

# **Design of an e-Registration Prototype Using HCI Principles: With Specific Reference to Tax Registration**

**J.T. Terblanche**

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Supervisor: Professor Jan H. Kroeze  
Co-Supervisor: Me. Sonja Gilliland

Vanderbijlpark  
November 2012

## DECLARATION

I declare that:

Design of an e-Registration Prototype Using HCI Principles: with Specific Reference to Tax Registration

is my own work, that all the sources used or quoted have been identified and acknowledged by means of complete references, and that this dissertation has not previously been submitted by me for a degree at any other university.

A handwritten signature in black ink, appearing to read 'JT Terblanche', is written over a light blue rectangular background.

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JT Terblanche

November 2012

## SUMMARY

The aim of the research was:

- to gain a better understanding on the concepts of Human-computer interaction (HCI) in general and the application of HCI principles in this field;
- to gain a better understanding of electronic registration systems (e-registration systems) and the use of web forms for this purpose;
- to gain a better understanding of which HCI principles could be applied to the design of a web form for e-registration;
- to apply the identified HCI principles to an example of a web form that was to be created;
- to evaluate the design of the web form by means of different data-gathering techniques, and
- to redesign the web form according to the data obtained from method triangulation.

In order to achieve these objectives, the research used, firstly a research methodology to determine which research approach to follow. Secondly, a literature review was then used to identify which HCI principles would be appropriate in the interface design of a web form for e-registration. The empirical part of this study consisted of a web form created according to these HCI principles, which was then evaluated according to usability goals. The evaluation included different data-gathering techniques, namely an observation of the manner in which the participants interacted with the web form, an interview which consisted of in-depth questions regarding the improvement of the web form and a questionnaire which consisted of specific questions regarding the usability of the web form. The web form was redesigned according to the suggestions made by the participants and a final web form prototype was introduced.

Finally, recommendations were made for additional studies in order to extend the study of HCI principles application in web forms, specifically in the design of tax e-registration systems in South Africa.

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# 1. INTRODUCTION AND PROBLEM STATEMENT

## 1.1. Introduction and background

According to a study conducted by Cyveillance (2000), the World Wide Web was estimated to contain more than 2 billion unique web pages. This same study found that the web grows at a rate of 7 million pages per day. Now, a decade later, web pages have increased to over 122 billion with this figure rapidly expanding each day (Joop.In, 2008). As of December 2011, the World Wide Web was said to have 555 million websites (Pingdom, 2012; Neil, 2012). Different types of websites may broadly include personal websites, business websites, informative websites and search engines (ToMakeWebsite.com, 2010). Wikipedia (2012) further categorises different types of websites into a list of almost 50 alternatives.

Many types of websites require user registration, and for this purpose web forms are used to add user information into an organisation's database (Te'eni *et al.*, 2007:282). Web forms also offer the functionality of processing financial transactions between the user and the organisation (Optillion, 2012). Given the extent of website options available and the extreme growth rate of websites universally, one could say that a large amount of these websites have added web form functionality for transactions such as user registration and financial dealings.

Organisations translate their paper-based processes into web-based applications by means of web forms (Aluja *et al.*, 2007:2029; Cook *et al.*, 2004:310) because of the benefits it provides. These benefits include cost-effective access to larger populations, reduced error in data input and the elimination of redundant information (Barak & English, 2002:70; Buchanan, 2002:150). Organisations may also consider the benefit of 'green information technology', which saves costs on paper use and also ensures a higher return on investment for a company as this plays a considerable role in the cost-cutting process (TechDune, 2009).

Regardless of these benefits, some organisations still make use of paper-based processes. This method of data-gathering may be seen as outdated and tedious by its users, seeing as the convenience of using electronic forms for submission saves time and ensures that forms are fully completed (Baker, 1996:1). The aforementioned issue encouraged the researcher to determine how to create and translate an efficient web form from its paper-based form. For this, the researcher needed to determine the requirements of a successful web form for

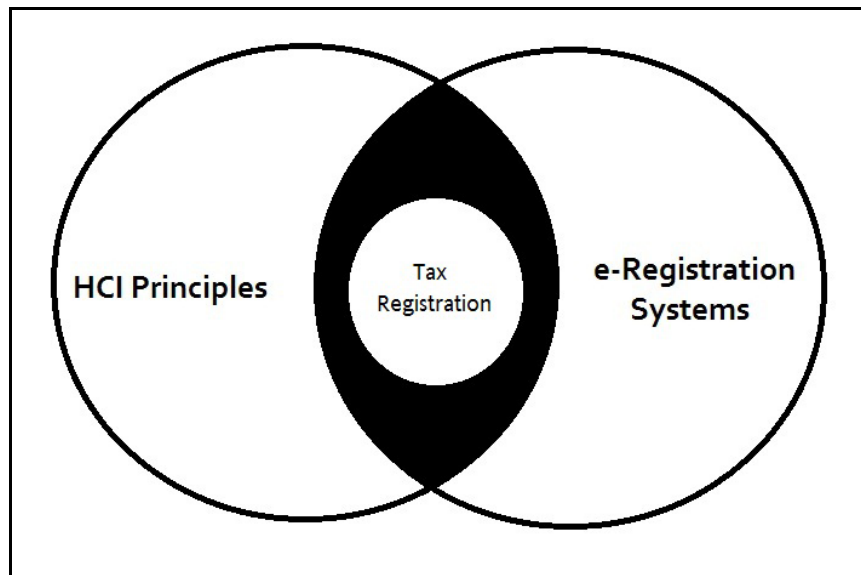
electronic registration (e-registration). The researcher then identified human-computer interaction (HCI) principles as a universal method of applying appropriate design principles to the creation of new information technology artifacts such as web forms (Rogers *et al.*, 2011: 25; ; Costa, 2008:265; Te'Eni *et al.*, 2007:195; Dix *et al.*,2004:259; Gulliksen *et al.*, 2003:7; Norman, 2002:17; Lynch and Horton, 2002: 24). For the purpose of this study, the fields of research are identified as e-registration systems and HCI principles.

## **1.2. Problem statement**

The current study focuses on the importance of the use of human-computer interaction principles in e-registration systems. The study further illustrates the importance thereof by using a tax registration system for first-time taxpayers as an example. It is suggested that the use of HCI principles could promote a better user experience in the design of an e-registration system.

First-time taxpayers could generally be represented by the younger working population, who because of their respective career or job demands, are knowledgeable about technology (e.g. electronic mail communication, point-of-sale systems, web browsing). At present, no electronic system is in place for the initial registration of taxpayers in South Africa. The only possibility is logging on to the SARS website and downloading a paper-based form. It could be said that the paper-based system may not be the ideal way of tax registration and one potential solution to this problem is to design an electronic/web form. This possibility is explored and constitutes the empirical work for this study. The scope of the empirical work is limited to interface design, where HCI principles are implemented to make the user-experience more enjoyable. This study stresses the importance of user-centred design and usability.

Research has been conducted in the HCI field as well as in the field of e-registration systems. A moderate amount of information could be found in the literature where these two fields overlap. Very little information could be found on the intersection of HCI and e-registration systems where a taxation system is the key focus. This intersection in academic research is illustrated in Figure 1.1.



**Figure 1.1: The research intersection indicated by the three study areas**

### **1.3. Research questions**

#### **1.3.1. Main research question**

How can HCI principles be applied to e-registration systems?

#### **1.3.2. Research subquestions**

1. Why create an e-registration prototype using HCI principles?
2. What are common examples of HCI principles?
3. What are the typical characteristics and requirements of e-registration systems?
4. Which HCI principles can be applicable to e-registration systems?
5. How can these HCI principles be applied to a specific e-registration system?

### **1.4. Theoretical framework**

Meyers (2009:21) states that choosing a theoretical framework is the next step in a study after choosing a relevant topic with possible research questions. Within the theoretical framework of a study there is a central theoretical theme. The central theoretical theme of

the current study stresses the importance of good interface design by applying the appropriate HCI principles to a given e-registration system.

After discussing different HCI principles, the study further applies specific HCI principles to an example of an e-registration system, namely, to determine which HCI principles applies, and by properly applying these HCI principles to a tax registration system for first-time taxpayers in South Africa.

### **1.5. Research approach**

Oates (2008:109) argues that designing a new system can only be defined as research if the design demonstrates academic characteristics such as critical evaluation and analysis, and not with mere technical implementation. This study entailed a literature review on the fields of e-registration and HCI principles, and to determine whether prior research had been done on the intersection of these fields. The approach followed for this mini-dissertation was “research through design” (Vera, 2009:17). This may be defined as creating a prototype of a system to answer a research question. Design research is also defined as creating a new, non-existent system by way of research (Vaishnavi & Kuechler: 2004). Hevner and Chatterjee (2010:5) also define Design Research as an example of where a question from the end-user is answered by the designer of a system through the creation of an appropriate and useful artifact.

The study is interpretive as it is based on an interpretation of an e-registration example and the evaluation derived from the qualitative data obtained by the methods used for method triangulation and literature (Oates, 2008:140-150). Oates (2008:37) defines method triangulation as using more than one data-gathering technique to obtain information and subsequently comparing the results obtained from these different methods. The data-gathering techniques used in this study include observation, a questionnaire and interviews. A detailed research methodology is presented in Chapter 2.

**Chapter 1** contains an overview of the study and the problems experienced with the paper-based tax registration system that lead to the research of HCI principles in e-registration systems. It is suggested that applying HCI principles could promote good user experiences in an e-registration system.

**Chapter 2** discusses the research methodology in detail.



**Chapter 3** contains the literature study and reflects the detailed research on the concepts of HCI and e-registration systems.

**Chapter 4** introduces an initial web form prototype that was evaluated by means of method triangulation.

In **Chapter 5** the results obtained from the method triangulation, which included a questionnaire, observation and interview for every participant, are discussed and evaluated. A final web form prototype is introduced.

**Chapter 6** contains a discussion on the research findings, their relevance, and how the literature study and the final results coincide.

**Chapter 7** summarises the findings in this study and how the research may contribute to filling a gap in the academic research environment.

## **1.6. Conclusion and possible contribution to information technology**

The success or failure of any system is measured by its user experience and usability. For any type of system it is important to have a user-centred design. When HCI principles are effectively applied to e-registration systems, the user experience could be more enjoyable. The study explores this concept and hopes to add to the body of Information Systems (IS) knowledge.

This research is an attempt to make a contribution to the field of IS by reflecting on the intersection of relevant research fields: human-computer interaction and e-registration systems. The next chapter contains a detailed discussion on the research methodology followed for this study.

## 1.7. Acknowledgements

A revised section of the literature study was published as a paper to the 15<sup>th</sup> International Business Information Management Association Conference (IBIMA).

TERBLANCHE, J.T., KROEZE, J.H. & GILLILAND, S. 2010. Guidelines for the design and creation of a web form to facilitate the registration of first time tax payers: An HCI approach (full paper). *Proceedings of the 15th International Business Information Management Association Conference (15th IBIMA)*, 6 - 7 November 2010, Cairo, Egypt, pp. 1033-1043. (Knowledge Management and Innovation: A Business Competitive Edge Perspective, edited by Khalid S. Soliman. On CD: ISBN: 978-0-9821489-4-5).

## **2. RESEARCH METHODOLOGY**

### **2.1. Introduction**

It is not enough to only intuitively answer the research question in an academic project. The research process also has to be carefully mapped in order to ensure that other academics accept the results (Oates, 2006:32). This chapter contains a detailed description of the reason for this study and the process that was followed to conduct the research.

“Research methodology” may be defined as the approach that is followed to solve a specific problem. Hofstee (2006:107) states that the chapter in which a researcher explains the method he or she followed to research a particular issue represents the map the reader will use to verify the results of the study. In other words, the reader will evaluate the results of a specific study based on the detailed explanation that the researcher presents of the process that was followed to obtain those results.

The research methodology is built around research questions. Oates (2006:34) proposes that research questions may be self-motivated or arise from external factors such as a lack of sufficient literature or the need to solve a specific problem. Both the main research question and subquestions of a study constitute the golden thread of the researcher’s investigation. Specific research questions were formulated for this study and are discussed in section 2.3.2.

According to Oates (2006:13), any research is built on an underlying research paradigm. The most common research paradigms being the interpretive, positivist and design research paradigms (Vera, 2009:17; Vaishnavi & Keuchler, 2004); and also the critical research paradigm as noted by Oates (2006:13). Design research is a research paradigm in IS (Information Systems) research (Hevner & Chatterjee, 2010:5). The interpretive, positivist and design research paradigms are discussed in the following section.

### **2.2. Research paradigms**

The researcher needs not only to understand the different paradigms and their different assumptions, but also how readers assess the quality of the research according to their paradigms (Oates, 2010:282). Within these research paradigms are philosophical worldviews around which the conduct of research is shaped (Oates, 2006:303). Table 2.1

provides a summary of the philosophical worldviews of different research paradigms according to Vaishnavi and Keuchler (2004).

**Table 2.1: Philosophical worldviews within the research paradigms (Vaishnavi & Keuchler, 2004)**

Basic Belief	Research Perspective		
	Positivist	Interpretive	Design
Ontology	A single reality, knowable, probabilistic	Multiple realities, socially constructed	Multiple, contextually situated alternative world states. Socio-technology enabled
Epistemology	Objective, dispassionate. Detached observer of truth	Subjective, i.e. Values and knowledge emerge from the researcher-participant interaction	<i>Knowing through making:</i> objectively constrained construction within a context. Iterative circumscription reveals meaning
Methodology	Observation, quantitative, statistical	Participation, qualitative. Hermeneutical, dialectical	Developmental. Measure artifactual impacts on the composite system
Axiology: what is of value	Truth: universal and beautiful, prediction	Understanding: situated and description	Control, creation, progress (i.e. improvement), understanding

The *positivistic research paradigm* “is based on the assumption that there is an orderly arrangement to the world we live in” (Adebesin *et al.*, 2011:310). A positivist researcher’s epistemological belief is that the object being studied has characteristics which can typically be measured using quantitative research methods (Myers, 2009:37; Vaishnavi & Keuchler, 2004).

Myers (2009:38) defines *interpretive research* as an assumption that no single reality exists and that people’s understanding of reality is a mental synthesis influenced by factors such as shared meanings, societal norms and language. The interpretive researcher makes an assumption of multiple realities that are socially constructed (Vaishnavi & Keuchler, 2004). This researcher aims to gain richer understanding of the context of the study and will typically use qualitative research methods (Oates, 2006:292).

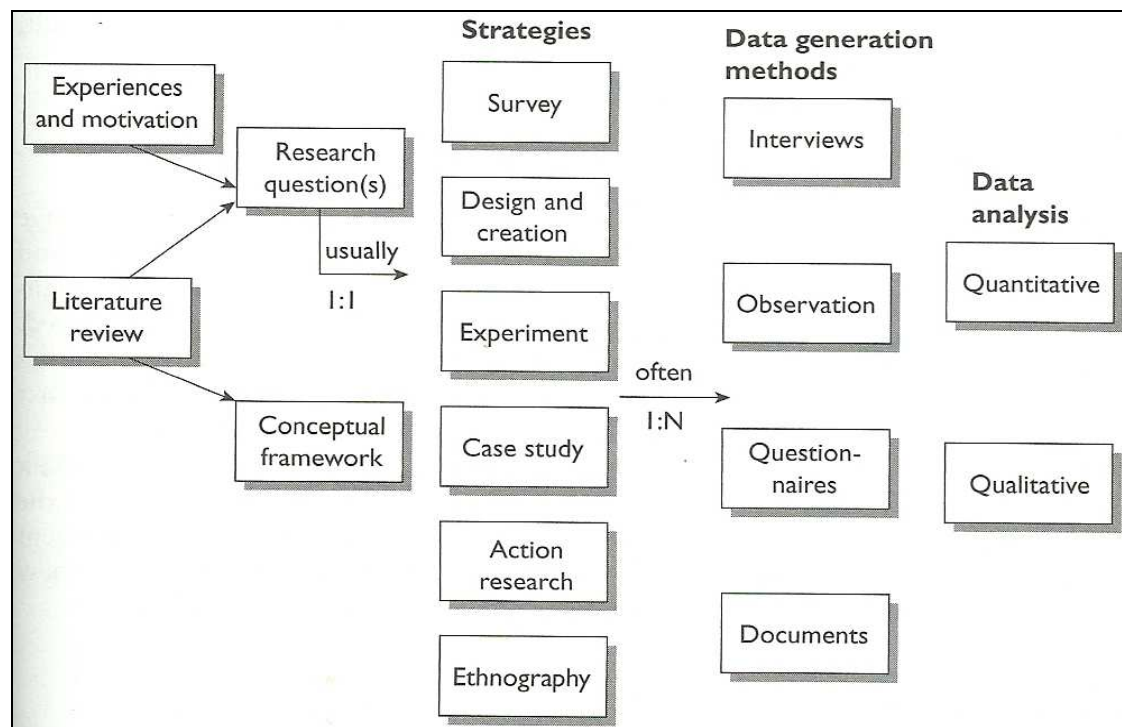
“*Design science research (DSR)* is a research paradigm in which a designer answers questions relevant to human problems via the creation of innovative artifacts, thereby contributing new knowledge to the body of scientific evidence” (Hevner & Chatterjee, 2010:5). According to Vaishnavi and Keuchler (2004) DSR “by definition changes the state of the world through the introduction of novel artifacts”. From both of these definitions we can assume that DSR is concerned with the creation of an artifact or instantiation that solves or addresses a specific problem. Vaishnavi and Keuchler (2004) further support this

definition with their concept of 'knowing through making', which simply explains that the design science researcher learns by creating or building – the construction of an artifact. Furthermore, Oates (2006:35) refers to DSR as a 'design and creation' strategy that is used when the research requires producing a new element of a system or a system as a whole.

The design science research paradigm was found to be the most appropriate paradigm for the current study. Vaishnavi and Keuchler (2004) describe DSR as certain techniques that complement the positivistic and interpretivistic perspectives on IS research. DSR involves analysis on the usability of created artifacts and therefore this process may involve methods used by interpretive or positivistic research paradigms. For this reason, the current study also included aspects of the interpretive paradigm as the iteration of the design process involved qualitative methods for data collection so that the researcher could have a richer understanding of the context of the study.

### 2.3. The research process

The researcher used Oates's research model (2006:33) for the purposes of this study. Figure 2.1 displays a graphical representation of this model. Oates (2006:33-39) defines the research process as follows:



**Figure 2.1: Oates's research model (2006:33)**

An individual wants to conduct research regarding a specific problem because of a certain motivation or because of a personal experience. Hofstee (2006:75) distinguishes between two main motivations for conducting research for a dissertation which are either to “shake the foundations of the academic world” or to obtain the degree which the student is enrolled for. Personal experience can be defined as any incident that occurs in the researcher’s world that drives him or her to investigate the matter further.

The experiences or motivations mentioned above bring about specific research questions that a researcher wants to answer. Lazar *et al.* (2010:85) write that research questions are formulated to define what the academic research project will attempt to discover.

After a research topic is identified, the researcher conducts a literature review. The literature review is an overview of previous research in the areas of interest, and covers information that may support or reject the central theoretical statement of the study. Webster and Watson (2002:13) believe that the reassessment of previous relevant literature is an important aspect of an academic study.

The researcher then structures his or her thoughts around the process that is to be followed and how his or her argument is to be proved. The result constitutes the researcher’s “conceptual framework” for the given study. A conceptual framework describes the manner in which a researcher structures his or her thoughts around the research process (Oates, 2006:34).

The researcher then chooses a strategy to conduct his or her research. Oates (2006:35) defines six strategies for research:

- **Ethnography** is a detailed recording of how interaction takes place between individuals and their environments. It provides an unbiased opinion on social relationships by sending the analyst into the field to be studied (Dix *et al.*, 2004:470).

- **Action research** is the attempt of researchers to provide a solution to an unknown problem by implementing a proposed method and reflecting on the result (Oates, 2006:154).
- A **survey** provides a systematic method to obtain data from large numbers of people or instances and the survey data are then used to identify patterns (Oates, 2006:93).
- **Experimenting** focuses on researching the causes or effects of an occurrence and then attempts to prove or disprove the current hypothesis (Lazar *et al.*, 2010:42).
- **Case studies** are perused when a researcher wants to empirically explore a peculiar occurrence within a real-life context, and has to rely on large amounts of triangulated data from multiple sources as proof (Yin, 2003:xi).
- A **design and creation strategy** is used when the research requires producing a new element of a system or a system as a whole (Oates, 2006:35).

Every academic research project requires data. The data may be obtained by way of different data-gathering techniques. Interviews, observations, questionnaires and documents are the most common data-gathering techniques used (Oates, 2006:116). Rogers *et al.* (2011:228) define these techniques or methods as follows:

- An **interview** is a conversation with an agenda and it takes place between two or more people. There are four leading interview types: unstructured interviews, structured interviews, semi-structured interviews and focus groups.
- **Observation** is the act of watching an individual (or individuals) during interaction with their environments to determine the relationship and the effects of the interaction. The two main observation types are direct and indirect observation. During direct observation the participant is aware of the analyst watching him or her in that given moment, and during indirect observation the participant may not be aware of being watched. Indirect observation also applies when recordings of observation is analysed at a later stage.
- **Questionnaires** are paper-based or electronic forms that contain open or closed questions on the particular research topic. Questionnaires represent the easiest way

to obtain data and can also be used to obtain data from a well-distributed extensive population (Lazar *et al.*, 2010:100).

- **Documents** could be companies' manuals for procedures. Documents are any descriptions needed by a researcher to understand the context in which a new IT product will be introduced (Oates, 2006:117).

The researcher then evaluates the data that have been obtained and analyses the results. Evaluation and analysis may be based on the method triangulation strategy. Method triangulation compares the results from multiple data-gathering techniques to provide different perspectives in an attempt to present more defensible findings (Rogers *et al.*, 2011:225).

### **2.3.1. Motivation for this study**

It is the researcher's experience that some registration processes are still paper-based whereas many companies nowadays use web forms and online databases to capture client details. Requirements of different registration processes are varied and for this reason the researcher wanted to investigate rules and guidelines that can generally be applied to web form design of e-registration systems. These rules and guidelines for design are commonly known as human-computer interaction (HCI) principles and are explained in more detail in the next chapter.

To identify which HCI principles would apply to web form design of an e-registration system, a detailed literature review needed to be conducted. The literature review is based on appropriate research questions which are discussed in the following section. The research findings were applied to an example of an e-registration system and a prototype of a system was designed and evaluated.

### **2.3.2. Research questions**

Based on the motivation for this study, one main research question and five sub research questions were identified:



### **2.3.2.1. Main research question**

How can HCI principles be applied to e-registration systems?

