

Online Yellow Pages for Older Adults: A Usability Study

Shai Aharon

**A dissertation submitted to Auckland University of Technology in partial
fulfillment of the requirement for the Degree of Master of Business**

2007

Business School

Primary Supervisor: Dr. Philip Carter

TABLE OF CONTENTS

<i>List of appendices</i>	<i>iv</i>
<i>List of tables</i>	<i>v</i>
<i>Attestation of Authorship</i>	<i>vi</i>
<i>Acknowledgements</i>	<i>vii</i>
<i>Abstract</i>	<i>viii</i>
1 Introduction	1
1.1 Background.....	1
1.2 Aim and approach	1
1.3 Structure of Dissertation.....	2
2 Literature Review	3
2.1 Yellow Pages.....	3
2.2 Usability	6
2.3 Older Adults	11
2.3.1 Visual design	12
2.3.2 Interaction design	13
2.3.3 Information design	15
2.3.4 Architecture design.....	15
2.4 Usability Testing with Older Adults.....	16
3 Method	18
4 Results	22
4.1 User 1	23
4.2 User 2	28
4.3 User 3	33
4.4 User 4	37
4.5 User 5	42
4.6 User 6	47
5 Discussion	52

5.1	Restrictive design features.....	52
5.2	Positive design factors.....	55
5.3	Other Factors	56
5.4	Main value	58
6	Summary.....	62
6.1	Implications.....	62
6.2	Limitations.....	65
6.3	Future work	65
6.4	Summary and Conclusions	66
	Appendices	68
	Appendix A: Website Usability Factors	68
	Appendix B: Summary of Participant background and characteristics	69
	Appendix C: Pre-Defined Tasks	70
	Appendix D: Participant questionnaire	71
	Appendix E: Participant information sheet	72
	Appendix F: Consent form.....	74
	Reference list.....	75

List of appendices

Appendix 1: website usability factors.....	68
Appendix 2: summary of participant background and characteristics	69
Appendix 3: pre-defined tasks	70
Appendix 4: participant questionnaire	71
Appendix 5: participant information sheet.....	72
Appendix 6: consent form.....	74

List of tables

Table 2.1: usability techniques.....	8
Table 4.1: summary of participant background and characteristics	22
Table 4.2: usability test results (user 1).....	24
Table 4.3: usability test results (user 2).....	29
Table 4.4: usability test results (user 3).....	34
Table 4.5: usability test results (user 4).....	38
Table 4.6: usability test results (user 5).....	43
Table 4.7: usability test results (user 6).....	48
Table 5.1: visual design restrictions	52
Table 5.2: interaction design restrictions.....	53
Table 5.3: information design restrictions.....	55
Table 5.4: summary of the main yellow pages book value users identified	59
Table 5.5: summary of the online website value	60

Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Shai Aharon

Acknowledgements

The author wishes to express his sincerest gratitude to Dr. Philip Carter for his patient support, encouragement and words of wisdom. Dr Carter's time and constructive guidance was always sincerely appreciated.

Sincere thanks are also due to Senionet who provided me the subjects in this study, as well as to their supervisors. Without their willingness to share details and perceptions, this study could not have been undertaken.

Special thanks to my wife Carmit for her support and big hug to my lovely four children Matan, Ravid, Amitai and Agam. Also special thanks to my parents overseas who were also great and to the many other family members and friends for their direct and indirect help they so willingly provided.

Ethics approval was given by the Auckland University of Technology Ethics Committee on 13 October 2006; AUTEK Reference number 06/156.

Abstract

This research examines the usability of online Yellow Pages for older adults. Older adults are an increasingly important group of internet users but they have not had much web design attention, even though previous studies indicate that they face various difficulties when using the internet. This study primarily uses usability testing to examine the actual experience of older adults when using the online Yellow Pages.

The findings from this study indicated that the online Yellow Pages has some design deficiencies in relation to older users, namely; small clickable icons, not easily recognised clickable items, important information located at the screen periphery, non-standard design of pages, missing headings for some clickable areas, poor distinction between content and advertisements, a poor search mechanism, and no spellchecker. However, positive aspects were also discovered, including; a good colour schema, appropriate use of hierarchical menus, simple language, a map facility, and national search.

The study showed that the Yellow Pages book is a highly valued product for the senior age group. There was strong motivation to use it because the information acquired related to important parts of their lives. In addition, the book assisted them to make appropriate use of this information. The study found that the online Yellow Pages was also regarded as a valuable product because it was seen to provide some of the functionality of the book. In addition, the online version was perceived to have additional value in that it provided national searching and location maps. However, computer and internet familiarity had a strong influence on prospective take up. Whether the user had the habit of having the computer on and immediately available also had a strong influence on users' expectation that they will become regular users of the online Yellow Pages.

This study contributes the first usability research done for the Yellow Pages web site among older adults. It builds on the existing understanding of older users' needs when using the Internet, and will benefit web designers and hopefully, in turn, older users.

1 Introduction

1.1 Background

I have been working in the Yellow Pages industry for almost fifteen years; mainly in the Information Technology department, developing and maintaining the current systems that produce the printed products. In an earlier study for a post-graduate course, I examined the usability of the printed Yellow Pages among non-native English speakers (Aharon, 2005) and concluded that the Yellow Pages book, which has been around for more than a hundred years is a very solid product and very easy to use.

In this study, I wanted to examine the usability of the online version of the Yellow Pages among older users 65 years old and over. I thought the online Yellow Pages would have a number of advantages, such as being updated on a daily basis and being accessible over the internet. I was also curious about an older user group, being in my forties myself and approaching that stage of my life.

The population of older people is projected to comprise 21 percent of the total population by the year 2050 and projected to reach 86.7 million ("The U.S. Administration on Aging", 2004). The baby boomers, who are currently computer and Internet users, will reach their retirement age from 2011. They are quite affluent and have high purchasing power which makes them extremely important customers for any business.

1.2 Aim and approach

The main focus of this research is on the usability study of online Yellow Pages among older user 65 years old and over. It is anticipated that the results from this research will assist the designers of the online Yellow Pages to understand what is working well and what needs improvement. The results will also inform other researchers into computer usability about the use of web pages from older adults' perspectives.

The research uses a short questionnaire and usability testing. The short questionnaire helped identify the users' usage of the Yellow Pages (both

online and the printed book) and its value. The usability testing helped identify what works and what doesn't work when older adults use the online Yellow Pages. Usability testing was the method used being best suited for this purpose because it directly studies users' behaviour at the time of use.

1.3 Structure of Dissertation

This study is composed of six chapters: introduction, literature review, method, results, discussion and the last chapter includes implications and summary. The introductory chapter aims to describe the researcher's motivations and the objectives of the research. In Chapter 2, background information will be presented on the Yellow Pages, usability techniques, older adults and the way web site should be designed to accommodate older users' needs. The chapter concludes with the way to run usability testing with older adults. Chapter 3 provides information on the participants' background, the way tests were carried out and the way data was analyzed. In chapter 4, data is presented for all 6 participants in a descriptive manner followed by results and conclusions. Chapter 5 presents the discussion with some restrictions and positive factors found through this study. The final chapter 6 contains implications, limitations, future work and a summary.

2 Literature Review

2.1 *Yellow Pages*

In a usability test of the printed Yellow Pages conducted by the author, Aharon (2005), among non-native English speakers, it was found that the Yellow Pages is a solid product and even novice users with poor English vocabulary were able to complete most of the given tasks successfully. Several additional recommendations were generated:

- Adding small icons for quick navigation beside services which are “open 24 hours”. Similar icons can be added for services who provides “free delivery”, “free quote”, “free parking” etc’.
- Use larger fonts at the alphabetical index helping older people to quickly find what they are looking for.
- Enhance the help pages at the beginning of the book and include more information about locality guides and cuisine guides.
- Enhance the help pages at the beginning of the book by including more information about the “fast find index” to explain the difference between headings and cross-reference headings.
- Mark for better spotting all text boxes appearing after headings, which are pointing to locality & cuisine guides.

According to the New Zealand Yellow Pages Intranet web site which can be accessed only internally to Yellow Pages staff, 9 out of 10 New Zealanders use at least one of the Yellow Pages products every month. For over half the people who use the Yellow Pages it’s the first and only stop. In addition 2 out of 3 New Zealanders believe the Yellow Pages is the best place to find products and services. Typically every week in New Zealand, over 1.2 million people use the Yellow Pages (print & online), and 87% of them purchase or intend to make a purchase within the next 6 months. 46% of people searching the Yellow Pages already have a business name in mind and 76% of people who used the Internet Yellow Pages buy or intend to buy.

Users know and trust the Yellow Pages brand as representing one of the best information sources for locating and buying products and services. The Yellow

Pages represent a product that exists over one hundred years backed by a nationwide network of sales professionals and reliably delivered every year at each and every door step nationwide. Further, it is the only product that combines all local businesses and service providers under one book. This brand image also carries over to the Internet, with many Internet users choosing Online Yellow Pages as their first port of call for sourcing and buying these same products and services (Yellow Pages Statistics, NZ Yellow Pages Intranet Web Site).

Compared with internet search engines, online Yellow Pages have a database structured from years of face-to-face contact with local advertisers (Stroud, 2006). Yellow Pages have two virtues that are indispensable for local search: they are both trustworthy and inclusive and they contain at least minimal information on all businesses that can't be found anywhere else (Himmelstein, 2005). Internet search engines provide less precise results than searching through a comprehensive directory built over keywords and designed for focused search. Seeking local service providers rather than facing voluminous results searching from the internet is likely to be attractive to older adults.

Almost every home and business in the country has at least one copy of the book delivered annually by the Yellow Pages. The printed product therefore is accessible to everyone and requires no technology to use. It has community and civil defence information and consumers often rely on the Yellow Pages during emergency situations (Yellow Pages Statistics, NZ Yellow Pages Intranet Web Site). The Yellow Pages book has detailed advertiser information and side-by-side comparisons quicker and easier than reviewing online listings which requires drilling down over-and-over for more information. Big companies can easily be spotted by their big Advertisements that always appear at the beginning of any classification. The book can also be used for note taking while calling around and bookmarked for popular searches. Such benefits may be attractive to older users who suffer from reduced peripheral vision and short memory problems.

On the other hand, the Yellow Pages books are big, bulky and hard to store and are not available to users outside their home. Often free copies are

limited to homes for specific geographic areas and searching outside your geographic area requires purchasing more books for other localities. In addition, pages can look cluttered where Advertisers' ads are lumped in with all the others for the same product, where shoppers can compare. The printed book is published once a year, therefore ads slow to reflect market changes ("Online Yellowpages.com").

A listing on Internet Yellow Pages covering local, regional national and international markets which may broaden the number of potential customers. In addition, the Internet Yellow Pages is updated daily giving new businesses the opportunity to penetrate the market almost immediately (NZ Yellow Pages Intranet Web Site).

Many small businesses are local in nature, serving people who live nearby. Being the online version of the reputable, structured printed book potentially puts the internet Yellow Pages as one of the main search engines to find local businesses and service providers.

On the other hand, it is very common among Yellow Pages companies worldwide to sell the first top 5 search results, this practice is expected to become more widespread hence, to be prominent in the internet Yellow Pages and to be ranked in the first top 5 can be very expensive for small businesses, and if a business is ranked low, it will probably never be found since users usually don't scroll through 20 or 30 listings to find this business. Therefore internet Yellow Pages can be very expensive and does not suit every business.

Furthermore, since Internet users who seek information are not confined to a telephone book mentality, the success of online advertising will not be developed by the Internet Yellow Pages group, which is a result of already high profitable business (Yellow Pages), but rather by companies such as Google, Yahoo and MSN who are user focused, innovative and quick acting to market and user demand (Spencer et al., 2005). In other words the future

Internet search does not belong to the Yellow Pages but to the big market players.

So far no research has been found to have been conducted on the usability of web-based Yellow Pages, among any age group. This research will focus on the actual usability of online Yellow Pages for older adults.

2.2 Usability

Usability is a well defined concept in the Human Computer Interaction research, referring to: “the extent to which a product can be used by specific users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use” (ISO 9241-11) (“International Organization for Standardization”, 1998).

