be informed of the aggregate research finding, please contact Kate Lazarenko on (3) 9903 1405 or fax (03) 9903 1077. The findings are accessible for 5 years.

<table>
<thead>
<tr>
<th>If you would like to contact the researchers about any aspect of this study, please contact the Chief Investigator:</th>
<th>If you have a complaint concerning the manner in which this research &lt;insert your project number here&gt; is being conducted, please contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/Prof Julie Fisher Ph: (03) 9903 2621 Fax: (03) 9903 1077 Email: <a href="mailto:Julie.Fisher@infotech.monash.edu.au">Julie.Fisher@infotech.monash.edu.au</a></td>
<td>Executive Officer Monash University Human Research Ethics Committee (MUHREC) Building 3e Room 111 Research Office Monash University VIC 3800 Tel: +61 3 9905 2052 Fax: +61 3 9905 3831 Email: <a href="mailto:muhrec@adm.monash.edu.au">muhrec@adm.monash.edu.au</a></td>
</tr>
</tbody>
</table>

Thank you,

*Kate Lazarenko*
Consent Form (Example)

Consent Form – Website/Portal Designers & Developers

Title: The role of user expectations in design and development of personalised health information websites and portals

NOTE: This consent form will remain with the Monash University researcher for their records

I agree to take part in the Monash University research project specified above. I have had the project explained to me, and I have read the Explanatory Statement, which I keep for my records. I understand that agreeing to take part means that:

List all procedures relevant to your data collection – delete those not applicable

I agree to be interviewed by the researcher    □ Yes □ No
I agree to allow the interview to be audio-taped    □ Yes □ No
I agree to make myself available for a further interview if required    □ Yes □ No

and

I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can discontinue participation in the research project any time prior to the completion of the data collection session without being penalised or disadvantaged in any way.

and

I understand that any data that the researcher extracts from the interview for use in reports or published findings will not, under any circumstances, contain names or identifying characteristics.

and

I understand that any information I provide is confidential, and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party.

and

I understand that data from the interview will be kept in a secure storage and accessible to the research team. I also understand that the data will be destroyed after a 5 year period unless I consent to it being used in future research.

Participant’s name

Signature

Date
Appendix 4  Screenshots of Health Websites
Selected for Competitive Analysis

1. HealthInsite

1.1 Home page

1.2 Advanced search
2. Better Health

2.1 Home page

<Image of Better Health website>

3. C*Health

3.1 Home page

<Image of C*Health website>
3.2 Health newsletter (personalised)

4. NHS

4.1 Home page
5. Aaroga

5.1 Home page

6. Health Xchange

6.1 Home page
6.2 Search

7. WebMD

7.1 Home page
7.2 Health tools

8. HealthLine

8.1 Home page
8.2 Symptoms checker

8.3 Treatment search tool
9. Healia

9.1 Home page

10. MyOptumHealth

10.1 Home page
11. Health Finder

11.1 Home page

11.2 My Health Finder
12. Everyday Health

12.1 Home page

13. Revolution Health

13.1 Home page
14. AOL Health

14.1 Home page
Appendix 5  Guidelines to Extract User Expectations towards Personalised Features of Health Information Websites and Portals

CENTRE FOR ORGANISATIONAL AND SOCIAL INFORMATICS

GUIDELINES TO EXTRACT USER EXPECTATIONS TOWARDS PERSONALISED FEATURES OF HEALTH INFORMATION WEBSITES AND PORTALS

August 2010
1 Introduction

The purpose of this document is to outline the procedures for extracting user expectations towards personalised features of health information websites and portals (referred to as health websites further in this document).

These Guidelines are developed to support designers and developers in their work on personalised features of health websites at different development stages: (1) the initial design stage when the work with the users begins; (2) the test stage when the users are involved in testing of the website and (3) the review stage when the website is evaluated. The Guidelines promote implementation of user-centred design principles and help extract user expectations towards personalised features of health websites.

The Guidelines are grounded in the theoretical Framework of User Expectations (in the e-health domain) that provides a foundation, upon which a systematic process of extracting user expectations has been built. The Framework represents four determinants of user expectations that influence their formation. The determinants are (1) affective components that influence user expectations depending on the emotional state a user holds, they can be both, positive (likeness and pleasantness) and negative (dislike, annoyance and frustration); (2) past experiences of users; (3) user intentions; (4) user beliefs and values (see Appendix G3).