### **2.3.2.2. Research subquestions**

1. Why create an e-registration prototype using HCI principles?
2. What are common examples of HCI principles?
3. What are the typical characteristics and requirements of e-registration systems?
4. Which HCI principles can be applicable to e-registration systems?
5. How can these HCI principles be applied to a specific e-registration system?

According to Oates (2006:33), while the research questions are identified, a conceptual framework needs to be structured to guide the researcher's thinking pattern. The next section explains the conceptual framework used for this study.

### **2.3.3. Conceptual framework**

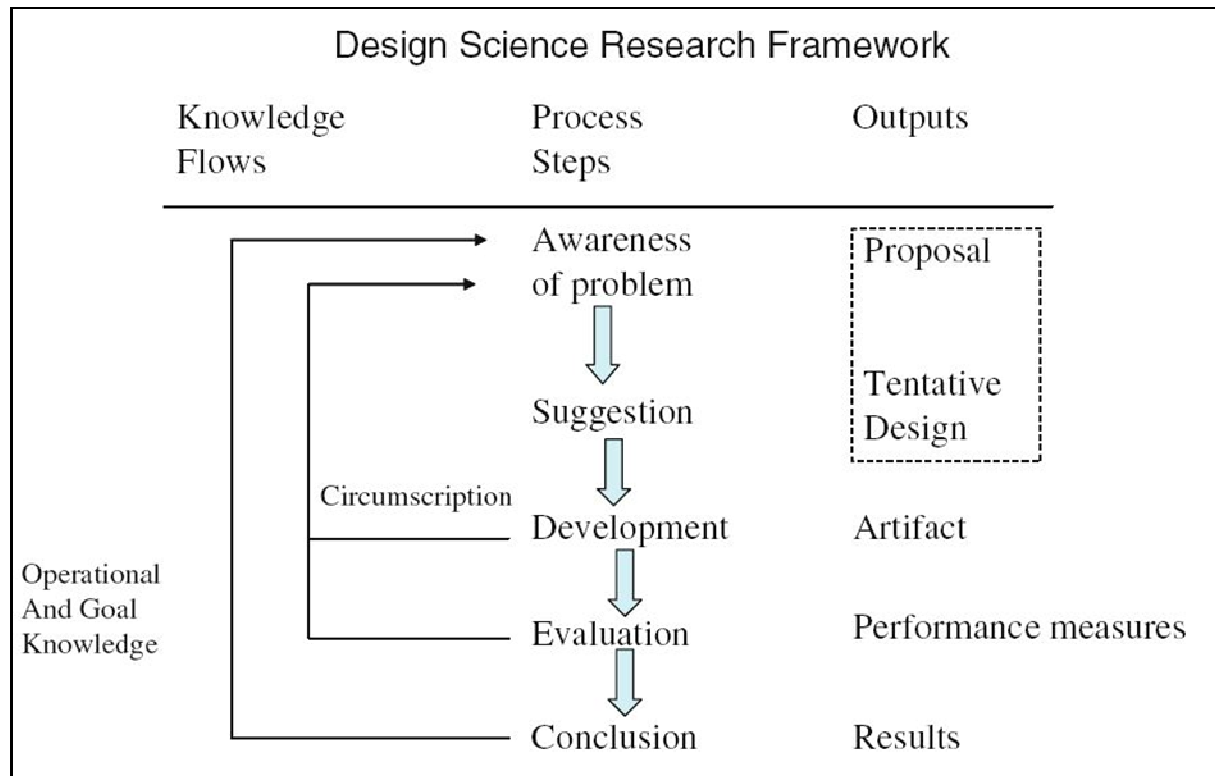
The researcher's logical thinking pattern regarding the approach to achieve the goal for this study may be defined as follows (Oates, 2006:34):

The related research topics explored in the literature study include HCI principles, e-registration systems, and the application of HCI principles in e-registration system design. Chapter 3 contains the literature review in which the research questions are addressed.

Within the DSR paradigm, the research strategy of design and creation was used for this study (see section 2.2.4).

As this study encompassed designing and creating a new IT product, the research development methodology (Oates, 2006:112) for this study included prototyping and testing

an early version of a particular registration system (Venter & Von Bellow, 2011:57). Dix *et al.* (2004:242) explains the method of prototyping used in this study as evolutionary prototyping, evolving from an initial limited version of the product to a final prototype that could be implemented by iteration. Commonly used in DSR is the framework of Vaishnavi and Keuchler (2004) which was adopted by Hevner and Chatterjee (2010:27) in Figure 2.2.



**Figure 2.2. Design science research framework (Vaishnavi & Keuchler, 2004; Hevner & Chatterjee, 2010:27)**

The DSR framework generally iterates through five phases: awareness of the problem, suggestion, development, evaluation and conclusion, as illustrated in Figure 2.2.

*1. Awareness of the problem:* In this phase, the researcher becomes aware of a problem. The initial problem is an academic research question that needs to be answered.

In the case of this study, the initial problem that the researcher became aware of was the lack of e-registration systems for some processes which still make use of paper-based forms.

*2. Suggestion:* In this phase, the researcher suggests a suitable answer for the identified problem. The suggested solution may be constructed from known solutions or based on new

findings. “This phase results in tentative design, for example a prototype” (Adebesin *et al.*, 2011:313).

For this study, the researcher's initial suggestion was to identify HCI principles that could be applied to the design of an e-registration system.

3. *Development*: In this phase, the suggested solution is created according to the current knowledge of the researcher.

In the developmental phase of this study, the researcher identified key HCI principles in the literature that could be applied to an appropriate example of a paper-based registration process that did not have a web form for e-registration at that time. An initial web form prototype was created.

4. *Evaluation*: In this phase, the created artifact is analysed and assessed using data-gathering methods.

After the prototype was created, data gathering techniques (interviews, questionnaires, observation) were used to evaluate the usability of the web form.

5. *Conclusion*: This phase is reached when a satisfactory artifact is presented. The artifact may not be optimal, but offers a suitable solution to the requirements or problem identified.

After the evaluation of the initial prototype, changes were made according to suggestions made by participants of the data gathering techniques to produce an instance of an e-registration system.

During the developmental and evaluation phases, the researcher may become aware of new problems. As a result, the process may be repeated with a new or revised goal by way of circumscription. Circumscription produces a step-wise understanding of a certain artifact and its usefulness in the course of constructing this artifact. It provides deeper knowledge to the researcher by identifying problems such as when a certain method does not work or when a process is incomplete.

During the five phases of the DSR framework, the researcher became aware of new problems such as processes that did not complete during the developmental phase and problems experienced by participants during evaluation. These phases then

iterated back to the 'awareness of the problem' phase and new 'suggestions' were made to avoid these problems. In chapter 4, a prototype e-registration web form was created according to the 'problem' identified by the researcher in the literature. After evaluation of the prototype, the researcher became aware of new problems that had arisen. The prototype was revised according to the evaluation and the revised artifact was presented in chapter 5. This iteration process through the five phases was concluded upon the presentation of an acceptable artifact.

This study attempts to present an aesthetically pleasing web form prototype for an e-registration system. Appropriate HCI principles were introduced in the design and creation of this web form. Evaluation of the web form focused on increased efficiency and usability of the proposed e-registration prototype.

Qualitative data were obtained by means of data-gathering techniques and the data were analysed in terms of the thematic approach to presenting an acceptable web form prototype (see section 2.3.5.).

The method triangulation results were used to improve the initial web form prototype and to introduce a prototype of a final web form (see Chapter 5).

The research strategy is discussed in section 2.3.4 below.

#### **2.3.4. Research strategy**

Oates (2006:35) defines design and creation as a research strategy. In information technology, the design and creation strategy often focuses on the analysis, design and development of an electronic product (Oates, 2006:109). Output of a design and creation research strategy could be a construct, model, method, instantiation or a combination of the aforementioned artifacts. On the research front, data-gathering methods are used to obtain a rich picture of the user experience when interacting with the e-registration web form prototype. This form of service or interactive product could be labelled the "front end" of an

“instantiation” (March & Smith, 1995:253). An instantiation is defined as a usable product that displays how theories or methods have been integrated into a computerised system.

Designing and creating new IT products or services usually represent an approach to solve a problem (Oates, 2006:111). In other words, a problem presents itself in the IT world, and one solution to that problem could be to create a new software product that addresses this problem. One example is given by Hevner *et al.* (2004:76) when stating that “information systems are implemented within organisations for the purpose of improving the effectiveness and efficiency of that organisation”. This means that an organisation’s implementation of a new system is aimed at improving the organisational processes. A design and creation research strategy that is tailored for the requirements of the proposed system would then have to be formulated.

### **2.3.5. Data-gathering techniques**

For the purposes of this study and with the aim of investigating the main research question, eight people were asked to participate in the different data-gathering techniques which included interviews, questionnaires and observations. The eight participants included 4 people who respectively have an Information Technology qualification, 2 graphic designers, 1 math teacher and 1 economist. These participants are all young of age and new to the working world, only three of whom had already registered for tax purposes. The researcher recognises that a sample size of 8 participants is small and may not reflect the viewpoints and opinions of the whole population, but that it is a sufficient sample size for a qualitative study of limited scope.

All the participants interacted with the initial web form prototype and completed a questionnaire that was relevant to this study (see subsection 2.3.5.3). All participants were observed during their interaction with the web form in order to measure their individual user experience. Similarly, all participants were interviewed and asked specific questions for more insightful feedback (see subsection 2.3.5.1 and 2.3.5.2). All the participants signed consent forms, chose to participate in this study and were given the right to anonymity.

#### **2.3.5.1. Interview**

Eight participants were interviewed. The interview was not structured and allowed open discussion. However, specific questions related to the web form prototype were asked in order to evaluate the usability of the prototype (see appendix D for an example of the interview questions).

#### **2.3.5.2. Observation**

All participants were observed during their interaction with the initial web form prototype. Their reactions to the system and the time they took to complete registration were recorded. Participants' reactions were noted to determine whether they were positive about the system, and the time taken to complete the registration was noted to determine whether completion of the web form could be more time-effective than a paper-based form (see appendix C for an example of the observation form).

#### **2.3.5.3. Questionnaire**

All the participants had to complete a questionnaire after their interaction with the web form. The questionnaire included specific questions that were relevant to this study (see appendix B).

The questions in the questionnaire were formulated with specific objectives and order in mind:

- To determine whether the participants have used web forms before (This would indicate whether the web form could be a feasible alternative to the paper-based form.)
- To determine whether they preferred the web form or the paper-based form and the reasons for their choice. Three participants had already been registered for tax using the paper-based system, the remaining participants used the existing navigation to download and complete the paper-based form as reference.

- To verify the researcher's statement that the web forms for registration could save time, money and effort.
- To determine the usability of the system and to allow the participants to motivate their answers and make suggestions for improvement.

### **2.3.6. Results of data analysis**

Using different data-gathering techniques and then comparing the results obtained is defined as method triangulation (Oates, 2006:37). For this study, three different data-gathering techniques (i.e. interviews, observation and a questionnaire) were used for different purposes, but with the aim to support the results. The results obtained in this manner were defined as qualitative data because the data were non-numeric and were the most common type of data obtained from interpretive research (Oates, 2006:38; Nielson, 2008).

The results of the data analysis were evaluated and used to improve the initial web form prototype. A final web form prototype was then introduced (see Chapter 5).

## **2.4. Ethics**

Oates (2006:67) discusses ethical procedures in an academic project. When people are involved in a study, the researcher needs ethical clearance. This clearance is obtained by describing the envisaged research and the nature of the participants in the study to the ethical clearance committee of the institution where the researcher enrolled.

This researcher completed a *Workwell ethics checklist* and determined the role of ethics clearance for this study by consulting the North-West University's *Ethical Review Decision Tree*. The researcher was granted ethical clearance and proceeded with the research.

The rights of the research participants were explained to them. They were informed that their participation was voluntary and anonymous and that they could withdraw at any time. All the participants chose to take part in the study and signed consent forms (see appendix A.)

## **2.5. Summary**

Oates's (2006:33) research model was adopted and implemented. Research paradigms and strategies were discussed in general, and more specific detail was provided on how this research was conducted.

This study used a design and creation strategy within the context of a design science research paradigm. Data were gathered by means of a literature review and different data-collection techniques (i.e. interviews, observation and a questionnaire). Qualitative data were obtained. The research for this study was based on a conceptual framework and was initiated as a result of a personal experience of the researcher. The researcher obtained ethical clearance to conduct this study.

The next chapter contains a detailed literature review of HCI principles, e-registration systems and the application of appropriate HCI principles within an e-registration system.



### **3. AN OVERVIEW OF HUMAN-COMPUTER INTERACTION AND E-REGISTRATION SYSTEMS**

#### **3.1. Introduction**

Conducting a review of previous publications in the same field is an important aspect in any academic project. This approach not only ensures knowledge about a specific topic, but also provides insight into how and why certain rules and criteria apply. Such research may inspire and promote creative thinking among future generations. Webster and Watson (2002:13) support this statement, declaring that “a review of prior, relevant literature is an essential feature of any academic project”. A reason could be because a hypothesis or a theory cannot be proven true or false without prior evidence that support the main idea. As a result, it would be nearly impossible to introduce innovation without documentation on previous successes or failures.

For the purposes of this study, the research questions require the fields of Human-Computer Interaction (HCI) and e-registration systems to be reviewed in the literature.

In Section 3.2, an overview of the concept of HCI is provided. This section explains general HCI principles as well as the need for these. In addition, it also introduces the concept of HCI and its application to the general world.

Section 3.3 contains a discussion on e-registration systems. This section explains where e-registration systems are used and why the use of e-registration systems is relevant today. It further discusses the advantages and disadvantages associated with web forms in general.

Section 3.4 provides an overview of the HCI principles that are applicable to e-registration systems and how the design and creation strategy is used to identify key factors that influence the introduction of a web form prototype.

Section 3.5 discusses a short literature review on the example of a paper-based form chosen to be translated to a web form using appropriate HCI principles: First-time individual tax registration.

### 3.2. Human-computer interaction

Human-Computer Interaction (HCI) is the study of the interaction between man and machine in any context, with special reference to theoretical, psychological and physical aspects of this interaction (Dix *et al.*, 2004:3). In general terms, HCI can be seen as any interaction that takes place between a user and a system or computer, and the effects that the interaction has on both parties. Rogers *et al.* (2011: 18) further state that HCI is now mainly focused on user experience i.e. understanding the interaction that takes place between the user and the system and then re-evaluating system design according to these user experiences. HCI is not limited to the interaction between user and system and may also include any type of interaction between human and any technological object, whether it be a remote control, a coffee machine, a plasma television or a physical desktop computer. For the purpose of this study, the researcher limits the concept of HCI to interface design as “researchers have suggested that up to 50% of the effort in development of information systems is devoted to user interface development” (Peslak, 2005:189; Douglas *et al.*, 2002:211 ; Myers & Rosson, 1992:195).

When an electronic system is designed, developers often get lost in object-oriented design, heuristic evaluation or systems analysis. **Object-oriented design** means that software takes on the form of real-world objects (Deitel & Deitel, 2005:23). **Heuristic evaluation** is the process of evaluating a system based on prior knowledge of or common sense on how a good system or interface should function (Luger, 2005:21). **Systems analysis** is the process of breaking down the requirements of a proposed system and finding the most suitable way to implement these requirements in order to achieve the best solution (Bentley & Whitten, 2007:32). These methods focus more on the inputs and outputs of a system and not so much on the user of the system. The aforementioned aspects are important, but the researcher believes that creating an electronic system for public use should be user-centred. This belief is supported by Mohler and Duff (2000:45) who claim that “all good websites are audience centred”. Carroll and Rosson (2002:vii) agree and write that everything from social context to the way in which a user strikes a key is important and could ultimately decide the success or failure of a system.

### 3.2.1. HCI principles

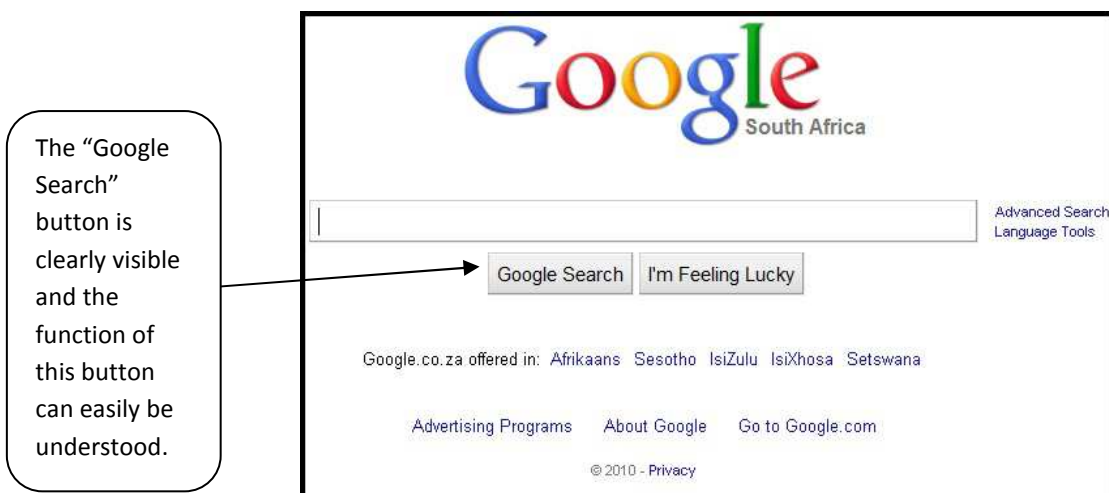
To stress the importance of the interaction between user and system, basic HCI principles have been introduced over time. HCI principles are rules and guidelines that are used to aid the successful design and usability of a system (Dix *et al.*, 2004:259). These principles are generalizable so as to help a designer identify different aspects of system creation (Rogers *et al.*, 2011: 25). Te'Eni *et al.* (2007:195) further state that each design principle has advantages but also has built-in constraints and limitations and should therefore be carefully applied.

The following are some examples of HCI principles found in literature:

- **Synthesizability**  
“Synthesis is the ability of the user to assess past operations on the current state” (Dix *et al.*, 2004:262). This means that the user has built a predictive mental model on the previous consequences of certain interactions and can now use this knowledge to address the current state of the interaction.
- **Predictability**  
This principle focuses on the user's ability to determine effects that future interactions will have on a system. This means that the user's current knowledge is sufficient for effective interaction with a new system (Dix *et al.*, 2004: 261).
- **Familiarity**  
This principle is concerned with the initial interaction between user and system, and how easily the user can determine how to initiate the interaction (Dix *et al.*, 2004: 263). For example, when switching from a typewriter to a word processor, this principle determines the familiarity of the user with the system when executing a specific task using two different devices.
- **Generalizability**  
The principle of generalizability focuses on the ability of the user to apply previous knowledge to a similar but unknown interaction (Dix *et al.*, 2004: 262). For example, knowledge gained from working with the Microsoft Office package may be transferred when using the Open Office package for the first time.

- **Visibility**

Closely related to the principles of predictability, familiarity and generalizability is the principle of *Visibility* (Rogers *et al.*, 2011:26; Costa, 2008:265; Gulliksen *et al.*, 2003:7; Norman, 2002:17; Lynch & Horton, 2002: 24). The more visible a function is to a user, the more likely the user will know what to do next. For example, buttons are highly visible controlling devices because their purpose is obvious. However, an online application may also be submitted by clicking on a link instead of pressing a button. The user could become frustrated because the function of this link is not visible, and he/she may not know how to approach the situation. (See Figure 3.1 for an example of visibility.)



**Figure 3.1: The Google interface depicting the HCI principle of visibility (<https://www.google.co.za/>)**

- **Consistency**

An example of this would be to design interfaces with similar operations to achieve similar tasks (Rogers *et al.*, 2011:28; Sklar, 2011: 30; Almeida & Baranauskas, 2010:170; Johnson, 2010:137; Costa, 2008:265; Dix *et al.*, 2004:264). An online website should preferably use the same interface layout for each web page. If the creator of the website is not consistent and uses a different layout for each web page, the user may experience difficulty in mastering the use of the website. (See Figures 3.2 and 3.3 as examples.)

It is clear from figures 3.2 and 3.3 that the main layout of the website remains the same and that only the content and highlighted menu item differs according to the

options that the user selects. This is a good example of consistency as the user always knows e.g. where to find the “login” option or the search textbox.



Figure 3.2: The Springbok Pharmacy website: Baby products (<http://www.springbokpharmacy.co.za/ProductList.asp?CategoryID=2&ParentID=1>)



Figure 3.3: The Springbok Pharmacy website: Cosmetic products (<http://www.springbokpharmacy.co.za/ProductList.asp?CategoryID=4&ParentID=1>)

- **Dialog Initiative**

This principle is concerned with who controls the dialog - the user or the system (Dix *et al.*, 2004: 266). For example, if a user installs new software, the system presents a controlled dialog initiative where the user has limited options to choose from. The user is then guided by the system through what is known as *system pre-emptive dialog*. *User pre-emptive dialog* is an interaction that is entirely free to the user, and in which the user may initiate any type of action towards the system. An example would be when working with multiple windows open on a desktop, the user can at

any time move freely among windows or initiate an action such as opening a spreadsheet or reading an email.

Figure 3.4 depicts the system pre-emptive dialog principle where the user cannot freely interact with the system. The dialog between user and system is initiated by the system.



**Figure 3.4: System pre-emptive dialog where the user is limited to waiting on the system's prompts and choosing from limited options**

- **Multi-threading**

This principle is concerned with the ability of a system to execute multiple tasks simultaneously (Dix *et al.*, 2004: 267). For example, while working on a document in a text-editor, the system may show a pop-up message with an audible warning that the anti-virus is outdated. These actions occur as consecutive actions in the system, but occur simultaneously from the user's perspective.

- **Substitutivity**

The principle of substitutivity focuses on simplifying a task for the user by already including some steps that are the same for all processes (Dix *et al.*, 2004: 268). For example, a website asking for the user's BMI (Body Mass Index), may also give the option for the system to calculate this value by asking the user for their weight and height rather than having the user calculate this value independently. Another example can be observed when adjusting the temperature of a sauna. The process can be presented as a computerised system depicting a graphic representation of a real-life thermometer, the value of which changes according to its settings. As a result, the user no longer needs to physically measure the temperature, and can easily read the values from the system instead.

- **Customizability**

This principle is concerned with how easily the user or system can modify the user interface according to user requirements (Dix *et al.*, 2004: 269). For example, when working on a Windows 7 operating system, the overall structure of the interface remains the same. However, the user is able to modify backgrounds, move icons and add shortcuts that meet the user's specific requirements (see Figure 3.5).