Meeting users’ requirements who demand power without complexity has made the computer industry sensitive to the design of the user interface. Many usability practitioners of the 1990 considered two main factors to measure usability: ease of learning and ease of use (Badre, 2002). Researches in the HCI field in the late 1990’s proposed other usability factors for assessing web site design. For example, Schubert and Selz (1999) put forward; hypermedia presentation, accessibility (24 hours access), readability (good structure of content), quantity of information, expert systems (personalization) and security as factors for a good web design. Gehrke and Turban (1999) gave; simplicity, navigation efficiency, content relevancy, security and consumer focus (task completion time, successful search rate, error rates, and frequency of cursor movement) as factors to measure usability. In addition, Proctor and Symonds (2000) found ease of finding information, logic of navigation, ease of reading data, speed of data, quality of language and accurate information as factors for usability measures. Nielsen (2000) proposed; ease of use, simplicity, readability, credibility and content. Badre (2002) gave; navigation, simplicity, credibility, readability and content. See appendix 1 for summary of these factors.

Each of the past studies identified different sets of usability factors with different terminologies. Further, each of the studies measured those factors in different ways suggesting that usability factors are developed by researchers to achieve different goals. There is no consensus on how to measure website usability (Ferre et al., 2001).

This study is explorative and will use usability testing to study users' behaviour at the time of use. Particular attention will be paid to the following usability factors:

- ease of reading data
- ease of finding information
- logic of navigation
- quality of language
- consumer focus (task completion time, successful search rate)
- navigation
- quantity of information

Usability evaluations encompass a range of methods and techniques. Table 2.1 lists the most common techniques. These are described.

Table 2.1: Usability Techniques

Usability technique	Description
Questionnaires and interviews	Offers opportunity to gather feedback from users.
Heuristic evaluation	Originally conceived by Jakob Nielsen, it allows quick and easy evaluation of a user interface design by applying general principles as guidelines.
Competitive analysis	Provide information on usability strength and weaknesses of a site compared to potential competitors.
User testing	Evaluating user interface by collecting data from people while using the system. This is frequently combined with the think aloud technique where users perform tasks while speaking aloud their thoughts, feelings and opinions.
Cognitive walkthrough	Done by an evaluator who construct tasks and then role plays the user to test the system.
Task analysis	Evaluate through interviews and observation how users accomplish a set of given tasks.
User profiling	Create a user profile (personas) by gathering information about the audience of the product and try to model them and their lives. This can be used to role-play through an interface design and to check if the design would meet the needs of such a user.

Questionnaires and interviews

Questionnaire is a method good for subjective measures as it tells the user's reaction as perceived by the user. Questionnaires may reach wider subject group and are fast to administer. However, they are fixed and therefore less probing and frequently suffer from low response rate. On the other hand, interviews generate immediate results and during interviews, questions may

be altered to suit the context and topics can be explored as they arise. However due to the volume of information, it is sometimes hard to encode the results. Further, users' response highly depends on the interviewer's skills to ask questions and sometimes interviewers put their own biased interpretation to what is said (Kuniavsky, 2003; Maguire, 1998; Nielsen, 1993; Shneiderman, 1998).

Heuristic evaluations

Despite the fact that many usability problems can be discovered during heuristic evaluation, it is too difficult for individual researcher to perform. One person can never find all the usability issues of an interface, therefore three to five people are recommended to conduct a more reliable heuristic evaluation on any interface (Nielsen & Mack, 1994). In addition, expert users can't fully identify with real users' knowledge and expertise. Heuristic evaluation can be performed early in the design process and can yield a good estimate how much the system can improve (Nielsen, 1993; Rosson & Carroll, 2002).

Competitive analysis

During competitive analysis, a lot can be learned from competitors to point out improvements to the interface; however it does not find individual usability problems (Nielsen, 1993).

Usability Testing

During usability testing, real users perform real tasks resulting in a comprehensive assessment of a product's usability. It is empirical, time and labour intensive and highly depends on interpersonal skills of the observer who conducts the test. It is also obtrusive and might change participants' behaviour. However, it does help in addressing specific evaluation objectives and can collect measurable, quantitative data. In addition it provides psychological benefit of watching actual users experiencing problems. Usability testing is usually combined with the "thinking aloud" technique to better understand the user's mental model and interaction with the interface (Maguire, 1998; Nielsen, 1993).

Cognitive walkthrough

Usually, the primary focus of the cognitive walkthrough is to establish how easy a system is to learn for first time or infrequent users through exploration (Wharton et al., 1994). Being cost effective in identifying wording problems, system navigation issues and inadequate system feedback, cognitive walkthrough is mainly designed to identify rather specific than generic problems and may fail to identify all deficiencies. In addition, results are opinions rather than objective data (Maguire, 1998; Wharton et al., 1994).

Task analysis

Tasks are activities which are meaningful to users and they describe a set of techniques people use to get things done. During task analysis a lot can be learned on the system and the information flows within it. It also provides knowledge of the tasks the user wishes to perform. However, it is time consuming and produces much data requiring considerable effort to analyse (Maguire, 1998).

User profiling

User profiles describe range of relevant skills of potential end users of a system, skills such as experience, level of education, job title, etc'. Once a user profile has been developed, personas can also be developed, which are exemplars of the end users. Creating personas provides focus for the design and help to concentrate on the end user. It also helps to get past personal opinions and presumptions to understand what users truly need (Courage & Baxter, 2005). However, audience of websites such as the Yellow Pages can range from young to older adults, male or female, housewives to professionals; therefore it is almost impossible to create personas to such web sites.

The aim of this research is to study users' behaviour at the time of use, therefore usability testing is the method best suited for this purpose.

2.3 Older Adults

Every seven seconds, another Baby Boomer turns 50 years old (Coughlin, 1999). The population of older people will continue to grow in the next decade and by the year 2050 the population of people 65 years and older is projected to reach 86.7 million. People in this age group would comprise 21 percent of the total population in the world at that time ("The U.S. Administration on Aging", 2004).

It is estimated that in the U.S. around 28% of Adults 65 years and older use a computer anywhere and 25% are also using the internet ("The U.S. Administration on Aging", 2004). Further, the baby boomers will soon replace the current older adults who are reluctant to use either a computer or the internet increasing dramatically the number of older adults who will be using the internet.

Older people are adopting the Internet with exceptional speed. The baby boomer and elderly markets are growing in size and importance; they are quite affluent and have high purchasing power. This makes them extremely important as customers for any business.

As indicated by Hawthorn (2000), older internet users were not the primary focus of web site designers until recently. With the vast increase of web sites, designers are now also focusing on the older population needs. Hawthorn (2000) also found that the effects of ageing start to become noticeable from the mid 40s, this increases the immediate attention required to fulfil the need of the older population.

When designing web sites for older users, certain age related difficulties such as fine motor movements and perceptual processing must be considered (Badre, 2002). In addition, vision, cognition, and dexterity limitations all increase with age and limit the ability to utilize the web (Czaja & Lee, 2003). Similarly, Hawthorn (2000) reviews research on aging and its implications for

interface design to address age-related declines in visual perception and processing, hearing, psychomotor abilities, attention and memory.

One of the primary cognitive declines observed in older adults involves working memory capacity, which is the ability to keep information active. The older user may have difficulty maintaining all of the information active in working memory when many steps are involved in the process. Consequently, older users may get lost in the site (Badre, 2002).

Four main dimensions while designing web sites are commonly identified (Chisnell et al., 2006): visual, interaction, information, and architecture design.

2.3.1 Visual design

Designing web pages encompass elements such as; page layout, content, font type & size, colour and background. Issues for older adults include deficits in visual acuity, eye movements, contrast sensitivity, the ability to discern colours, and narrowing of the visual field (Czaja & Lee, 2003; Fisk et al., 2004; Morrell et al., 2003). Such problems mean that some older adults will have difficulty noticing small or very subtle elements, such as clickable buttons or links with similar colour to the background (Czaja & Lee, 2003).

Some older users experience difficulties in discriminating between colours, especially those with short wavelength suggesting minimizing the use of colours that are close in hue. The ability to distinguish between adjacent areas that differ in light sensitivity decreases with age, suggesting the foreground and background of web sites should be of high contrast. Older adults have difficulties perceiving flashing text or graphics in the range over 10 Hz, suggesting that web site designers should avoid flashing items at a higher frequency (Badre, 2002). Similarly, Ellis and Kurniawan (2000) recommended the use of light background emphasizing high contrast.

Visual field reduction results in reduced peripheral vision and as a result older adults tend to focus more on the centre of the screen and are not able to detect information on the outer portions of the screen. Morrell et al. (2003,

p.40) suggest that “layouts should not be so complex (or contain so many elements) that they crowd equally important elements to the outer edges of the screen”. Furthermore, Czaja and Lee (2003) suggested the use of white space and line spacing to facilitate clicking links and other small targets. Similarly, Morrell et al. (2003) indicate that white space can enhance the reader’s understanding of complex materials because it conveys structure and sequence at a glance. Redish (2004) suggests the use of “Headings” as they force the use of white space, chunk the text into small pieces to facilitate scanning and help the page to become less dense.

Ellis and Kurniawan (2000) suggest the use of sans serif fonts at the size of 12-14 point. This is supported by Badre (2002) due to the decline in visual acuity with age. Bernard et al. (2001) found that older adult between ages of 62 and 83 read 14 point size font faster than 12 point size font. In addition the serif fonts were generally less readable than the sans serif fonts. However, they recommended the use of serif fonts if speed of reading is paramount and sans serif fonts if font preference is important. Contrary to Bernard et al. (2001), Chadwick-Dias et al. (2002) found that text size did not significantly affect performance in any age group in their studies. However, older adults were more likely to prefer larger text sizes.

2.3.2 Interaction design

According to the interaction design association (www.ixda.org), “Interaction Design is the professional discipline that defines the behaviour of interactive products and how products communicate their functionality to the people who use them”. In the case of web sites, the behaviour manifests through navigation elements such as links, buttons and scroll bars.

In the early days of designing web pages there were unwritten rules about how links should be coloured:

Blue is used when there are links the user has not visited.

Purple is used when there are links the user has visited.

Red is used when the user runs his mouse over links.

Links were underlined when embedded in text.

Older adults are not familiar with these rules; however they tend to click on whatever looks clickable to them (Chadwick-Dias et al., 2002). Therefore using standard links within web pages would make it easier for older adults to use the site.

(Echt, 2002, p. 77) report that “navigation buttons with both symbols and text resulted in the least confusion when compared to buttons with only symbols or only text, especially because older adults have deficits in symbol comprehension”.

Morrell et al. (2003) state in their study that scrolling is a problematic issue for older adults as they could not seem to understand that there was information below the screen because they don't comprehend the concept of scrolling. Once older user understand the concept of scrolling, it is essential to minimize it due to negative change of dexterity with age (Fisk et al., 2004). Hawthorn (2000) found that older users have disorientation problems while using scrollbars; this is because the act of scrolling can disrupt the user attention. Therefore Hawthorn (2003) suggests adding larger scrolling buttons to web sites similar to the use of larger text size.

Ellis and Kurniawan (2000) recommended that links on the page should be fairly large and should have plenty of space around them to prevent accidental selection. In addition, Hawthorn (2003) recommended the use of toolbars with large buttons to help the age restricted user to work with a consistent linear search space as they try to find needed options.

Researchers found out that many older users have difficulties using walking menus that lead from one pull down menu to the next. These require precise movements which is problematic for the older adult. Therefore, Morrell et al. (2003) recommend against using those menus.

Becker (2004) and Morrell et al. (2003) recommended the use of site maps as they offer navigational support and are useful in helping older adult users understand the relationship of a Web page with other pages as well as showing how to move quickly from one page to another.

2.3.3 Information design

According to www.whatis.com, “Information design is the detailed planning of specific information that is to be provided to a particular audience to meet specific objectives”. The ultimate focus of information design will be on the effectiveness of that information. Information designers’ focus on the language they use for writing on the web.

Researchers found out that older users are not familiar with common computer vocabulary and they simply ignore those words when they encounter them (Chadwick-Dias et al., 2002; Kantner & Rosenbaum, 2003). Therefore many researchers suggested avoiding technical jargon and presenting the information in a clear and familiar way to reduce the number of inferences that must be made (Morrell et al., 2003). Fisk et al. (2004, p. 52) stated that “educational attainment levels for older adults are lower than for young adults”, emphasizing the importance of simple language. Chadwick-Dias et al. (2002) found in their study that older adults spend more time reading text and instructions and often read all the text on the screen especially when asked to input information due to the fear of making a mistake.