2 Applicability of the Guidelines

1. User expectations are context dependent. Therefore, it is important to acknowledge that these Guidelines are applicable to user expectations towards personalised features of health websites SPECIFICALLY.

2. It is important to identify targeted groups of users to represent use cases. User perceptions of nominated personalised features and user intentions towards using such features are likely to vary from one group of users to another, which might affect user expectations. For efficient application of the Guidelines it is recommended to alter the scenarios and interview questions in accordance with a targeted group of users, whose expectations need to be extracted.

3 Terminology

The list of terms and their description in the context of the Guidelines are presented below.

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determinants of user</td>
<td>Cognitive elements that influence the formation of user expectations</td>
</tr>
<tr>
<td>expectations</td>
<td></td>
</tr>
<tr>
<td>Health information portal</td>
<td>A gateway that provides users with an easy access to a variety of medical information online. It accumulates health related information and provides a one-stop-for-all service when people are looking for medical information online.</td>
</tr>
<tr>
<td>Health information website</td>
<td>A collection of web pages that accumulates health related information and serves. It is a virtual place that brings together information on health, lifestyle and medical conditions.</td>
</tr>
<tr>
<td>Personalisation</td>
<td>An understanding of a user, user tasks and the context, in which the user accomplishes tasks and goals. Personalisation can be regarded as</td>
</tr>
</tbody>
</table>
a service of delivering relevant information to the right people at the right time with specific parameters of features that are personalised, regarded as service attributes.

<table>
<thead>
<tr>
<th>Personalised features</th>
<th>Features that refer to the adjustment of services in order to suit individual needs and preferences of users.</th>
</tr>
</thead>
<tbody>
<tr>
<td>User expectations</td>
<td>User attitudes towards and assumptions about the functionality of personalised features (or their interface design, content they deliver). Such attitudes refer to the presence or absence of certain functional (or design, or content) elements that affect performance of personalised features, anticipated by users. Attitudes and assumptions are defined and determined by user beliefs and values, previous online experiences of the users and their intentions towards the use of personalised features. Attitudes and assumptions are also influenced by a number of affective components, provoked as a result of a user interaction with personalised features.</td>
</tr>
<tr>
<td>User-centred design</td>
<td>Both a broad philosophy and a set of methods and techniques that claim the importance of user involvement in the process of design and development of websites and portals. Such involvement makes users the main participants of the design and development stages and allows them to choose what informational areas and functionality should be prioritised and paid particular attention to.</td>
</tr>
</tbody>
</table>

4 Procedure

The procedure for extracting user expectations is grounded in the user-centred design philosophy. This philosophy advocates for involving users in the systems design and development process using various set of techniques. The main techniques to extract user expectations is a think-aloud technique, coupled with interviews and observations.

There are two categories of personalised features that can be analysed:
- (1) existing personalised features;
- (2) prospective –non-existent/implemented yet - personalised features.

The procedure can be carried out at three stages of work with health websites:
- (1) the initial design stage when the work with the users begins;
- (2) the test stage when the users are involved in testing a website (applied to existing personalised features);
- (3) the review stage when a website is evaluated (applied to existing personalised features)

The procedure (outlined in the diagram below) can be regarded as a strategy and, therefore, involves a number of key steps combined with the monitor & review and communicate & analyse processes as continuous initiatives.
The outlined procedure is explained in detail below:

**1) Analyse personalised features (for existing personalised features ONLY)**

Existing personalised features need to be analysed to determine their (a) complexity (what functionality they deliver) in order to specify (b) a number and type of steps, required to extract user expectations towards these features.

Proposed personalised features do not need to be analysed to determine their complexity.

**(a) Complexity**

Techniques that can be used to determine complexity of personalised features:

- usability testing;
- expert evaluation;
- comparative analysis

The types of complexity of personalised features are:

<table>
<thead>
<tr>
<th>Type of complexity</th>
<th>Characteristic</th>
</tr>
</thead>
</table>
| Low                | It implies relative unification of the functionality of personalised features across various health websites.  
*For example, Personalised newsletter is a relatively straight-forwards feature that requires providing an email address and choosing what aspect of information the users are interested in. There is not much variety in the functionality of this feature, offered across various health websites.* |
| Medium             | It signifies relative flexibility in relation to the functionality of personalised features.  
*For example, such personalised features as Personalised search, Drug Interactions* |
checker and Find a doctor do vary in their functionality. However, there are more than 50% similarities of the functionality of these features across various health websites. Therefore, due to the relative (50%) commonness of implementations of such features, their complexity is defined as medium.

| High      | It signifies a great variety of the implemented functionality of personalised features.  
|           | For example, such feature as Symptoms checker has significant differences in its implementations across various health websites. Therefore, it is labelled as a 'high complexity' feature. |

(b) Steps

Step 1 (short interview)
Aim – to extract user expectations by asking users some generic questions about a nominated personalised feature in a form of a short interview. Step 1 is conducted at the start of each session – one session for each personalised feature.