**Figure 3.5: User's personal desktop has been customized according to the user's preference i.e. specific shortcuts on taskbar, personal background and certain desktop shortcuts**

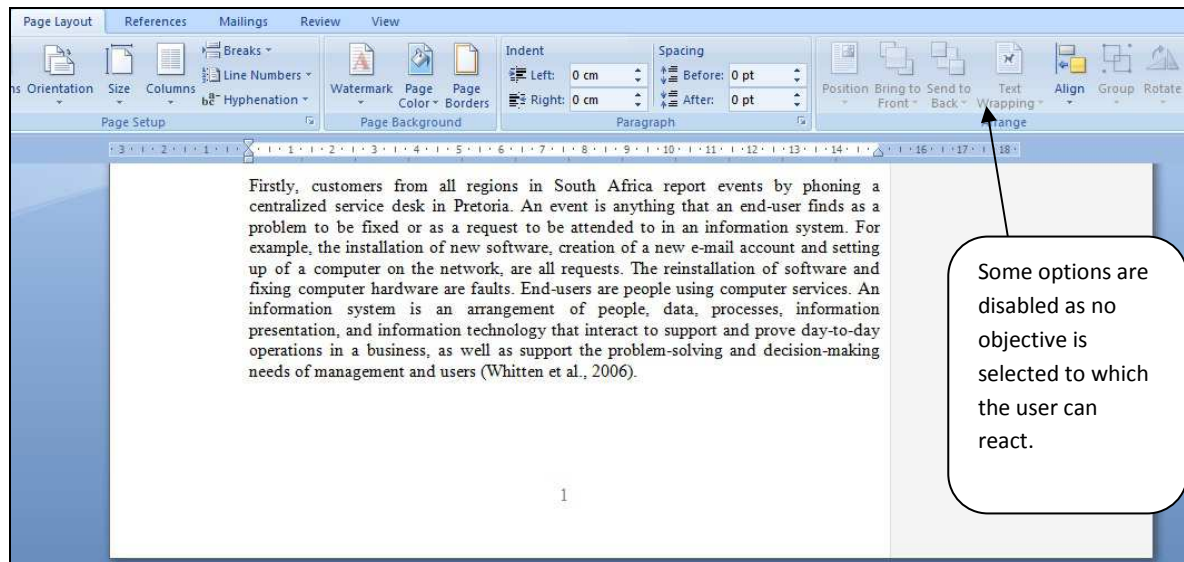
- **Observability - defaults**

The principle of defaults reduces the number of inputs given by users so as to prevent errors in data input (Dix *et al.*, 2004: 271).

- **Constraints**

Closely related to the principle of defaults is the principle of **Constraints** (Rogers *et al.*, 2011:27; Sklar, 2011: 32; Almeida & Baranauskas, 2010:170; Norman, 2002:60). A constraint limits user-system interaction. A typical example would be to disable an action which would then limit the user's choices thus preventing him/her from making mistakes or causing errors. (See Figure 3.6 for an example.)





**Figure 3.6: An MS Word document showing disabled options**

- **Responsiveness**

This principle is the measurement of time needed by the system to respond to a user's request, or to express changes made by the user (Dix *et al.*, 2004: 272; Szameitat *et al.*, 2009:561). Nielson (2000:42) stresses the importance of fast response times, stating that it is the most important design criterion for web pages. An instantaneous response is the ideal. Nevertheless, in some cases the system may not be able to handle all the responses initiated by the user, consequently causing it to 'hang' or 'freeze'. This occurs when the user continues to press keys while waiting for the system to respond to a specific action. The system remembers each request even though it may not appear as such, and this causes the system to overshoot.

- **Affordance**

The principle of affordance is a term used to explain the attribute of an object that allows the user to know how to make use of the object (Rogers *et al.*, 2011:29; Norman, 2002:9). For example, the thumbwheel on a mouse is shaped like a wheel so that the user may know that this function on the mouse 'rolls' or is 'scrolled'.

- **Feedback**

This attribute of the system offers information on the actions that a user performed and allows the user to revise mistakes or continue (Rogers *et al.*, 2011:26; Almeida & Baranauskas, 2010:170; Norman, 2002:27). For example, if a user made a mistake in registering for the online services of a company and submitted an entry, the



system may show a pop-up message displaying the error. This allows the user to correct the error so that his/her information can be successfully added to the company's online customer database. (See figure 3.7 for an example.)

**Personal profile**

The information below is required for you to register with us, add products to your basket and create wishlists.

**Confirm password must be the same as password**

Title \* Ms

First name \* JT

Last name \* Terblanche

Communication ☒ English ☐ Afrikaans

Email address \* jt.terblanche.com

Password \* .....

Confirm password \* .....

☐ Tick if you would like to complete the registration process.

**Note:** If you would like to buy products, we require more information about you. You may also complete this process at a later stage on your profile page, however we will prompt you to enter this information at the checkout process.

☐ Terms & Conditions. Updated: 12 Jul 2010

**Save**

**Figure 3.7: The registration process for Kalahari's online services (<http://www.kalahari.com/pipeline/register.aspx>)**

The above mentioned design principles support usability (Dix *et al.*, 2004:260) and are accompanied by a set of usability goals (Rogers *et al.*, 2011:19). Usability refers to determining if an interactive product triggers positive user experiences, whether its function is easily understood and if it is effective for the purpose it was created for (Rogers *et al.*, 2011:19, Nielsen, 2000:10). Loreto (2009:287) states that designers have to use HCI principles to create interfaces to improve usability. Spool *et al.* (1999:4) describe web site usability in terms of the availability of information. The same principle is still valid but websites are more interactive nowadays. The easier it is for an individual to find what he or she is looking for, the more usable the website is. Usability goals define the usability of an interactive product according to the following conditions (Rogers *et al.*, 2011:19):

- **Effectiveness.** This usability goal is based on how well a product or service fulfils its purpose.
- **Efficiency.** This usability goal explains the extent to which the product or service aids the user in performing certain tasks.
- **Safety.** This usability goal refers to protecting users from harmful situations.
- **Utility.** This usability goal explains how well the service or product meets a user's requirements.

- **Learnability.** This usability goal refers to how easy it is to use a system on encountering it for the first time.
- **Memorability.** This usability goal explains how well the system allows the user to remember how to use it in the future.

As stated above, usability is concerned with user experience and therefore, the proper implementation of HCI principles could create an enjoyable human-computer experience. Research findings in human-computer interaction literature have shown that good aesthetics enhance positive user experiences toward web applications (Wu *et al.*, 2011:337; Tractinsky *et al.*, 2006:1072; Skadberg & Kimmel, 2004:404; Tarasewich *et al.*, 2001:67; Schenkman & Jonsson, 2000:377). This might be because users “tend to display socially reflexive responses to computers without consciously thinking of the computer as a machine” (Lee, 2008:19). The reason for applying HCI principles to any type of system is to allow efficient interaction between the user and the electronic system. If these principles were successfully implemented, future users might judge the experience as being more pleasant (Te’eni *et al.*, 2007:2) and might therefore be more willing to register for any online system. Girgensohn and Lee (1997:1541) who designed and developed a dynamic web form to keep minutes and to record employee attendance at meetings, write that the form evolved because of constant user input and because HCI principles had been used. Stadlhofer and Salhofer (2007:12) emphasise the importance of web form design for e-government services as it would determine whether or not people are more willing to accept and use the system. Te’eni *et al.* (2007:2) further believe that the users of a web-based system only care about what is put into the system, what the system returns to them, and how they experienced the interaction between themselves and the system. Isomaki (2007:39) declares that technology induces positive emotional reactions in people. Rogers *et al.* (2011:23) mention both negative and positive user reactions to the interaction design such as satisfaction, joy, engagement, annoyance, frustration, a challenge and motivation.

User experiences are the emotions which users go through after having created a certain mental model. “Mental models give a deep understanding of people’s motivations and thought processes, along with the emotional and philosophical landscape in which they are operating” (Young, 2008:3). It is therefore beneficial for a designer to know and understand what type of mental model a user will build when interacting with the system. A designer building a system according to the user’s mental models may have an advantage from a strategic and tactical viewpoint as this can guide the design and aid in making effective business decisions (Young, 2008:11) such as capitalizing on the gaps between the solutions a business offers and what the customer is trying to accomplish (Young, 2008:xvii).

According to Nielsen (2003), the success of an interactive product or system depends on the ease of use from the user's point of view. Therefore, when a user interacts with a system, the designer wants the user to form a mental model with positive user experiences so as to encourage the user to utilise the product again. It is important to ensure an enjoyable user experience when interacting with a product. For this reason, the web form design should be user-centred.

For the purpose of this study, it would be beneficial to design the web form interface according to the user's mental models. This is done by determining which factors influence the interaction between the user and the system. A discussion on this topic follows in the next section.

### **3.2.2. Efficient web form design for users**

When designing and creating any form of software or electronic application, it is important to keep in mind how users think or how they could possibly perceive the new system. According to Dix *et al.* (2004:194), the main initiative of design is to “understand your materials”. The obvious materials in this case are the user and the system. Therefore, it is important to know and understand the user, what type of system is needed and which requirements the system needs to meet.

The user in this example is the person who has to register via an online system for the first time. When any system is developed, its “design and creation” has to be business-specific (i.e. related to the organisation that will use it.) Even more important, is that the design and creation should be user-specific, as the user holds the key to generating business (Terblanche *et al.*, 2010:1035). “Understanding the user” could mean that factors such as human senses, human memory, the manner in which humans think and reason, mental models, emotions and individual differences should be taken into account when designing and creating the system (Dix *et al.*, 2004:195).

The following are examples of factors that could influence the interaction between the system and the human being:

- Human senses could play a role in the design and creation of this web form. The visual display of the interface could be aesthetically pleasing, audio features could be provided, and the haptic sense could be accommodated (Venter & Von Bellow, 2011:10).

- The initial registration process requires only short-term memory (Venter & Von Bellow, 2011:14; Norman, 2002:63). Therefore the **learnability** of the web form should be well designed (Rogers *et al.*, 2011:19), i.e. a user should find it easy to learn how to use a system.
- People think and reason in different ways. As a result, the web form design should make provision for individual approaches to problem solving (Venter & Von Bellow, 2011:15, Dix *et al.*, 2004:40). The web form also has to accommodate different mental models that users build whilst using the system (Venter & Von Bellow, 2011:18, Dix *et al.*, 2004:49).
- People are emotional creatures and therefore feelings and emotions affect a person's every decision. An aesthetically pleasing interface could elicit satisfaction and this could encourage compliance (Venter & Von Bellow, 2011:19, Dix *et al.*, 2004:51).
- All people are different, and therefore every system design is different as it is developed according to the needs of the users. Another aspect to consider is computer literacy. The web form should not push the user to his/her cognitive limit (Venter & Von Bellow, 2011:19, Dix *et al.*, 2004:52). The design should therefore be professional but simple.

Developers often jump into a project with a preconceived idea of how things should work, and the results are often complicated and confusing. This researcher believes that software should be designed with both the novice and the expert user in mind. A novice user would need help whereas an expert user should be able to skip redundant steps in a process.

The problem in creating the system for an electronic registration system is to translate the paper-based system into an interactive web form. This translation would be subject to redesign of some components in order to suit the electronic system. Implementation of a web form eliminates manual data capture which is subject to human error. However, the system-to-be-created is not limited to the interface design; it also includes the physical components of the computer setup and its software. Thus, the designer has to understand the system, its requirements, and the constraints that could influence efficient interaction.

The following factors should be taken into account (Venter & Von Bellow, 2010:34):

- The assumption based on the requirements of the web form used in this study is that the user will interact with a standard computer system setup when doing online registration.
- The input devices required for the web form to be effective are a mouse and a keyboard, respectively used for navigation and text entry (Dix *et al.*, 2004:61). The leading output device is the monitor so that the user can see and visualise the process as he or she interacts with it. It could also be useful to provide printing options and audio output in order to emphasise pop-up warnings for incorrect input.
- Where computers are involved, processing speed is of cardinal importance. Users do not want to struggle with a system that is too slow. A slow processor could cause users to believe that an action which they already performed on the website was never executed (Venter & Von Bellow, 2010:35, Dix *et al.*, 2004:117). Therefore, the HCI principle of feedback in the design and creation phase is extremely important.
- It is also important to take network implications into account as the web form would be accessible on the Internet (Dix *et al.*, 2004:118).

Once the materials are understood, the interaction between the user and the system has to be defined. The interaction in this example is the communication between the individual registering online and the system via the web form.

The following factors could influence the interaction between a user and the web form:

- Norman (2002:51) writes that the closer the relation between a person's perception of a system and the functionality of the system is, the more effective the interaction would be.
- Ergonomics has a direct impact on how a user interacts with the web form and should be duly considered during the design and creation process. Ergonomics may be defined as the research done on the physical components that influence interaction (e.g. positioning, the use of colour, and health issues (Chaffin, 2005:482)).

- The most applicable interface for interaction would be the WIMP interface and its corresponding elements. WIMP is an acronym for windows, icons, menus and pointers (Rogers *et al.*, 2011:160). Typical elements of the WIMP interaction style are buttons, toolbars, menus and descriptive icons.
- A key aspect of interaction is the motivation that drives a user to interact with the web form (Dix *et al.*, 2004:52). For example, a quick and easy registration process.
- “Designing experience” is a key issue in respect of interaction and can be defined as translating a real-world situation into a virtual/ electronic representation (Dix *et al.*, 2004:157). Doing so requires the successful design of a prototype that represents the “real thing”. Table 3.1 illustrates the relationship between the real-world paper-based form and the proposed interactive web product. It further illustrates how designing the experience would carry over the real-world process into the interactive product.

**Table 3.1: Mimicking the real-life experience of paper-based registration into an electronic web form experience**

	<b>Paper form</b>	<b>Web form</b>
Design	Ordinary, ink on paper	Simplistic, providing help if a user does not know how to proceed
Layout	Normal text field options	Similar to paper-based form but containing relevant information only
Cost	Cheap as each user prints his/her own form	Cheap as a user has no need for printouts  Bandwidth costs increase
Access	Can be obtained from company where user wishes to register	Accessible on company website

This researcher believes that creativity and innovation play a significant role in developing a successful web form. Designing software for a specific audience requires creative skills that are seldom inherited. However, Carroll and Rosson (2002:vii) claim that “designing good interactive products is neither a science nor an art”. Suffice to say that there are always very specific approaches and principles that should be applied and followed that would facilitate the design of any interactive product. The researcher understands this statement and further believes that although there are basic rules and approaches that can be followed when new software is developed, it should be kept in mind that this software is developed for a specific reason and a specific user group (Nielson, 2000:11). The developer has to fully understand the circumstances, prerequisites and outcomes that are expected of the software. The successful combination of these characteristics can indeed be deemed an art.

The next section introduces the concept of electronic systems and how web forms are used for these products.

### **3.3. e-Registration Systems**

In the previous section, HCI principles and user experiences were discussed. For the purpose of this study, the effect of these principles in web form design for an e-registration system is evaluated. Before this can be done, the reader first needs a clear understanding of what an e-registration system is and how web forms are used for this purpose.

Electronic registration is commonly referred to as e-registration, its abbreviated term. From its name, the definition can be assumed to be a registration process that can be completed electronically. Common examples of processes that are available as e-registration procedures are registering for email (Figure 3.8), registering for social networking services (Figure 3.9) and registering for different service providers (Figure 3.10). Bean (2009:1) writes that as web services became more complex over time, there has been a growing interest of service-orientated architecture (SOA) to achieve interactive services such as completing an online application for an account. Online account creation is generally done through the means of a web form.

**YAHOO!**

Get free email and other leading web services with a Yahoo! account.

Name: First Name  Surname

Gender:

Birthday: Day  - Select Month -  Year

Country:

Postal Code:

**Select an ID and password**

Yahoo! ID and Email:  @

Password:

Re-type Password:

Password Strength: ☐ ☐ ☐ ☐

**In case you forget your ID or password...**

Alternative e-mail (optional):

Secret Question 1:

Your Answer:

Secret Question 2:

Your Answer:

**Figure 3.8: An example of an email e-registration web form (Yahoo sign-up: <https://edit.yahoo.com/registration?.src=fpctx&.intl=za&.done=http%3A%2F%2Fza.yahoo.com%2F> )**

**Join Twitter today.**

Full name:

Email:

Password:

Username:

☒ Keep me signed-in on this computer.

☒ Tailor Twitter based on my recent website visits. [Learn more.](#)

By clicking the button, you agree to the terms below:

These Terms of Service ("**Terms**") govern your access to and use of the services, including our various websites, SMS, APIs, email notifications, ...

**Create my account**

**Figure 3.9: An example of a social networking e-registration web form (Twitter sign-up: <https://twitter.com/signup> )**



The screenshot shows the Zando website's e-registration form. At the top, there's a navigation bar with the Zando logo, social media links (Facebook Like, 98k), and promotional banners for 'FREE SHIPPING WITHIN SOUTH AFRICA', 'FREE RETURNS FOR 14 DAYS', and 'CASH ON DELIVERY'. Below this is a category menu with 'Women', 'Men', and 'Kids' tabs, and a search bar stating 'Search over 500+ brands and 10000+ products'. The main content area is titled 'Create new customer account' and contains the following fields:

- Sex \***: A dropdown menu with 'Select' as the current value.
- E-mail \***: A text input field.
- First name \***: A text input field.
- Last name \***: A text input field.
- Birthday**: Three separate input fields for 'Day', 'Month', and 'Year'.
- Newsletter**: A checkbox labeled 'Newsletter'.
- Password \***: A text input field.
- Retype password \***: A text input field.

At the bottom of the form, there is a note '\* Required fields' and an orange 'Submit' button.

**Figure 3.10: An example of an online shopping service provider e-registration web form (Zando sign-up: <https://www.zando.co.za/customer/account/create/>)**

The web form created for the purpose of e-registration is then generally known as an e-registration system. A web form consists of components for selecting and accepting data such as radio buttons, text fields and check boxes, components for feedback such as appropriate sound or message boxes and arrangers such as labels, specific grouping and the order or arrangement of fields (Te'eni *et al.*, 2007:283). The form display is often based on an actual form that the user is familiar with and this makes it easier to use the interface (Dix *et al.*, 2004:140). When creating the web form, the designer considers the most suitable HCI principles in order to reduce effort and error in data input (Te'eni *et al.*, 2007:283).

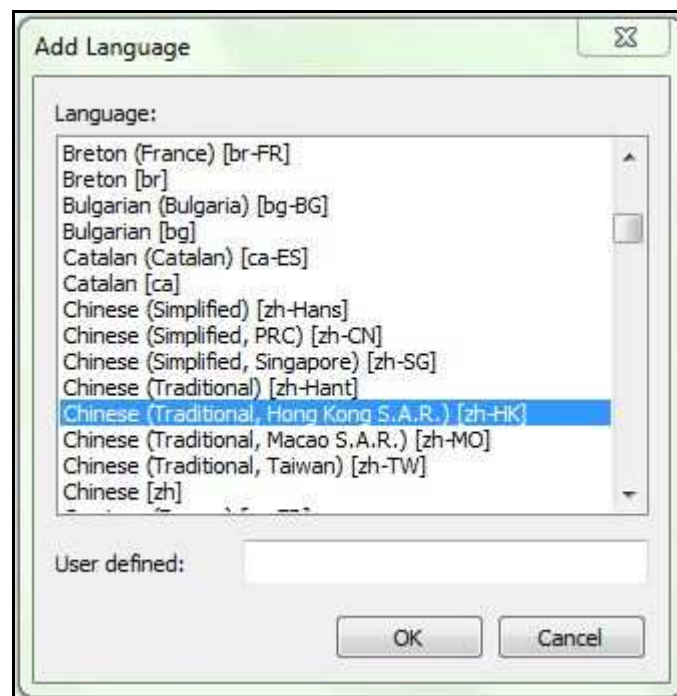
Web form creation can be seen as a tedious activity because of the amount of effort and magnitude of time invested in the design of such a form (Te'eni *et al.*, 2007:282). According to Te'eni *et al.* (2007:282), the objective of an effective interactive form is to minimise the user's effort when filling in important information, reduce the tendency of error in data input and promote trust in the user when sharing sensitive information. "For these reasons it is important to design the data input activity carefully" (Te'eni *et al.*, 2007:282). As this design activity is sometimes seen as an effort, companies often outsource the creation of these web forms to companies that specialise in building online forms. One such a company is Wufoo, who's intent is to transform "what are usually boring and tedious tasks into more fun activities" by carefully considering which information to add to the form (minimalism), using

the correct balance (consistency) and focusing on good-looking aesthetics (Rogers *et al.*, 2011:129). Figure 3.11 shows some examples of web forms created by Wufoo. In these examples, the use of different components can be seen e.g. radio buttons, drop-down combo boxes, text fields and buttons.

The image displays two examples of web forms created by Wufoo. The left form, titled "Customer Satisfaction Survey", has an orange header and contains several sections of radio button questions. The right form, titled "Employment Application", has a green header and includes a dropdown menu for position, radio buttons for relocation, a date picker for start date, a text field for portfolio website, a file upload button for resume, and a salary requirements section with text fields for dollars and cents.

**Figure 3.11: Examples of Wufoo's web forms (Wufoo Examples: <http://www.wufoo.com/examples/>)**

E-registration systems are typically used by companies to obtain user information from their clientele. A web form interface serves as the medium by which user information is saved into a company database. To control proper storage of information into a database in the correct format, the web form designer must apply appropriate design principles (Te'eni *et al.*, 2007:282). The most common method of reducing data error is building constraints into the options. For example, instead of allowing the user to enter a complete date, combo boxes can be used for the month, day and year criteria as these options have certain ranges or an electronic calendar option may be added where the user simply selects the appropriate date. Another example of a constraint is allowing the user to select check boxes for topics on information they might like to receive rather than asking them to elaborate in a text field. Rogers *et al.* (2011:163) identify one constraint that is poorly used in many web forms as the country of residence combo box that usually "opens as a never-ending menu" which lists all countries in the world in alphabetical order. This option is sufficient to use if a user lives in a country starting with the letter A but can be a tedious search option if the user lives in a country starting with letters such as T or W. Another example of such a long-winded search option box is selecting a user's specific language for a software program (see Figure 3.12). Rogers *et al.* (2011:163) recommend a predictive text option, where the user enters the initial letters of the word and is presented with possible matching options.



**Figure 3.12: A software program prompting the user to select the appropriate language**

From these suggestions, it can clearly be seen that careful thought should go into the design of a web form for e-registration. Te'eni *et al* (2007:283) emphasise that the order and grouping of data are also important and special focus should be given to the logical sequence of fields. For example, a user normally introduces herself/himself as 'Name Surname' and to accommodate this mental model a web form should ask, in order, first name and then surname Te'eni *et al* (2007:283). Another example is the logical sequence of an address e.g. street name, city, province and then country. A user should not have to navigate extensively from one field to another; related items should be grouped together. The grouping of items are controlled by white space, spatial proximity and labelling (Te'eni *et al.*, 2007:284). Options that are related are typically close in proximity, contain related labelling and are surrounded by sufficient white space to indicate a group (see Figure 3.13).