Kantner and Rosenbaum (2003) suggested in their study to use menu names that represent the choices they provide. They also suggested using meaningful text choices for commands, and reduction of symbols and icons, to reduce cognitive load as well as clutter.

2.3.4 Architecture design

According to www.whatis.com, “information architecture is the set of ideas about how all information in a given context should be treated philosophically and, in a general way, how it should be organized”. Chisnell et al. (2006) list two common questions about information architecture that affect all users but affect older adults most severely.

1. Should a web site’s organization (hierarchy) be broad or deep?
2. Is redundancy in links good?

Spatial memory declines with age as well as the ability to maintain mental focus (Fisk et al., 2004). Deep interface structures can create significant barriers for older adults who seem to forget the purpose of the task as well as the pages they had visited and the content of that page when the path length is too long (Zaphiris et al., 2003). This creates some challenge for web designers whom in one hand may want to create minimal density of screen information, which dictates the creation of deep structure in web design; and on the other hand such structure degrade performance in older adults. Zaphiris et al. (2003) found that participants performed less accurately in deep menus because they forget the pathway to the target and the shallower the hierarchy the better they performed. There is also clear evidence that all users perform better in shallow hierarchy and when targeting adults non-expandable hierarchies should be preferred.

Chadwick-Dias et al. (2002) recommended the use of redundant links as older users seem to associate bullets with buttons and by providing redundant links, older users have an increased likelihood of clicking their target and reaching their destination.

2.4 Usability Testing with Older Adults

The older adult audience is very large, not homogeneous, and they differ in life experience, habits, thoughts, beliefs and expertise. They also have a wide variety of physical and cognitive abilities. Testing older adults benefit from selecting the appropriate participants with pre-defined characteristics (see Appendix 2). When testing older adults, Chisnell et al. (2004) suggested the following:

- Allow more time for older users to accomplish tasks.
- Explain the session plan, timing and what can they expect.
- Schedule breaks.
- Avoid using computer and web terminologies.
- Be extra patient, wait longer than normal.
- Teach participants something at the end of the session.

- Be respectful; often use the words "Please" and "Thank you" throughout the session.

Chisnell et al. (2004) also suggested that tasks should be succinct and easy to remember, taking into account that the cognitive load on users is very high during the session (see Appendix 3 for pre-defined tasks).

3 Method

The chapter outlines the main objective of the research and the steps that were taken before the real test begun. It also describes the process of selecting the participants and details the procedure of the session. The conclusion of this chapter describes the steps taken upon completion of each session.

Objectives

The primary objective of this study is to look at what works and what doesn't work when older adults access the online Yellow Pages.

Pilot Test

A pilot test to refine the testing procedure was conducted and carried out on two users using the researcher's home-based computer. During the test, users were asked to complete all pre-defined tasks; this tested the feasibility of the tasks and helped the real test to run smoothly.

Testing the first participant, a very experienced computer user, helped streamlining the tasks in order to maintain the natural flow of the test. Testing the second participant, a novice computer user, helped to assess the feasibility of users being able to carry out the tasks.

The first participant

The first pilot study was carried with a male aged 15, a very experienced computer user, who never used any of the Yellow Pages products before. The user managed to complete all tasks successfully using his computer skills, Internet knowledge and Jargon.

The pre-defined tasks were refined and simplified as a result of the first pilot test outcomes. In addition, the order of the tasks was changed to cut down the amount of clicking and scrolling required between each task.

The second participant

The second pilot study was carried with a female aged 40, a novice computer user, who never used any of the Yellow Pages products before. The user managed to complete some of the pre-defined tasks successfully while further assistance was required with all the rest of the tasks. The user encountered some difficulties in understanding the jargon been used in the pre-defined tasks. For example, words such as 'Icon', 'Home Page' and 'Search bar' were omitted from the tasks. The tasks language was simplified as a result of the second pilot test outcomes.

Participants

Older adult reading comprehension is affected by cognitive changes associated with normal aging; as well as their education level and language proficiency (Becker, 2004). As such literacy plays a role in the usability of a web site by older adults; therefore users with English proficiency were selected. In addition all participants must have access to a computer and to the internet to ensure their participation in this study.

SeniorNet in New Zealand provides a wide variety of computer training opportunities suitable for older people. The local SeniorNet tutor suggested that older users in his centre are ranging from novice to expert users. He also suggested that running usability testing on the Yellow Pages Internet website would be challenging to some users in the centre.

Nielsen (2000) has found that 5 users will tend to uncover 85% of site usability problems and after that there are diminishing returns. Due to the constraints of this dissertation, we anticipate conducting usability testing with 6 users aged 65 years and over, aiming to get a mix of gender.

Six volunteers, including 3 females and 3 males, aged 65 to 85 years, participated in this study. All participants were recruited with the assistance of the local SeniorNet tutor. Participants were selected based on the following criteria: age, and English language proficiency (see appendix 2 for a summary of the participants' background). Each participant's computer experience and

Yellow Pages main value was elicited through a verbally administered background questionnaire.

Design & procedure

Audio tape provides vivid reproduction of the meeting as well as permanent record of the event. It also supports multiple analyses of data. In this study, all sessions were audio taped using a cassette recorder.

Each participant read the "Participant information sheet" prior to the study and signed the consent form (see appendices 5 & 6). Then they were asked to fill in a short questionnaire identifying their usage of the Yellow Pages and its significant value (see appendix 4 for participant's questionnaire).

Each session started with a one-on-one non-formal conversation, discussing the daily routines and what is interesting and important to the participants. This assisted in building descriptions of users' goals and lifestyles; it also informed how important Yellow Pages may be to them and also assisted in assessing the utility of online Yellow Pages against real criteria.

Five features in the online Yellow Pages were chosen. Individual tasks were written to explore usability of each feature. The Features were chosen considering how often they were used and how important they were to users, also features were chosen for being considered as troublesome for older users (see appendix 3 for pre-defined tasks). In addition, some online tasks from users' real world were tested. Those tasks were acquired during the non-formal conversation where users talked about their recent Yellow Pages printed book search.

Participants were interviewed briefly at the completion of the test. At the end of each session users were shown all the features currently available on the web site. All participants cooperated and enjoyed the session that took around one hour to complete.

Sessions were focused on what works and what doesn't work when older adults access the online Yellow Pages. Usability testing was the method used being best suited for this purpose because it directly studies users' behaviour at the time of use.

Data analysis

During data collection phase the emphasis was placed on accuracy of collected information. Immediately following each meeting, the recordings were analysed and parts of the conversation deemed important were transcribed verbatim. The results from tapes were merged with handwritten notes taken during the session, as described in the results chapter.

4 Results

In this chapter, data is presented for all 6 participants in a descriptive manner. Table 4.1 outlines the relevant characteristics and experience of the participants. The results for each participant are divided into three parts: general and preliminary interview, observation, and conclusion. In the observation section, the results are grouped and presented under the four headings of general, features, navigation, and naming.

Table 4.1: Summary of Participant background and characteristics

User	Age	Gender	Experience (in Years)			English Language proficiency	Location	Education
			Computer	Online	Online YP			
1	78	Male	4	3	0.5	Excellent	Local Senionet centre	Tertiary
2	85	Female	2	1	0	Excellent	Local Senionet centre	Secondary
3	76	Male	3	2	0	Excellent	Local Senionet centre	Secondary
4	65	Male	2	2	0	Excellent	Local Senionet centre	Secondary
5	71	Female	3	3	0	Excellent	Local Senionet centre	Tertiary
6	69	Female	4	2	0	Excellent	Local Senionet centre	Secondary

4.1 User 1

General

B. is a very competent computer user. He uses the printed Yellow Pages almost everyday to search for a variety of products and services. Lately he has been using the online version after upgrading his Internet connection to Broadband. He uses the online version mainly for products and services outside Auckland.

To B. the main value using the Internet Yellow Pages is the ability to search nationwide and get a list of results fast enough, thereafter, he calls the service providers in order to get the best value for money. Another important aspect of using the Online Yellow Pages that he highlighted initially was the ability to point out the location of each service provider so he can make choices according to geographical location. Table 4.2 provides the usability test results for user 1.

Table 4.2: Usability test results (User 1)

Task No'	Task	Percentage completed	Time to complete	*Rate difficulty	Comments
1a	Looking for service provider in living area	100%	90 Sec	2	User carried out task fairly easy
1b	Looking for directions by locating the Map Icon	80%	120 Sec	2	Tasks could not be completed successfully; user discovered an error in the system
1c	Get wider picture of map (Using zoom buttons)	100%	20 Sec	1	User carried out task fairly easy
2a	Looking for service provider in Auckland	100%	100 Sec	2	User carried out task fairly easy
2b	Find their Web site	100%	20 Sec	1	User carried out task fairly easy
3a	Looking for restaurants on Queen St', Auckland	50%	240 Sec	5	User could not complete task due to massive information
3b	Locate a certain Restaurant	0%		5	User Gave up
4	Using walkthrough	100%	300 Sec	2	User tried few options by entering different search phrases
5a	Expanding search to bordering neighbourhoods	40%	300 Sec	5	User tried one neighbourhood and commented that "You need to know your district"
5b	Sort alphabetically	0%		5	User didn't know how to do that

*Rate difficulty: (1=easy, 5=difficult)

Observation

General

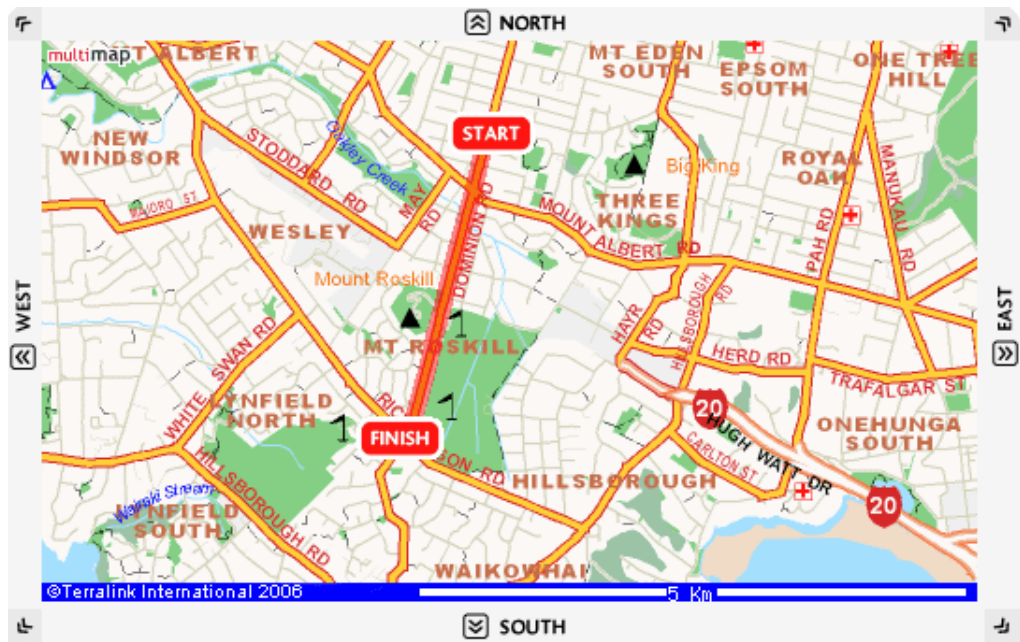
1. B. was browsing the online Yellow Pages web site with confidence. Generally speaking, B. knew what he was doing and understood all clickable buttons, what they meant and what he should expect after clicking on them.
2. In one particular case, B. clicked on a greyed out button a few times while trying to zoom in a map.
3. B. understood all the tasks given to him without requesting clarification.
4. B. was able to read all labels and text on the web site. He was also able to click on all clickable items regardless of their size or whether white space exists in between links. This indicates a reasonable level in fine motor skills.
5. The web site colour scheme (backgrounds and foregrounds) was clear to B. and he didn't have any problems reading the text.

Features

1. B. liked the clickable map icon which linked to a local map and the website icon which linked to the retailer/service provider web site.



2. There was confusion when typing a different street address on the "get directions" tab in the map section and receiving "Start" and "Finish" results. B. expected the cursor to be located on the new address rather than on getting directions.



3. B. didn't realize that he could do advanced search and locate certain businesses by street name. B. gave up looking for a restaurant in Queen Street - "there are 156 that come through" - he doubted that there was one on Queen street and questioned whether he should go one by one to find the particular one he was looking for.