Step 2a (hypothetical scenario & interview)
Aim – to extract user expectations by providing users with a hypothetical scenarios and asking them a set of questions about their hypothetical actions in a form of an interview.

Step 2b (actual scenario & interview)
Aim – to extract user expectations by asking users to access a nominated personalised feature of a selected health website in order to perform an actual scenario. While performing the scenario, the users are asked to talk aloud about everything that runs through their head, so-called think-aloud technique. If the users slow down or react in an emotional way, it is recommended to ask them certain questions about the causes of such reactions (see Appendix G7). After the scenario, the users are asked a set of questions about the performed task in order to gain an insight into their recent experiences with the nominated personalised feature.

(1) Existing Personalised Feature
- Low complexity
  - Step 1 (short interview)

(2) Prospective Personalised Feature
- Medium complexity
  - Step 1, Step 2a and Step 2b
- High complexity
  - Step 1 and Step 2b

(2) Develop questions

Questions developed for the extraction of user expectations towards personalised features of health websites, in an interview form, are based on the Framework of user expectations (see Appendix G3). The types of questions vary depending on the steps that need to be undertaken in order to extract user expectations:
Step 1

- When it comes to using __[personalised feature]__, what makes it valuable for you? – Beliefs/values
- What is important to you in the process of using it [the feature], apart from getting the information you are after? – Beliefs/values
- Can you think of any characteristics of the [personalised feature] that you liked or found helpful in the past? - Past experience; affective components
- Can you think of any characteristics of the [personalised feature] that you disliked or found disappointing in the past? - Past experience; affective components

The last two questions should only be asked if the personalised feature has been encountered by the user in the past.

With the prospective personalised features and existing personalised features unfamiliar to the users, it is recommended to provide users with a debrief on what the feature is (will be) and its (proposed) functionality (see Appendix G1).

Step 2a

- How would you envisage the feature functioning? - Intentions
- What would help you? Would this or that functionality help you? - Past experience
- What potential issues can you think of? - Past experience
- How many steps do you anticipate to go through before the final result? - Past experience; intentions

Step 2b

- Was there anything about [personalised feature] that you liked or found helpful? Why? - Past experience; beliefs/values; affective components
- Was there anything that you disliked or found disappointing about [personalised feature]? - Past experience; beliefs/values; affective components
- Have you got any other comments? - Past experience; beliefs/values; affective components

The example of a full set of questions can be found in Appendix G4.

(3) Create scenarios

The purpose of scenarios is to provoke a response from users, which is related to the functionality of the nominated personalised features. Both types of scenarios, hypothetical and actual ones, have to be:
- simple;
- precise;
- written in plain language - no specialised terminology should be used;
- comprehensive;
- relatively short;
- do-able;
- not overly time-consuming;
- tested prior to the performances;
- introduce real life & everyday problems;
- be close to the real life experiences.

The users should be asked to think aloud as they perform the actual scenarios (Step 2b).

Example of hypothetical and actual scenarios can be found in Appendix G4.
Suggested questions that can be asked while the users are performing scenarios, are listed in Appendix G7.

(4) Conduct sessions

- It is recommended to run the sessions in settings, close to the real life situations. For example, when the participants are invited into a comfortable office with either a laptop or a desktop, whatever they normally use, so that they can suit themselves in performing tasks.

- The number of participants can vary from six to eight.

- It is not recommended to run sessions for longer than 1.5 hours.

- The number of personalised features included in one session will depend on the complexity of personalised features and on how much interaction the session involves. The decision about the final number of personalised features should be based on the proposed duration of a session (see the previous point).

- Sessions need to be audio taped and the users need to give their consent for it. The users need to be observed in order to detect certain emotional responses, to be able to follow up on such responses and to enquire further. Video-taping of sessions is optional.

(5) Analyse results

Once the sessions are run and the audio data is transcribed, each session needs to be thoroughly analysed to extract user expectations towards nominated personalised features.