## Registration of pets (including registration of more animals than permitted)

First name:

Surname:

ID number:

E-mail address:

Home number:

Office number:

Cellphone number:

**Physical address:**

Flat/Complex name & number:

Street number:

Street name:

Street suffix:

City:

Area:

Area code:

Grouping of personal information

White space indicating the end of a grouping

Specific labelling that indicates a new group

**Figure 3.13: An example of grouped data on a web form (Pet registration: <https://www.capetown.gov.za/en/CampAndProg/Pages/AppIforregandorappltohavemo-reanimals.aspx> )**

After the successful application of appropriate design principles, both the company and the user may reap the benefits that a web form may offer. There are many advantages associated with using web/electronic forms such as:

- A web form is generally deemed an easy way to reach large populations quickly (Barak & English, 2002:70). Using web-based forms instead of paper-based forms would save money for paper, printing and distribution. The Internet is a worldwide phenomenon.
- A web form is a cost-effective manner to reach large populations (Barak & English, 2002:70). Web forms can be accessed anywhere in the world, whereas paper forms are limited to distribution constraints.

- Using electronic submission of forms or programs saves time (Baker, 1996:1). Online web forms can be completed online within a few minutes. Paper-based forms have to be posted or submitted at a particular place, both of which delay the process. If web-based forms were used, the data could be captured directly into the database, thus eliminating the middleman who has to capture data manually.
- Rules built into the electronic form prevent errors and ensure that the form is fully completed (Baker, 1996:1; Leon-Chacon, 2007:ii). Rules can be integrated into particular fields in order to limit data input, for example only text input for text fields and only numeric input for numeric fields. Data entry can further be controlled by adding check boxes, radio buttons or even automatic calendars for date entries. Rules can also be used to check whether all fields have been filled in - this is not possible with paper-based forms.
- Redundant data are eliminated and this reduces the possibility of errors in the data (Buchanan, 2002:150).
- The concept “green information technology” saves costs on paper use and also ensures a higher return on investment for a company as this plays a considerable role in the cost-cutting process (TechDune, 2009). Green information technology is a movement in the information systems world. Using web-based forms saves on expenditure because it eliminates paper and printing costs. Using web-based forms is also environmentally friendly as it eliminates travel to and from submission points and therefore ensures cleaner air for breathing.

Aluja *et al.* (2007:2029) compared paper-based forms with web-based forms because of the difficulty in reaching large populations, and the benefits of using the Internet as a means of data collection. Cook *et al.* (2004:310) compared an online form for sensitive medical data collection to be equivalent in completeness to that of its translated paper-based form. As a disadvantage, Aluja *et al.* (2007:2023) state that the reliability of a form used over the Internet cannot be assumed to have the same validity and reliability as a paper-based form, raising the issue that there might be perceptual, cognitive or emotionally-based differences. However, Bergeron and Kurzweil (2000:1) write that the disadvantages associated with electronic forms will decrease over time as the trend towards e-commerce increases. These authors mention disadvantages such as the limitations associated with direct interaction such as the frustration of fixed options on forms as opposed to communicating with

personnel. For the purpose of this study, the only disadvantage that can be identified is the matter of security. Personal information needs to be entered and users may have trust issues when doing so (Berdykhanova *et al.*, 2010: 1016). Other aspects such as personal interaction, fixed options and inadequate computer literacy to use the web form can be avoided by the user by completing the paper-based registration process.

The next section deals with how some of the identified HCI principles may be applied to e-registration systems.

### **3.4. HCI principles in e-registration systems**

In the previous section, the concept of e-registration and systems created for this purpose were discussed. In section 3.2 general HCI principles were introduced. It is now necessary to identify which HCI principles can be applied to the design of web forms for e-registration systems. The researcher has identified four HCI principles explained by Rogers *et al.* that can be applied to web form design (2011:26). Some of these principles overlap and also explain principles introduced by Dix *et al.* (2004:261) as discussed in Section 3.2. These chosen principles are applied to the interface design of an instance of an e-registration web form that currently only allows for paper-based registration. This prototype of a web form is introduced in Chapter 4.

#### **3.4.1. HCI Principles that will not be used**

For the purpose of a web form for e-registration the user will interact with the form only once and therefore the principles of *synthesizability* and *customizability* may be eliminated. These principles are concerned with the re-use of a particular product.

The *dialog initiative* will typically be user pre-emptive as the content of a web form is generally displayed on a single page and the user only receives feedback from the system upon submission of the information.

A web form is generally displayed on a single page in a tab or window and allows for *multi-threading* as multiple windowing systems can be open at the same time.

The principle of *substitutivity* will not play a role in the design of the web form as the layout of a web form is similar to the paper-based form.

The web form does not require continuous *response* to the user's actions as feedback is generally given upon submission of information.

The principle of *affordance* is aimed at the physical attributes of an object; a new physical product does not need to be designed for a web form.

### **3.4.2. HCI principles that can be used for web form design**

For the purpose of this study, the principles identified and chosen for web form interface design are the principles of *visibility*, *consistency*, *constraints* and *feedback*.

The principles of *predictability*, *familiarity* and *generalizability* can be explained by one principle - the principle of *visibility*. As discussed in section 3.2, the principle of visibility is the attributes of a system that allow a user to know what to do next, predict the outcome of interaction or to generalize previous knowledge to use a new product.

In Figure 3.14 an electronic registration system for email registration is displayed. In this web form, the principle of visibility is depicted by clearly labelled fields (see section marked 'A') and text fields that are marked with the type of input required (see section marked 'B').

The diagram shows a Gmail sign-up form with the following sections and fields:

- Name:** Two text input fields labeled 'First' and 'Last'.
- Choose your username:** A text input field followed by '@gmail.com'.
- Create a password:** A text input field.
- Confirm your password:** A text input field.
- Birthday:** Three dropdown menus labeled 'Month', 'Day', and 'Year'.
- Gender:** A dropdown menu labeled 'I am...'.
- Mobile phone:** A dropdown menu showing a flag and '+27' followed by a text input field.

Callout box **A** points to the 'Name' section, the 'Choose your username' section, and the 'Create a password' section. Callout box **B** points to the 'Last' name field, the 'Confirm your password' section, and the 'Birthday' section.

**Figure 3.14: Email registration web form depicting the principle of visibility (Gmail sign-up:**

**<https://accounts.google.com/SignUp?service=mail&continue=http%3A%2F%2Fmail.google.com%2Fmail%2F&ltmpl=default&hl=en> )**

The principle of *consistency* can also be explained by using the email registration web form as example. Consistency refers to the attributes of the interface that are the same for related functions or pages. For example, in Figure 3.15 section A the labels are of the same font, the same text size and aligned left of the page. The text fields are all of equal size, or multiple text fields in the same line are spaced to fill the general width of the web form (see section 'B'). These are attributes that lend consistency to the web form. The principle of consistency was found to be a key design principle in a case study conducted by Almeida and Baranauskas (2010:174) in which they had two user groups (students and specialists) who interacted with an e-government web site and shared their experiences on the interactions. The principle of consistency is again addressed in Section 4.4.4.



The image shows a registration form with the following sections:

- Name:** Two text input fields for 'First' and 'Last' name.
- Choose your username:** A single text input field with a placeholder '@gmail.com'.
- Create a password:** A single text input field.
- Confirm your password:** A single text input field.
- Birthday:** Three dropdown menus for 'Month', 'Day', and 'Year'.
- Gender:** A dropdown menu with the placeholder 'I am...'.
- Mobile phone:** A dropdown menu for country code (showing a South African flag and '+27') followed by a text input field.

Annotations:

- A:** Points to the 'Name' section, the 'Choose your username' field, and the 'Create a password' field.
- B:** Points to the 'Birthday' section.

**Figure 3.15: Email registration web form depicting the principle of consistency** (<https://accounts.google.com/SignUp?service=mail&continue=http%3A%2F%2Fmail.google.com%2Fmail%2F&tmpl=default&hl=en>)

The principle of *constraints* is concerned with limiting user options. In Figure 3.16, the principle of constraints can be seen in the Facebook registration web form in the fields where drop down combo boxes are provided with specific options e.g. in the 'I am' selection (section 'A') the sex can either be male or female, the user is not allowed to enter text into this field. The date of birth field also contains drop down combo boxes with options for the month, the day and the year (section 'B'). These limitations on user text entry are known as constraints. The principle of constraints was also found to be a key design principle in the case study conducted by Almeida and Baranauskas (2010:174).

The image shows a screenshot of the Facebook registration web form. The form is titled "Sign Up" and includes the text "It's free and always will be." Below this, there are several input fields: "Your First Name:", "Your Last Name:", "Your Email:", "Re-enter Email:", and "New Password:". Below these fields, there is a section for "I am:" with a "Select Sex:" dropdown menu, and a "Birthday:" section with "Month:", "Day:", and "Year:" dropdown menus. To the right of the form, there are two callout boxes labeled "A" and "B". Box "A" has an arrow pointing to the "Select Sex:" dropdown menu. Box "B" has an arrow pointing to the "Year:" dropdown menu. Below the birthday dropdowns, there is a link that says "Why do I need to provide my birthday?". At the bottom of the form, there is a green "Sign Up" button. Below the button, there is a disclaimer: "By clicking Sign Up, you agree to our Terms and that you have read our Data Use Policy, including our Cookie Use."

**Figure 3.16: Facebook registration web form depicting the principle of constraints ([www.facebook.com](http://www.facebook.com))**

The principle of *feedback* can also be illustrated by using the Facebook registration web form. Feedback is concerned with how the system informs the user that a process can continue or that the user has made a mistake and needs to redo a certain action. For example, in Figure 3.17 the user has not re-entered the exact same email address and upon submission the system displays a message informing the user that the email addresses do not match (section 'A'). The principle of feedback was found to be a key design principle in the case study conducted by Almeida and Baranauskas (2010:174) in which they identified that this principle was not optimally applied and that feedback messages were displayed in the wrong places on the e-government web site.

**Sign Up**  
It's free and always will be.

Your First Name: JT

Your Last Name: Terblanche

Your Email: jt@gmail.com

Re-enter Email: jt.one@gmail.com

New Password: ●●●●●

I am: Female

Birthday: Jan 1 1980

Why do I need to provide my birthday?

By clicking Sign Up, you agree to our Terms and that you have read our Data Use Policy, including our Cookie Use.

**Sign Up**

Your emails do not match. Please try again.

The user has not entered matching email addresses and the system displays a feedback message to inform the user of this mistake.

**Figure 3.17: Facebook registration web form depicting the principle of feedback (www.facebook.com)**

The principles of *visibility*, *consistency*, *constraints* and *feedback* as discussed above will be applied to the interface design of a new web form, more specifically, an example translated from a current paper-based process. The example identified for this study is the process of registering for individual tax for the first time. At present, South Africa has no online process available for registering for individual tax. The next section gives a brief discussion on e-government and e-taxation in general and why the adoption of an online process could be beneficial for this purpose. The introduction of such a new IT artifact is referred to a 'Design and Creation' strategy by Oates (2006:108), a strategy that is applied to web form interface design in Chapter 4.

### 3.5. Web form creation for individual tax registration

Governments all over the world have made attempts to provide information and services over the Internet (Vinod *et al.*, 2007:63). A government that makes such services available online with the aim of improving communication with their citizens and allowing for transactions to take place between the user and the organization joins the movement of e-government or electronic government (Debenedictis *et al.*, 2002:130). A benefit of making e-government services available online is that the user has increased control of when and how they want to interact with their government (Vinod *et al.*, 2007:64). It also mitigates transaction costs that are inherent in government services (Lee *et al.*, 2008: 843). Particularly e-taxation as it is “an important function of e-government since it highly relates to the life of citizens” (Berdykhanova *et al.*, 2010: 1016; Wu and Jian-Liang, 2005:785).

An e-government application that is being used commonly is the process of electronic tax filing (Manly *et al.*, 2005: 76). Given that taxation systems are a highly used e-government application (SARS:2012; SARS e-filing:2012), the question arises why there is no electronic registration system available for first-time tax registration in South Africa. Dandar *et al.* (2007:313) write that one of the objectives of the Government of Mongolia in introducing information and communication technology in the Mongolian taxation service is to promote voluntary compliance. In 2009, Sambuu and Dandar (2009:134) declared that implementing e-taxation to promote compliance was still an ongoing process.

Turkey implemented its MERNIS project in October 2000. After which, every citizen born in Turkey had to be registered for a Turkish identification number of 11 digits and two check digits at the end. This identification number is then used for taxation, voting, banking, education and other purposes (Turkish Tax System, 2007). This system was implemented to ensure the secure sharing of personal information and to increase the efficiency and speed with which public services are offered; it has “become the backbone of the e-Government infrastructure in Turkey” (Güncelleme, 2009). However, Dr Melih Kirlidog, a Turkish citizen who has a PhD in Information Technology, explains that initial tax registration is possible electronically but that the process is “so complex and volatile that many people do not want to do it themselves” (Kirlidog:2010). A simplistic design is therefore crucial to ensure continued interaction with a web form for first-time taxpayer e-registration. Simplicity in the design can be obtained by applying HCI principles efficiently and effectively.

Lee *et al.* (2008:843) wrote that “e-government can facilitate public services offerings in a truly standard, impersonal, efficient and convenient manner for both the service provider (the government) and service recipient (the citizens)”. This statement could be expanded to infer that making the tax registration system for first-time taxpayers an e-government application could be advantageous to both the individual registering for tax and the government in question. For this reason, the researcher chose the example of first-time tax registration to translate a paper-based form into a web form using the appropriate HCI principles for e-registration. The web form prototype is introduced in the next chapter.

### **3.6. Conclusion**

In this chapter, the following concepts were discussed:

- the general application of HCI principles and its associated user experiences
- web forms and its application in electronic registration systems
- HCI principles that could be used specifically for web form interface design and
- e-taxation - an instance used for this study to explain how HCI principles are applied to interface design for a specific web form

The main goal of this study is to illustrate the potential impact of HCI principles in the design and creation of a web-based strategy. It is quite evident that each aspect of HCI could play a role in the approach to the design and creation method.

Chapter 4 introduces an example of a paper-based form that does not yet have an equivalent web form prototype, a first-time individual tax registration process. This web form is designed in accordance with the aforementioned HCI principles in the hope of promoting an effective and efficient registration process. The product is evaluated by formulating specific questions based on the usability goals mentioned in this chapter, following which, the web form may then be redesigned if necessary. The final web form prototype for first-time taxpayer registration is proposed in chapter 5.

## **4. INITIAL WEB FORM DESIGN**

### **4.1. Introduction**

This chapter introduces an initial web form prototype for first-time taxpayer registration. As mentioned before, no online tax registration system is currently available.


The researcher would like to stress the fact that the initial web form design and application of the chosen HCI principles are limited to interface design. The purpose of the study is to evaluate whether a web form will allow for efficient interaction and good user experiences when appropriate HCI principles are applied to the design. The web form for first-time taxpayer registrations is merely an example of how HCI principles may be applied to an electronic registration system. The researcher in no way suggests this web form and the suggested processes to be followed as a complete and final solution or alternate option to the paper-based form process.

The current process for registration and the proposed web form for first-time taxpayer registration are discussed in the next section.

### **4.2. The SARS website**

The proposed web form should be accessible on the SARS website. In the researcher's opinion, the current process on the SARS website demands considerable effort by the individual tax payer. First the person has to navigate to the homepage of the SARS website (URL: [www.sars.gov.za](http://www.sars.gov.za)). This person is then directed to the web page displayed in Figure 4.1.

The current SARS website could be seen as cluttered and this could cause confusion in finding the option for individual taxpayer registration (see Figure 4.2)


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0800 00 72 77  
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You are here: [Home](#)

Welcome to the website of the South African Revenue Service (SARS)

**SARS will be at certain Malls over certain weekends, to assist you with**



Welcome to our SARS website!

Oupa G. Magashula  
Commissioner

You will be able to read about SARS, download publications and forms, find customs and excise-related information access information on the tax types -


Air Passenger Tax, Capital Gains Tax (CGT), Estate Duty, Excise Duties and Levies, Income Tax, Pay As You Earn (PAYE), Provisional Tax, Retirement Funds Tax, Skills Development Levy (SDL), Stamp Duty, Transfer Duty, Value Added Tax (VAT) and the Unemployment Insurance Fund (UIF).

### TAX SEASON 2010 NOW ON

Tax Season started 1 July 2010!

- Address by the SARS Commissioner on the launch of Tax Season 2010
- Media Release: Launch of Tax Season 2010

For more information, visit our Tax Season 2010 page...



**Customs Modernisation**  
Moving into the future

### 2010 EMPLOYERS TAX SEASON

### PAYE INTERIM (Biannual) RECONCILIATION

- Updated!** A Guide to Taxpayer Centricity (Client - Approach functionality on eFiling)
- New!** e@syFile™ Agent Appointment (ITA88) User Guide
- New!** Agent Appointment (ITA88) Process Guide
- New!** Video's: SARS simplifies PAYE Reconciliation

### Latest News

**SARS clamps down on illegal second-hand-car importers**  
Pretoria, 08 October 2010 - Members of the South African Revenue Service (SARS), along with the South African Police Service (SAPS), Departments of Trade and Industry (DTI) and Home Affairs today ended a week long joint operation targeting illegal second hand vehicle importers in

Figure 4.1: The homepage of the SARS website (www.sars.gov.za)



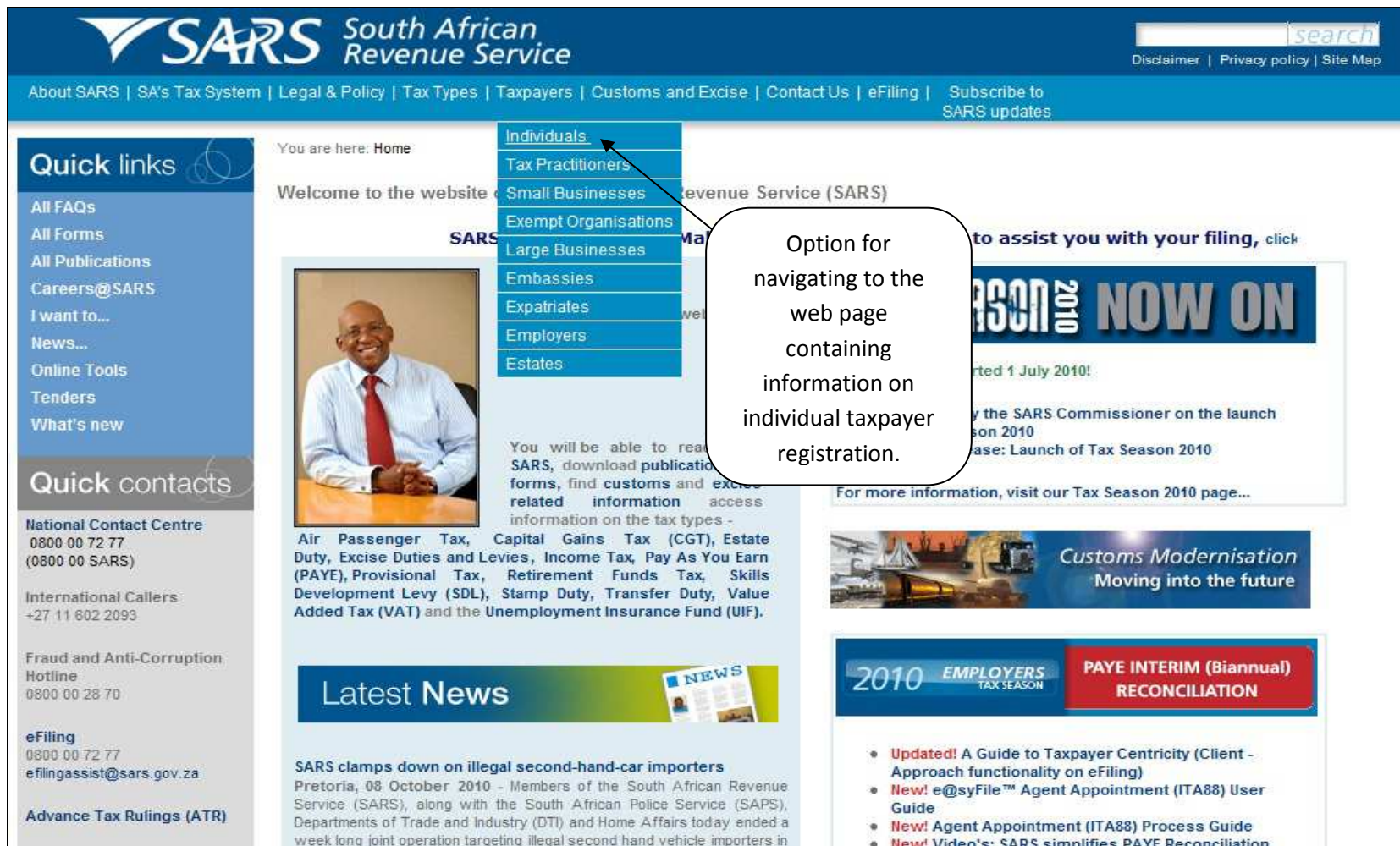


Figure 4.2: Option to navigate to the web page with information for individual taxpayers (www.sars.gov.za)



After navigating to the correct web page, the following web page is presented in Figure 4.3:

The screenshot displays the SARS South African Revenue Service website. The header features the SARS logo and navigation links: About SARS, SA's Tax System, Legal & Policy, Tax Types, Taxpayers, Customs and Excise, Contact Us, eFiling, and Subscribe to SARS updates. A search bar is located in the top right corner.

The main content area is titled "Quick links" and includes a list of links: All FAQs, All Forms, All Publications, Careers@SARS, I want to..., News..., Online Tools, Tenders, and What's new. Below this is a "Quick contacts" section with contact information for the National Contact Centre, International Callers, Fraud and Anti-Corruption Hotline, eFiling, and Advance Tax Rulings (ATR).

The "I want to..." section is expanded, showing the "Individuals" category. It asks, "Are you a first-time tax payer?" and provides instructions: "You need to register as a tax payer in order to get a tax number. Please complete the **IT 77 form**, then visit your nearest SARS branch and hand it in together with:"

- A certified copy of your Identification Document or Passport (drivers licences are not accepted);
- Your bank details: either a cancelled cheque or a certified/original copy of your account statement or an original letter from the bank confirming your bank details;
- Income details for the last 3 years e.g. copies of IRP5 etc;
- Proof of residence e.g. your rates/electricity bill.

It then states: "Once you have been registered and given your tax number, you can then register on [www.sarsefiling.co.za](http://www.sarsefiling.co.za) as a tax payer and fill out your returns online."

A "NEW!" banner reads: "Please see our Tax Season 2010 page for all the latest guides, information and more..."