Navigation

1. B. searched for launderettes in Mt Roskill and received one result. After clicking the Map icon, he commented "that circle, isn't necessarily where it is located, it is just a general indication". He tried to put a different address in the "get directions" tab and received a result which he couldn't figure out. By typing 1405 or 1305 Dominion Rd he received a very broad map which he couldn't zoom in. Even though the zoom button was greyed out, he tried to click on it with no response. B. indicated that there were much better web sites where you can get detailed directions, such as the stagecoach web site.
2. B. commented that the search engine was very poor and had a limited number of keywords to search for: "the search engine here is no way near as good as the Trademe search engine" and "Trademe has got a tremendous amount of cross referencing". B. also said that "it is easier

to search on Google than it is on the Yellow Pages". B. was looking for an agent of a certain sewing machine brand which he couldn't spell correctly, Yellow Pages returned no results when typing "Husqvarna sewing machine". However, he could put the search phrase in Google and find the agents in no time using the build-in spelling correction feature in Google. B. mentioned that in the book "They all have their big adverts" and "I did find one (*in the printed book*) but you can't tell by going down here (*using the online version*) whom they are agents for."

3. B. compared the results he received from looking in the printed Yellow Pages to the results from the online version. By keying "shuttle busses" he ended up with only one result. However, when searching the book he could find a big list of shuttles. It is important to note that "shuttle busses" is listed under "shuttle services" which appeared as red and underlined link (which is not the standard) at the bottom of the result. B. didn't seem to pick those links throughout the session.
4. B. frequently used the "Back" button on the navigation tool bar to go back each time and to start the search from scratch again rather than using the "home page" button located on the page.
5. B. was concentrated on the centre of the screen and didn't pick up links that were located at the far left side of the screen such as "sort by alphabetical" or "Related localities". In all cases those links appeared at the bottom left side and were visible to the user only after scrolling down.

Naming

1. B. understood the language used on the web site; all labels and titles were simple for him to understand.

Conclusion

Overall B. managed to complete most of the tasks with hardly any problems. B. suggested the use of a map with all the results marked in circles to be able

to locate their relative position. B. suggested the use of more keywords for searching similar to what Google has to offer. He also suggested the use of a map to locate addresses in addition to the “get direction” feature. B. also commented that there was a lot of essential information that you can’t get via the online Yellow Pages such as trading hours.

4.2 User 2

General

M. is a novice computer and Internet user. She uses the printed Yellow Pages occasionally to search for restaurants using the cuisine guide, and service providers such as plumbers and electricians using the locality guide. She had never used the online Yellow Pages before.

M. uses the internet to communicate via emails with her children and grandchildren who live overseas and to fill online travel insurance forms to get further online discount.

To M. the main value of using the Yellow Pages is to locate local service providers, to call them one by one in order to get the job done as quickly as possible. Table 4.3 provides the usability test results for user 2.

Table 4.3: Usability test results (User 2)

Task No'	Task	Percentage completed	Time to complete	*Rate difficulty	Comments
1a	Looking for service provider in living area	30%	More than 5 Minutes	2	User confused how to search and what to do, user eventually gave up
1b	Looking for directions by locating the Map Icon	100%	90 Sec	2	User carried out task fairly easy
1c	Get wider picture of map (Using zoom buttons)	100%	20 Sec	1	User carried out task fairly easy
2a	Looking for service provider in Auckland	30%	More than 5 Minutes	2	User confused how to search and what to do, user eventually gave up
2b	Find their Web site	100%	20 Sec	1	User carried out task fairly easy
3a	Looking for restaurants on Queen St', Auckland	0%	More than 5 Minutes	5	User could not complete task
3b	Locate a certain Restaurant	0%		5	Task was not carried out
4	Using walkthrough	20%	More than 5 Minutes	2	User tried few options by entering different search phrases
5a	Expanding search to bordering neighbourhoods	0%	More than 5 Minutes	5	User didn't know how to do that
5b	Sort alphabetically	0%		5	User didn't know how to do that

*Rate difficulty: (1=easy, 5=difficult)

Observation

General

1. M's hearing isn't very good. She has a slight tremble in her hands so using the mouse sometimes was a bit difficult. M. had difficulties clicking on small clickable areas and items close to each other.
2. M. wasn't sure what she was doing and quite often got stuck and didn't know what to do next. She was actually waiting for more instructions and help.
3. M. was able to read all labels and text on the web site without any problems.
4. The web site colour scheme (backgrounds and foregrounds) was clear to M. and she didn't have any problems reading the text.
5. M's memory wasn't very good and sometimes she couldn't remember what she clicked on.

Features

1. M. liked the clickable Icons (mainly the Map & Web site) and found them quite useful.
2. M. didn't realize that she could use the searchable area box to run queries. She also didn't understand the meaning of advanced search.

Navigation

1. M. was concentrated on the centre of the screen and didn't spot the search criteria links that were located on the left side of the screen and so she was not able to locate the "sort by alphabetical" or "Related localities" buttons. M. was using the "Browse a Category" option and ended with long list of categories which frustrated her and eventually she gave up.
2. After pointing M. to the search criteria buttons, she typed them in and was waiting for a response without clicking on the search button, after a minute she asked "how long does one have to wait for this to happen".

After showing her the search button, she was confused on how many times she needed to click on that button (once or twice). During the next task, M. forgot all about the search button and was waiting again for a response after typing in the search criteria.

3. M. tried to search for a restaurant on Queen Street by typing “Restaurant on Queen St.” and got nothing in the results. Next she tried to search for restaurants by clearing the rest of the fields “on Queen St” and remained with “Restaurants.” Again she got nothing in the results (because of the full stop that appeared at the end). She said, “This could take forever, which means to my mind it is easy to use the Yellow Pages (*the printed book*)”. She didn’t know what to do next and gave up.
4. M. closed the browser and started a new one each time a new task was given to her. “It is the most logical thing to do”.
5. In many occasions, M. was clicking on non-clickable Items and puzzled “I clicked on that and nothing is happening”.

We found **1187** entries for “**Restaurants**” in “**Auckland Region**”

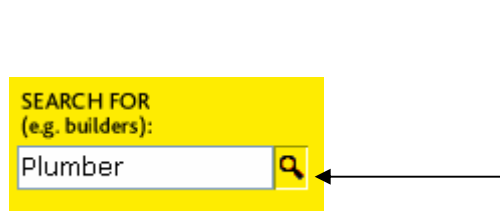
Category: [All](#) > [Food & Drink](#) > [Wining & Dining](#) > Restaurants
Location: [New Zealand](#) > Auckland Region

Refine your search by location

- [Auckland \(0800/Mobile\)](#) (9)
- [Auckland City](#) (638)
- [Franklin & Districts](#) (30)
- [Gulf Islands](#) (10)
- [Manukau City & Districts](#) (155)
- [North Shore](#) (167)
- [Papakura & Districts](#) (19)
- [Rodney](#) (76)
- [Waitakere City & District](#) (85)

M. was clicking on the ‘•’ rather than on the text.

6. After typing in service provider in the search criteria, M. clicked on the magnifying glass button located beside the search box.



A new screen labelled "Select a Category screen" immediately launched. M. responded, "Now I don't know what to do".

Naming

1. M. understood the basic language used on the website; however she pointed out that many buttons had missing labels.

Conclusion

M. failed to complete most of the tasks due to a combination of physical constraints, unfamiliarity with common internet usage, and poor website design.

M. will not use the online Yellow Pages unless she found a particular advantage in it. M. concluded that she would use only the printed product because:

- The amount of information lying beside each other. "You get it in a flash of an eye" (*referring to the book*). Also "Because mostly the Yellow Pages is just for getting name and address. You may not get the same details as on the Yellow Pages on the net (*referring to the Web Icon links*), but you would get enough to know that you are on the right track" (*referring to the book*).
- Her lack of Experience - "This is the sort of thing that you need to get on the Internet and play with it for hours".

4.3 User 3

General

P. has been using the Internet for quite a while. He uses the printed Yellow Pages occasionally to search for almost anything that he requires. He had never used the online Yellow Pages before.

To P. the main value of using the Yellow Pages is to get the best deal on the market preferably close to where he lives. He usually rings them all to find out what they have in stock to save him a lot of time running around.

P's main reason of not using the online Yellow Pages is his limited 10 hours per month dialup time which he would rather spend on things related to his motorcycle club, emails, and online bookings. Table 4.4 provides the usability test results for user 3.

Table 4.4: Usability test results (User 3)

Task No'	Task	Percentage completed	Time to complete	*Rate difficulty	Comments
1a	Looking for service provider in living area	30%	More than 10 Minutes	2	User going forward and backward browsing the categories
1b	Looking for directions by locating the Map Icon	50%	180 Sec	2	User clicked on the Icon after it was pointed to him
1c	Get wider picture of map (Using zoom buttons)	0%	150 Sec	1	User clicked the '+' rather than the '-'
2a	Looking for service provider in Auckland	30%	More than 10 Minutes	2	User going forward and backward browsing the categories
2b	Find their Web site	50%	180 Sec	2	User clicked on the Icon after it was pointed to him
3a	Looking for restaurants on Queen St', Auckland	0%	More than 5 Minutes	5	User could not complete task
3b	Locate a certain Restaurant	0%		5	Task was not carried out
4	Using walkthrough	20%	More than 5 Minutes	2	Task was not carried out
5a	Expanding search to bordering neighbourhoods	0%		5	User didn't know how to do that since user never used the search bar
5b	Sort alphabetically	0%		5	Task was not carried out

*Rate difficulty: (1=easy, 5=difficult)

Observation

General

1. As a first time user of the Internet Yellow Pages, P. didn't seem to cope with the way the web site is organised. He never used the search box, and he was navigating through the "Browse a category" option.
2. P. was trying very hard to complete all the tasks. P. was pressing on all clickable links under "Related Categories" and "Listed in" categories trying to find his way, often going back to where he started the search from ended up with nothing. "We are going back to the same thing" he repeated few times. Quite often he got stuck and didn't know what to do next.
3. P. was able to read all the labels and text on the web site without any problems.
4. The web site colour scheme (backgrounds and foregrounds) was clear to P. and he didn't have any problems reading the text.
5. P. didn't have any problem to scroll up, down, left, or right; he had control of the mouse.
6. P. was navigating on the page clicking on almost every possible button; he also clicked on many non-clickable items trying to see what would happen.

Features

1. P. liked the clickable Icons (mainly the Map & Web site) and found them quite useful.
2. P. never used the search box and this is because he never spells right. "My spelling is pretty crook" and "if this was Google, it would tell me" (*spelling mistake*).

Navigation

1. P. was navigating via the "Browse a Category" option getting a long list of sub categories. He read them all one by one trying a few sub categories going forwards and backwards.

2. P. was navigating around the online page reading all labels, texts and even tips provided on the web site. He managed to spot all non-centred clickable items such as the “sort by alphabetical” or “Related localities” buttons, however he never used them.
3. P. was distracted by advertisements which appeared at the top of the page. In one occasion an advertisement with the word “Go” appeared, this led P. to click on that word waiting for a response for his search query.
4. P. was not able to find even businesses that he knew; he was frustrated after few minutes of browsing and searching. “I will be frustrated by now” and “it is too complicated”. Eventually he concluded “I would better stick with what I know reasonably well, the Yellow Pages” (*referring to the book*).
5. P. was not familiar with the zoom functionality on the map and in order to get a wider view he kept pressing on the ‘+’ sign rather than the ‘-’. After clicking the ‘+’ sign around 7 times he concluded “one would think it is ‘+’ as It is already in the minimum size”.



6. In order to get ready for the next task, P. has been asked to return to the main website. P. clicked on the back button many times to go back. “Is this the quickest way to go back” he asked “it is the only way I know”.

Naming

1. P. understood the language used on the web site; however he pointed out that classifications have changed their names throughout the years. “I find when I am looking in the Yellow Pages; they have changed the

names, and I haven't changed with it. I have got to a stage where I am not going to change anymore".

Conclusion

P. didn't complete any of the tasks. For P. using the online Yellow Pages is a waste of time and money - "Cause I will be paying for all of this by now" (*referring to his limited 10 hours*) and "I've never used the online Yellow Pages and I won't use it, I would go straight to Google...They are wasting their time, you should put the money in Google. Yellow Pages got a long way to go."

P. is not a potential user for the online Yellow Pages. Although P. has got the browsing skills, running searches based on spelling will be problematic to P.