The analysis of results includes an assessment/consideration of the transcribed responses of users with the emphasis on certain attitudes that users expressed in regards to the functionalities of the nominated personalised features. These attitudes are user expectations.

Examples of how the users might reveal their expectations (not in a straight forward manner ‘I expect that...’ but in an indirect manner) can be found in Appendix G5.

(6) Monitor and Review

Ongoing monitoring and review is paramount to ensure that personalised features, represented on the health websites are meeting user expectations. Given that user expectations are dynamic and change when the market changes, regular monitoring and review of the market and competitors’ health websites is needed to be able to meet user expectations.

(7) Communicate and Analyse

Communication and analysis are important elements at each step of the extraction of user expectations. Effective communication is essential to ensure resolution of any potential issues or misunderstandings with the users. Analysis is required in order to use the most suited techniques and to develop the most appropriate questions and scenarios for the nominated personalised features.
An example of a Questionnaire used to extract user expectations towards such personalised features as (1) Personalised search, (2) Symptoms checker, (3) Find a doctor, (4) Personalised newsletter and (5) Drug interactions checker, can be found in Appendix G4.

A detailed list of user expectations towards five nominated personalised features can be found in Appendix G6. Six broad categories of existing user expectations towards the functionality of personalised features of health websites, extracted in 2010, also can be found in Appendix 6.
Appendix G1 Examples of Existing Personalised Features

As the users might not be familiar with some of the existing personalised features and would not be familiar with the prospective personalised features, it is recommended to provide users with a short explanation on what the feature is (will be) about and its (proposed) functionality.

The explanations should be:
- precise;
- concise;
- not too detailed about functionality;
- written in plain language;
- easy to understand.

Examples of the explanations:

<table>
<thead>
<tr>
<th>Personalised Feature</th>
<th>Brief Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms checker</td>
<td>Symptoms checker enables you to assess your state of health by asking you to provide a list of symptoms that you experience at present or experienced in the past. On the basis of these symptoms, the Symptoms checker provides you with a list of potentials conditions you might have. Being a stand alone feature, it does not replace visiting your Dr but it often helps determine whether you might require urgent medical assistance.</td>
</tr>
<tr>
<td>Find a doctor</td>
<td>Find a doctor is a feature that helps you locate health professionals you are looking for within the area you nominate.</td>
</tr>
<tr>
<td>Personalised Newsletter</td>
<td>Some health websites provide an option to sign up for a Personalised newsletter that will send you information about various conditions, diseases, etc. You will often be asked to provide some personal information about yourself and also some information about the healthcare aspects you are interested in, in order to receive such newsletters.</td>
</tr>
<tr>
<td>Drug interactions checker</td>
<td>Drug interactions checker is a feature that enables you to check interaction of two or more drugs with each other, and other substances such as alcohol, food and others.</td>
</tr>
</tbody>
</table>
Appendix G2  
Sessions to Extract User Expectations towards Selected Personalised Features

The results of analysis of five personalised features of health websites, conducted in 2010 with a targeted user group of health consumers, both males and females, 18-65 years old with at least 4 years of experience of using Internet, proved the following design of sessions with the users to be effective for extracting user expectations towards five existing personalised features:

<table>
<thead>
<tr>
<th>Personalised Feature</th>
<th>Sessions</th>
<th>Comments</th>
</tr>
</thead>
</table>
| 1. Personalised search | Step 1  
Step 2a  
- Scenario 1 (Hypothetical)  
Step 2b  
- Scenario 2 (Actual search) | Each of the participants was asked to test two personalised searches so the actual scenario was repeated twice for each of the personalised searches respectively. |
| 2. Symptoms checker | Step 1  
Step 2b  
- Scenario 2 (Actual search) | It was decided not to use the hypothetical scenario due to the:  
- complexity of the feature;  
- variety of its implementations (with or without body map, with a list of symptoms or type-in symptoms, with or without implementation of videos, etc.) |
| 3. Find a doctor | Step 1  
Step 2a  
- Scenario 1 (Hypothetical)  
Step 2b  
- Scenario 2 (Actual search) | The functional complexity of the feature required all steps to be performed. |
| 4. Personalised newsletter | Step 1 | The feature is very simple as it simply asks the users to tick boxes and provide their email address. Due to its functional simplicity, it was decided to disregard Step 2. |
| 5. Drug interactions checker | Step 1  
Step 2a  
- Scenario 1 (Hypothetical)  
Step 2b  
- Scenario 2 (Actual search) | The functional complexity of the feature required all steps to be performed. |
Appendix G3  Framework of User Expectations and Questions to Extract User Expectations

Framework of user expectations (see the diagram below) provides theoretical grounds upon which a systematic process of extracting user expectations can be built.