Below this, the "Or I want to..." section lists several options:

- Make a payment to SARS
- Raise a service issue
- Learn about taxes
- Report a suspicious activity
- Submit a tax return electronically
- Register for eFiling
- Request a tax directive
- Register as a practitioner
- Receive notifications of new publications (Internet Subscriptions and Notifications)
- Apply for an Advance Tax Ruling (ATR)
- Register for Value Added Tax (VAT) and Pay As You Earn (PAYE)

Figure 4.3: Web page with information for first-time taxpayer registration (<http://www.sars.co.za/home.asp?pid=216>)

The user then has to read the web page to obtain information on how to register for taxation. The web page provides the following information in figure 4.4:

- In order to obtain a tax number, the person has to complete the IT77 form (see appendix E). The words “IT 77 form” (see section marked “A”) is hyperlinked to download the form. One problem with this hyperlink is that it is not underlined, and users may not know they have to click on the words to download the form. A user may argue that the text colour is blue only to highlight the specific form that is required for individual tax payer registrations. This may lead the user to think that he or she needs to go to a SARS branch to obtain the form, which could be frustrating and possibly promote noncompliance because of transport problems.
- The user has to take the completed IT77 form and the following accompanying documents, as specified by the web page (see section marked “B”), to the nearest SARS branch:
  - A certified copy of the individual’s identification or passport document (Driver’s licenses are not accepted.)
  - The individual’s banking details: a cancelled cheque OR a certified copy of the individual’s account statement OR an original copy of the individual’s account statement OR an original letter from the bank confirming the individual’s banking details
  - Income details for the past three years: pay slips and/or IRP5 documents
  - Proof of residence: rates/electricity bill

After the user has taken all these documents to his or her nearest SARS branch, he or she is assigned a tax number. The researcher spent a considerable amount of time on obtaining these documents, especially pay slips for the preceding three years. After arriving at the Vereeniging SARS branch and waiting in a queue for half an hour, the researcher was told SARS did not accept certified copies of bank statements. This meant that the researcher had to locate the nearest branch of her bank to ask for a certified original bank statement. After an added hour, the researcher finally proceeded to the Vereeniging SARS branch to be registered for individual tax. The clerk that assisted the researcher pointed out that SARS only needed pay slips for the past three months or one IRP5 document. If a person wanting to register had worked for one month only one pay slip would suffice. In the opinion of the researcher, the list of requirements on the website could also play a role in noncompliance. In the case of first-time taxpayer registration, the web form could for example demand only

three pay slips. The researcher would like to propose that first-time taxpayers need only upload a certified copy of his or her last pay slip.


Figures 4.2 and 4.5 propose the required navigation and layout of the web page on the SARS website that should contain the link for first-time taxpayer registration.

Figure 4.2 displays the option for navigating to the web page that contains information on registering for individual tax, just as before. However, when this link is followed, the user is directed to the following web page (see Figure 4.5).

In following the current SARS colour scheme (i.e. blue, white and grey for text, and a blue hyperlink named “Register for individual tax” have been added to this web page (see Figure 4.6, section marked “A”). Above this link, strategically placed because users should know what they need for registration before they follow this link, instructions are given (see section marked “B”). If the link is above the instructions, the user may not read the requirements and not have the necessary documentation for uploading when they want to register.

After the user has gathered all the necessary documentation and is ready to register for individual tax, he or she can follow the link to open the proposed web form.

The next section introduces an initial web form prototype for individual taxpayer registration. This web form will be tested and evaluated by means different data-gathering techniques. Method triangulation would follow and the results are considered for the final web form prototype (see Chapter 5).


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**eFiling**  
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[efilingassist@sars.gov.za](mailto:efilingassist@sars.gov.za)

**Advance Tax Rulings (ATR)**

You are here: [Home...](#) I want to..... [Register](#)

### Individuals

Are you a first-time tax payer?

You need to register as a tax payer in order to get a tax number. Please complete the **IT 77 form**, then visit your nearest SARS branch and hand it in together with:

- A certified copy of your Identification Document or Passport (drivers licences are not accepted);
- Your bank details: either a cancelled cheque or a certified/original copy of your account statement or an original letter from the bank confirming your bank details;
- Income details for the last 3 years e.g. copies of IRPS etc;
- Proof of residence e.g. your rates/electricity bill.

Once you have been registered and given your tax number, you can then register on [www.sarsefiling.co.za](http://www.sarsefiling.co.za) as a tax payer and fill out your returns online.

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A

B

Figure 4.4: The requirements for individual tax registration (<http://www.sars.co.za/home.asp?pid=216>)


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You are here: [Home...](#) I want to..... [Register](#)

### Individuals

Please have the following documents ready to be uploaded with your registration:

- \* Certified copy of your identification document or passport (drivers licenses are not accepted)
- \* Banking details: A certified/ original copy of your bank statement
- \* Payslips for the last 3 months or an IRP5 document
- \* Proof of residence: e.g. Rates/ Electricity bill

You will be assigned a temporary tax number which will be valid for 2 weeks (14 days) from the registration date. Take your proof of identification along with your temporary tax number to your nearest SARS branch to sign off and make the tax number permanent.

Once you have been registered and given your tax number, you can then register on [www.sarsefiling.co.za](http://www.sarsefiling.co.za) as a tax payer and fill out your returns online.

Follow this link to register for individual tax: [Register for individual tax](#)

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Figure 4.5: The proposed web page with information on individual taxpayer registration (proposed web page)

### 4.3. The initial web form design for user evaluation

As mentioned before, Rogers *et al.*'s (2011:19) usability goals have been used to measure the usability of the interactive web form. One of these usability goals is “memorability”, which allows users to know how to use the form in future situations. As the user does not have to register for a second time, this usability goal may not seem important. However, it should be considered that the user may make use of the SARS e-filing website to apply for his or her tax returns. It is therefore suggested that the main layout of the web form look similar to the layout of the registration web form on the SARS e-filing website (see Figure 4.7).

During self-registration the clerk informed the researcher that the IT77 form (see appendix A) only has to be completed up to the employer's particulars on page two. The IT77 form has to be signed on page three. The information required from the person who wants to register for tax only makes up one and a half of the six pages of the IT77 form. The length of this form could be a stumbling block for taxpayers because it appears tedious. The interactive web form therefore only contains fields for the required information.

The following information is compulsory for individual tax registration:

- First name(s), surname
- Postal address, residential address, contact number (work/home/cell)
- Magisterial district in which the individual resides
- Identity/passport number
- Language, marriage status
- Name of bank, of account holder, type of account, branch number, account number
- Name of employer, postal address, business address, contact number

Figures 4.6 and 4.8 display the layout and navigation process on the proposed web form. When the user follows the link, “Register for individual tax” (see Figure 4.6, marked section “A”), he or she is directed to the following web page (see Figure 4.8). This web page contains an overview of the information the user needs before proceeding with the registration process.

- The user needs a number of documents before he or she can proceed with the registration. This documentation includes a certified copy of the person's identification documentation, a certified bank statement with the person's banking


details, a certified copy of his or her most recent pay slip, and a certified copy of proof of residence. All these documents must have been visibly certified. For the purposes of this study, these documents would be accepted as valid if there is clear proof of certification.

- After successful registration, the user is assigned a temporary tax number.
- A SARS consultant will notify the individual within 24 hours whether the documents are acceptable.
- The temporary tax number is valid for 14 days from the registration date. The individual has to physically submit proof of identification and the temporary tax number to the nearest SARS branch within 14 days. The temporary tax number then becomes the person's permanent tax number. When the individual cannot travel to a SARS branch, an alternative solution could be to send SARS scouts to central locations such as a police station twice a month to accommodate the 14 day interval.
- The above mentioned information is followed by a scroll box with terms and conditions for using the web form when you want to register as a taxpayer for the first time.

If the individual ticks the checkbox to agree with the terms and conditions, the "Continue" button is enabled and the user can proceed with the registration process. The user is then directed to the web form (see Figure 4.9). Note that the design of the proposed web form is similar to that of the e-filing web form. The web form starts by asking the user to upload the attachments specified as requirements for registration. Each individual requirement is accompanied by its own upload field to eliminate confusion. The web form content then encompasses the individual's information requirements.

The discussion in the next section shows how SARS's websites, the main website and the e-filing web form, lack some basic HCI principles and how these principles have been incorporated into the proposed web form for first-time taxpayer registration.




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### Individuals

Please have the following documents ready to be uploaded with your registration:

- \* Certified copy of your identification document or passport (drivers licenses are not accepted)
- \* Banking details: A certified/ original copy of your bank statement
- \* Payslips for the last 3 months or an IRP5 document
- \* Proof of residence: e.g. Rates/ Electricity bill

You will be assigned a temporary tax number which will be valid for 2 weeks (14 days) from the registration date. Take your proof of identification along with your temporary tax number to your nearest SARS branch to sign off and make the tax number permanent.

Once you have been registered and given your tax number, you can then register on [www.sarsefiling.co.za](http://www.sarsefiling.co.za) as a tax payer and fill out your returns online.

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**Figure 4.6: New web page for first-time individual taxpayers (proposed web page)**





### Individual User - Quick Registration

Title
Initials
Firstname
Surname

Mr

Identification Type
South African ID

ID Number

☒ I already have a tax reference number and wish to register for eFiling.

Tax Reference Number

Register for Provisional Tax?
☐ Yes ☒ No

Married
☐ Yes ☒ No

Preferred method of contact:
☒ E-mail ☐ Fax ☐ Post ☐ SMS ☐ Through Tax Practitioner

Home Number

Fax Number

Work Number

Do you wish to receive SMS notifications for the following events: ☒ Yes ☐ No

- After activation as an eFiler
- After any payment

Cell Number

E-mail Address

Physical Address

Postal Address

Work Address

Bank
ABN Amro

Branch Name

Branch Number

Account Holder Name

Account Number

Account Type
Cheque/Current Account

Tax Practitioner Number
PR -

Telephone Number

Login

(Your login name will be used to create a unique SARS eFiling login name)

Password

Confirm Password

Password Hint

(Should you forget your password, we will give you the password hint on request.)

Security Question
Select a question

Answer

Security PIN
845610

Verify Security PIN

Register
Cancel Registration

**Figure 4.7: The web form to register for e-filing**  
**(<https://secure.sarsefiling.co.za/?reg=1&ProcessCode=QUICKREGISTRATION>)**

## Registration Process

Please read through the following information before proceeding:

You need to have the following information available for upload before you can continue with the registration process. All documents must be visibly certified.

- A certified copy of proof of identification / passport (driver's licenses will not be accepted)
- A certified bank statement containing your banking details
- A certified copy of at least your most recent payslip
- A certified copy of proof of residence

\* After you have registered and uploaded the documents correctly, you will be assigned a temporary tax number.

\* Within 24 hours a SARS consultant will notify you whether your documentation is acceptable.

\* The temporary tax number is valid for **14 days** from the registration date. Within 14 days you need to take your proof of identification and tax number to the nearest SARS branch where you will sign off on the temporary tax number and it will become your permanent tax number.

## Terms and Conditions

This site is used under the terms and conditions specified below:

### SARS Individual Tax Payer Registration

#### WebSite Terms & Conditions

THESE TERMS ARE BINDING AND ENFORCEABLE AGAINST ALL PERSONS THAT ACCESS THE SARS INDIVIDUAL TAX PAYER REGISTRATION WEBSITE OR ANY PART THEREOF.

IF YOU DO NOT AGREE TO THESE TERMS AND CONDITIONS YOU MUST LEAVE THE SARS INDIVIDUAL TAX PAYER REGISTRATION WEBSITE NOW, AS FURTHER USE WILL AUTOMATICALLY BIND YOU TO THESE TERMS AND CONDITIONS.

#### DEFINITIONS AND INTERPRETATION

Review complete:  
[Terms and Conditions](#)

☐ I Accept

[Continue](#)

**Figure 4.8: Overview of information required for registration and acceptance of terms and conditions (proposed web page)**

**Please upload the following documents:**

Certified copy of proof of identification	<input type="text"/>	<input type="button" value="Browse"/>
Certified copy of banking details	<input type="text"/>	<input type="button" value="Browse"/>
Certified copy of last payslip	<input type="text"/>	<input type="button" value="Browse"/>
Certified copy of proof of residence	<input type="text"/>	<input type="button" value="Browse"/>

**Complete the following information:**

**Personal Details**

Title	Initials	Firstname	Surname
<input type="text" value="Mr"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
ID Number	<input type="text"/>		
Contact Number (Cellphone)	<input type="text"/>		
Contact Number (Home/Work)	<input type="text"/>		
Marital Status	<input type="text" value="Married"/>		
Language	<input type="text" value="English"/>		
Magisterial district in which you reside	<input type="text" value="Vanderbijlpark"/>		
Residential Address	Postal Address		
<input type="text"/>	<input type="text"/>		
<input type="text"/>	<input type="text"/>		
<input type="text"/>	<input type="text"/>		
<input type="text"/>	<input type="text"/>		

**Banking Details:**

Branch Code	<input type="text"/>
Bank Name	<input type="text"/>
Type of Account	<input type="text" value="Savings"/>
Account Number	<input type="text"/>
Account Holder	<input type="text"/>

**Employer Particulars:**

Name of Employer	<input type="text"/>
Business Address	Postal Address
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
Business Number	<input type="text"/>

**Security Verification:**

Security PIN	<input type="text" value="186757"/>
Verify Security PIN	<input type="text"/>

<input type="button" value="Register"/>	<input type="button" value="Cancel Registration"/>
---	--

**Figure 4.9: The proposed interactive web form for first-time taxpayer registration (proposed web form)**

#### **4.4. Applying HCI principles**

The central theme of this study is to apply appropriate HCI principles to e-registration systems to enhance the interaction between user and system. An example of a paper-based system was chosen to be translated into a web form. Four key HCI principles were identified in the literature review, and the absence of these HCI principles is pointed out in the example for first-time taxpayer registration.

##### **4.4.1 Visibility**

Visibility is an appropriate HCI attribute for an interactive device or system because the user learns how to use the device or system simply by looking at it. The home page of the SARS website (see Figure 4.1) is evaluated to demonstrate the HCI principle of visibility. The current site could be seen as cluttered and function visibility may not be clear. The web page contains large amounts of information and hyperlinks, but the information is not well organised and the hyperlinks are not underlined (which make these links look like normal text). It is therefore possible to state that the functions of options on this web page are not clearly visible.

Figure 4.10 is an example of how visibility has been implemented in the web form for first-time taxpayer registration. The heading of the page is clearly labelled as the “Individual Taxpayer Registration” web form (see section marked “A”). The user who accesses this web form will immediately know whether he or she is in the right place. All fields are clearly labelled with text for the specific field (see section marked “B”). A final example of the HCI principle of visibility is the text fields and combo boxes that indicate specific user input is required (see section marked “C”).

**SARS** **Individual Tax Payer Registration**

**Please upload the following documents:**

- Certified copy of proof of identification
- Certified copy of banking details
- Certified copy of last payslip
- Certified copy of proof of residence

**Complete the following information:**

**Personal Details**

Title  Initials  Firstname  Surname

Mr  ID Number

Contact Number (Cellphone)

Contact Number (Home/Work)

Marital Status  Married

Language  English

Magisterial district in which you reside  Vanderbijlpark

Residential Address  Postal Address

**Banking Details:**

Branch Code

Bank Name

Type of Account  Savings

Account Number

Account Holder

**Employer Particulars:**

Name of Employer

Business Address  Postal Address

Business Number

**Security Verification:**

Security PIN  186757

Verify Security PIN

**Annotations:**

- A:** Points to the SARS logo and the title "Individual Tax Payer Registration".
- B:** A bracket grouping the "Please upload the following documents:" section and the "Complete the following information:" section.
- C:** A bracket grouping the "Personal Details" section and the "Banking Details:" section.

**Figure 4.10: The HCI principle of visibility**

#### 4.4.2. Feedback

The feedback HCI principle is an attribute that tells users when and how to proceed when using a system. When tax returns are submitted by using the application “e@syFile” (which is a downloadable application to control and monitor tax returns), the program simply returns to the main layout of the application. There is no pop-up message or feedback from the system to inform the user about the status of his or her submission. Users could become confused or unsure whether the submission has been successful and start resubmitting their entries.

An example of how the feedback principle has been implemented in the web form is the status pop-up message that is shown to the user after the person has clicked the register button. If all the required documentation has been uploaded and all the fields have been completed, the following message appears (see Figure 4.11):



**Figure 4.11: Message box with feedback to user input: Successful registration**

If data have been entered incorrectly, a message box is displayed to inform the user that an error occurred in a particular section and he or she can then revise the input (see Figure 4.12).



**Figure 4.12: Message box with feedback to user input: Incorrect user input**

#### **4.4.3. Constraints**

The HCI principle of constraints restricts user input at a given moment to prevent errors or to allow the efficient flow of actions. The SARS website could for example apply a constraint on the web page with information on registering for e-filing (see Figure 4.13). The researcher suggests that while the checkbox for acceptance of the terms and conditions is unselected, the button to continue should be disabled. Thereafter, only when the user accepts the terms and conditions, the “Continue” button becomes enabled. The same argument is valid for the web form to register for e-filing. Unless all the fields and criteria have been completed, the “Register” button should be disabled (see Figure 4.14). When the user input in all the fields

matches the masking scheme and all fields have been fully completed, the button to register should be enabled.

An example of where constraints have been applied to the web form for first-time taxpayer registration is when drop-down boxes are used instead of allowing the user to enter information manually. Combo boxes limit a user's choices, which limit potential errors when data are entered manually. Another example of a constraint applied to the web form for individual taxpayer registration, is to disable the "Register" button on the form until all the text fields have been completed (see Figure 4.15).



**Step 1:** Read the Terms and Conditions below carefully and accept these.

**Step 2:** You need to provide us with your personal particulars and your login information. You will be able to select your own Login ID and password. For security purposes we will add four additional characters to this ID.

**Step 3:** Welcome to SARS eFiling. You can now login to the system.

**Note:**

Should you wish to register for other tax returns (e.g. EMP201, VAT201, IRP6), please use the normal eFiling registration process.

## Terms and Conditions

This site is used under the Terms and Conditions specified below.

**SARS eFiling**

**WebSite Terms & Conditions**

THESE TERMS AND CONDITIONS ARE BINDING AND ENFORCEABLE AGAINST ALL PERSONS THAT ACCESS THE SARS eFILING WEBSITE OR ANY PART THEREOF (THE SARS eFILING WEBSITE).

IF YOU DO NOT AGREE TO THESE TERMS AND CONDITIONS YOU MUST LEAVE THE SARS eFILING WEBSITE NOW, AS FURTHER USE WILL AUTOMATICALLY BIND YOU TO THESE TERMS AND CONDITIONS.

**DEFINITIONS AND INTERPRETATION**

1. "ECT Act" means the Electronic Communications and Transactions Act 25 of 2002
2. "SARS eFiling website" means the SARS eFiling website located at [redacted]

Review complete:  
Terms and Conditions

☐ I Accept

Continue

The Continue button should be disabled until the checkbox is selected.

**Figure 4.13: Lack of constraint example: Registration process for e-filing**  
(<https://secure.sarsefiling.co.za/?reg=1&ProcessCode=QUICKREGISTRATION>)



**SARS eFILING**

Bank: ABN Amro

Branch Name:

Branch Number:

Account Holder Name:

Account Number:

Account Type: Cheque/Current Account

Tax Practitioner Number: PR -

Telephone Number:

Login:

(Your login name will be used to create a unique SARS eFiling login name)

Password:

Confirm Password:

Password Hint:

(Should you forget your password, we will give you the password hint on request.)

Security Question: Select a question

Answer:

Security PIN: 845610

Verify Security PIN:

Register Cancel Registration

The 'Register' button should be disabled until all fields have been completed

**Figure 4.14: Lack of constraint example 2: E-filing web form**  
 (<https://secure.sarsefiling.co.za/?reg=1&ProcessCode=QUICKREGISTRATION>)

**Please upload the following documents:**

Certified copy of proof of identification	<input type="text"/>	<input type="button" value="Browse"/>
Certified copy of banking details	<input type="text"/>	<input type="button" value="Browse"/>
Certified copy of last payslip	<input type="text"/>	<input type="button" value="Browse"/>
Certified copy of proof of residence	<input type="text"/>	<input type="button" value="Browse"/>

**Complete the following information:**

**Personal Details**

Title	Initials	Firstname	Surname
<input type="text" value="Mr"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
ID Number	<input type="text"/>		
Contact Number (Cellphone)	<input type="text"/>		
Contact Number (Home/Work)	<input type="text"/>		
Marital Status	<input type="text" value="Married"/>		
Language	<input type="text" value="English"/>		
Magisterial district in which you reside	<input type="text" value="Vanderbijlpark"/>		
Residential Address	Postal Address		
<input type="text"/>	<input type="text"/>		
<input type="text"/>	<input type="text"/>		
<input type="text"/>	<input type="text"/>		
<input type="text"/>	<input type="text"/>		

**Banking Details:**

Branch Code	<input type="text"/>
Bank Name	<input type="text"/>
Type of Account	<input type="text" value="Savings"/>
Account Number	<input type="text"/>
Account Holder	<input type="text"/>

**Employer Particulars:**

Name of Employer	<input type="text"/>
Business Address	Postal Address
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
Business Number	<input type="text"/>

**Security Verification:**

Security PIN	<input type="text" value="186757"/>
Verify Security PIN	<input type="text"/>

<input type="button" value="Register"/>	<input type="button" value="Cancel Registration"/>
---	--

The 'Register' button is disabled until all fields have been completed

**Figure 4.15: The web form for individual taxpayer registration (proposed web form)**

#### 4.4.4. Consistency

The HCI principle of consistency comes into effect when interfaces are designed with similar operations to achieve similar tasks. If SARS's main website is compared to the SARS's e-filing website, it is clear that the two websites are completely different in design and layout (see Figures 4.16 and 4.17).