4.4 User 4

General

S. started using the internet around 2 years ago browsing and reading news. He uses the Printed Yellow Pages from time to time to search for almost anything. He had never used the online Yellow Pages before.

To S. the main value of using the Yellow Pages is the convenience of having access to all businesses and service providers' information at his fingertips. This saves him time running around looking for what he needs. He also appreciates that the data in the Yellow Pages book is updated every year providing reliable and accurate information. Table 4.5 provides the usability test results for user 4.

Table 4.5: Usability test results (User 4)

Task No'	Task	Percentage completed	Time to complete	*Rate difficulty	Comments
1a	Looking for service provider in living area	100%	120 Sec	2	User carried out task fairly easy
1b	Looking for directions by locating the Map Icon	100%	More than 5 Minutes	2	User spent a lot of time to locate the Map Icon, thereafter it was relatively easy
1c	Get wider picture of map (Using zoom buttons)	100%	30 Sec	1	User carried out task fairly easy
2a	Looking for service provider in Auckland	100%	120 Sec	2	User carried out task fairly easy
2b	Find their Web site	100%	10 Sec	1	User carried out task fairly easy
3a	Looking for restaurants on Queen St', Auckland	100%	More than 5 Minutes	5	User spent a lot of time until realizing he can use the advanced search option, thereafter it was relatively easy
3b	Locate a certain Restaurant	0%		5	User could not complete the task
4	Using walkthrough	100%	120 Sec	2	User carried out task fairly easy
5a	Expanding search to bordering neighbourhoods	0%		5	User didn't know how to do that
5b	Sort alphabetically	0%		5	User didn't know how to do that

*Rate difficulty: (1=easy, 5=difficult)

Observation

General

1. As a first time user of the Internet Yellow Pages, S. seems to cope very well with the way the website is organised. He always started by browsing through the “Browse a Category” option switching quickly to the search box if he can’t find what he is looking for.
2. S. was browsing with confidence trying to read the information on the page and was able to read all the labels and text on the web site without any problems.
3. The web site colour scheme (backgrounds and foregrounds) was clear to S. and he didn’t have any problems reading the text.
4. S. didn’t have any problem to scroll up, down, left, or right; he was controlling the mouse very well.

Features

1. S. found the Map icon and the get directions very useful. However, he recommended adding an approximate time for normal pace walking.

Navigation

1. S. was navigating via the “Browse a Category” option first. After realising that he ended up with too many sub categories, he quickly switched to the search box.
2. While searching for business or service provider in the area he lives in, S. keyed in the locality “Auckland” following the word “New Zealand” in the “Located in” search box. This search resulted in a message saying that “There are no location matches for “New Zealand Auckland”. S. was confused at the beginning but then he decided to drop the word “New Zealand” from the search box. This time he ended up with the correct results. S. repeated this behaviour a few times throughout the session.

3. S. couldn't spot the Map icon, spending time clicking on many clickable items trying to find the map details. Finally after discovering the Map icon he added "you must be familiar with what you are looking for". While navigating, he encountered all the non-centred clickable items such as the "sort by alphabetical" or "Related localities" buttons, however he forgot all about them when he had to use them later on.
4. S. was trying to get directions to the destination from where he lives by keying in his street address without the city. He ended up with nothing apart from a message in red requesting for input. The message was located above the search box and S. could not spot it. After paying his attention to the message he commented "looking at the screen, the attention is drawn on what you are looking at" and "I am not trained to absorb what it is on the screen".
5. S. found the walking direction at the bottom of the screen quite useful and commented that adding the approximate time would be helpful. S. commented that the word "Steps" is confusing and the right terminology should be "Stages". S. was trying to follow the main roads from start to finish not paying attention to the red path marked on the map, which indicates the chosen route. After paying his attention to the red path he commented "follow the red, does it actually say it anywhere?"

Walking Directions

[BACK TO TOP](#)

Your journey consists of 9 steps in total, and covers a distance of 4.7km.

Step	Instruction	Step distance	Distance so far
1	Depart on PAH ROAD	0.5 km	0 km
2	Turn left onto MT ALBERT ROAD	0.84 km	0.5 km
3	Turn right onto ST ANDREWS ROAD	0.39 km	1.34 km
4	Turn left onto KINGSWAY	0.23 km	1.72 km
5	Turn right onto MT EDEN ROAD	1.01 km	1.95 km
6	Turn left onto SHACKLETON ROAD	1.16 km	2.96 km
7	Turn right onto DOMINION ROAD	0.55 km	4.12 km
8	Turn left onto TENNYSON STREET	0.02 km	4.67 km
9	Arrive at your destination	0.02 km	4.68 km

6. In order to get ready for the next task, S. was asked to return to the main website. S. clicked on the back button many times to return to the beginning. This behaviour was repeated every time a new task was introduced. "Where is the home button" he asked, this was shown to him at the end of the session.
7. S. spotted the Web icon immediately. He remembered the location of the Map icon and he was looking at the same space on the screen.
8. S. was searching for service providers in Remuera Auckland by keying in "Auckland Remuera" and then "Remuera Auckland" ended up with no results in both cases. Then he tried to put a single locality and ending up with the correct data. This behaviour was repeated again in the next task when he keyed in "Auckland Queen St."
9. S. was able to find and use the advanced search option to locate specific addresses after about 5 minutes: "you really have to read and see and then understand what it is asking for".
10. After drawing S.'s attention to the "sort by alphabetical", "Related localities", and the "Home page" buttons, he replied "you have to read the whole screen, which I am not doing, as a habit" and "I am used to seeing a little at a time". This indicated that he was more focused on the tasks rather than exploring the site to locate its features.

Naming

1. S. understood and was familiar with the language used on the web site.

Conclusion

S. completed most of the tasks successfully. For S. using the online Yellow Pages means he will have to spend many hours in front of the computer to get familiar with the website and try to remember all its features. He said he would rather use the printed book since it is more familiar to him.

S. emphasized that the data in the Yellow Pages is very reliable compare to other ads anywhere else and this is probably because ads do cost a lot to businesses.

S. might be a potential user for the online Yellow Pages. S. has got the browsing skills and he still uses the Yellow Pages as a source of information. He appreciates the fact that he can browse nationally while the printed book provides only local information. It is apparent to S. that the online data originates from the same reliable Yellow Pages database. Knowing this may encourage S. to use the online system more.

4.5 User 5

General

B. is an intermediate to advanced computer user and a very experienced Internet user. She started using the internet around 3 years ago browsing and reading news, sending emails, and communicates via VOIP with her family overseas. Her computer is on 24 hours per day and she is constantly online using broadband. She uses the Yellow Pages quite frequently to seek trades people or suppliers of certain goods. She had never used the online Yellow Pages before.

To B. the main value of using the Yellow Pages is the amount of information available on the Yellow Pages compared to classified advertisements in newspapers. In addition, it is also very reliable, almost always available, and she can also get most of the things she needs. Table 4.6 provides the usability test results for user 5.

Table 4.6: Usability test results (User 5)

Task No'	Task	Percentage completed	Time to complete	*Rate difficulty	Comments
1a	Looking for service provider in living area	100%	150 Sec	2	User carried out task fairly easy
1b	Looking for directions by locating the Map Icon	100%	20 Sec	2	User carried out task fairly easy
1c	Get wider picture of map (Using zoom buttons)	100%	60 Sec	1	User carried out task fairly easy
2a	Looking for service provider in Auckland	100%	150 Sec	2	User carried out task fairly easy
2b	Find their Web site	100%	10 Sec	1	User carried out task fairly easy
3a	Looking for restaurants on Queen St', Auckland	100%	More than 5 Minutes	5	User spent some time trying to understand which search box to use
3b	Locate a certain Restaurant	100%	200 Sec	5	User completed the task after a while
4	Using walkthrough	100%	120 Sec	2	User carried out task fairly easy
5a	Expanding search to bordering neighbourhoods	100%	200 Sec	5	User completed the task after a while
5b	Sort alphabetically	100%	120 Sec	5	User carried out task fairly easy

*Rate difficulty: (1=easy, 5=difficult)

Observation

General

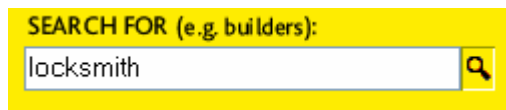
1. As a first time user of the Internet Yellow Pages, B. was navigating very well.
2. B. was browsing and trying to read the information on the page. She was able to read all labels and text on the web site without any problems.
3. The web site colour scheme (backgrounds and foregrounds) was clear to B. and she didn't have any problems reading the text.
4. B. didn't have any problem to scroll up, down, left, or right, she was controlling the mouse very well.

Features

1. B. found the Map and found the direction features very useful.
2. B. always used the search box and never used the "Browse a Category" option.

Navigation

1. B. initially pressed on the magnifying glass located beside the search box after keying in the search criteria and a new screen labelled "Select a category screen" immediately launched. B. was puzzled as she assumed the magnifying glass beside the search box would mean search. After returning back to the main screen B. realized that she pressed on the wrong button, she spotted the "Search" button and continued with her query.



2. B. managed to spot the "Listed in" categories listed under the results and managed to navigate to the right classification.
3. B. found the "Map" and "Web" icons quite easily and was quite impressed from the amount of information she received. In order to get

a wider map, she used the '+' sign and after receiving the same information she tried the '-' sign saying "now I see, '-' means wider view, this should have been tagged".

4. B. was searching for Candle Makers in the business name and ended up with no results. Then she tried to use the Category search box but this ended up with no results either. B. read the list of suggestions provided and pressed on the advanced button to search for Candle Makers in the keyword. The search returned no results because the category field was still populated with the word Candle Maker. Thereafter, B. tried to remove the word "maker" from the Category and from the keyword with no luck. B. could not figure why the search returned no results. Therefore B. tried just the word "Candle" in the keyword and again no result returned. At this point she gave up. She was advised to type "Candles" in the keyword. This time a few results came back and then she managed to locate the correct classification "Candles". "Sometimes you got to think of that word" she added.



KEYWORDS
(e.g. flower bouquets):
Candle

BUSINESS NAME
(e.g. Telecom):

CATEGORY
(e.g. builders):
Candle makers

STREET NAME
(e.g. Queen Street):

LOCATED IN
(e.g. Wellington):
New Zealand

Normal Search

5. While searching for business in a certain area, she clicked on the "Need a map" icon instead of the "search" icon.

FIND IT NOW...

SEARCH FOR (e.g. builders):

OR A BUSINESS CALLED (e.g. Telecom):

LOCATED IN (e.g. Wellington):
New Zealand

[Advanced Search](#)

Search **TIPS**

Need a map? [Click Here](#)

This resulted in a different set of screens appearing. B. gave up after a few minutes of navigating through the new set of screens. She returned back to the beginning and started all over again.

6. B. was searching for restaurants on Queen St'. She used the advanced search and keyed in "Restaurants" in the keyword and "Queen" in the street name. This ended up with no results. Then she tried "Restaurant" ending up with 1 in Auckland. B. was quite puzzled, then she has been advised to use the category search rather than the keyword, this time a long list of businesses appeared.
7. B. was trying to sort the results alphabetically; she was trying the browser tools but no luck. After a brief explanation about browser functionality and website clickable items, she managed to find the sort by alphabetical button.
8. B. also found the "related localities" button after a while. "You just have to keep searching and exploring. Once you have done it once or twice it would be easy".

Naming

1. B. understood and was familiar with the language used on the web site.

Conclusion

B. completed all the tasks successfully. For B. using the online Yellow Pages was a very interesting lesson "the information is there, you just need to spend

some time to find it” and “I am just amazed how much information you can get.” B. added that she was very confused in which box to put her search criteria every time she is doing advanced search. Sometime she needed to use the “Category” search box and sometime the “Keywords”; however B. concluded that she will be using the Online Yellow Pages from now on and she will even tell all her friends about it. The fact of her being online and her computer is always on makes it easy for her to access to Internet and the online Yellow Pages website.

4.6 User 6

General

V. is an advanced computer user and a beginner Internet user. She started using the internet around 2 years ago mainly for emails. She uses the Yellow Pages every now and then searching for products she desires to buy. She had never used the online Yellow Pages before.

To V. the main value of using the Yellow Pages is the amount of information available on the Yellow Pages. This saves her a lot of time running around and look for the product she desires to buy. Table 4.7 provides the usability test results for user 6.