Each element of the Framework represents determinants of user expectations that influence the formation of expectations. Therefore, the determinants of user expectations need to be taken into consideration in order to effectively extract user expectations towards health websites. There are four determinants:

(1) Affective components

Affective components are factors that affect user expectations depending on the emotional state the user holds. They can be both, positive (likeness and pleasantness) and negative (dislike, annoyance and frustration). Affective components influence the formation of user expectations, but they also serve as indicators of user’s emotional state, which helps determine and extract user expectations.

(2) Past experiences

Personalised features are widely implemented across various websites and portals so the users are likely to have an experience of working with them before. That experience is likely to affect
user expectations towards encountered personalised features of health websites, even though the users might not have used them before. This makes previous experiences an important criterion to consider in order to extract user expectations.

(3) Intentions

Intentions involve commitment and link an action tendency to a conscious plan, which may help in a formation of predictions of outcomes. Depending on what users intend to get out of a personalised feature, they build their expectations and perception of it around these intentions. Intentions are dictated by and dependent on user individuality and a situational context.

(4) Beliefs and Values

Beliefs are proper, accepted grounds for seeking or claiming a particular outcome. They relate to future occurrences and are perceived as important determinants of those occurrences because they influence the choices that are made.

Values are motives that influence actions and summarise past experiences linking them to the dimension of "goodness-badness". Values determine attitudes and behaviours and are usually relatively stable, although they do change over a life-span due to socialisation and other life experiences, but they are not affectively neutral.

Each of the questions developed to extract user expectations towards personalised features of health websites, is referred to one or more determinants of user expectations, identified in the Framework (see the table below).

<table>
<thead>
<tr>
<th>Determinants of user expectations</th>
<th>Questions</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beliefs/values</td>
<td>When it comes to using ___________, what makes it valuable for you?</td>
<td></td>
</tr>
<tr>
<td>Beliefs/values</td>
<td>What is important to you in the process of using it [personalised feature], apart from getting the information you are after?</td>
<td></td>
</tr>
<tr>
<td>Past experience; affective</td>
<td>□ Can you think of any characteristics of the [personalised feature] that you liked or found helpful in the past?</td>
<td>Step 1 (Interview)</td>
</tr>
<tr>
<td>components</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past experience; affective</td>
<td>□ Can you think of any characteristics of the [personalised feature] that you disliked or found disappointing in the past?</td>
<td></td>
</tr>
<tr>
<td>components</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past experience</td>
<td>What would help you? Would this or that functionality help you?</td>
<td></td>
</tr>
<tr>
<td>Past experience</td>
<td>What potential issues can you think of?</td>
<td>Step 2a (Hypothetical scenario &amp; interview)</td>
</tr>
<tr>
<td>Past experience; intentions</td>
<td>How many steps do you anticipate to go through before the final result?</td>
<td></td>
</tr>
<tr>
<td>Intentions</td>
<td>How would you envisage the feature functioning?</td>
<td></td>
</tr>
<tr>
<td>Past experience; beliefs/values; affective components</td>
<td>Was there anything about <em>personalised feature</em> that you liked or found helpful? Why?</td>
<td>Step 2b (Concluding Interview - after the actual scenario)</td>
</tr>
<tr>
<td>Past experience; Beliefs/values; Affective components</td>
<td>Was there anything that you disliked or found disappointing about <em>personalised feature</em>?</td>
<td></td>
</tr>
<tr>
<td>Past experience; Beliefs/values; Affective components</td>
<td>Have you got any other comments?</td>
<td></td>
</tr>
</tbody>
</table>
Appendix G4  Sample of a Questionnaire Used to Extract User Expectations

This is an example of a Questionnaire used to extract user expectations towards five personalised features of health websites. The session was conducted in 2010 with a targeted user group of health consumers, both males and females, 18-65 years old with at least 4 years of experience of using Internet.