Figure 4.16: SARS main website home page (www.sars.gov.za)

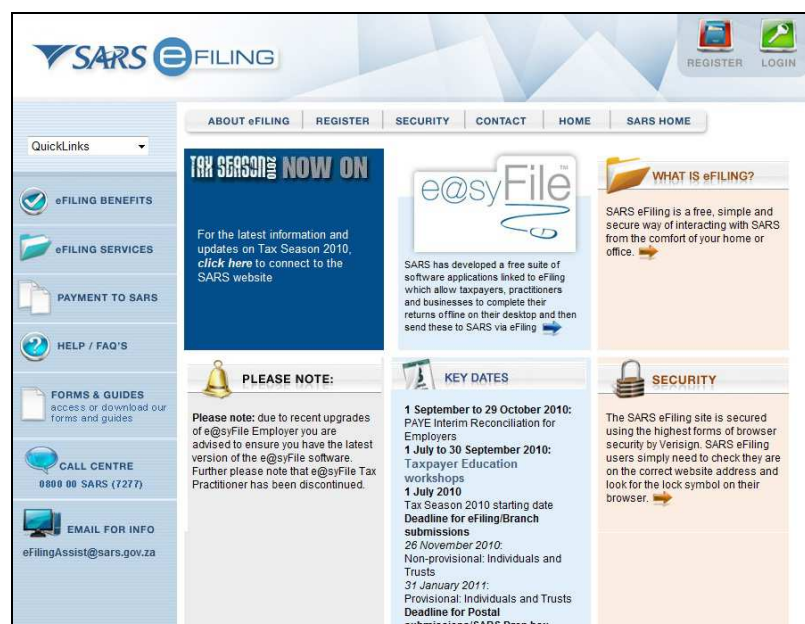



Figure 4.17: SARS e-filing home page (www.sarsefiling.co.za)

Consistency in its products is vital for any organisation. It would therefore benefit SARS if its websites looked similar and only the contents differed. The main layout of the suggested web form for individual taxpayer registration is similar to/consistent with the web form layout for e-filing registration. The suggested web form therefore provides a good example of consistency (compare Figures 4.18 and 4.19.)

#### **4.5. Conclusion**

In the previous chapter four key HCI principles were identified in the literature that could be useful in the design of a web form interface. These principles were applied to the interface design of a web form example for first-time taxpayer registration in this chapter.

In the next chapter, the results from the method triangulation exercise are discussed. Eight respondents participated in the different data-gathering methods so that the usability of the web form could be tested. The outcome of these results is used to re-evaluate the initial web form prototype for first-time taxpayer registration and to introduce a final web form prototype in Chapter 5.



### Individual User - Quick Registration

Title  
Mr

Initials

Firstname

Surname

Identification Type  
South African ID

ID Number

☒ I already have a tax reference number and wish to register for eFiling.

Tax Reference Number

Register for Provisional Tax? ☐ Yes ☒ No

Married ☐ Yes ☒ No

---

Preferred method of contact: ☒ E-mail ☐ Fax ☐ Post ☐ SMS ☐ Through Tax Practitioner

Home Number

Fax Number

Work Number

Do you wish to receive SMS notifications for the following events: ☒ Yes ☐ No

- After activation as an eFiler
- After any payment

Cell Number

E-mail Address

---

Physical Address

Postal Address

Work Address

---

Bank  
ABN Amro

Branch Name

Branch Number

Account Holder Name

Account Number

Account Type  
Cheque/Current Account

---

Tax Practitioner Number  
PR -

Telephone Number

---

Login

(Your login name will be used to create a unique SARS eFiling login name)

Password

Confirm Password

Password Hint

(Should you forget your password, we will give you the password hint on request.)

Security Question  
Select a question

Answer

Security PIN  
845610

Verify Security PIN

Register Cancel Registration

**Figure 4.18: Layout of e-filing web form**  
(<https://secure.sarsefiling.co.za/?reg=1&ProcessCode=QUICKREGISTRATION>)

**Please upload the following documents:**

Certified copy of proof of identification	<input type="text"/>	<input type="button" value="Browse"/>
Certified copy of banking details	<input type="text"/>	<input type="button" value="Browse"/>
Certified copy of last payslip	<input type="text"/>	<input type="button" value="Browse"/>
Certified copy of proof of residence	<input type="text"/>	<input type="button" value="Browse"/>

**Complete the following information:**

**Personal Details**

Title	Initials	Firstname	Surname
<input type="text" value="Mr"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
ID Number	<input type="text"/>		
Contact Number (Cellphone)	<input type="text"/>		
Contact Number (Home/Work)	<input type="text"/>		
Marital Status	<input type="text" value="Married"/>		
Language	<input type="text" value="English"/>		
Magisterial district in which you reside	<input type="text" value="Vanderbijlpark"/>		
Residential Address	Postal Address		
<input type="text"/>	<input type="text"/>		
<input type="text"/>	<input type="text"/>		
<input type="text"/>	<input type="text"/>		

**Banking Details:**

Branch Code	<input type="text"/>
Bank Name	<input type="text"/>
Type of Account	<input type="text" value="Savings"/>
Account Number	<input type="text"/>
Account Holder	<input type="text"/>

**Employer Particulars:**

Name of Employer	<input type="text"/>
Business Address	Postal Address
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
Business Number	<input type="text"/>

**Security Verification:**

Security PIN	<input type="text" value="186757"/>
Verify Security PIN	<input type="text"/>

<input type="button" value="Register"/>	<input type="button" value="Cancel Registration"/>
---	--

**Figure 4.19: Suggested layout of individual taxpayer registration web form (proposed web form)**

## **5. THE TRIANGULATED RESULTS ARE USED TO PROPOSE AN INTERACTIVE WEB FORM PROTOTYPE FOR FIRST-TIME TAXPAYER REGISTRATION**

### **5.1. Introduction**

After the initial web form was designed, its usability was tested by performing different data-gathering techniques for method triangulation. Again, method triangulation may be defined as comparing the results from two or more data-gathering techniques (Rogers *et al.*, 2011:225). Eight respondents participated in all of these techniques, which included a questionnaire (Appendix B), an interview (Appendix D) and an observation (Appendix C).

For the purposes of observation, all of the participants were monitored during their interaction with the web form. All reactions to the system were noted and recorded. All of the participants were subsequently interviewed and more in-depth questions were asked. Lastly, each participant had to complete a questionnaire in which he or she was asked to rate the web form in terms of specific questions formulated with reference to Rogers *et al.*'s (2011:19) usability goals. The participants were also asked to suggest improvements for the web form. This criterion forms the basis for the final interactive web form prototype that is introduced in this chapter.

### **5.2. Results from data-gathering techniques for method triangulation**

Eight respondents were asked to participate in the data-gathering techniques for this study. Every respondent participated in all of the data-gathering techniques. All the participants were given an opportunity to interact with the web form proposed in Chapter 4. All of them received a questionnaire to complete on their interaction with the web form. All of the respondents were observed during interaction with the web form and their responses to the system were noted. All of the participants were interviewed and more in-depth questions were asked. All of the participants signed consent forms (Appendix A) and chose to participate in this study.



### 5.2.1 Observation

During observation, the participants were told that they would interact with a web form to register as individual taxpayers. The participants were seated in front of a computer with an open browser on the simulated version of the SARS home page (see Figure 5.1). They were asked to navigate to the web page they thought would contain the information on tax registration. When the participants found the (suggested) web page with registration details (see Figure 5.2), they were concerned about the documents that had to be uploaded. For the purposes of this study, four documents, namely a bank statement, proof of identification, proof of residence, and a pay slip had been saved on the desktop of the computer, and the participants had to upload these documents in the given fields. The participants then entered their personal information and proceeded to register for individual tax.

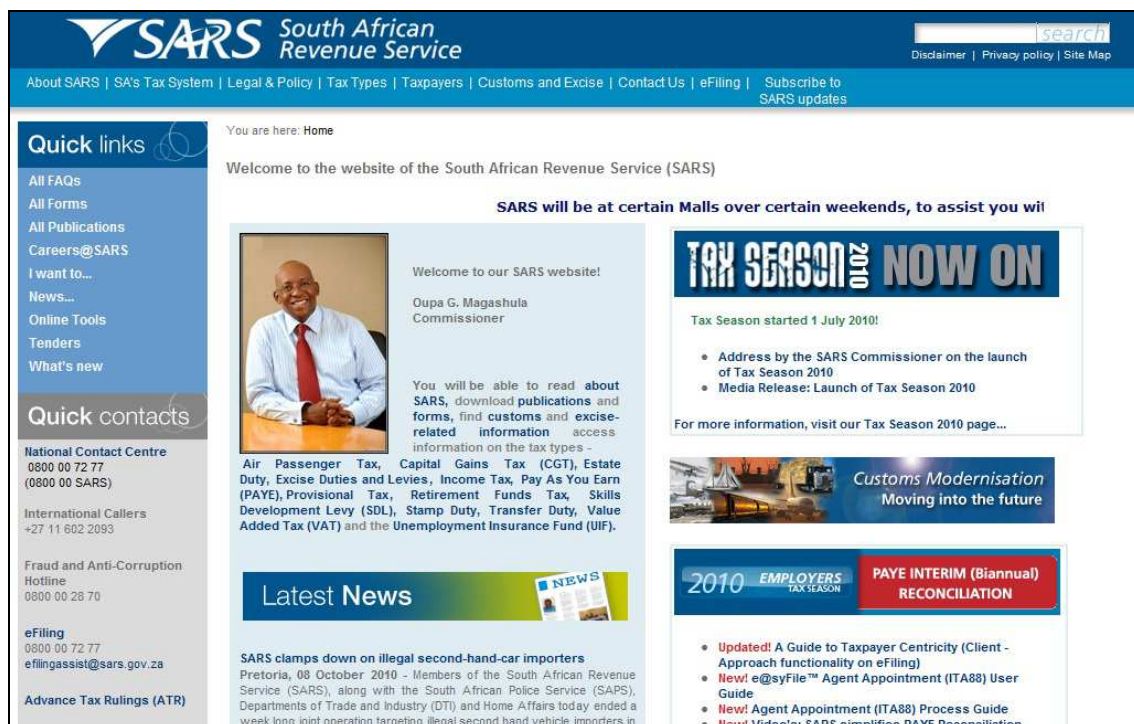


Figure 5.1: SARS home page (www.sars.gov.za)

Results based on observations:

- One participant (12.5%) struggled to find the page for individual tax registration. This could be because the SARS home page might appear cluttered.



- All the participants (100%) expressed concern about the required documentation. They were then informed that they had to upload the documents from the computer's desktop.
- The computer-literate participants (62.5%) completed the web form in an average period of less than eleven minutes. The average completion time of all the participants was less than seventeen minutes.
- Three of the eight participants (37.5%) made mistakes the first time they completed the form. They had to repeat the exercise. One of those three participants made another mistake.
- All the participants (100%) appeared to be satisfied with the results.
- Four of the participants (50%) did not write the temporary tax number down.
- Two of the participants (25%) asked whether a backup measure was in place to obtain the temporary tax number again.

## Registration Process

Please read through the following information before proceeding:

You need to have the following information available for upload before you can continue with the registration process. All documents must be visibly certified.

- A certified copy of proof of identification / passport (driver's licenses will not be accepted)
- A certified bank statement containing your banking details
- A certified copy of at least your most recent payslip
- A certified copy of proof of residence

\* After you have registered and uploaded the documents correctly, you will be assigned a temporary tax number.

\* Within 24 hours a SARS consultant will notify you whether your documentation is acceptable.

\* The temporary tax number is valid for **14 days** from the registration date. Within 14 days you need to take your proof of identification and tax number to the nearest SARS branch where you will sign off on the temporary tax number and it will become your permanent tax number.

## Terms and Conditions

This site is used under the terms and conditions specified below.

### SARS Individual Tax Payer Registration

#### WebSite Terms & Conditions

THESE TERMS ARE BINDING AND ENFORCEABLE AGAINST ALL PERSONS THAT ACCESS THE SARS INDIVIDUAL TAX PAYER REGISTRATION WEBSITE OR ANY PART THEREOF.

IF YOU DO NOT AGREE TO THESE TERMS AND CONDITIONS YOU MUST LEAVE THE SARS INDIVIDUAL TAX PAYER REGISTRATION WEBSITE NOW, AS FURTHER USE WILL AUTOMATICALLY BIND YOU TO THESE TERMS AND CONDITIONS.

#### DEFINITIONS AND INTERPRETATION

Review complete:  
[Terms and Conditions](#)

☐ I Accept

[Continue](#)

Figure 5.2: Web page with registration details (suggested web page)

### 5.2.2. Interviews

The researcher conducted in-depth interviews with all of the participants to obtain suggestions for improving the proposed web form.

The participants were asked the following questions:

- Is the design of the web form user-friendly? Give a reason for the answer.
- Is the web form a better solution to register for tax than the current paper-based form? Why?
- Is the layout of the web form effective for efficient registration? Elaborate.
- Suggest improvements to the web form.

Results from the interviews:

- All the participants (100%) agreed that the web form design was user-friendly to a certain extent but that it needed a few adjustments.
- Seven of the participants (87.5%) said that they would prefer to register online as the web form was short and simple to complete.
- All the participants (100%) said that the layout was consistent with that of the SARS e-filing web form and that the web form was easy to understand.
- One of the participants (12.5%) suggested that the address fields had to be labelled. The first field, for example, had to be labelled “Street name”, the second field had to be labelled “Suburb”, and so on. This participant also stated that the text field for the postal code had to be shortened and allow only four digits.
- One of the participants (12.5%) noted that a combo box that had only two entries should rather be given as an option between two radio buttons. For example, the combo box to select the account type had only two options.

- Two of the participants (25%) asked how an individual would obtain the temporary tax number if it had been misplaced and suggested that a text field had to be added under the field for the cell phone number, stating that the temporary tax number would be SMS-ed to that number. One participant also suggested that a text field for an e-mail address be added for the tax number to be e-mailed to the address as well. This participant stated that a person who would be willing to register for online services would probably have an e-mail address.
- One of the participants (12.5%) said that when a user pressed “ENTER” or “TAB”, the web form should allow for keyboard navigation. This participant also stated that if a user should skip a field by pressing the TAB button, the web form should automatically display a warning message saying that the skipped field was required for tax registration.

### **5.2.3. Questionnaire**

Questionnaires were given to all eight the participants. The questionnaire comprised two pages with closed- and open-ended questions. Specific questions were based on Rogers *et al.*'s (2011:19) usability goals.

Results from the questionnaires:

- All the participants (100%) claimed to have used web forms for registration before.
- Five of the participants (62.5%) claimed a good level of computer literacy.
- All the participants (100%) agreed that the web form would save time, money and effort in registering for tax purposes.
- Seven of the participants (87.5%) said that the web form would be effective in registering for individual tax.
- Seven of the participants (87.5%) agreed that the web form was more efficient than the paper-based form.

- Six of the participants (75%) were unsure whether the web form allowed user security.
- Seven of the participants (87.5%) found the web form easy to use and complete.
- All the participants (100%) agreed that the layout of the web form was similar to the layout of the e-filing web form and that completing the web form for registration would help them to use the form for e-filing registration.
- One of the participants (12.5%) recommended that the web form allow some form of signature verification so that travelling to a SARS branch to provide a final signature would be unnecessary. The Ascertia (2010) company provides leading signature verification products for documents such as .pdf files and .xml files. If SARS wanted to incorporate a system that would make it unnecessary for individuals to travel to SARS branches, software from Ascertia could be recommended.

Seven of the participants (87.5%) claimed that they would be more willing to comply with individual tax registration requirements if an electronic form was available.

#### **5.2.4. Summary of the results**

- All the participants seemed (100%) open to the possibility of implementing a web form for individual taxpayer registration.
- Seven of the participants (87.5%) preferred to register online for individual taxation.
- During observation, it took on average less than seventeen minutes to complete the web form.
- Suggestions were made during the interviews on how the web form could be improved. These suggestions included adding labels to certain text fields, using radio buttons for certain options instead of combo boxes, allowing efficient keyboard navigation, and providing some kind of backup initiative to reclaim a temporary tax number.

### **5.3. Final web form prototype**

The results from the data-gathering methods used for the method triangulation exercise were used to make improvements and changes to the initially proposed web form. Usability was tested by means of different data-gathering techniques, and the results were implemented to improve user experience.

Suggestions by the participants were carefully evaluated and were implemented to improve the web form's usability.

#### **5.3.1. Navigation to the web form**

The navigation process remains unchanged (see Chapter 4). Users can locate the web form by navigating to the SARS home page, choosing the option for taxpayers, individuals, and following the link that reads "Register for individual tax". It is recommended that a separate menu item be implemented for individual taxpayer registration. However, for the purposes of this study the current navigation process remains unchanged. When the user has selected the link to register for individual taxation, he or she is directed to the web page that contains information on the registration process. The user has to accept the terms and conditions to proceed to the web form. Figure 5.11 depicts the improved layout of the web form.

#### **5.3.2. Changes to the web form**

Changes to the web form are discussed in this section, and the reasons for these changes are submitted.

##### **5.3.2.1. Text field added for e-mail address**

One participant argued during an interview that anyone who is willing to register for an online service would probably already have an e-mail address for correspondence purposes. Obtaining the e-mail address from the person who registers for tax would be ideal as a backup for sending the temporary tax number allocated to this person. However, the e-mail text field is not mandatory as some people may not have an e-mail address (see Figure 5.3).

Email Address (If Available)	<input type="text"/>
* Temporary Tax Number will be emailed to this email address	

**Figure 5.3: Text field added to the web form for e-mail address**

#### **5.3.2.2. Note added under cell phone number**

It was brought to the researcher's attention that a person might forget to write down the temporary tax number allocated to him or her and that some form of backup should be provided to reclaim this number. The temporary tax number will be SMS-ed to the cell phone number provided during registration (see Figure 5.4).

Contact Number (Cell phone)	<input type="text"/>
* Temporary Tax Number will be SMS-ed to this number	

**Figure 5.4: Note added under contact number of individual**

#### **5.3.2.3. Reminder added if individual does not have an email address or a cell phone number**

People without an e-mail address or a cell phone number are to be reminded to write down the temporary tax number. A note has to be added under the contact details of the person to remind him or her to write down the temporary tax number (see Figure 5.5).

Contact Number (Cell phone)	<input type="text"/>
* Tempory Tax Number will be SMS-ed to this number	
Contact Number (Home/Work)	<input type="text"/>
Email Address (If Available)	<input type="text"/>
* Tempory Tax Number will be emailed to this email address	
<p><b>*If you do not have an email address or cell phone number please remember to write the temporary tax number down that will be displayed in the messagebox upon registration.</b></p>	
Marital Status	Married <input type="button" value="v"/>

**Figure 5.5: Add a reminder to write down the temporary tax number**

#### 5.3.2.4. Radio button added for account type

It was suggested by one of the participants that a field in which a user has to choose between two options should be presented as a radio button instead of a combo box. As the IT77 form classifies the two options for account type as Savings or Cheque, the combo box for this option has been replaced with a radio button (see Figure 5.6).

<b>Banking Details:</b>	
Branch Code	<input type="text"/>
Bank Name	<input type="text"/>
Type of Account	<input checked="" type="radio"/> Savings <input type="radio"/> Cheque
Account Number	<input type="text"/>
Account Holder	<input type="text"/>

**Figure 5.6: A radio button is used instead of a combo box for the account type**

#### 5.3.2.5. Labels added for address text fields

One participant suggested that labels be added to the text fields for the different addresses so that the user knows which part of the address should go into which text field. Labels were subsequently added to the field for personal addresses and to the employer's addresses (see Figures 5.7 and 5.8).



Magisterial district in which you reside		Vereeniging ▼
	Residential Address	Postal Address
Line 1	<input type="text"/>	<input type="text"/>
Line 2	<input type="text"/>	<input type="text"/>
Suburb	<input type="text"/>	<input type="text"/>
Code	<input type="text"/>	<input type="text"/>

**Figure 5.7: Labels added to address fields**

<b>Employer Particulars:</b>		
Name of Employer <input type="text"/>		
	Business Address	Postal Address
Line 1	<input type="text"/>	<input type="text"/>
Line 2	<input type="text"/>	<input type="text"/>
Suburb	<input type="text"/>	<input type="text"/>
Code	<input type="text"/>	<input type="text"/>
Business Number <input type="text"/>		

**Figure 5.8: Labels added to the address fields for the employer's particulars**

### 5.3.3. More HCI principles

Some of the participants suggested improvements to the web form based on two of the HCI principles introduced in this study.

#### 5.3.3.1. Feedback

One participant suggested that feedback on errors should be provided while the user is registering for tax purposes. If a field is skipped, and the person continues to enter data in the next text field, a warning message should appear to draw attention to the error. Figure 5.9 shows an error message after a user skipped the text field for "ID number". It is a common HCI principle to display an error message in red as people associate the colour with danger (Dix *et al.*, 2004:135).

Johnson (2010:74) explains that when error messages appear on websites, it is advisable not to use pop-up messages as some users may have their browsers set to blocking all pop-up messages. The error messages are therefore shown in the body of the web form, located near the field in which the error occurred.

**Complete the following information:**

Personal Details

Title	Initials	Firstname	Surname
Dr ▾	MN	Mokwena	Naledi

ID Number  \*Field required for registration

Contact Number (Cellphone)

\* Tempory Tax Number will be SMS-ed to this number

Contact Number (Home/Work)

Email Address (If Applicable)

\* Tempory Tax Number will be emailed to this email address

Marital Status

Language

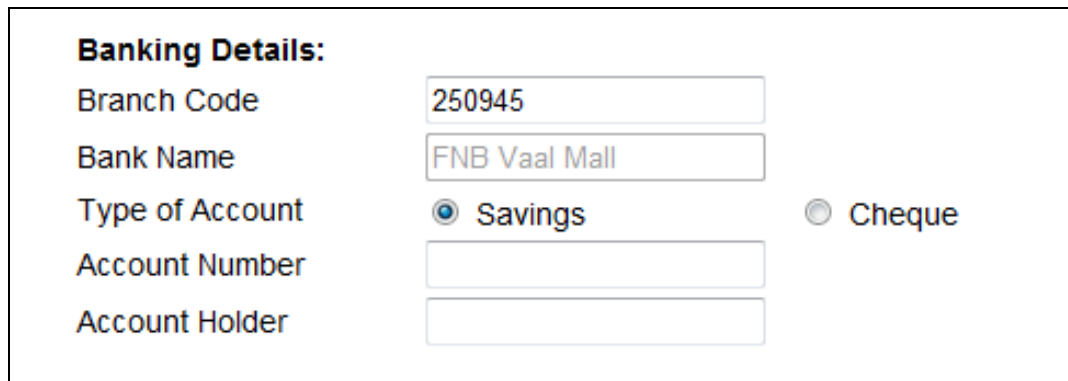
Magisterial district in which you reside

	Residential Address	Postal Address
Line 1	<input type="text"/>	<input type="text"/>
Line 2	<input type="text"/>	<input type="text"/>
Suburb	<input type="text"/>	<input type="text"/>
Code	<input type="text"/>	<input type="text"/>

**Figure 5.9: Error message displayed when a user skips a field**

### 5.3.3.2. Constraints

Several participants indicated that they had used web forms before (e.g. a web form for internet banking). It was suggested that when the branch code of the bank has been entered, the bank name be displayed automatically in the relevant text field, and the text field then be disabled. One may reasonably assume that a user would be able to provide the branch code of his or her bank, as one of the documents that has to be uploaded during registration for tax is a certified statement of the user's banking details (see Figure 5.10).