Table 4.7: Usability test results (User 6)

Task No'	Task	Percentage completed	Time to complete	*Rate difficulty	Comments
1a	Looking for service provider in living area	60%	More than 5 Minutes	2	User tried many search options to complete the task
1b	Looking for directions by locating the Map Icon	50%	120 Sec	2	User could not find Icon link. User was able to complete task after showing her the Icon
1c	Get wider picture of map (Using zoom buttons)	100%	10 Sec	1	User carried out task fairly easy
2a	Looking for service provider in Auckland	60%	150 Sec	2	User tried many search options to complete the task
2b	Find their Web site	50%	120 Sec	1	User could not find Icon link
3a	Looking for restaurants on Queen St', Auckland	100%	More than 5 Minutes	5	User managed to complete task with help
3b	Locate a certain Restaurant	0%	200 Sec	5	User could not complete the task
4	Using walkthrough	100%	120 Sec	2	User carried out task fairly easy
5a	Expanding search to bordering neighbourhoods	0%	200 Sec	5	User could not complete the task
5b	Sort alphabetically	0%	200 Sec	5	User could not complete the task

*Rate difficulty: (1=easy, 5=difficult)

Observation

General

1. As a first time user of the Internet Yellow Pages, V. navigated with confidence.
2. V. was able to read all labels and text on the web site without any problems.
3. The web site colour scheme (backgrounds and foregrounds) was clear to V. and she didn't have any problems reading the text.
4. Scrolling was not an issue to V., she was controlling mouse movements very well.
5. There were few occasions where V. clicked on non-clickable items such as choosing a category or sub-category. This behaviour was repeated a few times until she was instructed on how to identify clickable items.

Features

1. V. found the Map and Web site icons very useful as well as all the clickable shortcuts such as "alphabetical sort" and "related localities", however she commented that they should be more visible.
2. V. always used the search box and never used the "Browse a Category" option.

Navigation

1. V. was trying to look for "Croquet" to purchase as a Christmas gift. After keying in the search criteria, V. initially pressed on the magnifying glass located beside the search box assuming it is the search button, a new screen labelled "Select a category screen" immediately launched. V. was trying to click on the category icon located beside the name with no luck.



After a description on the appearance of clickable vs. non clickable items she clicked on the correct item this time. Every time a new list of sub category opened, V. had to scroll down to it as it immediately jumped back to the top. V. found it very frustrating: “that is very annoying that you have to scroll down every time”. V. eventually gave up the whole category issue as she could not find what she was looking for.

2. V. returned to the main screen where she was shown that the search button is located below the search box. V. clicked on the search button ending up with only one result. “That could not be right; surely there are more of them in New Zealand”.
3. V. could not locate the “Map” and “Web” icons although they were located on the right end side of the business name. After she was pointed to the Icons she found the map and the direction feature very useful, she was able to use the zoom buttons with ease.
4. V. was searching for a restaurant on Queen St’ with not much luck. She got a very big list of restaurants in Auckland centre, however she could not filter out the Queen St’ restaurants. After explaining her about the advanced search option, she was able to filter out only the Queen St’ restaurants, however she could not sort them alphabetically in order to find a particular one.
5. V. didn’t know how to broaden her search to related localities. After showing her the link on the screen, she commented “this is too important to be left out of the way”.

6. V. was using the browser "Home" button in order to go back to the home page. Obviously the Yellow Pages web site disappeared and the defined address under "Internet options" appeared, V. had to click the Yellow Pages web site once again.

Naming

1. V. understood and was familiar with the language used on the web site.

Conclusion

V. completed some of her tasks successfully. For V. using the online Yellow Pages was a good exercise. V. added that she might use the Online Yellow Pages however, because she uses dial up together with the fact that her computer is shut down most of the time, "I will have to find a good excuse to turn on my computer and not to use the Yellow Pages book just lying on my desk."

5 Discussion

Both restrictive and positive design features discovered across the different usability tests are highlighted and discussed. The main value of both the book and the online form of the Yellow Pages are also considered and compared.

5.1 Restrictive design features

Three factors emerged that influenced the usability of the Yellow Pages website and impacted on the actions of at least fifty percent of the participants. These factors include; data located outside the screen centre, clicking on non-clickable areas on the screen, and lack of appropriate headings. They are considered under the three sections of visual, interactive, and information design factors.

Visual design factors

Table 5.1 lists the visual design factors encountered by the participants.

Table 5.1: Visual design restrictions

Factor	User 1	User 2	User 3	User 4	User 5	User 6
Focus on the Centre of the screen most of the time	X	X		X		X
Difficulties Clicking on small clickable areas		X				

From Table 5.1 it can be seen that four of the six participants were concentrated on the centre of the screen and couldn't spot the information that was available on the outer portion of the screen. Such information includes the "sort alphabetical" and "related localities" buttons and in two occasions the search button. This is consistent with prior studies (Czaja & Lee, 2003; Morrell et al., 2003) indicating that older adults face reduction in peripheral vision leading them to focus on the centre of the screen. As participant 4 indicated "the attention is drawn on what you are looking at" may be common to all four participants who were focusing on the centre of the screen. However, it is

interesting to note that two participants read all the information on the screen. User 3, whose inability to spell right forced him to read everything on screen and user 5, being the most experienced Internet user among all six participants, was using her experience and proficiency during the session.

The majority of users didn't have problems clicking on small clickable areas or icons which are close to each other. All users got their experience with computers and Internet. However, one user encountered problems in clicking on small clickable areas due to slight tremble in her hands.

Interaction design factors

Table 5.2 lists the interaction design factors encountered by the participants.

Table 5.2: Interaction design restrictions

Factor	User 1	User 2	User 3	User 4	User 5	User 6
Clicking on non-clickable items	once	X	X			X
Difficulties using the search mechanism	X	X	Never used	X	X	X

From Table 5.2 it can be seen that three of the six participants were clicking on non-clickable items. Distinguishing between clickable and non-clickable items requires following certain rules (see 2.3.2). Supported by the literature (Chadwick-Dias et al., 2002), older adults are not familiar with those rules therefore it is quite essential to use standard links within the web page. Otherwise, it will be too hard for older adults to learn to use a new design for every new site they encounter. This may lead to a risk of losing those users to sites which are designed in a conventional way.

There are no common characteristics among the users who were clicking on non-clickable items; each one had his own reason, i.e. age, disability and lack of experience. Also there are no common characteristics among the users who were clicking on clickable items; therefore results from this study do not

point to any relation between the ability to click on clickable items and the age of the participants.

From Table 5.2 it can be seen that all the six participants were having difficulties using the search mechanism, particularly the advanced search option. The following is a summary of all issues users encountered while using the search mechanism:

- Users got confused with the “Keywords” and “Category” search option.
- Users’ spelling mistakes were not corrected and one user avoided the search option due to spelling difficulties.
- Users got confused with the magnifying glass icon beside the search bar and mistakenly used it as a search button.
- Search returned no results for single term search, but succeeded for the plural term search (i.e. Candle vs. Candles).
- Search returned no results when additional characters such as a full stop were present (i.e. Restaurant.).

Search functionality is important especially for users who cannot navigate easily. This study reveals that many of the current search mechanisms are not usable and require the attention of the online Yellow Pages web designers.

Searching the online Yellow Pages for service providers initially returned voluminous information when searching nationally. In addition, results returned from the online Yellow Pages were sorted randomly. However, the information could be narrowed quite significantly and very easily using the build in category and location refine options. This function was commonly used by all participants as observed throughout the testing. This feature may be attractive to older users who have wide variety of physical and cognitive abilities; narrowing down the results in a step by step manner will help to overcome some of those disabilities.

Information design factors

Table 5.3 lists the information design factors encountered by the participants.

Table 5.3: Information design restrictions

Factor	User 1	User 2	User 3	User 4	User 5	User 6
Difficulties in understanding links and buttons and their meanings due to lack of appropriate headings	X	X	X	X	X	X

From Table 5.3 it can be seen that all the six participants had difficulties understanding the various links and buttons due to lack of appropriate headings. Such lack of headings includes the meaning of the '+' and '-' under the map zoom button and the magnifying glass beside the search box which launch an alphabetical category screen. No users located the "Home Page" button and used instead the back button. In several occasions two users restarted the browser to return to the home page.

There are no common characteristics among the users who understood all buttons and the users who did not. Some of the buttons were even clicked by the two pre-test users, therefore results from this study do not point to any relation between the ability to understand links and buttons due to lack of appropriate headings and the age of the participants. However, they do indicate a poor website design.

5.2 Positive design factors

Three factors emerged that influenced the usability of the Yellow Pages website and were considered as having positive impact on all participants. These factors include the web site colour scheme, good use of hierarchical menus, and simple language use. These are considered under the three sections of visual, interactive, and information design.

Visual design factors

All participants reported that the colour scheme was very clear and they have no difficulties reading all the text on screen. The colour schemes that are used on the web site are either black over white or black over yellow; both are easy to read and of high contrast. Such colour scheme is supported by the literature (Badre, 2002; Ellis & Kurniawan, 2000) since light sensitivity decreases with age and using high contrast display are helpful for older adults.

Interaction design factors

No walking menus were used in the Yellow Pages web site. As recommended by the literature (Morrell et al., 2003), walking menus require mouse management skills and precise movements. Avoiding walking menus does make the Yellow Pages web site more senior friendly. Instead, good use of hierarchical menus was observed and was successfully utilized by all six participants.

Information design factors

All participants understood the language used on the web site. As recommended by the literature (Chadwick-Dias et al., 2002; Fisk et al., 2004), using simple language is important for older adults as they tend to read all the information and instructions appearing on the web site.

5.3 Other Factors

As indicated, the online Yellow Pages does not use ranking when the search results are displayed. However, with a click of one button results can be sorted alphabetically; yet, the majority of users did not spot that button although the functionality exists. Furthermore, it is very common among Yellow Pages companies worldwide to sell the first top 5 search results. This practice will soon be introduced in the New Zealand Yellow Pages starting in June 2007. For older users the most important factors that influence their decision as reported by the majority of users are cost reliability and location. Forcing older users, who have problems scrolling and controlling mouse

movements to select the first top 5 search results may hinder their willingness to use the online Yellow Pages next time they come to search for a local service provider.

To ensure good content accessibility for all online Yellow Pages users, checking the spelling of the text typed in the search bar is very important. Users who misspell words should be provided with the right spelling, instead of their search showing no result. Older users have problems spelling long words. Worsened eyesight might also cause more spelling mistakes as the users cannot easily see what they are typing (Zaphiris & Kurniawan, 2005).

One of the primary cognitive declines in older adults involves working memory capacity (Badre, 2002). As a result older users are less able to perform variety of verbal and spatial working memory tasks, especially as the tasks become more complex. Therefore, it is reasonable to assume that, if working memory demands of Web navigation tasks can be lessened, then the performance of older adults on these tasks could be improved. That is, steps for performing a search should be simple and clear and should be kept to the smallest number of steps possible. The user should not have to infer what to do next. More of the information presented in a website might also be better understood, and remembered, by older adults if working memory requirements are lessened in its design. Less effort would be exerted on navigation and more attention could be applied to the material at hand (Holt & Morrell, 2002, p. 112).

Another important consideration for designers to have in mind is how much of the learning a user has to do to use online Yellow Pages relates to general web usage and how much is just about the Yellow Pages website? The older adults in this study were slightly atypical in that they were all already active with the Internet - using e-mails, voice over I.P., participating in online clubs, making online bookings, or reading news. However, they all had various difficulties with the online Yellow Pages site.

The additional difficulties encountered by less than fifty percent of the users were:

- Clear distinction between content and advertising. For example, the users were confused by advertisements displaying the word “Go”.
- Highlighting of clickable items differently from non-clickable items. Make it obvious what is clickable and what is not.
- Design windows with a less number of categories on it to reduce memory overload.

In reflecting on other aspects highlighted in the literature review, the following were also found:

- None of the users had problem with scrolling which is contrary to Morrell et al. (2003); further research would be useful.
- Users found the navigation buttons with both symbols and text (Map & Web site icons) less confusing than buttons with only symbols or only text (the category selection button), which is supported by Morrell et al. (2003).
- A majority of users didn't have problems clicking on small links on the page which is contrary to Ellis and Kurniawan (2000); further research is recommended.
- Text size didn't affect any of the users' performance; users were able to read all text on the web site. These findings are supported by Chadwick-Dias et al. (2002).
- Some users had problems recognising clickable links, which may be due to the fact that standard links such as colour change when the mouse runs over the link, were not used on the web site. This practice was recommended by Chadwick-Dias et al. (2002).