1. Generic Questions

Please provide the following information:

Gender:  □ male  □ female

Age:  □ 18-30  □ 31-45  □ 45+

Experience of using Internet (years) ______

How often:  □ daily  □ weekly  □ fortnightly

Have you used health information portals or websites before? yes / no

If yes, which of the following features are you familiar with:-

□ search
□ symptoms checker
□ find a doctor
□ newsletter
□ drug interactions checker

2. Personalised Features Related Questions

2.1 Personalised Search (medium complexity)

Step 1
1. When it comes to using personalised search, what makes it valuable for you?
2. What is important to you in the process of searching, apart from getting the information you are after?
   □ Can you think of any characteristics of personalised search that you liked or found helpful in the past?
   □ Can you think of any characteristics of personalised search that you disliked or found disappointing in the past?

Step 2a - Hypothetical Scenario

“Imagine that your partner appears to have chicken pox, and that you are going to search for the information online using one of the health information portals or websites. You are particularly interested in the symptoms of the disease when it affects adults”

1. How would you envisage it functioning? (or ‘Please describe how would you go about your search?’)
2. What would help you in your search?
3. What potential issues can you think of?
4. If you were to get too many results, what would help you narrow your search down?

1 The first section – Generic questions - might include demographic information but it is not compulsory
Step 2b - Actual Scenario (1)

“Imagine that your partner appears to have chicken pox. Please search the Healia portal (http://www.healia.com/) for the information about its symptoms when it affects adults. While you do so, try to say everything that goes through your mind. You may stop once you feel you have come to a satisfying result or whenever you want to quit.”

1. Was there anything about this search function that you liked or found helpful? Why?
2. Was there anything that you disliked or found disappointing about this search function?
3. Have you got any other comments?

Step 2b - Actual Scenario (2)

“Imagine that your partner appears to have tonsillitis. Please search the Revolution Health (http://www.revolutionhealth.com/) portal for the information about its symptoms that adults have. While you do so, try to say everything that goes through your mind. You may stop once you feel you have come to a satisfying result or whenever you want to quit.”

1. Was there anything about this search function that you liked or found helpful? Why?
2. Was there anything that you disliked or found disappointing about this search function?
3. Have you got any other comments?

2.2 Symptoms Checker (high complexity)

Step 1

- Might start with a brief explanation about the feature

1. What would make such a feature valuable for you?
2. What is important to you in the process of checking the symptoms, apart from getting the information you are after?
3. How would you envisage it functioning?
4. How many steps would you anticipate to go through before getting the final result?

☐ Can you think of any characteristics of this feature that you liked or found helpful in the past?
☐ Can you think of any characteristics of this feature that you disliked or found disappointing in the past?

Step 2b - Actual Scenario

“Imagine that you are suffering from light abdominal pain. Use the symptoms checker located on the WebMD website (http://symptoms.webmd.com/) to identify the condition. While you do so, try to say everything that goes through your mind. You may stop once you feel you have come to a satisfying result or whenever you want to quit.”

1. Was there anything about this feature that you particularly liked or found useful? Why?
2. Was there anything that you disliked or found disappointing about this feature?
3. Have you got any comments about the visual map/list of symptoms?
4. Have you got any other comments?

2.3 Find a Doctor (medium complexity)

Step 1

- Might start with a brief explanation about the feature

1. What would make such a feature valuable for you?
2. What is important to you in the process of finding a doctor, apart from getting the information you are after?

☐ Can you think of any characteristics of this feature that you liked or found helpful in the past?
☐ Can you think of any characteristics of this feature that you disliked or found disappointing in the past?

Step 2a - Hypothetical Scenario
Think of a hypothetical situation when you have **light back pain**. You have decided to locate a health practitioner who would be able to help you by using an online tool ‘Find a Doctor’.

1. How would you envisage it functioning?
2. What would help you in finding a doctor?
3. What characteristics of the doctor would be important to you?
4. How many steps would you anticipate to go through before getting the final result?
5. What potential issues can you think of?

Step 2b - Actual Scenario


1. Was there anything about this feature that you particularly liked or found useful? Why?
2. Was there anything you disliked or found disappointing about the feature?
3. Have you got any other comments?

### 2.4 Personalised Newsletter (low complexity)

Some portals provide an option to sign up for a personalised newsletter that would send you information about various conditions, diseases, etc. They tend to ask you to provide some personal information about yourself and also some information about the healthcare aspects you are interested in.

**Step 1**
- **Might start with a brief explanation about the feature**

1. What would make such a feature valuable to you?
2. What information about yourself would you be willing to provide to make the newsletter more relevant to you?
3. What options to choose from do you believe it should provide (in terms of the healthcare aspects)?
4. How often would you expect to get such a newsletter?