**Banking Details:**

Branch Code	<input type="text" value="250945"/>
Bank Name	<input type="text" value="FNB Vaal Mall"/>
Type of Account	<input checked="" type="radio"/> Savings <input type="radio"/> Cheque
Account Number	<input type="text"/>
Account Holder	<input type="text"/>

**Figure 5.10: The bank name is displayed and the text field is disabled after the branch code has been entered**

#### 5.4. Conclusion

After the initial web form prototype has been tested for usability, an improved prototype was introduced. Eight respondents participated in all of the triangulation methods (including observation, interviews and a questionnaire) for usability testing. The participants were asked to suggest improvements to the web form. These suggestions were subsequently evaluated and implemented.

The final web form prototype introduced in this chapter is an example of how HCI principles can be implemented for good interaction between the user and the system. 87% of the participants claimed that they would be more compliant in terms of individual tax registration if an online web form, such as the one introduced in this chapter, were available for this purpose.

Chapter 6 discusses the research findings, their relevance, and the correlation between the literature study and the final results.

**Please upload the following documents:**

Certified copy of proof of identification	<input type="text"/>	<input type="button" value="Browse"/>
Certified copy of banking details	<input type="text"/>	<input type="button" value="Browse"/>
Certified copy of last payslip	<input type="text"/>	<input type="button" value="Browse"/>
Certified copy of proof of residence	<input type="text"/>	<input type="button" value="Browse"/>

**Complete the following information:**

**Personal Details**

Title	Initials	Firstname	Surname
<input type="text" value="Mr"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
ID Number	<input type="text"/>		
Contact Number (Cell phone)	<input type="text"/>		
* Temporary Tax Number will be SMS-ed to this number			
Contact Number (Home/Work)	<input type="text"/>		
Email Address (If Available)	<input type="text"/>		
* Temporary Tax Number will be emailed to this email address			

**If you do not have an email address or cell phone number please remember to write the temporary tax number down that will be displayed in the messagebox upon registration.**

Marital Status	<input type="text" value="Married"/>
Language	<input type="text" value="English"/>
Magisterial district in which you reside	<input type="text" value="Vanderbijlpark"/>

	Residential Address	Postal Address
Line 1	<input type="text"/>	<input type="text"/>
Line 2	<input type="text"/>	<input type="text"/>
Suburb	<input type="text"/>	<input type="text"/>
Code	<input type="text"/>	<input type="text"/>

**Banking Details:**

Branch Code	<input type="text"/>
Bank Name	<input type="text"/>
Type of Account	<input type="radio"/> Savings <input type="radio"/> Cheque
Account Number	<input type="text"/>
Account Holder	<input type="text"/>

**Employer Particulars:**

Name of Employer	<input type="text"/>	
	Business Address	Postal Address
Line 1	<input type="text"/>	<input type="text"/>
Line 2	<input type="text"/>	<input type="text"/>
Suburb	<input type="text"/>	<input type="text"/>
Code	<input type="text"/>	<input type="text"/>
Business Number	<input type="text"/>	

**Security Verification:**

Security PIN	<input type="text" value="186757"/>
Verify Security PIN	<input type="text"/>

<input type="button" value="Register"/>	<input type="button" value="Cancel Registration"/>
---	--

**Figure 5.11: The new layout of the web form after method triangulation results were applied**

## **6. RESULTS AND DISCUSSION**

### **6.1. Introduction**

The research findings and the relevance of the results are discussed in this chapter. The success of the research findings can be measured by the extent to which the results correlated with the literature study.

### **6.2. Discussion**

#### **6.2.1 Research findings and their relevance**

The main research question in this study asked how the HCI principles could be applied to e-registration systems. The central theoretical theme of this study was that if a web form for e-registration was designed based on relevant HCI principles, it could promote an enjoyable human-computer experience. The HCI principles of *visibility*, *consistency*, *constraints* and *feedback* were applied to the interface design of a new web form, more specifically, an example translated from a current paper-based process. The example identified for this study is the process of registering for individual tax for the first time. At present, South Africa has no online process available for registering for individual tax. After an initial web form prototype was introduced, the web form's usability was evaluated by comparing the results of the data-gathering methods.

Eight respondents participated in all of the data-gathering methods (interviews, observations and a questionnaire) (see appendices B, C and D). The triangulated results were evaluated and the web form was improved.

The researcher identified that some paper-based processes still do not have an equivalent web-based application available. The aforementioned issue lead the researcher to investigate e-registration systems and the application of HCI principles in its design. The researcher then identified a paper-based process to be translated into a web form. The result was subject to the web form being designed and created with reference to basic HCI principles that would facilitate interaction between the user and the system.

All the participants interacted with the web form and completed a topic-specific questionnaire. The participants were specifically asked whether they favoured the conventional paper-based form or the web form. 87.5% of the participants preferred the web form and rejected the paper-based system.

Although the sample size in this study was small (eight participants), it can be assumed from the results that these individuals found the web form to be an enjoyable user experience. The participants were asked to substantiate their preference for the web form instead of the paper-based form.

The questionnaire results may be summarised as follows:

- The web form process is faster and takes less effort to complete than the paper form.
- The web form is easier to complete.
- No papers have to be posted or faxed.
- There is no need to fill in a paper form or stand in a queue.
- Web forms are quicker to complete than conventional paper forms.
- There is no need to travel to a SARS branch during office hours in order to register for tax.
- There is no need to interact with incompetent or unhelpful staff.

All the participants agreed that the web form for registration would save time, money and effort and that completing the web form was the better option. The participants were asked specific questions that had been formulated in terms of usability goals based on the work of Rogers and her colleagues (2011:19). The web form was rated positively for effectiveness, efficiency, utility, learnability and memorability. However, the participants were unsure whether the web form was secure. For the purposes of this study, the web form was created using normal HTML (HyperText Markup Language) coding on a normal HTTP (HyperText Transfer Protocol) site. When an individual has to submit confidential information, it would be advisable to use an HTTPS (HyperText Transfer Protocol over Secure Socket Layer) connection.

There are measures to ensure the security of user input in web forms. Banking sites use HTTPS connection sites when their clients log in for online banking. SARS explains identity theft as a reason for not having an online tax registration system in place.

Identity theft may generally be defined as using another individual's personal information to commit fraud (Li, 2010:379). One method of identity theft that has been exploited is the attempt of criminals to register multiple automated entries. "Completely Automated Public Turing test to tell Computers and Humans Apart" (CAPTCHA) was implemented for this reason. CAPTCHA is a test that distinguishes between computers and people. A typical example is an image that contains distorted text at the bottom of a web form used for registration (Von Ahn *et al.*, 2008:1465). (See Figure 6.1)



The image shows a web form for security verification. It has a title "Security Verification:". Below the title, there is a label "Security PIN" and another label "Verify Security PIN". To the right of the "Verify Security PIN" label is a text input field. To the right of the input field is a CAPTCHA image showing the number "186757" in a distorted, noisy font. At the bottom of the form are two buttons: "Register" and "Cancel Registration".

**Figure 6.1: CAPTCHA is implemented in the suggested web form for tax registration to eliminate the possibility of automated computer entries**

### **6.2.2 Correlation of results and literature study**

Although only a small subset of HCI principles were implemented in this study, the difference in interaction is clearly recognisable. The literature study entailed a detailed overview of HCI principles and these principles were illustrated by their implementation in the initial and revision stages of the web form prototype. Examples were shown of how these HCI principles had been applied in the initial prototype and after triangulation, and some of these principles were again highlighted during usability evaluation.

The research questions formulated for this study asked whether an online web form for e-registration, based on appropriate HCI principles, could promote an enjoyable user experience. This possibility was explored and represents the empirical work for the study. It was found that a large percentage of the people who participated in the data-gathering

techniques stated that the web form would save time, money and effort in the registration process, and that they would prefer to use the web form for registration purposes.

### **6.3. Conclusion**

The researcher emphasised the idea that a user experience could be more pleasant if the appropriate HCI principles were applied to web form design. This statement was supported by the results of the study. 87% of the participants agreed that the web form for registration would save time, money and effort, and claimed that they would be more willing to use a web form for tax registration if it were available. The researcher therefore concluded that the main research question for this study has been answered positively within the limitations of the study.

Chapter 7 provides a broad summary and conclusion, and discusses the limitations of the study and possibilities for future research.



## 7. SUMMARY AND CONCLUSION

### 7.1. Introduction

Research for this study was carried out in the research fields of HCI principles and e-registration systems. Further research followed on the subset categories of design and creation, usability and web forms. The research was undertaken with the aim of answering the question 'How can HCI principles be applied to the design of web forms so that paper-based registration processes can efficiently be translated into e-registration processes?'. To create such a web form, the researcher first had to understand the requirements of an e-registration system and which HCI principles, when applied to the design of this web form, would promote efficient interaction. An example was identified in the form of first-time individual tax registration and the research findings were applied to create a web form for this instance.

An initial web form prototype, based on HCI principles to promote efficient interaction between the user and the system, was introduced. This prototype's usability was evaluated and triangulation of the results of the data-gathering techniques was performed to gather qualitative data. The qualitative data were evaluated and implemented to improve the initial web form prototype. A final web form prototype was introduced in Chapter 5.

HCI principles were applied to the web form in order to enhance interaction between the individual who registers for tax and the web form. It is the opinion of the researcher that effective interaction could promote a positive response in users, and that this in turn could promote compliance with a given e-registration system. This opinion is supported by Vyravene (2010), Isomaki (2007:39) and Te'eni *et al.* (2007:2) who believe that technology could provoke positive responses in users and promote compliance. It is believed that users only care about the input into and the output from the system, and how the interaction affects them.

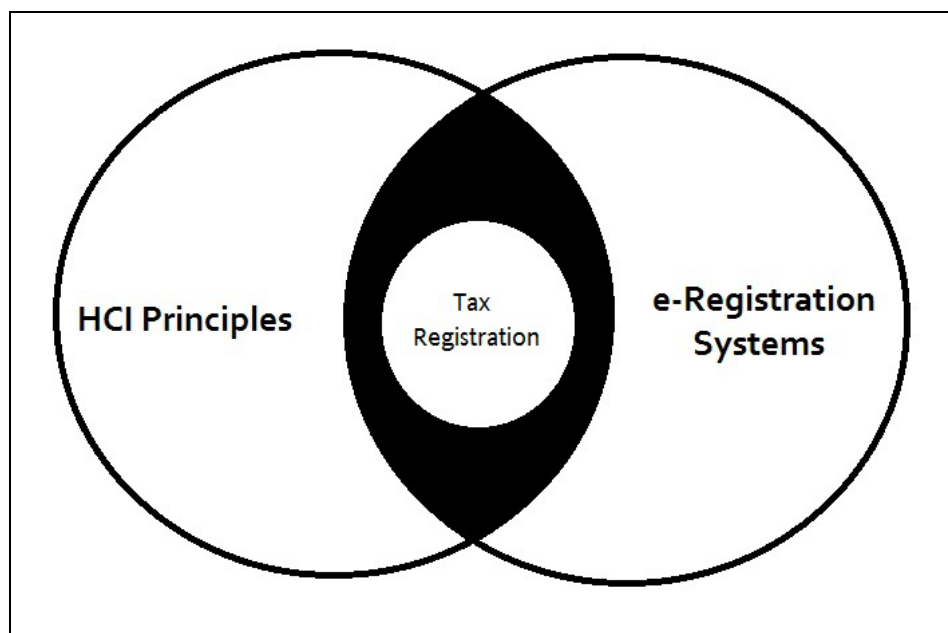
An overview of the study appears in the section below, along with a discussion over the manner in which the research results answered the main research question of this study.

## 7.2. Summary of the study

This academic project comprises seven chapters in a logical sequence. The study begins with an introduction to inform the reader as to what the project entailed (Chapter 1). In Chapter 2 the research methodology is discussed. The second chapter is followed by a literature review that explored previous research in relevant fields (Chapter 3). Chapter 4 introduces an initial web form prototype and chapter 5 introduces the final web form prototype after usability evaluation. Chapter 6 discusses the findings and their relevance. Chapter 7 contains a summary of the research for this academic project.

### *Chapter 1: Introduction*

This study introduces a new research project. Research has been conducted in the HCI field as well as in the field of e-registration systems. A moderate amount of information could be found in the literature where these two fields overlap. Very little information could be found on the intersection of HCI and e-registration systems where a taxation system is the key focus. This intersection in academic research is illustrated in Figure 7.1.



**Figure 7.1: The research gap indicated by the three study areas**

### *Chapter 2: Research methodology*

Oates's (2006:33) model for the research process was selected and implemented. Chapter 2 discusses the research methodology and development methodology both in general and in detail. This study followed a Design Science Research approach by Hevner, which is also explained by Oates as a 'design and creation' strategy. Data were gathered by means of a detailed literature review and different data-collection techniques (including interviews, observation and a questionnaire). These methods produced qualitative data. The research conducted for this study was founded on a conceptual framework of the researcher based on personal experience. The researcher received ethical clearance to conduct this study.

### *Chapter 3: Literature study*

The literature study forms the basis of an academic project. Before empirical testing can commence, existing research findings on related topics have to be investigated. The research questions for this study proposed the fields of HCI principles and e-registration systems. As this study required the development of a web form for first-time individual taxpayer registration, the research field of design and creation that applies to the development of the web form was also explored. These research areas were explored in detail in the second and third chapter of this academic project.

### *Chapter 4: Prototype of initial web form*

The researcher's conceptual framework for designing and creating the initial web form prototype may be defined as follows:

- A web registration form was needed for individual tax registration.
- The requirements of the IT77 paper-based form was analysed to determine what had to be included in the web-based form.
- These requirements were also based on self-registration for individual taxation. During which, the researcher had been told that the form only had to be completed up to the employer's particulars (on the second page) and signed (on the third page).
- When the requirements of the paper-based form had been identified, these fields were added to the web form.

- Specific HCI principles were identified and applied to the web form for e-registration.
- An initial web form prototype was introduced (Chapter 4).
- The initial web form prototype was evaluated by means of different data-gathering techniques and the results were triangulated. Eight respondents participated in different data-gathering techniques, including observation, interviews and a questionnaire (Chapter 5).
- A final web form prototype was introduced after improvements based on the research results were implemented (Chapter 5). The HCI principles of visibility, feedback, constraints and consistency (Rogers *et al.*, 2011:26) were implemented in the first prototype. The usability goals (Rogers *et al.*, 2011:19) of effectiveness, efficiency, usability, learnability and memorability were achieved.

#### *Chapter 5: Results from data-gathering techniques and final web form prototype*

Chapter 5 starts with a discussion on the results of the different data-gathering techniques. Eight respondents participated in different data-gathering techniques. The participants were observed during interaction with the initial web form prototype. All eight of the participants were interviewed and had to complete the questionnaire. The questionnaire contained specific questions relevant to the central theme of this study.

The results may be summarised as follows:

- The computer-literate participants (62.5%) completed the web form in an average period of less than eleven minutes. The average completion time of all the participants was less than seventeen minutes.
- Suggestions to improve the usability of the web form were submitted during the interviews. These suggestions were evaluated and implemented in the final web form prototype.
- Questionnaire:
  - All the participants had completed web forms before.

- 87.5% of the participants preferred the web form for individual tax registration.
- 87.5% of the participants agreed that the web form would save time, money and effort.
- 87.5% of the participants agreed that the web form was the better option for individual tax registration.
- 87.5% of the participants said that the web form was effective, efficient, usable, easy to learn to use, and would promote interaction with the e-filing registration form. (The usability goal of memorability (Rogers *et al.*, 2011:19) was achieved by designing the web form to look similar to the e-filing registration form.)
- 75% of the participants were unsure whether the web form would promote user safety. (This issue is addressed in Section 7.3.)

The triangulated results were evaluated and used to improve the initial prototype. A final web form prototype was then introduced (Chapter 5).

### *Chapter 6: Discussion of the findings*

The researcher emphasised the idea that a user experience could be more pleasant if the appropriate HCI principles were applied to web form design. This statement was supported by the results of the study. 87% of the participants agreed that the web form for registration would save time, money and effort, and claimed that they would be more willing to use a web form for tax registration if it were available. The researcher therefore concluded that the main research question for this study had been answered positively within the limitations of the study.

### 7.3. Limitations of the study and possibilities for further research

This study had certain limitations, and opportunities for further research are summarised below.

- **HCI principles.** Numerous HCI principles have been defined and are available for application. Four of these HCI principles were selected for this study. More HCI principles could be implemented in a more extensive study.
- **Individual tax.** This study was limited to registration for individual taxation. Opportunities for further research would be available if HCI principles were for example introduced for business registration and tax practitioners.
- **Safety.** The usability goal of user safety was not fully addressed. This study concentrated on the safety and validity of SARS registration in a very limited way.
- **Computerised registration.** The web form layout was limited to interaction with a standard computer. Small handheld devices are currently used to access the internet (e.g. cell phones). An opportunity for further research would be to scale the web form for mobile use (Nielson, 2000:353).
- **Functionality.** The web form introduced in this study is a limited prototype coded in basic HTML language. This implies that the web form could be redesigned and implemented as a fully functional and secure system.

### 7.4. Conclusion and contribution to the IT field

The main research question of this study was answered by the research findings and the method triangulation exercise results. When time, money and effort are kept to the minimum, users may be more willing to comply with requirements. The participants in this study preferred to interact with a web form to register for individual tax instead of the current paper-based registration form. The web form was designed in accordance with a number of HCI principles in order to facilitate the interaction between the user and the system.

This study reflected on the intersection of the two research fields of HCI principles and e-registration systems. Limited resources were available, highlighting a research-opportunity in the academic literature and therefore an opportunity for further research.

The researcher trusts that her efforts would contribute to the IT field and proposes guidelines for using HCI principle in e-registration system design, more specifically, for designing and creating a web form prototype for individual first-time tax registration.

The contribution to the literature may be defined as follow:

- Electronic registration systems are widely used. The researcher translated a paper-based form into a web form for a process that does not yet have an e-registration system available.
- HCI is a broadly researched topic but the researcher applies HCI principles to a new example and this contributes towards new research within the discipline.
- Little research was available on the intersection of the fields of HCI principles and e-registration systems. This dissertation adds knowledge to this direction of research and proposes possibilities for future research.

IT is a broad research discipline and offers many subset research areas. By reflecting on the intersection of the two subset research fields that this study explored, it can be concluded that the researcher made a contribution towards the IT discipline.

## **REFERENCES**

ADEBESIN, F., KOTZE, P. & GELDERBLOM, H. 2011. Design research as a framework to evaluate the usability and accessibility of the digital doorway. Design, Development & Research Conference, Cape Peninsula University of Technology, Cape Town, 26-27 September 2011.

ALMEIDA, L.D.A. & BARANAUSKAS, M.C.C. 2010. Universal design principles combined with web accessibility guidelines: a case study. *In Proceedings of the IX Symposium on Human Factors in Computing Systems, October 5-8, 2010, Belo Horizonte, Minas Gerais, Brazil.* Pg 169-178.

ALUJA, A., ROSSIER, J. & ZUCKERMAN, M. 2007. Equivalence of paper and pencil vs internet forms of the zkpq-50-cc in spanish and french samples. *Elsevier: Personality and Individual Differences* 43 (2007): 2022-2032.

BAKER, R. 1996. Are electronic forms available for business? *Best's Review*, 96 (10): 86-87.

BARAK, A. & ENGLISH, N. 2002. Prospects and limitations of psychological testing on the Internet. *Journal of Technology in Human Services*, 19:65-89.

BEAN, J. 2009. SOA and web services interface design: principles, techniques and standards. San Francisco: Morgan Kaufmann Publishers.

BENTLEY, L.D. & WHITTEN, J.L. 2007. Systems analysis and design for the global enterprise. 7<sup>th</sup> ed. New York: McGraw-Hill.

BERDYKHANOVA, D., DEGHANTANHA, A. & HARIRAJ, K. 2010. Trust challenges and issues of e-government: e-tax prospective. *in Information Technology (ITSim), 2010 International Symposium*, 10:1015-1019. IEEE, ISBN 978-1-4244-6716-7.

BERGERON, B.P. & KURZWEIL, R. 2000. The eternal e-customer: how emotionally intelligent interfaces can create long-lasting customer relationship. New York: McGraw-Hill Professional.



- BUCHANAN, T. 2002. Online assessment: Desirable or dangerous? *Professional Psychology: Research and Practice*, 33(2):148-154.
- CARROLL, J.M. & ROSSON, M.B. 2002. Usability engineering: scenario-based development of human-computer interaction. London: Academic Press.
- CHAFFIN, D.B. 2005. Improving digital human modelling for proactive ergonomics in design. *Ergonomics* 48(5):478-491.
- COOK, A.J., ROBERTS, D.A., HENDERSON, M.D., VAN WINKLE, L.C., CHASTAIN, D.C. & HAMILL-RUTH, R.J. 2004. Electronic pain questionnaires: A Randomized, crossover comparison with paper questionnaires for chronic pain assessment. *International Association for the Study of Pain*, 110:310-317.
- COSTA, P. 2008. Evaluating web site design. in *Proceedings of the 26th annual ACM international conference on Design of communication*, September 22-24, 2008, Lisbon, Portugal [doi>10.1145/1456536.1456591]. pg 265-266.
- Cyveillance. (2000). Internet exceeds 2 billion pages. Available at: <http://www.cyveillance.com/web/newsroom/releases/2000/2000-07-10.htm>. Accessed: 18 March 2010.
- DANDAR, E., SAMBUU, U., UNURKHAAN, E. & PUREV, T. 2007. Comprehensive analysis on Mongolian tax information system. In *Proceedings of the 1st international conference on Theory and practice of electronic governance*, China, Macao (2007):313-316.
- DEBENEDICTIS, A., HOWELL, W., FIGUEROA, R. & BOGGS, R.A. 2002. E-government defined: an overview of the next big information technology challenge. *International Association for Computer Information Systems*, 2002:130-136.
- DEITEL, H.M. & DEITEL, P.J. 2005. Java How to Program 6<sup>th</sup> ed. New Jersey: Prentice Hall, Pearson Education.
- DIX, A., FINLAY, J., ABOWD, G.D. & BEALE, R. 2004. Human-Computer Interaction. 3<sup>rd</sup> ed. England: Pearson Education.