5.4 Main value

The Yellow Pages printed book was popular among all users. Table 5.4 summaries the main values the six participants identified.

Table 5.4: Summary of the main Yellow Pages book value users identified

No	Yellow Pages book main value	User 1	User 2	User 3	User 4	User 5	User 6
1	Get the best value for money	X					
2	Get the job done as quickly as possible		X				
3	Get the best deal on the market			X			
4	Save time running around			X			X
5	Access to service providers & information at fingertip			X	X		
6	Reliable and accurate information				X	X	
7	High volume of information					X	X

Table 5.4 shows that the Yellow Pages book is a valuable product among all six participants. Further investigation could reveal and increase the number of shared values. Other values such as portability (the book can be physically carried); cross referencing within the book classifications and various guides throughout the book could all be the subject for future research.

All six participants started using the internet in the last 3 years (see appendix 2), meaning the only source of reliable information and service providers was the printed book until recently. Various comments were made throughout the sessions from all participants regarding the Yellow Pages printed product which reflect their view and high value of the book. Comments such as “it is easy to use the Yellow Pages” and “You get it in a flash of an eye”, also “I would better stick with what I know reasonably well”. These all indicate that the Yellow Pages will remain their preferred choice for many more years to come.

Table 5.5 summaries the value of the online web site among the participants.

Table 5.5: Summary of the online website value

Website main value	User 1	User 2	User 3	User 4	User 5	User 6
Ability to search nationwide.	X			X		
Point out the location of the service providers.	X					
Fast delivered and high volume of information.					X	

Table 5.5 shows that the online Yellow Pages is considered a valuable product among three participants. Two of them (users 1 & 5) are the only users having their computer turned on and connected to the Internet via broadband. The online website could potentially be accessed by two more users (users 4 & 6) among the group; especially with some training. The other two users (users 2 & 3) are unlikely to use the online Yellow Pages due to difficulties in spelling and some physical constraints relating to old age such as the hand dexterity needed to operate the mouse.

In one case, the user was very keen to use the online version mainly because of the wealth of information. For some people, knowing there is a lot of information will be enough motivation to learn how to use the website.

Since the online version of Yellow Pages comes from the same source of information, it helps older adults gain confidence in its reliability and accuracy. Further, all users confronted high volume of information using different search criteria while browsing the online Yellow Pages. This indicates how well the online version helped older adults fulfil the last 3 values specified in Table 5.4. The research stopped at the point of finding the information and did not carry on engaging users with the actual purchase of any item. In addition, considering that only four out of the six users were able to complete the majority of the tasks, no clear evidence has been identified to point to the fulfilment of the first four values specified in Table 5.4.

Throughout the session, users have identified the features that can only be obtained from the online version of the Yellow Pages; nationwide search, fast delivered and narrowed down to locality, the use of a map to point out the location of the service provider, and the option to seek further information through the web site link. Some users appreciated and recognised the benefits of those features which helped to raise their confidence level in the Yellow Pages products.

However, there were some features that could not be obtained from the online version, such as; non-alphabetical listing, limited information (typically name and contact details), related headings, and also the ability to view and compare side-by-side advertisements from various service providers. Nevertheless, users appreciated that they can still save time running around by having the information available to them so they can still ring around to get the best deal on the market.

6 Summary

6.1 Implications

Considering that by the year 2050, twenty one percent of the world population, or 86.7 million people, will be 65 years and older ("The U.S. Administration on Aging", 2004)(Administration of aging, 2004), focusing on usability of web sites for older adults is warranted. Older adults are key Internet consumers who need to be targeted as part of web design strategies. Web designers that will effectively follow the guidelines for building senior friendly web sites can help open the Internet to people 65 years old and over. With expected growing number of older adults using the Internet, more studies are needed to identify problems older adults face while using the internet.

This research study explored the usability of online Yellow Pages for older adults and has made the following contributions:

6.1.1 Enhancing the understanding of the requirements of older adult users.

The internet can be a valuable part of older adults' lives. Participants in this study were using the Internet to communicate with family via e-mail or voice over IP, be part of online clubs, make online bookings and reading news. Such activities have the potential to improve older peoples' quality of life. Older adults feel part of the modern world and welcome the opportunity that technology may offer to facilitate social contact with their family who have made computers and the Internet an inherent part of their lives (Osman et al., 2005).

Certainly, the number of older users using the Internet is increasing; however, problems unique to that population will still remain, such as; visual perception and processing, hearing, psychomotor abilities, attention, memory and so on. Further, some of the barriers that senior users face when accessing the Internet relate to the computer design itself, things such as; hand dexterity with mouse movements, hand eye coordination operating and pressing buttons and peripheral vision while displaying information onscreen; all

functions which decline with age. Those barriers point to the importance and necessity of those systems to be re-adjusted to meet the needs of the senior population.

As the web becomes more widespread among the older adults group and the population ages, then general web using skills will improve across older adults. Ideally the Yellow Pages should get a useful and robust design now, for if they continually change it, users may become disheartened because of the repeated efforts they will have to make to learn the new features all over again.

The results from this study indicate that the majority of older adults who participated in this study won't use the online Yellow Pages because the book is more instantly available, and it also already delivers the two most desired capabilities of comparison of services and location.

6.1.2 Recommend steps to the New Zealand Yellow Pages for enhancing the online application.

Yellow Pages web designers can improve the design in the following main areas:

Visual design

- Avoid small clickable areas and centralise important information such as the alphabetical sort button.
- Clearly distinguish between content and advertising.
- Avoid using misleading words such as "Go" on advertisements.
- Highlight clickable items differently from other non-clickable highlighted items such as in the "Refine search by location".

Interaction design

- Use standard links throughout the web page.
 - Investigate the use of Auto Complete and a spell checker into the search bar.
 - Make it obvious what is clickable and what is not.

- Buttons and links should show that they have been clicked.
- Make visible change other than the cursor, when the user moves the mouse onto a clickable area.
- Avoid unfamiliar symbols to graphic buttons since many older adults have low computer and Web expertise.
- Clearly label all buttons.
- Minimise vertical scrolling in a secondary window and pop-up windows.
- Design windows with a fewer number of categories on it.

Information design

- Include text to all images and clickable areas and create link phrases that make sense.
- Give clear instructions and write them in plain language when displaying the map information.
- Add approximate time for normal pace walking in the “Get Directions” map results.

Yellow Pages should be aware of the fact that the shift in classification naming throughout the years may isolate some older people from using the printed product as well as the online version of the Yellow Pages.

Designers should be alert to the importance of getting the search engine to match users’ behaviours and needs. Easy comparison of services for cost, reliability, and convenience are valued highly. Attention is also needed on how search results will be listed.

Yellow Pages will benefit through involving adult users in their design process. Designers may conduct a survey to increase their understanding of older adult’s needs. They may sit alongside older users and conduct usability testing to study users’ actual behaviour at the time of use as has been shown to be effective in this study.

It is possible that enhancing the usability of the online Yellow Pages website will increase the use of the website among the older population, and this in

return, will save the cost of educating older adults on its usage, and also diminish the users' effort required to learn and use the website.

6.1.3 Contributes the first usability research done for the Yellow Pages web site among older adults.

This is the first study to date of which I am aware that examines the usability of the online Yellow Pages for older adults and therefore it will be of some value to the usability community, both researchers and practitioners.

6.2 *Limitations*

A major limitation of this study was that it only involved six participants and these were self-selected SeniorNet members with an interest in computers. The majority of members were well educated with two participants having tertiary background. It is unknown how much the selected participants differ from other users of on-line communities for older adults, and from older adults in general, therefore limiting the generalizability of the findings. The findings of this study are therefore preliminary. However, the study does indicate some areas for future research.

6.3 *Future work*

There have not been many studies on older users using the Internet and none on the online Yellow Pages website; therefore there are many opportunities and directions to pursue. A wider selection of older users can be investigated. A survey on actual computer and Internet use amongst all older users would be useful. In addition, research can be conducted on the usability of the online Yellow Pages with members of all age groups. Studies of different ethnic groups with different language proficiencies would be beneficial.

Future research to compare online search engines such as Google with the Yellow Pages search mechanisms will be useful for Yellow Pages web developers and designers as this aspect is important for older users. The ways results are ranked is important. The different ways of ranking such as, alphabetical, location, and business fee should be investigated particularly

with how these affect older users' decision processes and their likelihood to take up the use of online Yellow Pages as a regular thing.

Future research to analyze the percentage of people who have spelling problems will be useful to indicate how important it would be for a spell checker to be added.

6.4 Summary and Conclusions

The Internet is becoming an important and attractive source of acquiring information for users of all ages. This trend is expected to continue and to become more widespread. This study focused on older adults 65 years old and over including three males and three females who were all Seniornet members with some computer and Internet experience. The main goal of this study was to examine the usability of online Yellow Pages for older adults. Usability testing was the method used to examine the actual experience and behaviour of senior people while using the Yellow Pages website.

The study showed that the Yellow Pages book is a highly valued product for older adults. There was strong motivation to use Yellow Pages because the information acquired from the book related to important parts of these older peoples' lives. In addition, the study found out that the online Yellow Pages was also regarded as a valuable product because it was seen to provide some of the functionality of the book.

The findings from this study indicated that the online Yellow Pages has some design deficiencies in relation to older users, namely; small clickable icons, not easily recognised clickable items, important information located at the screen periphery, non-standard design of pages, missing headings for some clickable areas, poor distinction between content and advertisements, a poor search mechanism, and no spellchecker. However, positive aspects were also discovered, including; a good colour schema, appropriate use of hierarchical menus, simple language, a map facility, and national search.

Results from this study clearly indicates that the majority of older adults who participated in this study won't use the online Yellow Pages, because the book is more instantly available and delivers the two most desired capabilities, comparison of services and location. Computer and internet familiarity appears to have a strong influence on prospective take up. Whether the user has the habit of having the computer on and immediately available also had a strong influence on users' expectation that they will become regular users of the online Yellow Pages. As the population ages and older adult users become more experienced and familiar with computer and internet use, the use of the online Yellow Pages should increase, especially if the habit of leaving the computer on and connected to the internet becomes more established.

This study contributes the first usability research done for the Yellow Pages web site among older adults to the usability community. It builds on the existing understanding of older users' needs when using the Internet, and will benefit web designers and, in turn, older users.

Through this study I have increased my understanding and appreciation of older adults' abilities and needs when using a computer particularly when accessing the Internet. I was impressed and heartened to find that the participants in this study did not have their advancing age or their physical disabilities diminish their willingness to learn how to use modern technology and to do it efficiently. I have also gained knowledge of how to run usability tests; mainly in the area of improving my interpersonal skills which occurred as the tests progressed.

Appendices

Appendix A: Website Usability Factors

Factors Author	Navigation	Readability	Simplicity	Ability to learn	Accessibility	Interactivity	Content	Credibility
(Badre, 2002)	Easy to navigate	Content structure	Response time				Clear content	Security & privacy
(Ferre et al., 2001)			Efficiency of site	Easy to learn				Low error rate
(Gehrke & Turban, 1999)	User friendly navigation		Page loading speed				Clear business content	Secure websites
(Nielsen, 2000)	Easy to navigate	Easy data reading	Speed				Clear content	Credibility
(Proctor & Symonds, 2000)	Logic of navigation	Easy data reading	Speed of data display			Quality of graphics	Data timeliness	
(Roy et al., 2001)	Ease of navigation			Easy to learn				
(Schubert & Selz, 1999)		Good content structure			24 hours access	Hypermedia presentation	Quantity of information	Anonymity
(Spool et al., 1999)	Ease of finding information,	Easy to read data	Speed of data display			Quality and appearance of site	Timeliness of data	
(Zhang et al., 2000)	Ease of navigation		Page loading speed	Easy to learn		Visual appearance	Information availability & site stability	Privacy

Appendix B: Summary of Participant background and characteristics

User	Age	Gender	Experience (in Years)			English Language proficiency	Location	Education
			Computer	Online	Online YP			
1	78	Male	4	3	0.5	Excellent	Local Senionet centre	Tertiary
2	85	Female	2	1	0	Excellent	Local Senionet centre	Secondary
3	76	Male	3	2	0	Excellent	Local Senionet centre	Secondary
4	65	Male	2	2	0	Excellent	Local Senionet centre	Secondary
5	71	Female	3	3	0	Excellent	Local Senionet centre	Tertiary
6	69	Female	4	2	0	Excellent	Local Senionet centre	Secondary

Appendix C: Pre-Defined Tasks

1. (Testing map Icon)

You are looking for laundrettes in the area you live in.