### 2.5 Drug Interactions Checker (medium complexity)

**Step 1**
- **Might start with a brief explanation about the feature**

1. What would make such a feature valuable for you?
2. What is important to you in the process of checking the drug interactions?
3. Can you think of any characteristics of this feature that you liked or found helpful in the past?
4. Can you think of any characteristics of this feature that you found disappointing in the past?

**Step 2a - Hypothetical Scenario**

“Imag[ine that you need to check interaction of such drugs as *penicillin* and *tetracycline* using an online drug interaction tool on a health website”

1. How would you envisage it functioning?
2. What could help you in the process of checking?
3. What potential issues can you think of?
4. How many steps would you anticipate to go through before getting the final result?

**Step 2b - Actual Scenario**

“Imagine that you need to check interaction of *penicillin* and *tetracycline* using the drug interaction tool on Healthline website ([http://www.healthline.com/](http://www.healthline.com/)). While you do so, try to say
everything that goes through your mind. You may stop once you feel you have come to a satisfying result or whenever you want to quit”

1. Was there anything about this feature that you particularly liked or found helpful?
2. Was there anything you disliked or found disappointing about this feature?
3. Are there any other substances you would want to see the drug interacts with (apart from the presented ones)?
4. Have you got any other comments?
Appendix G5  What to Look for During the Process of Extraction of User Expectations

User expectations do not always get revealed in a straight-forward manner ‘I expect that...’ but rather in an indirect manner:

Examples:

‘I thought this feature would.’
‘I wanted to see...’
‘Where is... (certain functionality or feature)?’
‘That would be nice to have...’
‘I would always prefer...’
‘Oh that’s exactly what I was talking/thinking about!’
‘It should be ...’
‘That would be very useful/helpful (to have)...’
‘Normally it’s like this/should be like this...’
‘It’s good but I would (want to have it this way)’
‘Why doesn’t it say that...?’
Etc.

A careful analysis of the data, collected during think-aloud sessions, is required as the participants can express their expectations in various ways. However, participants often re-iterate the points made so as the session continues, certain points related to the expectations, become obvious. It is also recommended that the analysis of the data is conducted directly after each of the think-aloud sessions while the impressions from the session, observations, expressed emotions and body language of the participants, are still fresh.
Appendix G6    User Expectations towards Selected Personalised Features

The results of analysis of five personalised features of health websites, conducted in 2010 with the targeted user group of health consumers, both males and females, 18-65 years old with at least 4 years of experience of using Internet, demonstrated that user expectations towards five personalised features (1) Personalised search, (2) Find a doctor, (3) Personalised newsletter, (4) Symptoms checker and (5) Drug interactions checker, can be classified into six broad categories presented on the diagram below:

The users:
- expressed the need for help with the medical terminology finding it complex to spell medical terms;
- expected to have options to refine obtained results to make them more relevant;
- expected to have some sort of help and guidance from health websites about working with personalised features;
- had certain expectations in relation to what additional information they wanted to obtain when they dealt with certain personalised features, and what information they were ready to provide to get more relevant results;
- had certain expectations towards the presentation of the results by Personalised search and towards the design of the personalised features themselves.

The table below presents a set of revealed user expectations towards five selected personalised features of health websites.
<table>
<thead>
<tr>
<th>Expectations</th>
<th>Personalised features</th>
<th>Personalised search</th>
<th>Symptoms checker</th>
<th>Find a doctor</th>
<th>Personalised newsletter</th>
<th>Drug interactions checker</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Minimised medical terminology</td>
<td>Term suggestions; Related search; Type-in help; Spell checker</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Term suggestions; Type-in help; Spell checker</td>
<td></td>
</tr>
<tr>
<td>2. Provision of additional information and information required from the users</td>
<td>Credentials; Output (additional information) - additional suggestions, featured articles, etc.</td>
<td>Output (additional information) - type of medications that can help and possible ways of treatment, places to go to for help and further referrals</td>
<td>Output (additional information) - Doctor's experience, credentials, gender, reputation, etc.</td>
<td>Input - age (range), gender, interests/preferences, postcode, etc.</td>
<td>Credentials; Output (additional information) - drug brand names, additional substances the drug may interact with; information about the producers of the drugs, about the interaction itself and potential side effects and whether the drugs can be taken together</td>
<td></td>
</tr>
<tr>
<td>3. How well the results can be refined</td>
<td>Filtering the results - by certain topics, type of results, symptoms, age, etc.</td>
<td>Filtering the results - by gender, age</td>
<td>Filtering the results - by postcode/surrounding area, practitioner, proximity to the specified area</td>
<td>Filtering the results - by conditions and concerns, certain diseases, interests and types of information</td>
<td>Filtering the results - parameters are not specified</td>
<td></td>
</tr>
<tr>
<td>4. Presentation of the results in an informative manner</td>
<td>Description of the obtained resources - blub, number of obtained resources, date of the last update, relevance match (%)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Expectations</td>
<td>Personalised search</td>
<td>Symptoms checker</td>
<td>Find a doctor</td>
<td>Personalised newsletter</td>
<td>Drug interactions checker</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>--------------</td>
<td>------------------------</td>
<td>-------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>5. Design of personalised Features</strong></td>
<td>Location of the search box; Highlighting of certain aspects; Sponsor links and ads; Navigation; Top down structure</td>
<td>Highlighting of certain aspects; Navigation; Top down structure; Visual map; List of symptoms; Font and layout</td>
<td>Visual map</td>
<td>N/A</td>
<td>Top down structure</td>
<td></td>
</tr>
<tr>
<td><strong>6. Provision of help with Personalised Features</strong></td>
<td>Help with the categories; Help with the functionality</td>
<td>Help with the functionality</td>
<td>Help with the categories; Help with the functionality</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>
Appendix G7  Questions to Ask Users during the Scenarios