- DOUGLAS, S., TREMAINE, M., LEVENTHAL, L., WILLS, C. & MANARIS, B. 2002. Incorporating human-computer interaction into the undergraduate computer science curriculum. in *Proceedings of the 33th SIGCSE technical symposium on Computer science education*, 211-212.
- GIRGENSOHN, A & LEE, A. 1997. Seamless integration of interactive forms into the web. *Computer Networks and ISDN Systems*, 29 (1997): 1531-1542.
- GULLIKSEN, J., GORANSSON, B., BOIVIE, I., BLOMKVIST, S., PERSSON, J. & CAJANDER, A. 2003. Key principles for user-centred systems design. *BIT 2003*, pg 1-11.
- GUNCELLEME, S. 2009. The civil registrations system MERNIS. [http://www.nvi.gov.tr/English/Mernis\\_En.html?pageindex=0](http://www.nvi.gov.tr/English/Mernis_En.html?pageindex=0). Date of access: 7 November 2010.
- HEVNER, A.R. & CHATTERJEE, S. 2010. Design research in information systems. New York: Springer Science+Business Media.
- HEVNER, A.R., MARCH, S.T. & PARK, J. 2004. Design Science in information system research. *MIS quarterly* 28(1): 75-105.
- HOFSTEE, E. 2006. Constructing a good dissertation. Johannesburg: EPE.
- ISOMAKI, H. 2007. Different levels of information systems designers' forms of thought and potential for human-centred design. *International Journal of Technology and Human Interaction*, 3(1):30-48.
- JOHNSON, J. 2010. Designing with the mind in mind: simple guide to understanding user interface design rules. China: Morgan Kaufmann.
- JOOP.IN. 2008. The world wide web is growing a billion pages per day. <http://www.joop.in/Archive/the-world-wide-web-is-growing-a-billion-pages-per-day/>. Date of access: 12 October 2012
- KIRLIDOG, M. 2010. Personal email correspondence. 27 July 2010. Vanderbijlpark.

- LAZAR, J., FENG, J.H. & HOCHHEISER, H. 2010. Research methods in human-computer interaction. New York: Wiley and Sons
- LEE, D. 2008. A socio-cognitive model of information disclosure in human-computer interaction. Doctor of Philosophy submitted to Michigan State University.
- LEE, K.C., KIRLIDOG, M., LEE, S. & LIM, G.G. 2008. User evaluations of tax filing web sites. *Online Information Review*, 32(6):842-859. Available: [www.emeraldinsight.com/1468-4527.htm](http://www.emeraldinsight.com/1468-4527.htm)
- LEON-CHACON, L.A. 2007. Touch mouse: design and implementation of a touch screen based paper-equivalent electronic Form. Master of Science submitted to University of Puerto Rico.
- LORETO, I. 2009. Games design principles for improving social web applications. *In Proceedings of the 13th International Conference on Human-Computer Interaction. Part IV: Interacting in Various Application Domains*. Pg287-295.
- LUGER, G.F. 2005. Artificial Intelligence 5<sup>th</sup> ed. England: Pearson Education.
- LYNCH, P.J. & HORTON, S. 2002. Web style guide: basic design principles for creating web sites. 2<sup>nd</sup> ed. Connecticut: Yale University Press New Haven.
- LI, C. 2010. Handbook of research on computational forensics, digital crime and investigation: methods and solutions. Hershey: Information Science Reference IGI Global.
- MANLY, T.S., THOMAS, D.W. & RITSEMA, C.M. 2005. Attracting nonfilers through amnesty programs: internal versus external motivation. *Journal of the American Taxation Association*, 27:75-95.
- MARCH, S. & SMITH, G. 1995. Design and natural science research on information technology. *Decision Support Systems*, 15: 251-266.
- MYERS, M.D. 2009. Qualitative research in business and management. London: SAGE Publications Ltd.

MYERS, B. & ROSSON M. 1992. Survey on user interface programming. *Proceedings SIGCHI'92: Human Factors in Computing Systems*, 195-202.

MOHLER, J.L. & DUFF, J.M. 2000. Designing interactive web sites. New York: Delmar Thomson Learning.

NEIL, S. 2012. A brief look at the extent of growth of the internet. <http://blog.ncrypted.net/a-brief-look-at-the-extent-of-growth-of-the-internet/>. Date of access: 12 October 2012.

NIELSON, J. 2000. Designing web usability. New York: New Riders.

NIELSON, J. 2003. Usability 101: Introduction to usability. Jakob Nielson's Alertbox: <http://www.useit.com/alertbox/20030825.html>. Date of access: 15 October 2011.

NIELSON, J. 2008. When to use which user experience research methods. Jakob Nielson's Alertbox: <http://www.useit.com/alertbox/user-research-methods.html>. Date of access: 15 October 2011.

NORMAN, D. A. 2002. The design of everyday things. New York: Basic Books.

OATES, B.J. 2006. Researching information systems and computing. Los Angeles: Sage.

OPTILLION. 2012. Different types of website. <http://www.optillion.co.uk/web-development/website-types.asp>. Date of access: 12 October 2012.

PESLAK, A. 2005. A Framework and implementation of user interface and human-computer interaction instruction. *Journal of Information Technology Education*, 5:189-205.

PINGDOM. 2012. Internet 2011 in numbers. <http://royal.pingdom.com/2012/01/17/internet-2012-in-numbers/>. Date of access: 12 October 2012.

ROGERS, Y., SHARP, H. & PREECE, J. 2011. Interaction design: beyond human-computer interaction. 3<sup>rd</sup> ed. United Kingdom: Wiley.

SAMBUU, U. & DANDAR, E. 2009. E-taxation in Mongolia: Current state, lessons learnt, and future challenges. In *Proceedings of the 3rd International Conference on Theory and Practice of Electronic Governance*, Bogata, Columbia (2009). 134-137.

SARS. 2012. South African Revenue Service. [www.sars.gov.za](http://www.sars.gov.za)

SARS e-filing. 2012. South African Revenue Service Electronic Filing. [www.sarsefiling.co.za](http://www.sarsefiling.co.za)

SCHENKMAN, B. & JONSSON, F. 2000. Aesthetics and preferences of web pages. *Behaviour and Information Technology*, 19(5):367–377.

SKADBERG, Y.X. & KIMMEL, J.R. 2004. Visitor's flow experience while browsing a web site: its measurement, contributing factors and consequences. *Computers in Human Behavior*, 20(2004):403-422.

SKLAR, J. 2011. Principles of web design: the web technologies series. 5<sup>th</sup> ed. Boston: Course Technology Press.

SPOOL, J.M., SCANLON, T., SCHROEDER, W., SNYDER, C. & DEANGELO, T. 1999. Web site usability: a designer's guide. San Francisco: Morgan Kaufmann.

STADLHOFER, B. & SALHOFER, P. 2007. Automatic generation of e-government forms from semantic descriptions. In *Proceedings of the 1st international conference on Theory and practice of electronic governance*, China, Macao (2007):12–19.

SZAMEITAT, A.J., RUMMEL, J., SZAMEITAT, D.P. & STERR, A. 2009. Behavioural and emotional consequences of brief delays in human-computer interaction. *Journal of Human-Computer Studies*, 67(2009):561-570.

TARASEWICH, P., DANIEL, H. Z., & GRIFFIN, H. E. 2001. Aesthetics and web site design. *Quarterly Journal of Electronic Commerce*, 2(1):67–81.

TE'ENI, D., CAREY, J. & ZHANG, P. 2007. Human Computer interaction: developing effective organizational information systems. New York: Wiley & Sons.

TECHDUNE. 2009. What is the ROI on green information technology?  
<http://www.techdune.com/2009/04/28/what-is-the-roi-on-green-information-technology-it/>.  
Date of access: 20 March 2010.

TERBLANCHE, J.T., KROEZE, J.H. & GILLILAND, S. 2010. Guidelines for the design and creation of a web form to facilitate the registration of first time tax payers: An HCI approach (full paper). *Proceedings of the 15th International Business Information Management Association Conference (15th IBIMA)*, 6 - 7 November 2010, Cairo, Egypt, pp. 1033-1043. (Knowledge Management and Innovation: A Business Competitive Edge Perspective, edited by Khalid S. Soliman. On CD: ISBN: 978-0-9821489-4-5).

TRACTINSKY, N., COKHAVI, A., KIRSCHENBAU, M. & SHARFI, T. 2006. Evaluating the consistency of immediate aesthetic perceptions of web pages. *International Journal of Human-Computer Studies*, 64:1071–1083.

TOMAKEWEBSITE.COM. 2010. Different types or kinds of websites.  
<http://www.tomakewebsite.com/types-of-websites.html>. Date of access: 12 October 2012.

TURKISH TAX SYSTEM. 2007. Revenue administration.  
<http://www.gib.gov.tr/index.php?id=469> Date of access: 10 August 2010.

VAISHNAVI, V. & KUECHLER, W. 2004. Design Science Research in Information Systems. Last updated September 30, 2011. URL: <http://desrist.org/desrist>. Date of access: 15 October 2011.

VENTER, S. & VON BELLOW, A. 2011. Human Computer Interaction V1.0. London: CTI Education Group and London School of Business and Management.

VERA, A.L. 2009. Co-designing Interactive spaces for and with designers: supporting mood-board making. [PhD thesis: Eindhoven University of Technology Library, ISBN:978-90-386-1602-5].

VINOD, K., MUKMJI, B. & BUTT, I. 2007. Factors for successful e-government adoption: a conceptual framework. *Electronic Journal of e-Government*, 5(1): 63-76.

VON AHN, L., MAURER, B., MCMILLEN, B., ABRAHAM, D. & BLUM, M. 2008. reCAPTCHA: Human-based character recognition via web security measures. *Science*, 321:1465. Available: [www.sciencemag.org](http://www.sciencemag.org).

VYRAVENE, J. 2010. Technology can ease the pains of governance, risk and compliance. <http://companies.mybroadband.co.za/blog/2010/03/02/technology-can-ease-the-pains-of-governance-risk-and-compliance/>. Date of Access: 4 March 2010.

WEBSTER, J. & WATSON, R.T. 2002. Analyzing the Past to prepare for the future: writing a literature review. *MIS Quarterly*, 26(2): 13-23.

WIKIPEDIA. 2012. Websites. <http://en.wikipedia.org/wiki/Website>. Date of access: 12 October 2012.

WU, I. & JIAN-LIANG, C. 2005. An extension of trust and TAM model with TPB in the initial adoption of on-line tax: An empirical study. *International Journal of Human-Computer Studies*, 62:784-808.

WU, O., YUNFEI CHEN, B.L. & WEIMING, H. 2011. Evaluating the visual quality of web pages using a computational aesthetic approach. *WSDM'11, February 9-12, 2011, Hong Kong, China*. Pg 337-346.

YIN, R.K. 2003. Applications of case study research. New York: Sage.

YOUNG, I. 2008. Mental models: Aligning design strategy with human behaviour. New York: Rosenfeld Media, LLC.

## **APPENDIX A: CONSENT FORM**

### **CONSENT FORM**

Participant # : \_\_\_\_\_

I hereby state that I volunteer to participate in the evaluation study conducted by Miss. JT Terblanche from the Vaal Triangle Campus of the North-West University.

I was informed that the study focuses on the possible contribution HCI principles can make towards web form design, with specific reference to a tax system for new tax payers.

I will be asked to complete a short questionnaire, answer a few in-depth questions in the form of an interview, or take notes on my experience with registering for tax following the paper-based method/be observed while using the tax registration web from.

All the information gathered during this study, including my name, will be kept at a confidential level and I am allowed to withdraw at any time during the study. I have the right not to participate. I have the right to anonymity.

---

**Signature of Participant**

---

**Date**



## APPENDIX B: QUESTIONNAIRE

Participant #:

Please tick the appropriate box and answer the open-ended questions.

What is your level of computer literacy?

Expert	Good	Fair	Novice

Have you used a web form before?

Yes	No

If yes, what was the web form used for?

--

Which method do you prefer for first-time individual tax registration?

Paper-based	Web form

Why?

--

Tick the appropriate box:

The web form...	Strongly Agree	Agree	Average	Disagree	Strongly Disagree
is well designed					
is user-friendly					
saves time in the registration process					
saves money in the registration process					
saves effort in the registration process					
is a better option for registering for tax					

**Usability Goals:**

**Effective** – In your opinion, would the web form be an effective solution for individual tax registration?

**Efficient** – Would you say that the web form allows an individual to register for tax at a more efficient rate than that of the paper-based process?

**Safety** – Does the web form incorporate any measures to allow user safety?

**Utility** – Can the web form be used for first time tax payer registrations?

**Learnability** – Is it easy to learn how to use the web form when interacting with it for the first time?

**Memorability** – Does the web form encourage the individual to make use of the e-filing system?

Any recommendations for the web form:

Would you be more compliant towards registering for tax if it was electronically possible?  
Please give a reason for your answer.

## APPENDIX C: OBSERVATION FORM

**Observation – Participant #:** \_\_\_\_\_

Time taken to complete registration: \_\_\_\_\_

Observation Notes:

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

## APPENDIX D: INTERVIEW FORM

Interview – Participant #: \_\_\_\_\_

Is the design of the web form user friendly? Give a reason for the answer.

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Is the web form a better solution to register for individual tax than the current paper-based form? Why?

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Is the layout of the web form effective for efficient registration? Elaborate.

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Make suggestions for improvement of the web form.

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INCOME TAX  
INKOMSTEBELASTINGIT 72  
IB 77

Application for registration as a taxpayer or changing of registered particulars: Individual  
Aansoek om registrasie as 'n belastingpligtige of verandering van geregistreerde besonderhede: Individueel

WHERE REGISTERED PARTICULARS HAVE CHANGED, THE APPLICANT MUST ONLY FILL IN THE CHANGED PARTICULARS AND THE INCOME TAX REFERENCE NUMBER. IN GEVALLE WAAR GEREGERDEDE BESONDERHEDE VERANDERT, MOET DE AANSCDER BLIE DE INKOMTEBELASTINGVERWYNGINGSCOMMER EN DAARDE BESONDERHEDE WA VERANDERT NIT INVUL.

USE CAPITAL LETTERS AND WHERE APPLICABLE MARK WITH AN "X"  
 GEBRUIK HOOFDLETTERS EN WAAR TOEGELIJK MERK MET EN "X"

In come Tax reference number  
Inkomsttabell stängs av utslagsnummer

Area Code  
Area Code

Personal particulars  
Persoonlike besonderhede

Surname  
Van

First Name(s)  
Voorname

Postal address  
PosadresResidential address  
Who nadres

Magisterial District in which you reside  
Landroodstrik waarin u woontlig is

Postcode

For office use - Overmass address indicator  
Vir kantoor gebruik - Oorwese adres indiktor

Postal code  
Postkoda

For office use - Overseas address indicator  
Vir kantoorgebruik - Oorsese adres indiktor

Particulars: (Self)  
Besonderhede: (Self)

Language  
Test

Tel no - Work / Business  
Tel nr - Work / Household

Tel no - House  
Tel nr - Hunt

Cellular phone number  
Salt Lake to omniomex

Identity number  
Identifikationsnummer

Other (eg. Passport)  
Ander (bv. Passpoort)

Date of birth  
Dag van geboorte

Occupation  
Barren

Type of marriage:  
Tipo huwelijk

Married	in	out of	community of property
Getroud	binne	buite	gemeenskap van goedere

Bank particulars  
Bankbesonderhede

Name of Bank Naam van Bank		
Name of account holder Naam van rekeninghouder		
Type of account Type rekening	Current Lozend	Savings / Transmission Sparen / Transmissie
Branch number Taknummer		
Account number Rekeningnummer		

Particulars of employer  
Besonderheden van werkgever

Name  
 Naam

Postal address  
 Postadres

Business address  
 Bedrijfsadres

Telephone number  
 Telefoonnummer

PAYE reference number  
 LBS verwijzingsnummer

Particulars of three main partners  
Bijzonderheden van drie hoofvennooten

Beschouwers van de huurvermote		Beschouwers van de huurvermote	
Initial(s) and Surname Voortel(er)s en Van			
Income Tax number Inkomstebelastingnummer			
Initial(s) and Surname Voortel(er)s en Van			
Income Tax number Inkomstebelastingnummer			
Initial(s) and Surname Voortel(er)s en Van			
Income Tax number Inkomstebelastingnummer			
Initial(s) and Surname Voortel(er)s en Van			
Income Tax number Inkomstebelastingnummer			

**Income Details**  
**Besonderhede van inkomste**

Do you need to register for provisional tax?  
 Moet u vir voorlopige belasting registreer?

YES  
JA

NO  
NEE

State the estimated taxable income per annum  
 Meld die geskatte belaatbare inkomste

R

Nature of income Aard van inkomste	Period Tydperk		Gross amount rands only Bruto bedrag slegs rands
	From Van	To Tot	
1) Salary / Wages: a) Salaries / Lohne			
b)			
c)			
d)			
2) Commission Kommissie			
3) Pension Pensioen			
4) Member of Close Corporation: Member's fees Lid van Beslote Korporasie: Lede geld			
5) Director's fees / Remuneration Direktorsfoole / Vergoeding			
6) Business income: Specify Besigheid inkomste: Spesifiseer			
7) Farming income Boerdery-inkomste			
8) Fringe benefits Byvoordele			
9) Allowances / Service benefits belaae / Diensvoordele			
10) Income from investments Inkomste uit beleggings			
11) Rental income Huur inkomste			
12) Annuity income from a retirement fund Inkomste uit Annuïteite van 'n uittrappings-aansluitingsfonds			
13) Lump sum benefits Enkelebedragvoordele			
14) Gratuities Gratifikasies			
15) Special remuneration: Photo teams Spesiale vergoeding: Foto spanne			
16) Income from sources outside RSA Inkomste uit bronne buite RSA			
17) Other: Specify Ander: Spesifiseer			
Total Totaal			

Signature of applicant / Handtekening van aanvraker

Application date / Aansoekdatum

Type of Estate  
Type Boedel

(if applicable)  
(indien van toepassing)

	Effective date / Effektiviteitsdatum
<input type="checkbox"/> Insolvency Insolvensie	E E J J - W W - C D
<input type="checkbox"/> Death Dood	E E J J - W W - C D
<input type="checkbox"/> Agriculture credit Landbou krediet	E E J J - W W - C D
<input type="checkbox"/> Administration order Administrasie bevel	E E J J - W W - C D
<input type="checkbox"/> Sequestration Selwestrasse	E E J J - W W - C D
<input type="checkbox"/> Judicial management Gereguleerde bestuur	E E J J - W W - C D
<input type="checkbox"/> Other: Specify Ander: Spesifiseer	E E J J - W W - C D

☐ Executor  
Eisakuteur

☐ Curator  
Kunstor

☐ Representative  
Vertoerwoordiger

Initial(s) and Surname  
Voeder(s) en Van

[illegible]

Postal address

Postal code \_\_\_\_\_

Registered address:  
Geregistreerde adres:[illegible]

Telephone number(s)  
E-mail address(es)

Work/business  
Work/business

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

First meeting  
Eerste vergadering

Second meeting  
Tweede vergadering

Special meeting  
Speciale vergadering

Signature of estate representative / Handtekening van boedel verteenwoordiger

Application date / Aanvraagdatum



**FOR OFFICE USE ONLY**  
**SLEGS VIR KANTOORGEBRUIK**

**Taxpayer category: Individual**  
**Kategorie van belastingpligtige: Individu**

Current financial year and  
 Huidige finansiële jaarsinde    
 Initial year of liability  
 Eerste jaar van aanspreeklikheid

**Taxpayer type**  
**Tipe belastingpligtige**

☐ Non-provisional  
 Nie-voorlopig  
☐ Provisional  
 Voorlopig

**Taxpayer classification**  
**Klassifikasie belastingpligtige**

☐ SE: SITE  
 SE: SIBW  
☐ S: Salary  
 S: Salaries  
☐ SS: Salary short  
 SS: Verkorte salaris  
☐ SB: Salary investments  
 SB: Salaries Beleggings  
☐ BU: Business / Farming  
 BU: Besigheid / Boerdery

**Taxpayer sub-category**  
**Sub Kategorie van belastingpligtige**

☐ Normal  
 Normaal  
☐ Parliamentarian  
 Parlementêr  
☐ Visiting Artist  
 Besoekende Kunstenaar  
☐ Emigrant  
 Emigrant  
☐ Mining  
 Mynbou

**Return type**  
**Tipe opgawe**

☐ S  
☐ C

**Suspense code**  
**Afwagtingsredekode**

☐ Short term imprisonment  
 Kortetermyn gevangenisstraf  
☐ Overseas  
 Oorsee  
☐ Study / University  
 Studie / Universiteit

Suspense effective date  
 Effektiewe datum van afwagting       -   -

Signature of registration clerk / Handtekening van registrasiekliek

-   -

Registration date / Registrasie datum

**Documents required for registrations - Individuals**  
**Dokumentasie benodig vir registrasie - Individue**

The following documentation is required in order for SARS to review your application. Your application may be rejected in the instance where the required documents have not been submitted with your application.

Die volgende dokumentasie word benodig ten einde SARS in staat te stel om u aansoek om registrasie vir inkomstebelastingdoeleindes te oorweeg. U aansoek mag u geweier word in gevalle waar die nodige dokumentasie nie dienoreenkomstig ingedien is nie.

**Application Form**  
**Aansoekvorm**

An IT77 need to be completed and signed by the taxpayer or his / her representative. This application is available at any SARS Branch Office or could be printed from the SARS Website at [www.sars.gov.za](http://www.sars.gov.za)

'n IT77 moet voltooi word en geteken word deur die belastingpligtige of sy / haar verteenwoordiger. Hierdie aansoek is beskikbaar by enige SARS Takkantoor of kan gedruk word van die SARS webtuiste by [www.sars.gov.za](http://www.sars.gov.za)

**Proof of Identity**  
**Bewyslewing van identiteit**

A certified legible copy of the taxpayer's identity document or Passport document.  
Please note that drivers Licences are not acceptable.

'n Geertifiseerde leesbare afskrif van die belastingpligtige se identiteitsdokument of Paspoortdokument.  
Neem kennis dat bestuursslensies nie aanvaarbaar is nie.

**Bank Details**  
**Bankbesonderhede**

Should the bank details be completed on the application form ONE of the following documents should accompany the application.  
Indien die bankbesonderhede op die aansoek voltooi is moet EEN van die volgende dokumente voorsien word.

- A cancelled cheque.  
'n Gekanselleerde tjek.
- A certified legible copy of / original statement of account which clearly indicate the account holder name, the account number and the branch number.  
'n Leesbare geertifiseerde afskrif van / oorspronklike bankstaat wat die naam van rekeningshouer, die rekeningnummer en die taknummer bevestig.
- An original letter from your banker (on an official letterhead) which confirm the account holder name, the account number and the branch number.  
'n Oorspronklike brief van u bankier (op 'n offisiële briefhoof) wat die naam van die rekeninghouer, die rekeningnummer en die taknummer bevestig.

**Details of Income received**  
**Besonderhede van inkomste ontvang**

Income details need to be supplied for the last 3 years. Copies of documents (e.g. IRP5, IT 3) should be provided where applicable.

Die besonderhede van inkomste ontvang vir die laaste 3 jaar moet voorsien word. Afskrifte van dokumente (bv. IRP 5, IB 3) moet voorsien word waar van toepassing.