Let's see if you can find some instructions on how to get there.

Once we have seen the map, we would like to get a wider view of it.

2. (Testing web site Icon)

You are considering moving into a retirement village and looking for one in Remuera, Auckland.

You are also interested to find out as much information as you can via their web site.

3. (Testing massive scrolling & small clickable areas)

You are looking for a restaurant on Queen Street, Auckland

The restaurant you are looking for starts with the letters "Sa" – try to look for them in the page you are currently in.

4. (Testing walkthrough by categories)

You are looking to purchase drums for storing rain water to be used for your garden.

5. (Testing Information not in the centre)

You have just moved into the Mt Wellington area and you are looking to purchase plants for your garden.

Now you would like to expand your findings to bordering neighbourhoods.

You are looking for Justice of the peace in the area you live in.

Now you would like to sort them alphabetically.

Appendix D: Participant questionnaire

Participant Questionnaire



Online Yellow Pages for Older Adults: A usability study

22 Aug 2006

Please answer the following questions.

1. Do you use the Yellow Pages books? Yes / No

Please state why _____

2. Do you use the online Yellow Pages? Yes / No

Please state why _____

3. What type of services do you look for in the Yellow Pages?

4. How important is the Yellow Pages for you?

My Name: _____

Age: _____

Approved by the Auckland University of Technology Ethics Committee on 13 October 2006

AUTEC Reference number 06/156

Participant Information Sheet



22 Aug 2006

Online Yellow Pages for Older Adults: A usability study

You have been invited to take part in research I am conducting as part of a Masters in Business at the Auckland University of Technology.

What is the purpose of this research?

The purpose of this research is to investigate the use of the online Yellow Pages from older adults' perspectives. The focus is on the usability of the online pages and not the computing capabilities of the users.

The results will be written up as a dissertation and submitted to the Auckland University of Technology.

How was I chosen for this invitation?

You have been chosen because you are 65 years old or over and have access to a computer and the internet.

What will happen in this research?

First you will fill out a short questionnaire. Then, you will be asked to use the online Yellow Pages. The researcher will be taking notes, the session will be audio taped, and the computer itself may record what happens. You will be asked questions during the process and possibly again after the session. The whole session will take about one hour of your time.

You are under no pressure to complete these tasks. Participation is voluntary. You may withdraw yourself at any time prior to the completion of data collection without being disadvantaged in any way. If you withdraw, all relevant transcripts, or parts thereof, will be destroyed.

What are the benefits?

It is anticipated that the results from this research will assist the designers of the online Yellow Pages to understand what is working well and what needs improvement. The results will also inform other researchers into computer usability about the use of web pages from older adults' perspectives.

How will my privacy be protected?

The researcher and supervisor will assure the confidentiality of the participants. Real names will not be used in the written material. Material collected during the testing will only be used for the purposes of this study and seen only by the researcher and his supervisor. This material will be securely stored. The material will be destroyed when no longer of use for its original purpose.

How do I agree to participate in this research?

Please complete the consent form and return it within a week.

Will I receive feedback on the results of this research?

The results and discussion sections will be sent to you either electronically or by post upon request.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Philip Carter, phil.carter@aut.ac.nz, 921 9999 ext 5300.

Concerns regarding the conduct of the research should be notified to the Executive Secretary, AUTEK, Madeline Banda, madeline.banda@aut.ac.nz , 921 9999 ext 8044.

Whom do I contact for further information about this research?***Researcher Contact Details:***

Shai Aharon, shaaha97@aut.ac.nz.

Project Supervisor Contact Details:

Philip Carter, phil.carter@aut.ac.nz , 921 9999 ext 5300.

Approved by the Auckland University of Technology Ethics Committee on 13 October 2006

AUTEK Reference number 06/156

Appendix F: Consent form

Consent to Participation in Research



Consent to Participation in Research

Title of project: Online Yellow Pages for Older Adults: A Usability Study

Project Supervisor: Dr Philip Carter

Researcher: Shai Aharon

- I have read and understood the information provided about this research project as outlined in the information sheet (c41s01).
- I have had an opportunity to ask questions and to have them answered.
- I understand and agree that the interview will be audio taped.
- I understand that I may withdraw myself or any information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way. If I withdraw, I understand that all relevant transcripts, or parts thereof, will be destroyed.
- I grant permission for any information collected to be used for purposes as outlined in the information sheet (c41s01).
- I agree to take part in this research.
- Summary of findings will be sent to me either electronically or by post upon request.

Participant signature:

Participant name:

Date:

Approved by the Auckland University of Technology Ethics Committee on 13 October 2006

AUTEC Reference number 06/156

Reference list

- Aharon, S. (2005). Usability testing for the printed Yellow Pages among non-native English speakers: Assignment handed in for the strategic usability paper at the AUT.
- Badre, A. N. (2002). *Shaping web usability*. Addison-Wesley.
- Becker, S. A. (2004). A study of web usability for older adults seeking online health resources. *ACM Transactions on Computer Human Interaction*, 11(4), 387-406.
- Bernard, M., Liao, C., & Mills, M. (2001). Determining the Best Online Font for Older Adults. Retrieved August 29, 2006, from <http://www.usabilitynews.org/>
- Chadwick-Dias, A., McNulty, M., & Tullis, T. (2002). *Web usability and age: How design changes can improve performance*. Paper presented at the ACM Conference on Universal Usability Proceedings of the 2003 conference on Universal usability Vancouver, British Columbia, Canada.
- Chisnell, D. E., Redish, J. C. G., & Lee, A. (2004). Recruiting and Working With Older Participants. from www.aarp.org
- Chisnell, D. E., Redish, J. C. G., & Lee, A. (2006). New Heuristics for Understanding Older Adults as Web Users. *Society for Technical Communication*, 53(1), 39-59.
- Coughlin, J. F. (1999). Technology need of aging boomers. *Issues in science and technology*(53-60).
- Courage, C., & Baxter, K. (2005). *Understanding Your Users: A Practical Guide to User Requirements Methods, Tools, and Techniques*. San Francisco: Morgan Kaufmann Publishers.
- Czaja, S. J., & Lee, C. C. (2003). Designing computer systems for older adults. In J. Jacko & A. Sears (Eds.), *The human-computer interaction handbook* (pp. 413-427). NJ: Lawrence Erlbaum Associates.
- Echt, K. V. (2002). Designing Web-Based Health Information for Older Adults: Visual Considerations and Design Directives. In W. M. Roger (Ed.), *Older Adults, Health Information and the World Wide Web*. Mahwah, NJ.: Lawrence Erlbaum Associates.

- Ellis, R. D., & Kurniawan, S. H. (2000). Increasing the usability of online information for older users: A case study in participatory design. *International Journal of Human-Computer Interaction*, 12(2), 263–276.
- Ferre, X., Juristo, N., Windl, H., & Constantine, L. (2001). Usability Basics for Software Developers. *IEEE Software*, 22-29.
- Fisk, A., Rogers, W. A., Charness, N., Czaja, S. J., & Sharit, J. (2004). *Designing for older adults: Principles and Creative Human Factors Approaches*: CRC Press LLC.
- Gehrke, D., & Turban, E. (1999). *Determinants of Successful Web Site Design: Relative Importance and Recommendations for Effectiveness*. Paper presented at the Proceedings of the 31st Hawaii International Conference on Information Systems.
- Hawthorn, D. (2000). Possible implications of aging for interface designers. *Interacting with Computers*, 12, 507-528.
- Hawthorn, D. (2003, November 10-11, 2003). *How universal is good design for older users?* Paper presented at the Proceeding of the 2003 conference on Universal usability, Vancouver, British Columbia, Canada.
- Himmelstein, M. (2005). Local search: The Internet is the Yellow Pages. *Computer*, 38(2), 26-34.
- Holt, B. J., & Morrell, R. W. (2002). Guidelines for Web Site Design for Older Adults: The Ultimate Influence of Cognitive Factors. In W. M. Roger (Ed.), *Older Adults, Health Information and the World Wide Web*. Mahwah, NJ.: Lawrence Erlbaum Associates.
- International Organization for Standardization. (1998). <http://www.iso.org/>
- Kantner, L., & Rosenbaum, S. (2003, 21-24 September). *Usable computers for the elderly: applying coaching experiences*. Paper presented at the Professional Communication Conference, 2003. IPCC 2003. Proceedings. IEEE International.
- Kuniavsky, M. (2003). *Observing the User Experience. A practitioner's guide to user research*. San Francisco: Morgan Kaufmann.
- Maguire, M. C. (1998). User-Centred Requirements Handbook. Retrieved August 29, 2006, from <http://www.idemployee.id.tue.nl/g.w.m.rauterberg/index.html>

- Morrell, R. W., Dailey, S. R., Feldman, C., Mayhorn, C. B., & Echt, K. V. (2003). *Older adults and information technology: A compendium of scientific research and web site accessibility guidelines.*: National Institute on Aging.
- Nielsen, J. (1993). *Usability Engineering*. San Diego, CA: Academic Press.
- Nielsen, J. (2000). *Designing Web Usability*. Indianapolis, IN: New Riders.
- Nielsen, J., & Mack, R. L. (1994). *Usability Inspection Methods*. New York, NY: John Wiley & Sons.
- Online Yellowpages.com. <http://www.onlineyellowpages.com/10reasons.asp>.
- Osman, Z., Poulson, D., & Nicolle, C. (2005). Introducing computers and the Internet to older users: findings from the Care OnLine project. *Universal Access in the Information Society*, 4(1), 1-8.
- Proctor, C., & Symonds, J. (2000). *Designing for Web Site Usability*. Paper presented at the Proceedings of Australian Conference on Information Systems, Brisbane, Australia.
- Rosson, M. B., & Carroll, J. M. (2002). *Usability Engineering. Scenario-based Development of Human-Computer Interaction*. San Francisco, CA: Morgan Kaufmann.
- Roy, M., Dewit, O., & Aubert, B. (2001). The impact of Interface usability on trust in web retailers. *Internet Research: Electronic Networking Applications and Policy* 11(5), 388-398.
- Schubert, P., & Selz, D. (1999). *Web Assessment-Measuring the Effectiveness of Electronic Commerce Sites*. Paper presented at the 32nd Annual Hawaii International Conference on System Sciences.
- Shneiderman, B. (1998). *Designing the User Interface. Strategies for Effective Human-Computer Interaction*: Addison Wesley Higher Education.
- Spencer, A., Mullaney, T. J., & McNamee, M. (2005). Can Yellow Pages Stay in the Black? *Business Week Online*.
- Spool, J. M., Scanlon, T., Schroeder, W., Snyder, C., & DeAngelo, T. (1999). *Web Site Usability: A Designer's Guide*. San Francisco, CA: Morgan Kaufmann Publishers.
- Stroud, J. (2006). Yellow Pages have built-in advantage. *Knight Ridder Tribune Business News*, p. 1.

The U.S. Administration on Aging. (2004). <http://www.aoa.gov/>.

Wharton, C., Riemann, J., Lewis, C., & Polson, P. (1994). The Cognitive Walkthrough Method: A Practitioner's Guide. In J. Nielsen & R. L. Mack (Eds.), *Usability Inspection Methods* (pp. 105-140). New York: John Wiley & Sons.

Zaphiris, P., & Kurniawan, S. H. (2005). *Research-derived web design guidelines for older people*. Paper presented at the Proceedings of the 7th international ACM SIGACCESS conference on Computers and accessibility, Baltimore, MD, USA.

Zaphiris, P., Kurniawan, S. H., & Ellis, R. D. (2003). *Age related differences and the Depth vs. Breadth trade-off in hierarchical online information systems*. Paper presented at the User Interfaces for All, LNCS 2615, pp. 23–42, Springer-Verlag Berlin Heidelberg.

Zhang, P., Von Dran, G. M., Small, R. V., & Barcellos, S. (2000). *A Two-factor Theory for Website Design*. Paper presented at the Proceedings of the 33rd Annual Hawaii International Conference on System Sciences