There are four types of questions that users can be asked while they are performing scenarios:

- Questions concerned with problems, experienced by a participants in a process of solving a task, such as ‘What is happening?’, ‘What are you looking for?’ and so on. These questions can be asked if a participant is slowing down in their task, etc.

- Speculative or hypothetical questions, related to non-existing aspects of the system, such as ‘Would it be of interest to you (if it was here)?’, ‘Would it help you?’ and so on. These questions can be asked about hypothetical features in order to provide participants with some suggestions and wait for their response and feedback.

- Retrospective questions when the participants are asked to look back and assess certain situations. Such questions as ‘Did you notice this? Why not?’ and so on can be used to provoke a reaction to certain functionalities of a feature that went unnoticed.

- Questions related directly to the emotions, expressed by the participants. The questions like ‘Why are you laughing?’, ‘Do you like it?’ can be used to get a clear idea about the emotional responses of the participants to certain functionalities.

The choice of the questions will depend on the analysed personalised feature and the scenario itself.
GLOSSARY

**Customer** – an individual or entity for whom a product is developed or service is rendered, and/or the individual or entity who uses the product or service, i.e. same as a user (here).

**Desired expectations** - wanted level of the systems performance

**Determinants of user expectations** - cognitive elements that influence formation of expectations

**E-health** - delivery of information and health services via the Internet or related technologies

**E-patients** - the new breed of Internet users gathering information about a medical issue of particular interest to them.

**Expectation disconfirmation theory** – is a theory that originates from marketing and posits that user satisfaction is mediated through positive or negative (dis)confirmation between expectations and service performance; the (dis)confirmation occurs when the users compare their perceptions of service performance against their expectations towards that service. If perceived performance exceeds or meets user expectations then the user is satisfied; if not, then the user stays dissatisfied. Confirmation occurs when perceived performance meets user expectations while disconfirmation occurs when it does not.

**Expectations** - beliefs about a future event that is based on information gathered directly by the users through personal observation, indirectly through attention to information provided by others (including websites and portals), or is inferred based on information or observation of some related occurrence.

**Health consumer** - same as e-patients (here)

**Health information portal** – a gateway that provides users with an easy access to a variety of medical information online. It accumulates health related information and provides one-stop-for-all service when people are looking for medical information online.
Health information website - a collection of web pages that accumulates health related information and serves. It is a virtual place that brings together information on health, lifestyle and medical conditions.

Health website – same as Health information website/portal (here)

Information overload – the state the users are at when they are no longer able to process the retrieved information effectively due to its volume.

Internet patients – same as e-patients (here)

Internet-savvy patients – same as e-patients (here)

Medical website – same as Health information website (here)

Online health systems – health information websites and portals (here)

Personalised features - features that adjust services of the websites in order to suit individual needs and preferences of the website users

Predictive (adequate) expectations - estimates of anticipated level of the system performance

Requirements engineering - an area within a broader field of systems and software engineering focused on eliciting systems’ requirements – “statements that identifies a capability, characteristic, or quality factor of a system in order for it to have value and utility for a user

User-centred design - is both a broad philosophy and a set of methods and techniques that claim the importance of user involvement in the process of information systems design.